Invented for life

BOSCH

Bosch Motorsport

Racing Equipment 2025



24h LE MANS

BOSCH

PREMIUM PARTNER

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Get in Touch with Interex Motorsport

We want to hear from you – **Race and Rally Teams**, **Constructors** and specialist **Performance Shops** around the world. Interex Motorsport has supplied customers in **more than 120 countries** worldwide with weekly shipments heading to the Central American & Caribbean regions, Asian markets and into Europe.

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Control	1
Displays	2
Electronics	3
Fuel & Spark	4
Actuators	5
Sensors	6
Brake	7
Software	8
More	9
Appendix	10

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Control 11

Engine Control Units Gasoline 12
Engine Control Unit MS 6 CUP EVO 13
Engine Control Unit MS 6.1 EVO 18
Engine Control Unit MS 6.2 EVO 23
Engine Control Unit MS 6.3 EVO 28
Engine Control Unit MS 6.4 EVO 34
Engine Control Unit MS 6.4P EVO 39
Engine Control Unit MS 7.8 45

Engine Control Unit Diesel 49
Engine Control Unit MS 25 Sport 49

Vehicle Control Units 51
Vehicle Control Unit MS 50.4 52
Vehicle Control Unit MS 50.4P incl. CCA 56

Displays 61

Displays 62
Display DDU 10 63
Display DDU 11 67

Electronics 71

CAN Keypad 72
CAN Keypad CK-M12 72

Collision Avoidance Systems 76
Collision Avoidance System CAS-M light 77
Collision Avoidance System CAS-M 3 EVO 80

Data Loggers 85
Data Logger C 70 86
Data Logger and Sensor Interface C 80 90
USB Data Components 94

Power Boxes 96
PowerBox PBX 90 97
PowerBox PBX 190 101

Sensor Interfaces 105
Data Logger and Sensor Interface C 80 106
Lambdatronic LT4 110
Lambdatronic LT4 ADV 112
Wheel Speed Signal Splitter 115

Test System 118
µLC Test System 118
Expansion Board CAN-FD 120
Expansion Board Current Loop Interface 121
Expansion Board Digital Multichannel Pot. 122
Expansion Board Digital Outputs 124
Expansion Board FlexIO 125

Fuel & Spark 127

Diesel System Components 128
Diesel System Components 128

Fuel Pressure Regulators 129
Fuel Pressure Regulator Mini 2 130
Fuel Pressure Regulator Mini 5 132
Fuel Pressure Regulator Mini A 133
FPR Adaptor light 135

Fuel Pumps 136
Fuel Pump FP 165-E 137
Fuel Pump FP 200-7 139
Fuel Pump FP 200-E 141
HP Fuel Pump HDP 5 143

Ignition Coils 145
Ignition Coil C90i-E8 146
Ignition Coil C90i-E10 148
Ignition Coil C90i-pro 150
Ignition Coil C90i-pro evo 152
Ignition Coil C90i-WG 154
Ignition Coil P50/P50-M 156
Ignition Coil P65 159
Ignition Coil P65-T 161
Ignition Coil P65-TWG 164
Ignition Coil P65-WG 166
Ignition Coil P65-WS 168
Ignition Coil PS-T 170

Ignition Modules 172
Ignition Module IM 3.2 173
Ignition Module IM 4 175

Injection Valves 177
Injection Valve EV 14 178
HP Injection Valve HDEV 5.2 183

Actuators 187

Electronic Throttle Body 188
Electronic Throttle Body 188

Wiper Motor 191
Wiper Direct Actuator WDA 191

Sensors 195

Air Pressure 196
Pressure Sensor Air PS-AA 197
Pressure Sensor Air PS-AS 199
Pressure Sensor Air PSA-N 201

Fluid Pressure **203**
Pressure Sensor Fluid PSC-260 204
Pressure Sensor Fluid PSS-10 206
Pressure Sensor Fluid PSS-250R 208
Pressure Sensor Fluid PSS-140/260/420/600 210

Knock **212**
Knock Sensor KS4-P 213
Knock Sensor KS4-R 215
Knock Sensor KS4-R2 217

Lambda **219**
Lambda Sensor LSU 4.9 220
Lambda Sensor LSU ADV/ADV pre Turbo 223
Lambda Sensor Mini-LSU 4.9 226

Pressure & Temperature **229**
Pressure Sensor Combined PST 1/PST 3 230
Pressure Sensor Combined PST 4 233
Pressure Sensor Combined PST-F 1 235
Pressure Sensor Combined PST-F 2 280 bar 238
Pressure Sensor Combined PST-F 2 350 bar 240

Rotary Position **242**
Rotary Position Sensor RPS-F 242

Speed **244**
Speed Sensor Hall-Effect HA-D 90 245
Speed Sensor Hall-Effect HA-Di 248
Speed Sensor Hall-Effect HA-M 252
Speed Sensor Hall-Effect HA-N 254
Speed Sensor Hall-Effect Mini-HA-P 256
Speed Sensor Hall-Effect Mini-HA-P sealed 260

Steering Wheel Angle **262**
Steering Wheel Angle Sensor LWS 262

Temperature **264**
Temperature Sensor NTC M5-HS 265
Temperature Sensor NTC M6-HS 267
Temperature Sensor NTC M8-HS 269
Temperature Sensor NTC M12 271
Temperature Sensor NTC M12-H 273
Temperature Sensor NTC M12-L 275

Vehicle Dynamics **277**
Acceleration Sensor MM5.10 278
Acceleration Sensor MM5.10-R 281
Acceleration Sensor MM7.10 283

Brake 287

Antilock Braking Systems ABS **288**
ABS M5 Kit 289
ABS M5 Kit Clubsport 291
ABS M5 Kit Porsche Cup 293

Electronic Brake System EBS **295**
Electronic Brake System EBS 295

Software 299

Analysis **300**
Analysis Tool WinDarab V7 300

API **302**
COM-API for WinDarab Expert 302

Customer Code Area **303**
CCA Development Environment 303

Licenses **304**
License Manager 304

PBXSuite **305**
PBXSuite 305

RaceABS **306**
RaceABS Software Tool 306

RaceConnect **307**
RaceConnect 307

Scrutineering **308**
Scrutineering Configurator and Tool 308

Simulation **309**
Simulation Tool LapSim 309
Simulation Packages 311

System Configuration **312**
System Configuration Tool RaceCon 312

More 313

Breakout Boxes **314**
Breakout Box BOB 66-pole 315
Breakout Box BOB MS 6 / MS 6 EVO 316
Breakout Box BOB MS 7 317
Breakout Box BOB PBX 90 318
Breakout Box BOB PBX 190 319

Communication Interface **320**
Com Interface MSA-Box II 320

Connector Opening Tool **321**
Connector Opening Tool for AS series 321

Connectors **322**
Connectors 322

Vibration Profiles **323**
Vibration Profile 1 323
Vibration Profile 2 324
Vibration Profile 3 325
Vibration Profile 4 326
Vibration Profile Shock 327

Wiring Harnesses **328**
Customized Wiring Harnesses 328

Appendix **329**

General Information **330**
General Information 330

Control 1

Engine Control Units Gasoline 12

Engine Control Unit Diesel 49

Vehicle Control Units 51

1 Overview

Engine Control Unit MS 6 CUP EVO



- Delivery for OEM with project-specific program status
- HP package for 4-cylinder engines
- Supports Customer Code Area CCA
- 8 GB memory
- SENT sensor support

Engine Control Unit MS 6.1 EVO



- Optimized for low-pressure injection
- Measurement with 21 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

Engine Control Unit MS 6.2 EVO



- Optimized for low-pressure injection
- Measurement with 38 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

Engine Control Unit MS 6.3 EVO



- Optimized for low- and high-pressure injection
- Measurement with 21 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

Engine Control Unit MS 6.4 EVO



- Optimized for low- and high-pressure injection
- Measurement with 38 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

Engine Control Unit MS 6.4P EVO



- 866 MHz Dual Core Processor for projects with high performance demand
- Supports Customer Code Area CCA
- 4 GB memory plus 16 GB upgrade
- SENT sensor support

Engine Control Unit MS 7.8



- Optimized for low- and high-pressure injection
- 5 CAN, 3 of them CAN-FD capable
- 4 x 8.5 A H-Bridge
- Gearbox control optionally included
- SENT sensor support

Engine Control Unit MS 6 CUP EVO



Features

- Delivery for OEM with project-specific program status
- HP package for 4-cylinder engines
- Supports Customer Code Area CCA
- 8 GB memory
- SENT sensor support

The MS 6 CUP EVO engine control unit manages gasoline engines up to 4 cylinders. As a member of our MS 6 family it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 6 family utilizes a new software development process based on MATLAB/Simulink which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 6 CUP EVO to support complex or unusual engine or chassis configurations.

Application

High pressure injection
- Max. 4 cylinders up to 12,500 rpm

Low pressure injection
- Max. 4 cylinders up to 12,500 rpm

Ignition
- 4 x ignition control, IGBT or BJT, coils with integrated amplifier

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist various gear cut systems
- Diagnostics
- Integrated safety strategy for 1 electronic throttle control

Integrated support of manual gearshift

Electronic throttle control

Variable Valve Timing VVT

Turbo control

Traction control

Launch control

LTE Ethernet telemetry support

Internal logger Recording 1
- 4 GB memory
- 100 free configurable channels, 20 Hz sampling rate
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional

Internal logger Recording 2
- 4 GB memory
- 200 free configurable channels, 50 Hz sampling rate
- FULL_LOG_2 (1,500 channels/1 kHz sampling rate on Recording 2) optional

Logging rates
- Usage of all features: 300 kB/s
- Primary logging use case: 600 kB/s
- Logging data download rate: up to 4 MB/s

Technical Specifications

Mechanical Data

Aluminum housing	
2 Bosch connectors	196 pins in total
Size	226 x 181 x 44 mm
Weight	1,086 g
Protection Classification	IP54
Temp. range (at internal sensors)	-20 to 80°C

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 667 MHz, FPGA

Inputs

26 analog inputs

	4 x reserved for electronic throttle controls
	5 x no integrated pull-up
	3 x option for angle synchronous measurement, no integrated pull-up
	4 x fixed 3.01 kOhm pull-up
	10 x switchable 3.01 kOhm pull-up

6 internal measurements

1

1 x ambient pressure
1 x acceleration 6-axis
2 x ECU temperature
2 x ECU voltage

4 function related inputs

1 x Thermocouple exhaust gas temperature sensor (K-type)
1 x Lambda interface for LSU 4.9 sensor type
2 x Knock sensors

18 digital inputs

1 x switchable Hall or inductive sensor for flywheel measurement
2 x Hall sensor for sync wheel detection
4 x switchable Hall or DF11 sensors for camshaft position or wheel speed
2 x switchable Hall or inductive sensors for turbo speed measurement
1 x digital switch Engine ON/OFF
8 x digital, e.g. SENT

Sensor supplies and screens

4 x sensor supplies 5 V, 50 mA
3 x sensor supplies 5 V, 150 mA
7 x sensor grounds
2 x sensor screens

Outputs

15 function related outputs

High Pressure Injection
4 x controls, magnetic injectors
1 x high pressure pump with MSV control

Low Pressure Injection
4 x controls, high impedance injectors

Ignition
4 x controls, IGBT or BJT, coils with integrated amplifier

1 x 8.5 A H-bridge reserved for electronic throttle
1 x 4 A pwm lowside switch for Lambda heater

13 freely configurable outputs

2 x 8.5 A H-bridge
1 x 4 A pwm lowside switch
2 x 3 A pwm lowside switch
5 x 2.2 A pwm lowside switch
3 x 1 A pwm lowside switch

3 outputs signals

1 x engine rpm
1 x flywheel
1 x trigger wheel

Software Tools (free download)

Data Analysis tool WinDarab V7
System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors (not included)

Mating Connector 91 pins	F02U.B00.711-01
Mating Connector 105 pins	F02U.B00.712-01

Norms

Product Safety

EN IEC 62368-1:2020+A11:2020

Materials

REACH - Nr. 1907/2006

EMC

UNECE10:rev.6/AMD1:2020
KN41
ISO11452-2
ISO11452-4
ISO10605
ISO7637-2
ISO7367-3
ISO16750-2
US FCC: Title 47, Part 15 Subpart B
ICES-003

Testing

SAEJ1211

Communication

2 Ethernet
3 CAN
1 LIN
8 SENT
1 RS232
1 Time sync synchronization Ethernet
3 Communication screens

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experiences with calibration of ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch ECU

FULL_LOG_1

Extension for Recording 1
- 1,500 channels
- 1 kHz sampling rate

FULL_LOG_2

Extension for Recording 2
- 1,500 channels
- 1 kHz sampling rate

Gear Control

Project individual option

Innovation License Device

Activation of a set of additional functions for a single device:
- Crank rotation direction detection (using sensor DG23i)
- Using a 2nd crank backup sensor
- Crank-Pre-set, quick start based on previous crank stop position
- Far-Bank, 2nd injector per cylinder possible
- Cam-only-synchronisation, engine run without crank sensor signal (specific cam trigger wheel needed)

Innovation Package Project

Innovation Package Project has the same content as Innovation License Device, but license is valid for the whole project instead of a single device

DATA_USB

Data copy to USB flash drive

Ordering Information

Engine Control Unit MS 6 CUP EVO
Order number **F02U.V03.111-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

Gear Control
Order number **on request**

Innovation License Device
Order number **F02U.V02.510-01**

Innovation Package Project
Order number **F02U.V02.511-01**

DATA_USB
Order number **F02U.V03.476-01**

Accessories

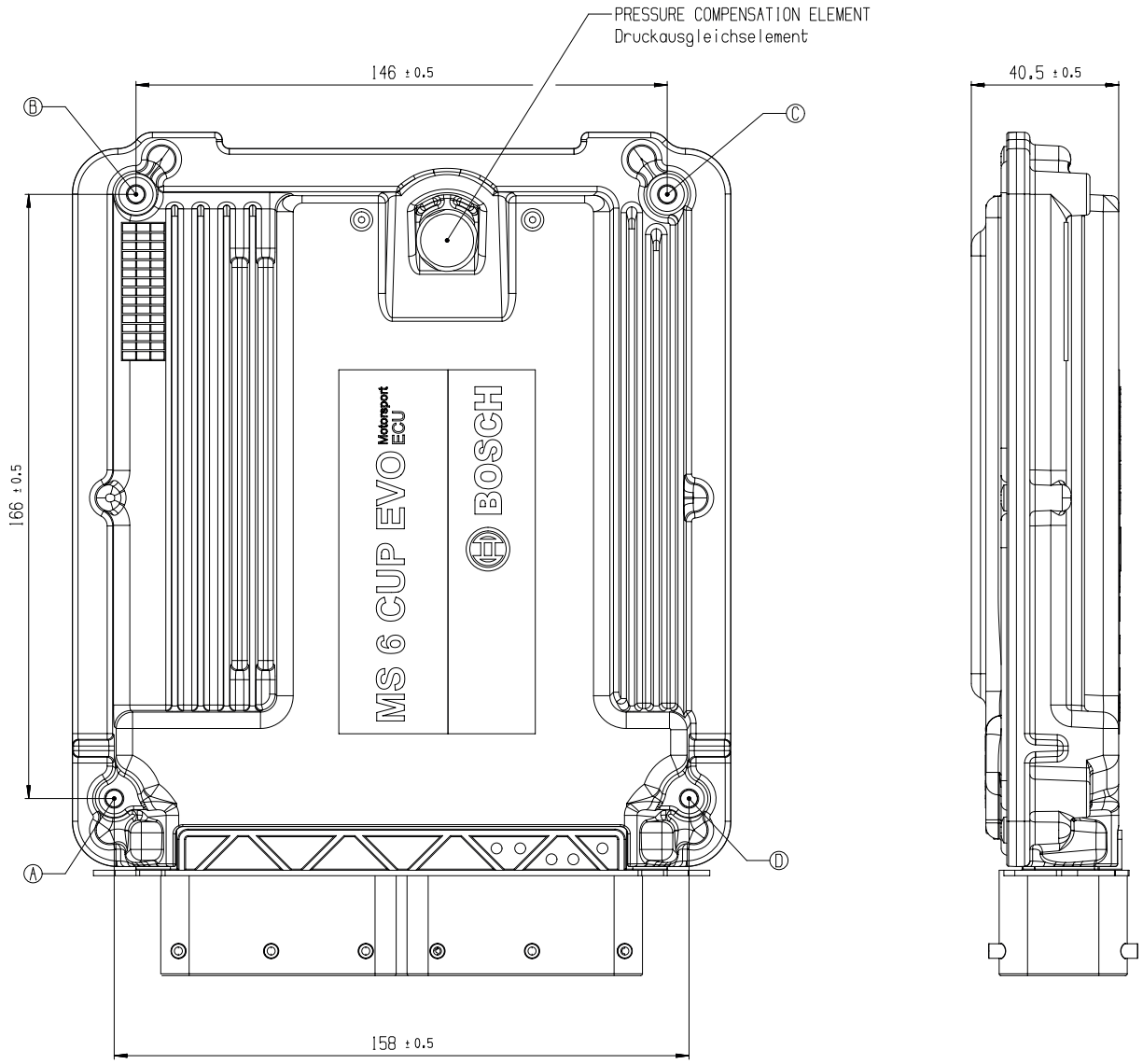
Breakout Box BOB MS 6 EVO
Order number **F02U.V02.294-02**

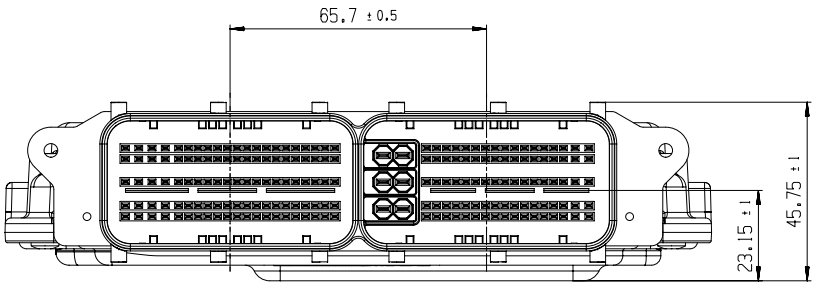
Mating Connector 91 pins
Order number **F02U.B00.711-01**

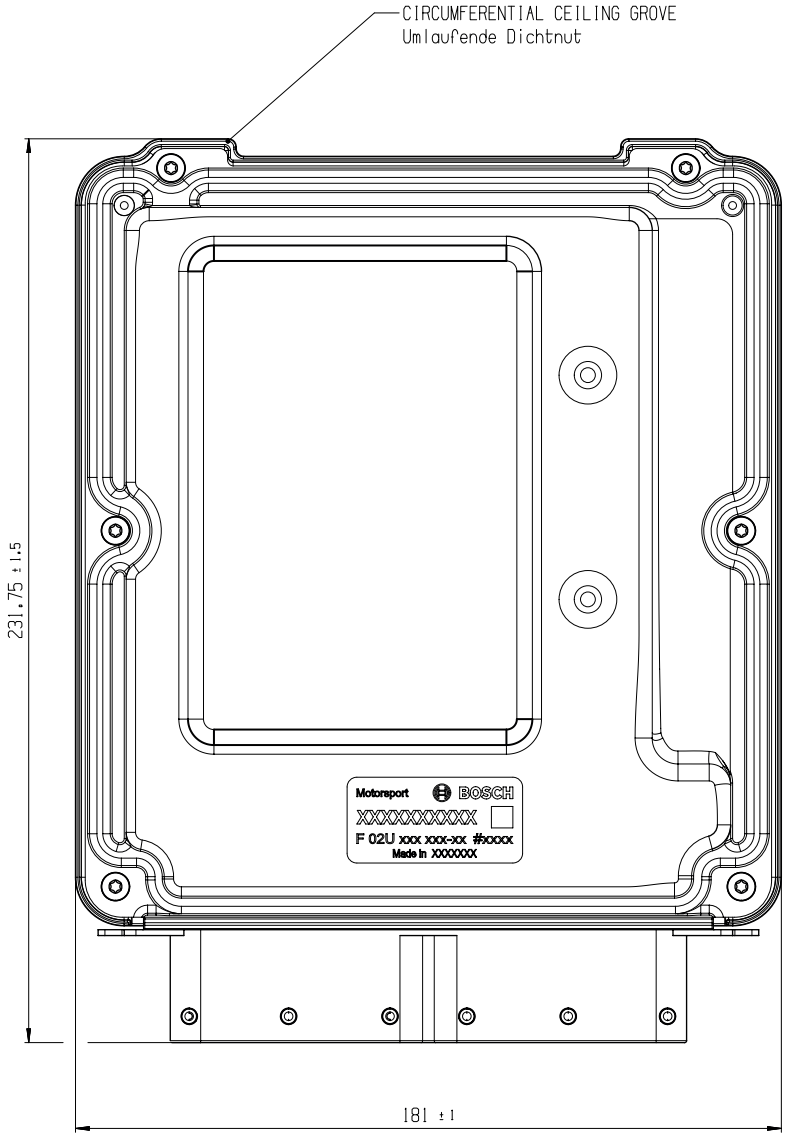
Mating Connector 105 pins
Order number **F02U.B00.712-01**

1

Dimensions






CIRCUMFERENTIAL CEILING GROVE
Umlaufende Dichtnut
231,75 ±1.5
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxx
Made in XXXXXX
181 ±1

1

Engine Control Unit MS 6.1 EVO



Features

- Optimized for low-pressure injection
- Measurement with 21 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

The MS 6.1 EVO engine control unit manages gasoline engines up to 12 cylinders. As a member of our MS 6 family it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 6 family utilizes a new software development process based on MATLAB/Simulink which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 6.1 EVO to support complex or unusual engine or chassis configurations.

Application

Low pressure injection
- Max. 12 cylinders up to 12,500 rpm, high impedance injectors only

Ignition
- 12 x ignition control, IGBT or BJT, coils with integrated amplifier

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist various gear cut systems
- Diagnostics
- Integrated safety strategy for electronic throttle control

Integrated support of manual gearshift	
Electronic throttle control	Optional, see Upgrades
Variable Valve Timing VVT	Optional, see Upgrades
Turbo control	Optional, see Upgrades
Traction control	Optional, see Upgrades
Launch control	Optional, see Upgrades
LTE Ethernet telemetry support	

Internal logger
- 4 GB memory on Recording 1 enabled
- 100 free configurable channels, 20 Hz
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional
- FULL_LOG_2 (4 GB memory/1,500 channels/1 kHz sampling rate on Recording 2) optional

Logging rates
- Usage of all features: 300 kB/s
- Primary logging use case: 600 kB/s
- Logging data download rate: up to 4 MB/s

Technical Specifications

Mechanical Data

Aluminum housing	
2 Bosch connectors	196 pins in total
Size	226 x 181 x 44 mm
Weight	1,086 g
Protection Classification	IP54
Temp. range (at internal sensors)	-20 to 80°C

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 667 MHz, FPGA

Inputs

21 analog inputs

6 x reserved for electronic throttle controls	
3 x no integrated pull-up	
3 x option for angle synchronous measurement, no integrated pull-up	
4 x fixed 3.01 kOhm pull-up	
5 x switchable 3.01 kOhm pull-up	

6 internal measurements

1 x ambient pressure	
1 x acceleration 6-axis	
2 x ECU temperature	
2 x ECU voltage	

8 function related inputs

- 1 x Thermocouple exhaust gas temperature sensors (K-type)
- 2 x Lambda interfaces for LSU 4.9 sensor types
- 1 x Lap trigger/beacon input
- 4 x Knock sensors

18 digital inputs

- 1 x switchable Hall or inductive sensor for flywheel measurement
- 2 x Hall sensor for sync wheel detection
- 4 x switchable Hall or DF11 sensors for camshaft position or wheel speed
- 2 x switchable Hall or inductive sensors for turbo speed measurement
- 1 x digital switch for engine ON/OFF
- 8 x digital, e.g. SENT

Sensor supplies and screens

4 x sensor supplies 5 V / 50 mA

3 x sensor supplies 5 V / 150 mA

7 x sensor grounds

2 x sensor screens

Outputs

28 function related outputs

Low Pressure Injection

- 12 x 2.2 A controls, high impedance injectors

Ignition

- 12 x control, IGBT or BJT, coils with integrated amplifier

2 x 8.5 A H-bridge reserved for electronic throttle

2 x 4 A pwm lowside switch for Lambda heater

19 freely configurable outputs

- 1 x 8.5 A H-bridge
- 2 x 4 A pwm lowside switch
- 4 x 3 A pwm lowside switch
- 8 x 2.2 A pwm lowside switch
- 4 x 1 A pwm lowside switch

3 output signals

- 1 x engine rpm
- 1 x flywheel
- 1 x trigger wheel

Software Tools (free download)

Data Analysis tool WinDarab V7

System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors (not included)

Mating Connector 91 pins	F02U.B00.711-01
Mating Connector 105 pins	F02U.B00.712-01

Norms

Product Safety

EN IEC 62368-1:2020+A11:2020

Materials

REACH - Nr. 1907/2006

EMC

UNECE10:rev.6/AMD1:2020

KN41

ISO11452-2

ISO11452-4

ISO10605

ISO7637-2

ISO7367-3

ISO16750-2

US FCC: Title 47, Part 15 Subpart B

ICES-003

Testing

SAEJ1211

Communication

2 Ethernet

3 CAN

1 LIN

8 SENT

1 RS232

1 Time sync synchronization Ethernet

3 Communication screens

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experiences with calibration of ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Application
Configurable flywheel- and trigger disc geometries, Selectable links between functions and in- or outputs

Function documentation
Automatically created during code generation

MatLab code generation
Support for customer own MatLab function development

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

1

Upgrades

Engine Function Package 1

- Electronic Throttle Control
- VVT
- Turbo Control

Engine Function Package 2

- Traction Control
- Launch Control

Measurement Package

17 Additional analog inputs
- 7 x no integrated pull-up
- 1 x option for angle synchronous measurement, no integrated pull-up
- 1 x fixed 3.01 kOhm pull-up
- 8 x switchable 3.01 kOhm pull-up

Extension of the use of 8 digital channels as analogue / digital inputs (shared)

1 Additional function related inputs
- 1 x Thermocouple K-type

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch ECU

FULL_LOG_1

Extension for Recording 1
- 1,500 channels
- 1 kHz sampling rate

FULL_LOG_2

Activation of Recording 2
- 1,500 channels
- 1 kHz sampling rate
- 4 GB memory

Gear Control Package 1

Gear control MEGA-Line functionality, has to be used with MEGA-Line components (License model via MEGA-Line)

-- Link to MEGA-Line Support Request --

-- Link to MEGA-Line License Request Form --

Gear Control Package 2

Gear control Bosch Motorsport functionality

SW Package MS 6 Drag 1

- Launch Time
- Launch Distance
- Torque Pre-Control
- Launch RPM Control
- Universal Outputs for Time/Distance Controls

SW Package MS 6 Drag 2 (requires Drag 1 License)

- Acceleration Sensor MM5.10 included
- Time/Distance Boost Control
- Driveshaft Speed Control
- Driveshaft Gradient Control
- Acceleration Control
- Wheelie Control

Innovation License Device

Activation of a set of additional functions for a single device:
- Crank rotation direction detection (using sensor DG23i)
- Using a 2nd crank backup sensor
- Crank-Preset, quick start based on previous crank stop position
- Far-Bank, 2nd injector per cylinder possible
- Cam-only-synchronisation, engine run without crank sensor signal (specific cam trigger wheel needed)

Innovation Package Project

Innovation Package Project has the same content as Innovation License Device, but license is valid for the whole project instead of a single device

DATA_USB

Data copy to USB flash drive

Ordering Information

Engine Control Unit MS 6.1 EVO
Order number **F02U.V03.113-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

Engine Function Package 1
Order number **F02U.V02.001-01**

Engine Function Package 2
Order number **F02U.V02.002-01**

Measurement Package
Order number **F02U.V02.000-01**

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

Gear Control Package 1
Order number **please contact MEGA-Line**

Gear Control Package 2
Order number **F02U.V02.108-01**

SW Package MS 6 Drag 1
Order number **F02U.V0U.409-01**

SW Package MS 6 Drag 2
Order number **F02U.V0U.410-01**

Innovation License Device
Order number **F02U.V02.510-01**

Innovation Package Project
Order number **F02U.V02.511-01**

DATA_USB
Order number **F02U.V03.476-01**

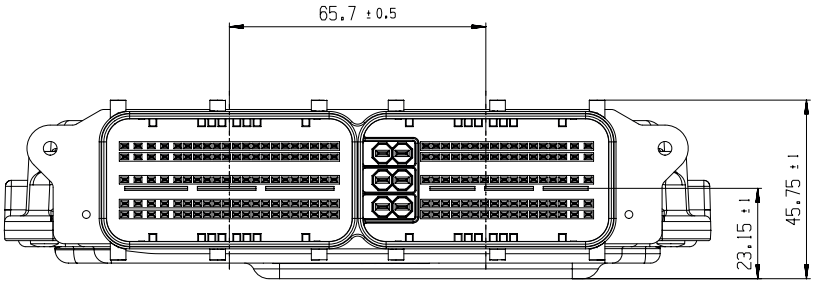
Accessories

Breakout Box BOB MS 6 EVO
Order number **F02U.V02.294-02**

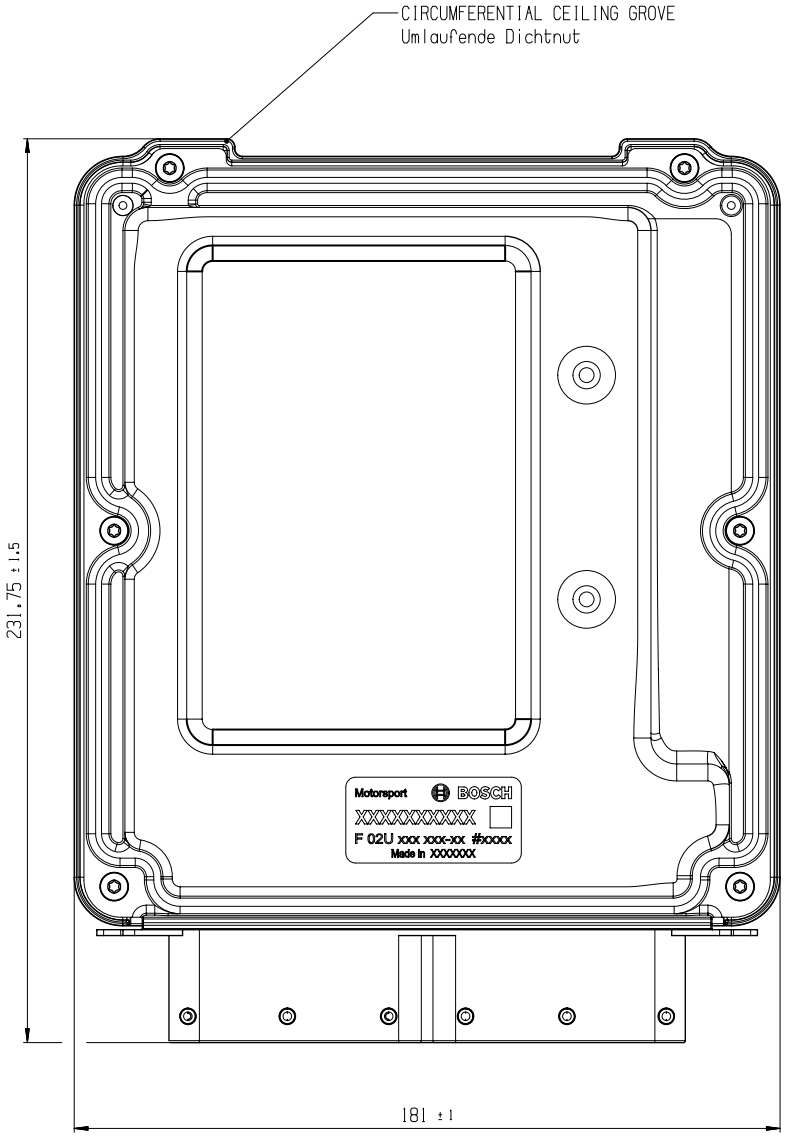
Mating Connector 91 pins
Order number **F02U.B00.711-01**

Mating Connector 105 pins
Order number **F02U.B00.712-01**

Dimensions



1


CIRCUMFERENTIAL CEILING GROVE
Umlaufende Dichtnut
231,75 ± 1,5
181 ± 1
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxxx
Made in XXXXXX

Engine Control Unit MS 6.2 EVO



Features

- Optimized for low-pressure injection
- Measurement with 38 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

The MS 6.2 EVO engine control unit manages gasoline engines up to 12 cylinders. As a member of our MS 6 family it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 6 family utilizes a new software development process based on MATLAB/Simulink which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 6.2 EVO to support complex or unusual engine or chassis configurations.

Application

Low pressure injection
- Max. 12 cylinders up to 12,500 rpm, high impedance injectors only

Ignition
- 12 x ignition control, IGBT or BJT, coils with integrated amplifier

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist various gear cut systems
- Diagnostics
- Integrated safety strategy for 2 electronic throttle controls

Integrated support of manual gearshift

Electronic throttle control

Variable Valve Timing VVT

Turbo control

Traction control

Launch control

LTE Ethernet telemetry support

Internal logger
- 4 GB memory on Recording 1 enabled
- 100 free configurable channels, 20 Hz
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional
- FULL_LOG_2 (4 GB memory/1,500 channels/1 kHz sampling rate on Recording 2) optional

Logging rates
- Usage of all features: 300 kB/s
- Primary logging use case: 600 kB/s
- Logging data download rate: up to 4 MB/s

Technical Specifications

Mechanical Data

Aluminum housing	
2 Bosch connectors	196 pins in total
Size	226 x 181 x 44 mm
Weight	1,086 g
Protection Classification	IP54
Temp. range (at internal sensors)	-20 to 80°C

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 667 MHz, FPGA

Inputs

38 analog inputs

6 x reserved for electronic throttle controls	
10 x no integrated pull-up	
4 x option for angle synchronous measurement, no integrated pull-up	
5 x fixed 3.01 kOhm pull-up	
13 x switchable 3.01 kOhm pull-up	

8 analog/digital inputs (shared)

8 x option for angle synchronous measurement / digital (e.g. SENT)	

6 internal measurements

1 x ambient pressure	

1

1 x acceleration 6-axis
2 x ECU temperature
2 x ECU voltage

9 function related inputs

2 x thermocouple exhaust gas temperature sensors (K-type)
2 x Lambda interfaces for LSU 4.9 sensor types
1 x lap trigger/beacon input
4 x knock sensors

10 digital inputs

1 x switchable Hall or inductive sensor for flywheel measurement
2 x Hall sensor for sync wheel detection
4 x switchable Hall or DF11 sensors for camshaft position or wheel speed
2 x switchable Hall or inductive sensors for turbo speed measurement
1 x digital switch for engine ON/OFF

Sensor supplies and screens

4 x sensor supplies 5 V / 50 mA
3 x sensor supplies 5 V / 150 mA
7 x sensor grounds
2 x sensor screens

Outputs

28 function related outputs

Low Pressure Injection
12 x 2.2 A low pressure injection for high impedance injectors
Ignition
12 x ignition control, IGBT or BJT, coils with integrated amplifier
2 x 8.5 A H-bridge reserved for electronic throttle
2 x 4 A pwm lowside switch for Lambda heater

19 freely configurable outputs

1 x 8.5 A H-bridge
2 x 4 A pwm lowside switch
4 x 3 A pwm lowside switch
8 x 2.2 A pwm lowside switch
4 x 1 A pwm lowside switch

3 output signals

1 x engine rpm
1 x flywheel
1 x trigger wheel

Software Tools (free download)

Data Analysis tool WinDarab V7
System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors (not included)

Mating Connector 91 pins	F02U.B00.711-01
Mating Connector 105 pins	F02U.B00.712-01

Norms

Product Safety

EN IEC 62368-1:2020+A11:2020

Materials

REACH - Nr. 1907/2006

EMC

UNECE10:rev.6/AMD1:2020
KN41
ISO11452-2
ISO11452-4
ISO10605
ISO7637-2
ISO7367-3
ISO16750-2
US FCC: Title 47, Part 15 Subpart B
ICES-003

Testing

SAEJ1211

Communication

2 Ethernet
3 CAN
1 LIN
8 SENT
1 RS232
1 Time sync synchronization Ethernet
3 Communication screens

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experiences with calibration of ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Application
Configurable flywheel- and trigger disc geometries, Selectable links between functions and in- or outputs

Function documentation
Automatically created during code generation

MatLab code generation
Support for customer own MatLab function development

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch ECU

FULL_LOG_1

Extension for Recording 1
- 1,500 channels
- 1 kHz sampling rate

FULL_LOG_2

Activation of Recording 2
- 1,500 channels
- 1 kHz sampling rate
- 4 GB memory

Gear Control Package 1

Gear control MEGA-Line functionality, has to be used with MEGA-Line components (License model via MEGA-Line)

-- Link to MEGA-Line Support Request --

-- Link to MEGA-Line License Request Form --

Gear Control Package 2

Gear control Bosch Motorsport functionality

SW Package MS 6 Drag 1

- Launch Timer
- Launch Distance
- Torque Pre-Control
- Launch RPM Control
- Universal Outputs for Time/Distance Controls

SW Package MS 6 Drag 2 (requires Drag 1 License)

- Acceleration Sensor MM5.10 included
- Time/Distance Boost Control
- Driveshaft Speed Control
- Driveshaft Gradient Control
- Acceleration Control
- Wheelie Control

Innovation License Device

Activation of a set of additional functions for a single device:
- Crank rotation direction detection (using sensor DG23i)
- Using a 2nd crank backup sensor
- Crank-Pre-set, quick start based on previous crank stop position
- Far-Bank, 2nd injector per cylinder possible
- Cam-only-synchronisation, engine run without crank sensor signal (specific cam trigger wheel needed)

Innovation Package Project

Innovation Package Project has the same content as Innovation License Device, but license is valid for the whole project instead of a single device

DATA_USB

Data copy to USB flash drive

Ordering Information

Engine Control Unit MS 6.2 EVO
Order number **F02U.V03.115-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

Gear Control Package 1
Order number **please contact MEGA-Line**

Gear Control Package 2
Order number **F02U.V02.108-01**

SW Package MS 6 Drag 1
Order number **F02U.V0U.409-01**

SW Package MS 6 Drag 2
Order number **F02U.V0U.410-01**

Innovation License Device
Order number **F02U.V02.510-01**

Innovation Package Project
Order number **F02U.V02.511-01**

DATA_USB
Order number **F02U.V03.476-01**

Accessories

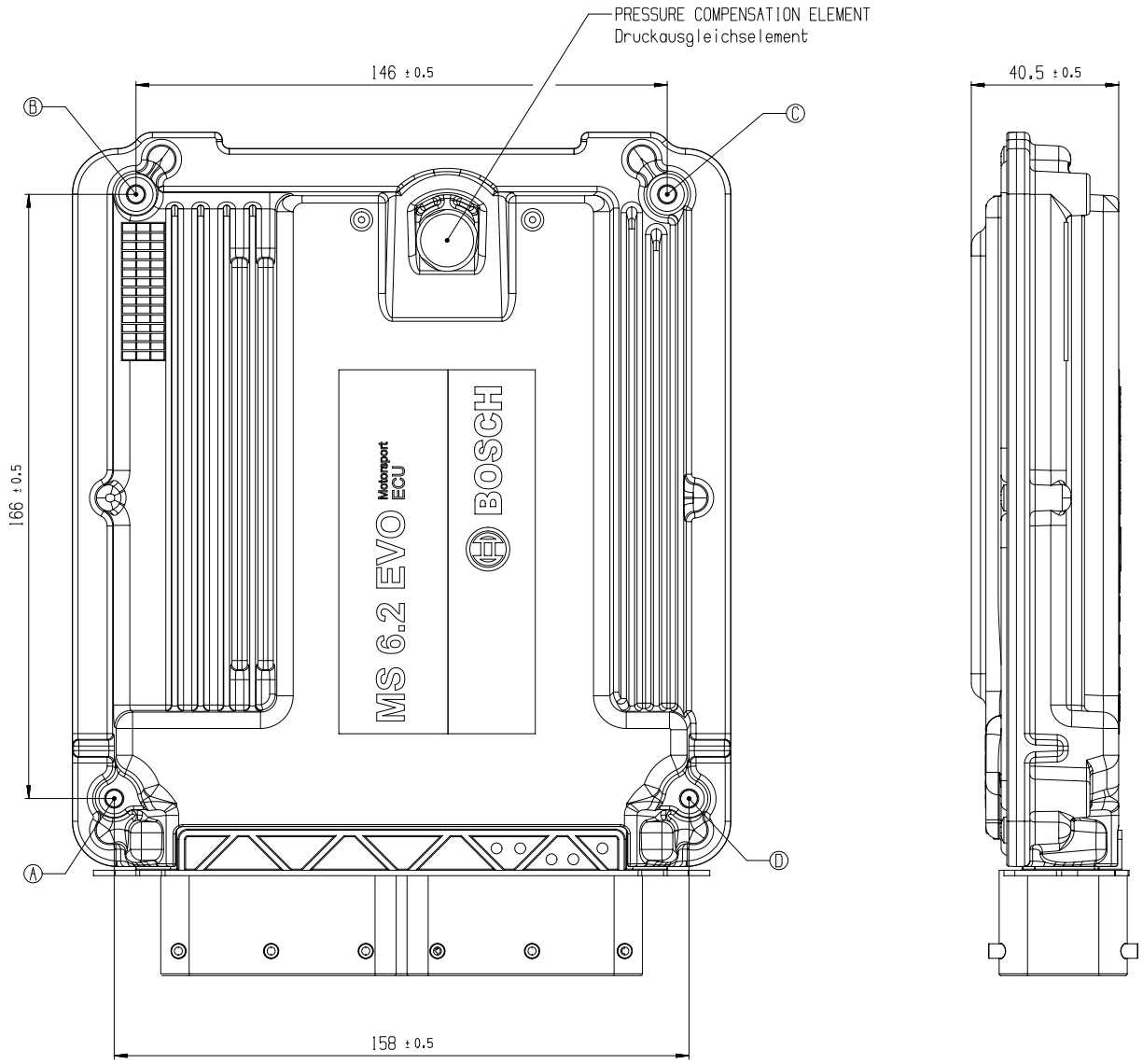
Breakout Box BOB MS 6 EVO
Order number **F02U.V02.294-02**

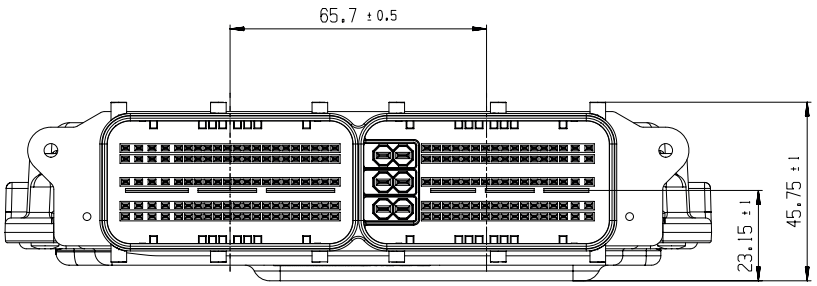
Mating Connector 91 pins
Order number **F02U.B00.711-01**

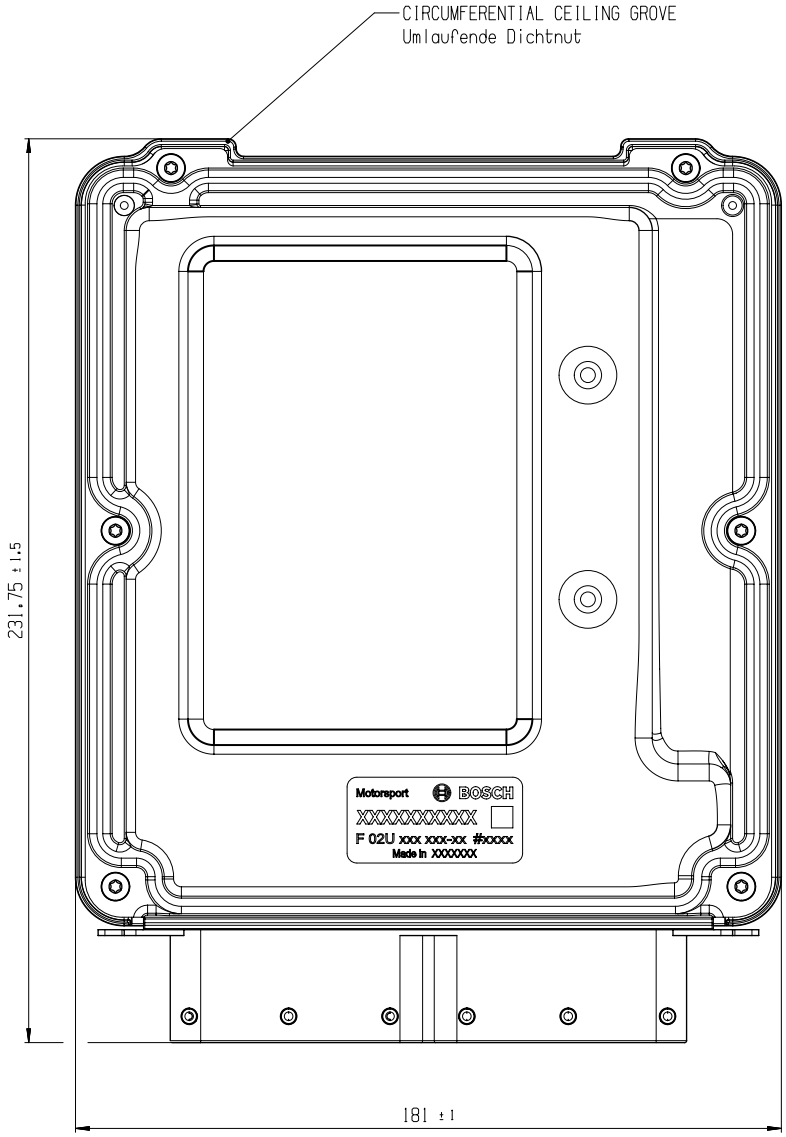
Mating Connector 105 pins
Order number **F02U.B00.712-01**

1

Dimensions






CIRCUMFERENTIAL CEILING GROVE
Umlaufende Dichtnut
231,75 ±1.5
181 ±1
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxx
Made in XXXXXX

1

Engine Control Unit MS 6.3 EVO



Features

- Optimized for low- and high-pressure injection
- Measurement with 21 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

The MS 6.3 EVO engine control unit manages gasoline engines up to 12 cylinders. As a member of our MS 6 family it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 6 family utilizes a new software development process based on MATLAB/Simulink which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 6.3 EVO to support complex or unusual engine or chassis configurations.

Application

High pressure injection
Integrated power stages for the use of:
- 4 cylinders up to 12,500 rpm
- 6 cylinders up to 9,500 rpm
- 8 cylinders up to 8,500 rpm

(depending on injection types and pressure ranges)

Low pressure injection
- Max. 12 cylinders up to 12,500 rpm, high impedance injectors only

Ignition
- 12 x ignition control, IGBT or BJT, coils with integrated amplifier

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist various gear cut systems
- Diagnostics
- Integrated safety strategy for 2 electronic throttle controls

Integrated support of manual gearshift

Electronic throttle control

Variable Valve Timing VVT

Turbo control

Traction control

Launch control

LTE Ethernet telemetry support

Internal logger
- 4 GB memory on Recording 1 enabled
- 100 free configurable channels, 20 Hz
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional
- FULL_LOG_2 (4 GB memory/1,500 channels/1 kHz sampling rate on Recording 2) optional

Logging rates
- Usage of all features: 300 kB/s
- Primary logging use case: 600 kB/s
- Logging data download rate: up to 4 MB/s

Technical Specifications

Mechanical Data

Aluminum housing	
2 Bosch connectors	196 pins in total
Size	226 x 181 x 44 mm
Weight	1,086 g
Protection Classification	IP54
Temp. range (at internal sensors)	-20 to 80°C

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 667 MHz, FPGA

Inputs

21 analog inputs

6 x reserved for electronic throttle controls

3 x no integrated pull-up

3 x option for angle synchronous measurement, no integrated pull-up

4 x fixed 3.01 kOhm pull-up

5 x switchable 3.01 kOhm pull-up

6 internal measurements

1 x ambient pressure
1 x acceleration 6-axis
2 x ECU temperature
2 x ECU voltage

8 function related inputs

1 x Thermocouple exhaust gas temperature sensors (K-type)
2 x Lambda interfaces for LSU 4.9 sensor types
1 x Lap trigger/beacon input
4 x Knock sensors

18 digital inputs

1 x switchable Hall or inductive sensor for flywheel measurement
2 x Hall sensor for sync wheel detection
4 x switchable Hall or DF11 sensors for camshaft position or wheel speed
2 x switchable Hall or inductive sensors for turbo speed measurement
1 x digital switch for engine ON/OFF
8 x digital, e.g. SENT

Sensor supplies and screens

4 x sensor supplies 5 V / 50 mA
3 x sensor supplies 5 V / 150 mA
7 x sensor grounds
2 x sensor screens

Outputs

38 function related outputs

High Pressure Injection

2 x high pressure pump with MSV control
8 x high pressure injection for magnetic injectors

Low Pressure Injection

12 x 2.2 A low pressure injection for high impedance injectors

Ignition

12 x ignition control, IGBT or BJT, coils with integrated amplifier

2 x 8.5 A H-bridge reserved for electronic throttle
2 x 4 A pwm lowside switch for Lambda heater

19 freely configurable outputs

1 x 8.5 A H-bridge
2 x 4 A pwm lowside switch
4 x 3 A pwm lowside switch
8 x 2.2 A pwm lowside switch
4 x 1 A pwm lowside switch

3 output signals

1 x engine rpm
1 x flywheel
1 x trigger wheel

Software Tools (free download)

Data Analysis tool WinDarab V7
System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors (not included)

Mating Connector 91 pins	F02U.B00.711-01
Mating Connector 105 pins	F02U.B00.712-01

Norms

Product Safety

EN IEC 62368-1:2020+A11:2020

Materials

REACH - Nr. 1907/2006

EMC

UNECE10:rev.6/AMD1:2020
KN41
ISO11452-2
ISO11452-4
ISO10605
ISO7637-2
ISO7367-3
ISO16750-2
US FCC: Title 47, Part 15 Subpart B
ICES-003

Testing

SAEJ1211

Communication

2 Ethernet
3 CAN
1 LIN
8 SENT
1 RS232
1 Time sync synchronization Ethernet
3 Communication screens

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experiences with calibration of ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

1

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

High Pressure Injection Package

Enables the control of a 2nd high pressure pump

Measurement Package

17 Additional analogue inputs
- 7 x no integrated pull-up
- 1 x option for angle synchronous measurement, no integrated pull-up
- 1 x fixed 3.01 kOhm pull-up
- 8 x switchable 3.01 kOhm pull-up

Extension of the use of 8 digital channels as analogue / digital inputs (shared)

1 Additional function related inputs
- 1 x Thermocouple K-type

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch ECU

FULL_LOG_1

Extension for Recording 1
- 1,500 channels
- 1 kHz sampling rate

FULL_LOG_2

Activation of Recording 2
- 1,500 channels
- 1 kHz sampling rate
- 4 GB memory

Gear Control Package 1

Gear control MEGA-Line functionality, has to be used with MEGA-Line components (License model via MEGA-Line)

-- Link to MEGA-Line Support Request --

-- Link to MEGA-Line License Request Form --

Gear Control Package 2

Gear control Bosch Motorsport functionality

SW Package MS 6 Drag 1

- Launch Timer
- Launch Distance
- Torque Pre-Control
- Launch RPM Control
- Universal Outputs for Time/Distance Controls

SW Package MS 6 Drag 2 (requires Drag 1 License)

- Acceleration Sensor MM5.10 included
- Time/Distance Boost Control
- Driveshaft Speed Control
- Driveshaft Gradient Control
- Acceleration Control
- Wheelie Control

Innovation License Device

Activation of a set of additional functions for a single device:
- Crank rotation direction detection (using sensor DG23i)
- Using a 2nd crank backup sensor
- Crank-Pre-set, quick start based on previous crank stop position
- Far-Bank, 2nd injector per cylinder possible
- Cam-only-synchronisation, engine run without crank sensor signal (specific cam trigger wheel needed)

Innovation Package Project

Innovation Package Project has the same content as Innovation License Device, but license is valid for the whole project instead of a single device

DATA_USB

Data copy to USB flash drive

Ordering Information

Engine Control Unit MS 6.3 EVO
Order number **F02U.V03.110-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

High Pressure Injection Package
Order number **F02U.V01.999-01**

Measurement Package
Order number **F02U.V02.000-01**

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

Gear Control Package 1
Order number **please contact MEGA-Line**

Gear Control Package 2
Order number **F02U.V02.108-01**

SW Package MS 6 Drag 1
Order number **F02U.V0U.409-01**

SW Package MS 6 Drag 2
Order number **F02U.V0U.410-01**

Innovation License Device
Order number **F02U.V02.510-01**

Innovation Package Project
Order number **F02U.V02.511-01**

DATA_USB
Order number **F02U.V03.476-01**

Accessories

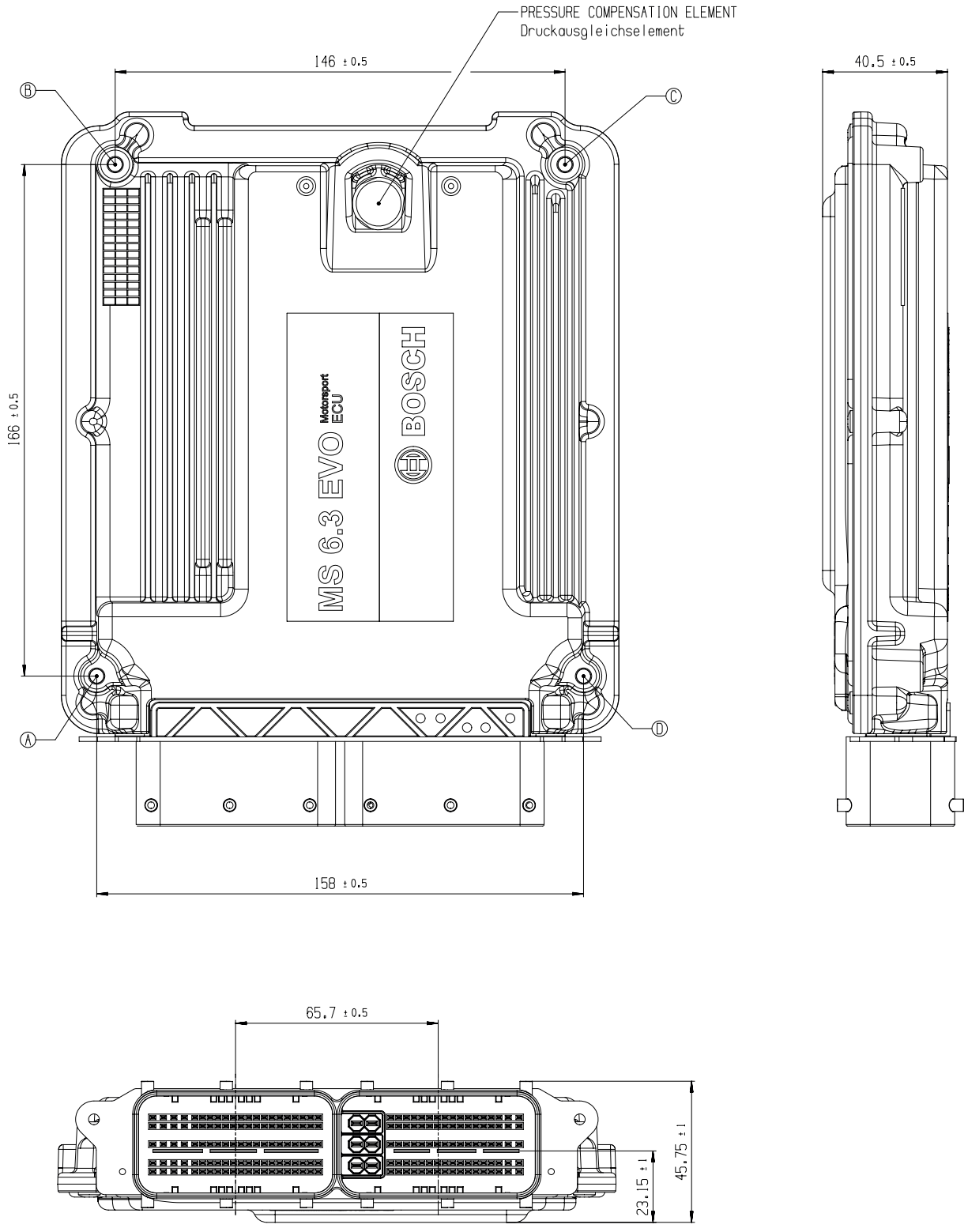
Breakout Box BOB MS 6 EVO
Order number **F02U.V02.294-02**

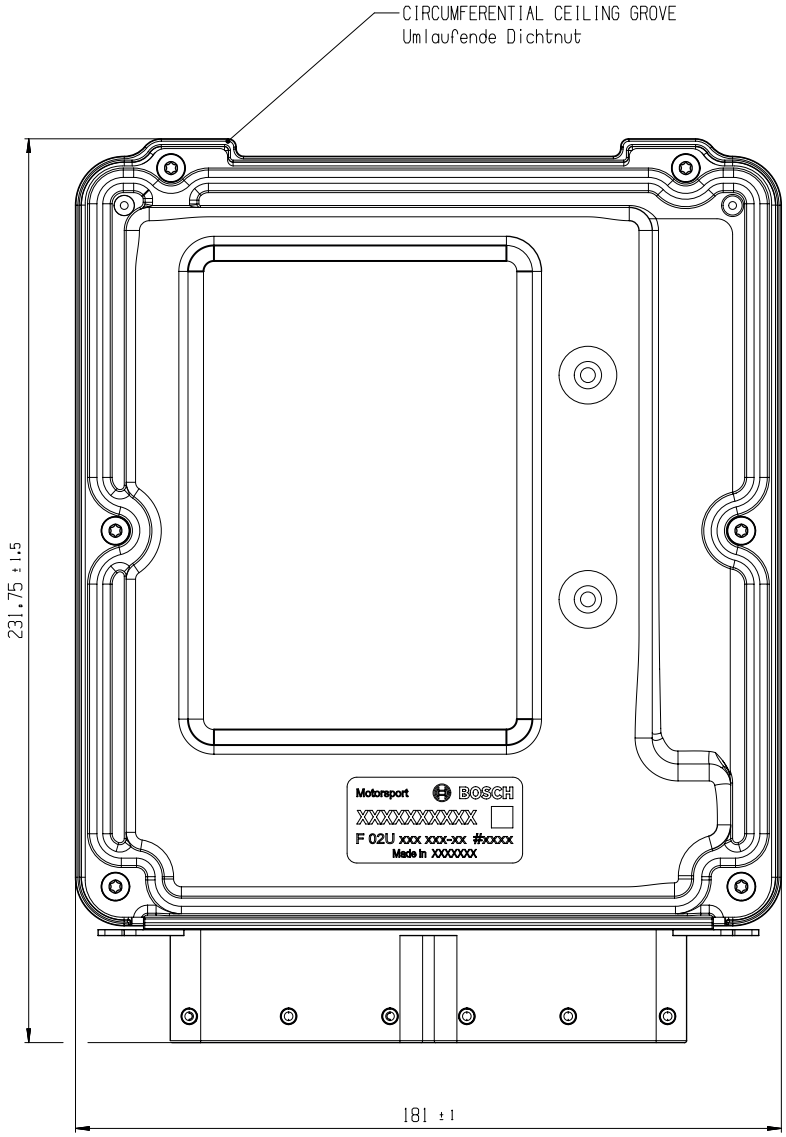
Mating Connector 91 pins
Order number **F02U.B00.711-01**

Mating Connector 105 pins
Order number **F02U.B00.712-01**

1

Dimensions




CIRCUMFERENTIAL CEILING GROVE
Umlaufende Dichtnut
231,75 ±1.5
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxx
Made in XXXXXX
181 ±1

1

Engine Control Unit MS 6.4 EVO



Features

- Optimized for low- and high-pressure injection
- Measurement with 38 analog inputs
- Supports Customer Code Area CCA
- 4 GB memory plus 4 GB upgrade
- SENT sensor support

The MS 6.4 EVO engine control unit manages gasoline engines up to 12 cylinders. As a member of our MS 6 family it features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 6 family utilizes a new software development process based on MATLAB/Simulink which significantly speeds algorithm development by using automatic code and documentation generation. Custom functions can be quickly and easily generated. The flexible hardware design allows the MS 6.4 EVO to support complex or unusual engine or chassis configurations.

Application

High pressure injection
Integrated power stages for the use of:
- 4 cylinders up to 12,500 rpm
- 6 cylinders up to 9,500 rpm
- 8 cylinders up to 8,500 rpm

(depending on injection types and pressure ranges)

High Pressure Injection Package inclusive
Enables the control of a 2nd high pressure pump

Low pressure injection
- Max. 12 cylinders up to 12,500 rpm, high impedance injectors only

Ignition
- 12 x ignition control, IGBT or BJT, coils with integrated amplifier

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist various gear cut systems
- Diagnostics
- Integrated safety strategy for 2 electronic throttle controls

Integrated support of manual gearshift

Electronic throttle control

Variable Valve Timing VVT

Turbo control

Traction control

Launch control

LTE Ethernet telemetry support

Internal logger
- 4 GB memory on Recording 1 enabled
- 100 free configurable channels, 20 Hz
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional
- FULL_LOG_2 (4 GB memory/1,500 channels/1 kHz sampling rate on Recording 2) optional

Logging rates
- Usage of all features: 300 kB/s
- Primary logging use case: 600 kB/s
- Logging data download rate: up to 4 MB/s

Technical Specifications

Mechanical Data

Aluminum housing	
2 Bosch connectors	196 pins in total
Size	226 x 181 x 44 mm
Weight	1,086 g
Protection Classification	IP54
Temp. range (at internal sensors)	-20 to 80°C

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 667 MHz, FPGA

Inputs

38 analog inputs

- 6 x reserved for electronic throttle controls
- 10 x no integrated pull-up
- 4 x option for angle synchronous measurement, no integrated pull-up
- 5 x fixed 3.01 kOhm pull-up

13 x switchable 3.01 kOhm pull-up

8 analog/digital inputs (shared)

8 x option for angle synchronous measurement / digital (e.g. SENT)

6 internal measurements

1 x ambient pressure

1 x acceleration 6-axis

2 x ECU temperature

2 x ECU voltage

9 function related inputs

2 x thermocouple exhaust gas temperature sensors (K-type)

2 x Lambda interfaces for LSU 4.9 sensor types

1 x lap trigger/beacon input

4 x knock sensors

10 digital inputs

1 x switchable Hall or inductive sensor for flywheel measurement

2 x Hall sensor for sync wheel detection

4 x switchable Hall or DF11 sensors for camshaft position or wheel speed

2 x switchable Hall or inductive sensors for turbo speed measurement

1 x digital switch for engine ON/OFF

Sensor supplies and screens

4 x sensor supplies 5 V / 50 mA

3 x sensor supplies 5 V / 150 mA

7 x sensor grounds

2 x sensor screens

Outputs

38 function related outputs

High Pressure Injection

2 x high pressure pump with MSV control
8 x high pressure injection for magnetic injectors

Low Pressure Injection

12 x 2.2 A low pressure injection for high impedance injectors

Ignition

12 x ignition control, IGBT or BJT, coils with integrated amplifier

2 x 8.5 A H-bridge reserved for electronic throttle

2 x 4 A pwm lowside switch for Lambda heater

19 freely configurable outputs

1 x 8.5 A H-bridge

2 x 4 A pwm lowside switch

4 x 3 A pwm lowside switch

8 x 2.2 A pwm lowside switch

4 x 1 A pwm lowside switch

3 output signals

1 x engine rpm

1 x flywheel

1 x trigger wheel

Software Tools (free download)

Data Analysis tool WinDarab V7

System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors (not included)

Mating Connector 91 pins	F02U.B00.711-01
Mating Connector 105 pins	F02U.B00.712-01

Norms

Product Safety

EN IEC 62368-1:2020+A11:2020

Materials

REACH - Nr. 1907/2006

EMC

UNECE10:rev.6/AMD1:2020

KN41

ISO11452-2

ISO11452-4

ISO10605

ISO7637-2

ISO7367-3

ISO16750-2

US FCC: Title 47, Part 15 Subpart B

ICES-003

Testing

SAEJ1211

Communication

2 Ethernet

3 CAN

1 LIN

8 SENT

1 RS232

1 Time sync synchronization Ethernet

3 Communication screens

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experiences with calibration of ECUs, we recommend calibration support from Bosch Motorsport.

1

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch ECU

FULL_LOG_1

Extension for Recording 1
- 1,500 channels
- 1 kHz sampling rate

FULL_LOG_2

Activation of Recording 2
- 1,500 channels
- 1 kHz sampling rate
- 4 GB memory

Gear Control Package 1

Gear control MEGA-Line functionality, has to be used with MEGA-Line components (License model via MEGA-Line)

-- Link to MEGA-Line Support Request --

-- Link to MEGA-Line License Request Form --

Gear Control Package 2

Gear control Bosch Motorsport functionality

SW Package MS 6 Drag 1

- Launch Timer
- Launch Distance
- Torque Pre-Control
- Launch RPM Control
- Universal Outputs for Time/Distance Controls

SW Package MS 6 Drag 2 (requires Drag 1 License)

- Acceleration Sensor MM5.10 included
- Time/Distance Boost Control
- Driveshaft Speed Control
- Driveshaft Gradient Control
- Acceleration Control
- Wheelie Control

Innovation License Device

Activation of a set of additional functions for a single device:
- Crank rotation direction detection (using sensor DG23i)
- Using a 2nd crank backup sensor
- Crank-Pre-set, quick start based on previous crank stop position
- Far-Bank, 2nd injector per cylinder possible
- Cam-only-synchronisation, engine run without crank sensor signal (specific cam trigger wheel needed)

Innovation Package Project

Innovation Package Project has the same content as Innovation License Device, but license is valid for the whole project instead of a single device

DATA_USB

Data copy to USB flash drive

Ordering Information

Engine Control Unit MS 6.4 EVO
Order number **F02U.V03.114-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

Gear Control Package 1
Order number **please contact MEGA-Line**

Gear Control Package 2
Order number **F02U.V02.108-01**

SW Package MS 6 Drag 1
Order number **F02U.V0U.409-01**

SW Package MS 6 Drag 2
Order number **F02U.V0U.410-01**

Innovation License Device
Order number **F02U.V02.510-01**

Innovation Package Project
Order number **F02U.V02.511-01**

DATA_USB
Order number **F02U.V03.476-01**

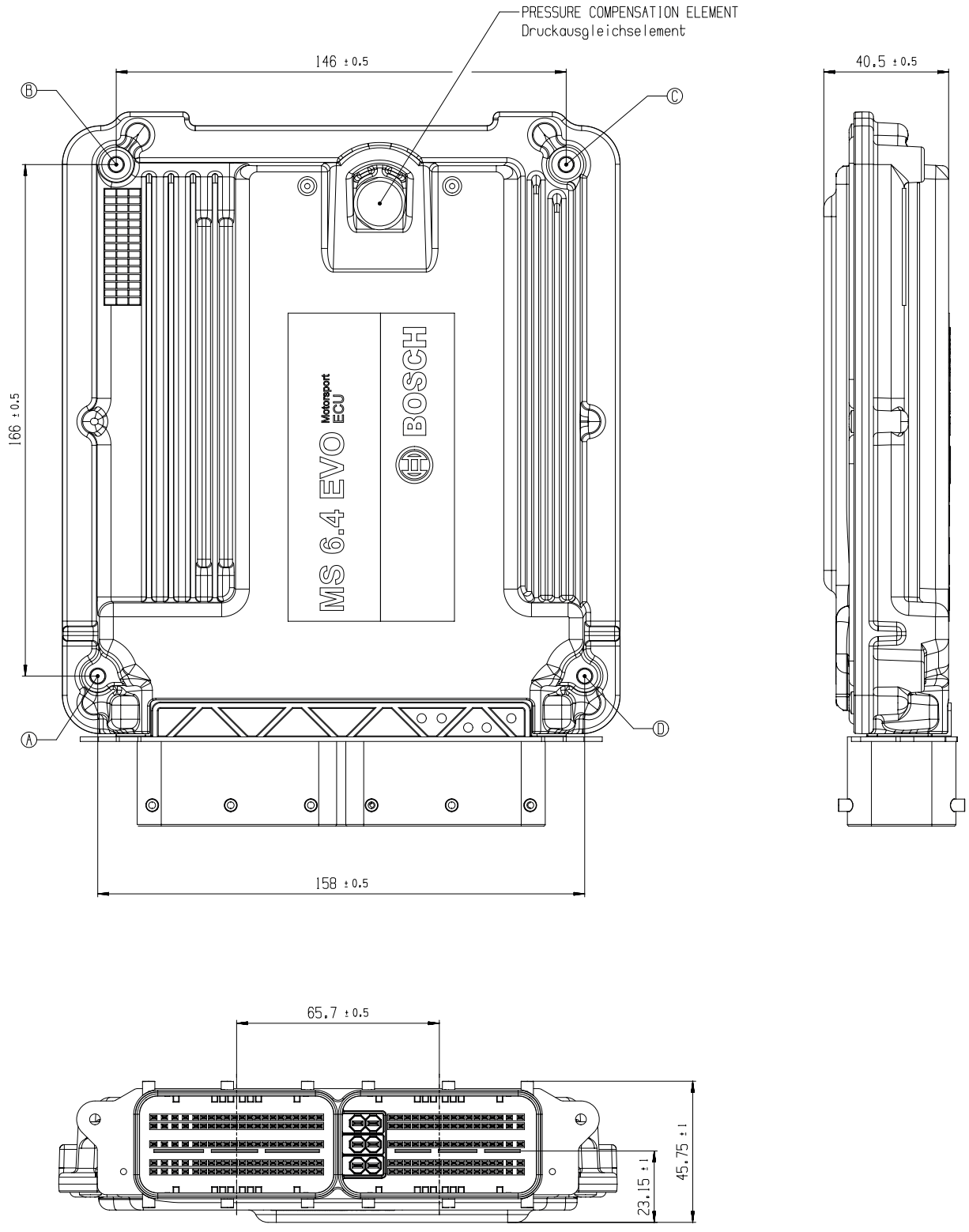
Accessories

Breakout Box BOB MS 6 EVO
Order number **F02U.V02.294-02**

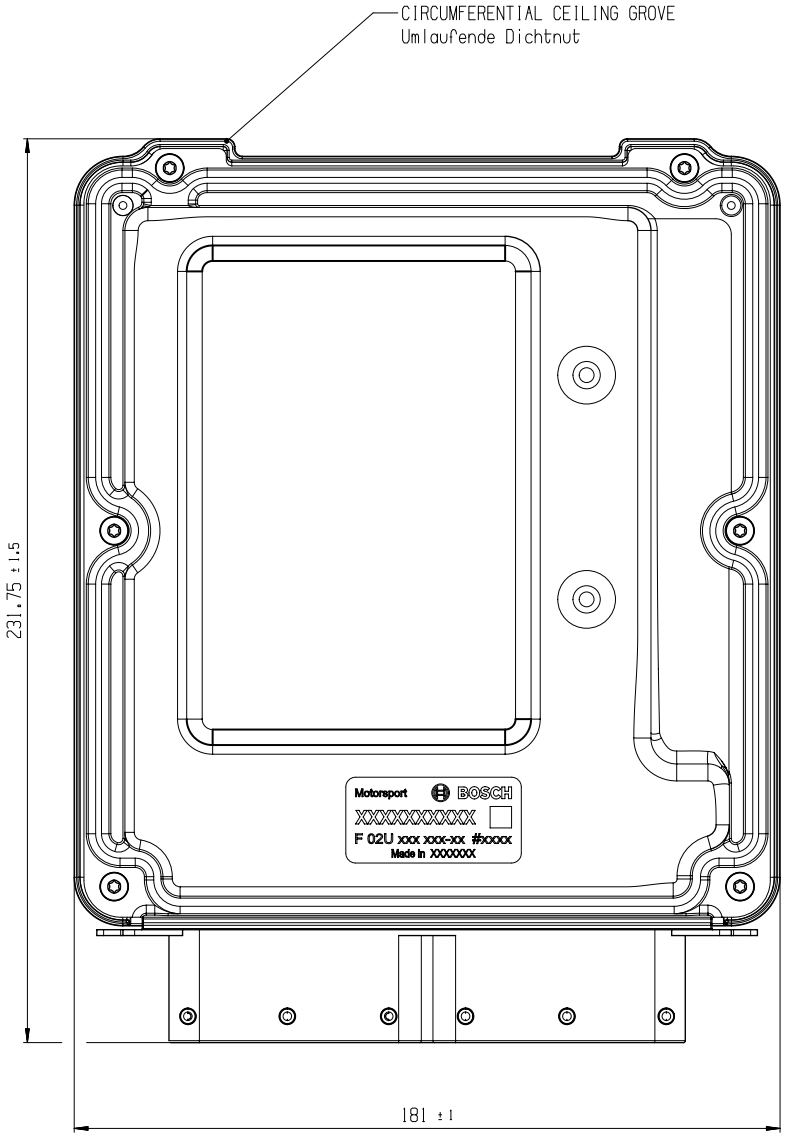
Mating Connector 91 pins
Order number **F02U.B00.711-01**

Mating Connector 105 pins
Order number **F02U.B00.712-01**

Dimensions


PRESSURE COMPENSATION ELEMENT
Druckausgleichselement
146 ±0.5
40.5 ±0.5
166 ±0.5
158 ±0.5
MS 6.4 EVO
Motorsport ECU
BOSCH
A
B
C
D
65.7 ±0.5
45.75 ±1
23.15 ±1

1


CIRCUMFERENTIAL CEILING GROVE
Umlaufende Dichtnut
231,75 ± 1,5
181 ± 1
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxxx
Made in XXXXXX

Engine Control Unit MS 6.4P EVO



Features

- 866 MHz Dual Core Processor for projects with high performance demand
- Supports Customer Code Area CCA
- 4 GB memory plus 16 GB upgrade
- SENT sensor support

The MS 6.4P EVO engine control unit manages gasoline engines up to 12 cylinders. The MS 6 family provides high control performance, logging capabilities and an extensive feature set to improve performance in your application. It features a powerful digital processing core and a high-end FPGA for ultimate performance and flexibility. Custom functions can be provided quickly and easily as a service or implemented as customer code with MATLAB/Simulink. The MS 6 family is fully integrated into the Bosch Motorsport system architecture.
Hint: Specific Software Version for MS 6.4P EVO needed, not compatible with MS 6.4 EVO software.

Application

High pressure injection
Integrated power stages for the use of:
- 4 cylinders up to 12,500 rpm
- 6 cylinders up to 9,500 rpm
- 8 cylinders up to 8,500 rpm

(depending on injection types and pressure ranges)

High Pressure Injection Package inclusive
Enables the control of a 2nd high pressure pump

Low pressure injection
- Max. 12 cylinders up to 12,500 rpm, high impedance injectors only

Ignition
- 12 x ignition control, IGBT or BJT, coils with integrated amplifier

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist various gear cut systems
- Diagnostics
- Integrated safety strategy for 2 electronic throttle controls

Integrated support of manual gearshift

Electronic throttle control

Variable Valve Timing VVT

Turbo control

Traction control

Launch control

LTE Ethernet telemetry support

Internal logger
- 4 GB memory on Recording 1 enabled
- 100 free configurable channels, 20 Hz
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional
- PERF_LOG_1 (16 GB memory on Partition 1) optional
- FULL_LOG_2 (4 GB memory/1,500 channels/1 kHz sampling rate on Recording 2) optional

Logging rates
- Usage of all features: 400 kB/s
- Primary logging use case: 800 kB/s
- Logging data download rate: up to 5 MB/s

Technical Specifications

Mechanical Data

Aluminum housing	
2 Bosch connectors	196 pins in total
Size	226 x 181 x 44 mm
Weight	1,086 g
Protection Classification	IP54
Temp. range (at internal sensors)	0 to 80°C

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 866 MHz, FPGA

Inputs

38 analog inputs
- 6 x reserved for electronic throttle controls
- 10 x no integrated pull-up
- 4 x option for angle synchronous measurement, no integrated pull-up

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5 x fixed 3.01 kOhm pull-up

13 x switchable 3.01 kOhm pull-up

8 analog/digital inputs (shared)

8 x option for angle synchronous measurement / digital (e.g. SENT)

6 internal measurements

1 x ambient pressure

1 x acceleration 6-axis

2 x ECU temperature

2 x ECU voltage

9 function related inputs

2 x thermocouple exhaust gas temperature sensors (K-type)

2 x Lambda interfaces for LSU 4.9 sensor types

1 x lap trigger/beacon input

4 x knock sensors

10 digital inputs

1 x switchable Hall or inductive sensor for flywheel measurement

2 x Hall sensor for sync wheel detection

4 x switchable Hall or DF11 sensors for camshaft position or wheel speed

2 x switchable Hall or inductive sensors for turbo speed measurement

1 x digital switch for engine ON/OFF

Sensor supplies and screens

4 x sensor supplies 5 V / 50 mA

3 x sensor supplies 5 V / 150 mA

7 x sensor grounds

2 x sensor screens

Outputs

38 function related outputs

High Pressure Injection

2 x high pressure pump with MSV control
8 x high pressure injection for magnetic injectors

Low Pressure Injection

12 x 2.2 A low pressure injection for high impedance injectors

Ignition

12 x ignition control, IGBT or BJT, coils with integrated amplifier

2 x 8.5 A H-bridge reserved for electronic throttle

2 x 4 A pwm lowside switch for Lambda heater

19 freely configurable outputs

1 x 8.5 A H-bridge

2 x 4 A pwm lowside switch

4 x 3 A pwm lowside switch

8 x 2.2 A pwm lowside switch

4 x 1 A pwm lowside switch

3 output signals

1 x engine rpm

1 x flywheel

1 x trigger wheel

Software Tools (free download)

Data Analysis tool WinDarab V7

System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors (not included)

Mating Connector 91 pins	F02U.B00.711-01
Mating Connector 105 pins	F02U.B00.712-01

Norms

Product Safety

EN IEC 62368-1:2020+A11:2020

Materials

REACH - Nr. 1907/2006

EMC

UNECE10:rev.6/AMD1:2020

KN41

ISO11452-2

ISO11452-4

ISO10605

ISO7637-2

ISO7367-3

ISO16750-2

US FCC: Title 47, Part 15 Subpart B

ICES-003

Testing

SAEJ1211

Communication

2 Ethernet

3 CAN

1 LIN

8 SENT

1 RS232

1 Time sync synchronization Ethernet

3 Communication screens

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experiences with calibration of ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch ECU

FULL_LOG_1

Extension for Recording 1
- 1,500 channels
- 1 kHz sampling rate

PERF_LOG_1 (requires FULL_LOG_1)

Increase logging Partition 1 from 4 GB to 16 GB memory

FULL_LOG_2

Activation of Recording 2
- 1,500 channels
- 1 kHz sampling rate
- 4 GB memory

Gear Control Package 1

Gear control MEGA-Line functionality, has to be used with MEGA-Line components (License model via MEGA-Line)

-- Link to MEGA-Line Support Request --

-- Link to MEGA-Line License Request Form --

Gear Control Package 2

Gear control Bosch Motorsport functionality

Specific project SW for MS 6.4P EVO, based on MS 6.4 EVO SW, offered as engineering service

SW Package MS 6 Drag 1

- Launch Timer
- Launch Distance
- Torque Pre-Control
- Launch RPM Control
- Universal Outputs for Time/Distance Controls

SW Package MS 6 Drag 2 (requires Drag 1 License)

- Acceleration Sensor MM5.10 included
- Time/Distance Boost Control
- Driveshaft Speed Control
- Driveshaft Gradient Control
- Acceleration Control
- Wheelie Control

Innovation License Device

Activation of a set of additional functions for a single device:
- Crank rotation direction detection (using sensor DG23i)
- Using a 2nd crank backup sensor
- Crank-Pre-set, quick start based on previous crank stop position
- Far-Bank, 2nd injector per cylinder possible
- Cam-only-synchronisation, engine run without crank sensor signal (specific cam trigger wheel needed)

Innovation Package Project

Innovation Package Project has the same content as Innovation License Device, but license is valid for the whole project instead of a single device

DATA_USB

Data copy to USB flash drive

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Ordering Information

Engine Control Unit MS 6.4P EVO
Order number **F02U.V03.112-01**

Engine Control Unit MS 6 EVO RX
FIA-homologated version for WRX Championship
Order number **on request**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

PERF_LOG_1
Order number **F02U.V03.054-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

Gear Control Package 1
Order number **please contact MEGA-Line**

Gear Control Package 2
Order number **F02U.V02.108-01**

Specific project SW for MS 6.4 Performance, based on MS 6.4 SW, offered as engineering service
Order number **on request**

SW Package MS 6 Drag 1
Order number **F02U.V0U.409-01**

SW Package MS 6 Drag 2
Order number **F02U.V0U.410-01**

Innovation License Device
Order number **F02U.V02.510-01**

Innovation Package Project
Order number **F02U.V02.511-01**

DATA_USB
Order number **F02U.V03.476-01**

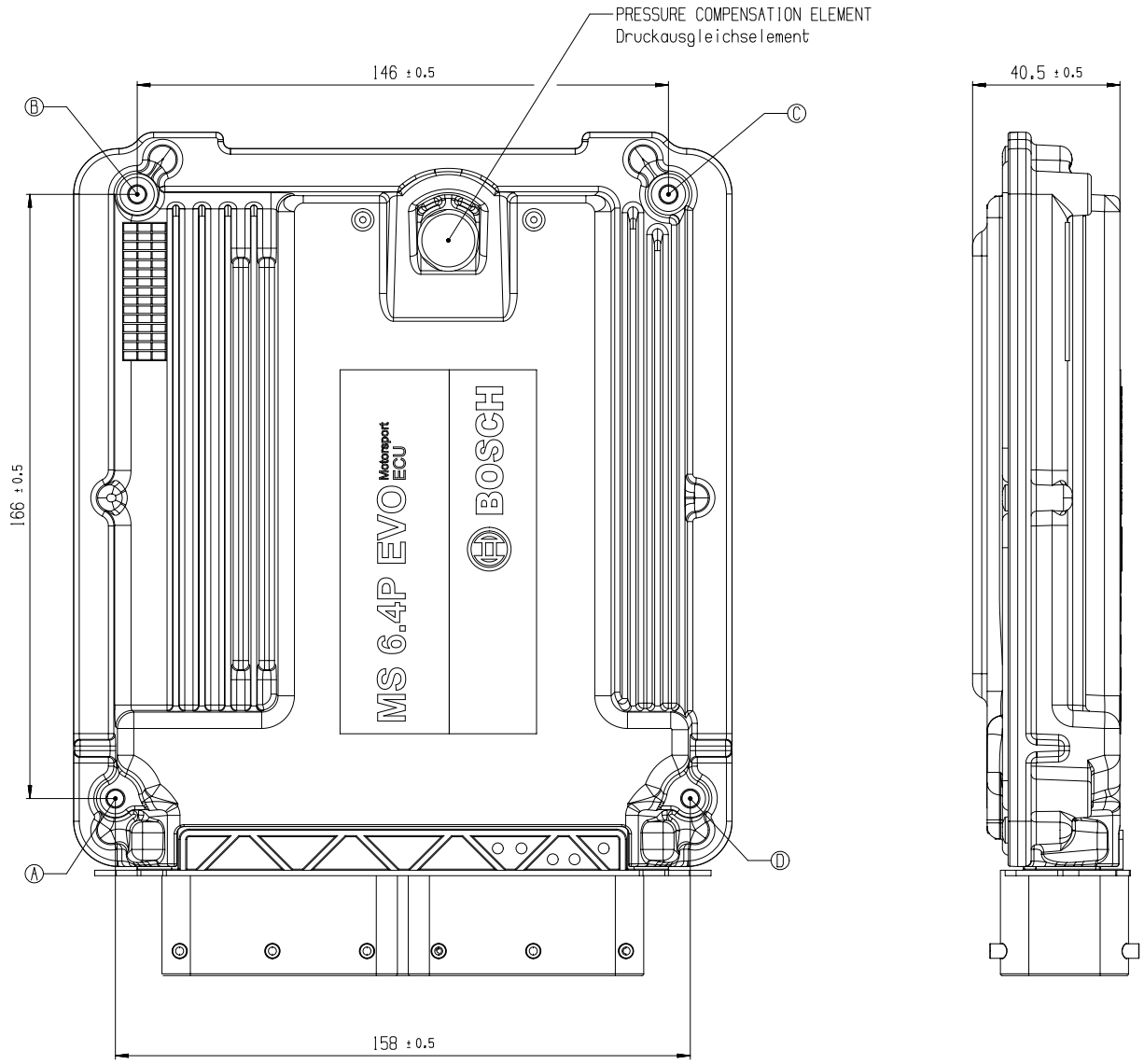
Accessories

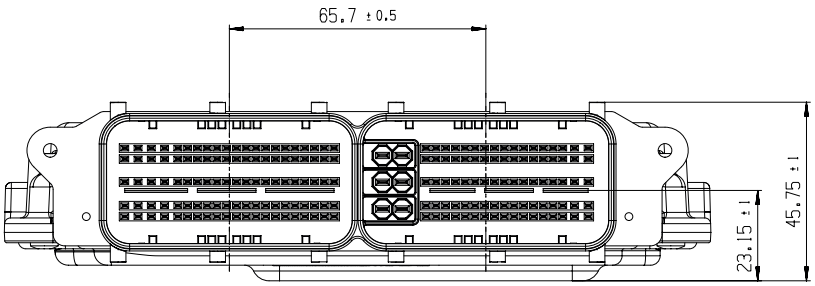
Breakout Box BOB MS 6 EVO
Order number **F02U.V02.294-02**

Mating Connector 91 pins
Order number **F02U.B00.711-01**

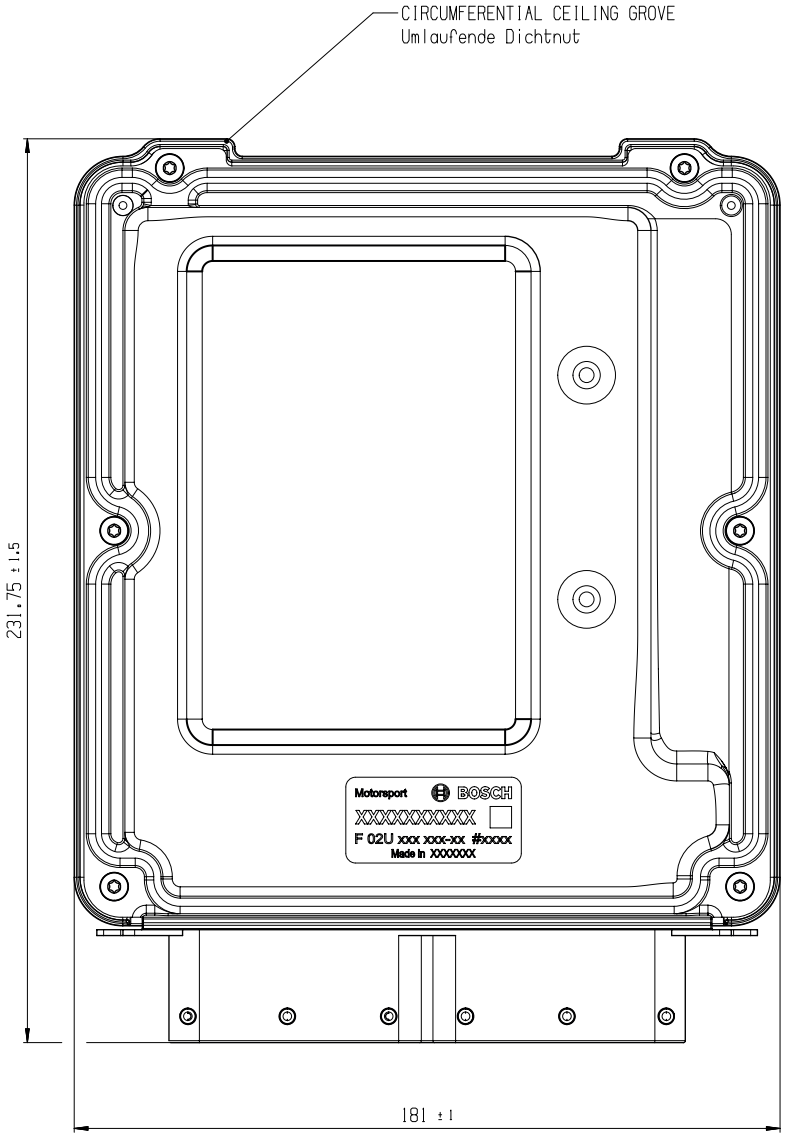
Mating Connector 105 pins
Order number **F02U.B00.712-01**

Dimensions


PRESSURE COMPENSATION ELEMENT
Druckausgleichselement
146 ±0.5
40.5 ±0.5
166 ±0.5
MS 6.4P EVO Motorsport ECU
BOSCH
158 ±0.5


65.7 ±0.5
45.75 ±1
23.15 ±1

1


CIRCUMFERENTIAL CEILING GROVE
Umlaufende Dichtnut
231,75 ± 1,5
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxxx
Made in XXXXXX
181 ± 1

Engine Control Unit MS 7.8



Features

- Optimized for low- and high-pressure injection
- 5 CAN, 3 of them CAN-FD capable
- 4 x 8.5 A H-Bridge
- Gearbox control optionally included
- SENT sensor support

The MS 7.8 engine control unit manages gasoline engines up to 12 cylinders. The MS 7 line features a powerful digital processing core with floating point arithmetic and a high-end FPGA for ultimate performance and flexibility. The MS 7 line utilizes a software development process based on MATLAB/Simulink which significantly speeds up algorithm development by using automatic code and documentation generation. Custom functions can be generated quickly and easily. The flexible hardware design allows the MS 7.8 to support complex or unusual engine or chassis configurations.
Version MS 7.8-ADV was developed for use with Lambda Sensor LSU ADV (higher max. Hexagon temperature).

Application

High pressure injection
Integrated power stages for triple injection and use of:
- 4 cylinders up to 14,600 rpm
- 6 cylinders up to 9,700 rpm
- 8 cylinders up to 7,300 rpm

(for supply voltages >10 V, depending on injection types and pressure ranges)

HP package for flat and V-engines inclusive (2nd Bank, fuel control valve 2, external cylinder 9-12)

Low pressure injection
- Max. 12 cylinders up to 16,000 rpm, high impedance injectors only

Outputs can be used alternatively as low side switches 2.2 A with fast decay

Ignition
- 8 integrated power stages up to 20 A
- alternatively, up to 12 drivers for use with external power stages

Physical engine model for fast application
- determine engine load by throttle position or air pressure signals
- mixture control and basic ignition guided by main signal relative load rl
- Subsystems pit speed-, launch-, rpm-limiter and ASR are integrated inside torque control
- Separated power cut functions to assist several gear cut systems
- Diagnostics
- Integrated safety strategy for 2 electronic throttle controls

Integrated support of manual gearshift

Electronic throttle control

Variable Valve Timing VVT

Turbo control

Traction control

Launch control

LTE Ethernet telemetry support

Internal logger
- FULL_LOG_1 (4 GB memory on Recording 1) enabled
- PERF_LOG_1 (16 GB memory on Partition 1) optional
- FULL_LOG_2 (4 GB memory on Recording 2) enabled
- DATA_USB (Data copy to USB flash drive) enabled

Logging rates
- Usage of all features: 400 kB/s
- Primary logging use case: >800 kB/s
- Logging data download rate: up to 6.2 MB/s

Technical Specifications

Mechanical Data

Milled aluminum housing	
4 motorsport connectors, 264 pins in total	
Size without connectors	198 x 180 x 42 mm
Weight	1,560 g
Protection Classification	IP67
Temp. range (at internal sensors)	-20 to 85°C
Max. Vibration	Vibration Profile 1 (see Downloads or www.bosch-motorsport.com)

Electrical Data

Power supply	6 to 18 V
CPU	Dual Core 1 GHz, FPGA

Inputs

46 analog inputs

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8 analog/digital/SENT inputs (shared)

12 digital inputs

- 4 x switchable Hall/inductive
- 4 x Hall
- 4 x switchable Hall/DF11

21 internal measurements

- 8 x ECU Current (Sensor Supply)
- 8 x ECU Voltage (Sensor Supply)
- 1 x Boost Voltage
- 1 x Booster Supply Voltage
- 1 x Dynpwr Supply Voltage
- 1 x Supply Current
- 1 x USB Current

18 function related inputs

- 8 x fast ADC for combustion chamber pressure input
- 2 x thermocouple exhaust gas temperature sensors (multi-type)
- 2 x Lambda interfaces for LSU 4.9 sensor types (LSU-ADV version available, see Ordering Information)
- 1 x digital switch for engine ON/OFF
- 1 x digital input for beacon receiver
- 4 x knock sensors

Sensor supplies and screens

8 x sensor supply 400 mA, switchable 5 V/Vbat with voltage and current sensing

8 x sensor grounds

2 x sensor screens

Outputs

38 function related outputs

High Pressure Injection

- 2 x high pressure pump with fuel control valve
- 8 x high pressure injection for magnetic injectors

Low Pressure Injection

- 12 x 2.2 A low pressure injection for high impedance injectors

Ignition

- 12 x ignition control, IGBT or BJT, coils with integrated power stage, or max. 8 cylinders and coils without integrated power stage, 20 A

2 x 8.5 A H-bridge reserved for electronic throttle

2 x 3 A pwm lowside switch for Lambda heater

15 freely configurable outputs

- 2 x 8.5 A H-bridge
- 2 x 4 A pwm lowside switch
- 6 x 3 A pwm lowside switch
- 4 x 2.2 A pwm lowside switch
- 1 x 1 A pwm lowside switch low dump resistant

5 output signals

- 5 x MUX outputs for internal signals like flywheel, knock signals, cylinder pressure

Adaptation and Documentation

Configuration
Configurable flywheel- and trigger disc geometries
Selectable links between functions and in- or outputs

Function documentation
Automatically created during code generation

MatLab code generation
Support for customer own MatLab function development

Software Tools (free download)

Data Analysis tool WinDarab V7

System Configuration tool RaceCon 2.7.0.9 or later

Mating Connectors

LIFE (red)	AS618-35SN
Actuator (blue)	AS618-35SB
Combined (orange)	AS618-35SC
Sensor (yellow)	AS618-35SA

Communication

1 Ethernet 1 Gbit

3 Ethernet 100 Mbit

5 CAN, 3 of them CAN-FD capable

1 LIN

1 USB

8 SENT

1 Time sync synchronization Ethernet

2 Network screens

Installation Notes

Inspection services recommended after 220 h or 24 months, internal battery to be replaced during service.

Depending on your experiences with calibration of ECUs we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface cable are not included and must be ordered separately.

Legal Restrictions

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Upgrades

CCA Hardware Upgrade per device

Enable Customer Code Area

PERF_LOG_1

Increase logging Partition 1 from 4 GB to 16 GB memory

Gear Control Package 1

Gear control MEGA-Line functionality, has to be used with MEGA-Line components (License model via MEGA-Line)

-- Link to MEGA-Line Support Request--

-- Link to MEGA-Line License Request Form --

Gear Control Package 2

Gear control Bosch Motorsport functionality

Accessories

- Rugged USB flash drive
- Mating connector for USB flash drive on car loom side
- Adapter cable to PC USB-Port
- Cylinder pressure detection base package
- Knock detection via cylinder pressure evaluation
- Programming interface cable

Ordering Information

Engine Control Unit MS 7.8
Order number **F02U.V03.249-02**

Engine Control Unit MS 7.8-ADV
Order number **F02U.V03.316-02**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

PERF_LOG_1
Order number **F02U.V03.054-01**

Gear Control Package 1
Order number **please contact MEGA-Line**

Gear Control Package 2
Order number **F02U.V02.264-01**

Cylinder pressure detection base package
Order number **F02U.V02.543-01**

Knock detection via cylinder pressure evaluation
Order number **F02U.V02.544-01**

Accessories

Breakout Box BOB 66-pole, Connector code blue
Order number **F02U.V02.295-01**

Breakout Box BOB 66-pole, Connector code orange
Order number **F02U.V02.296-01**

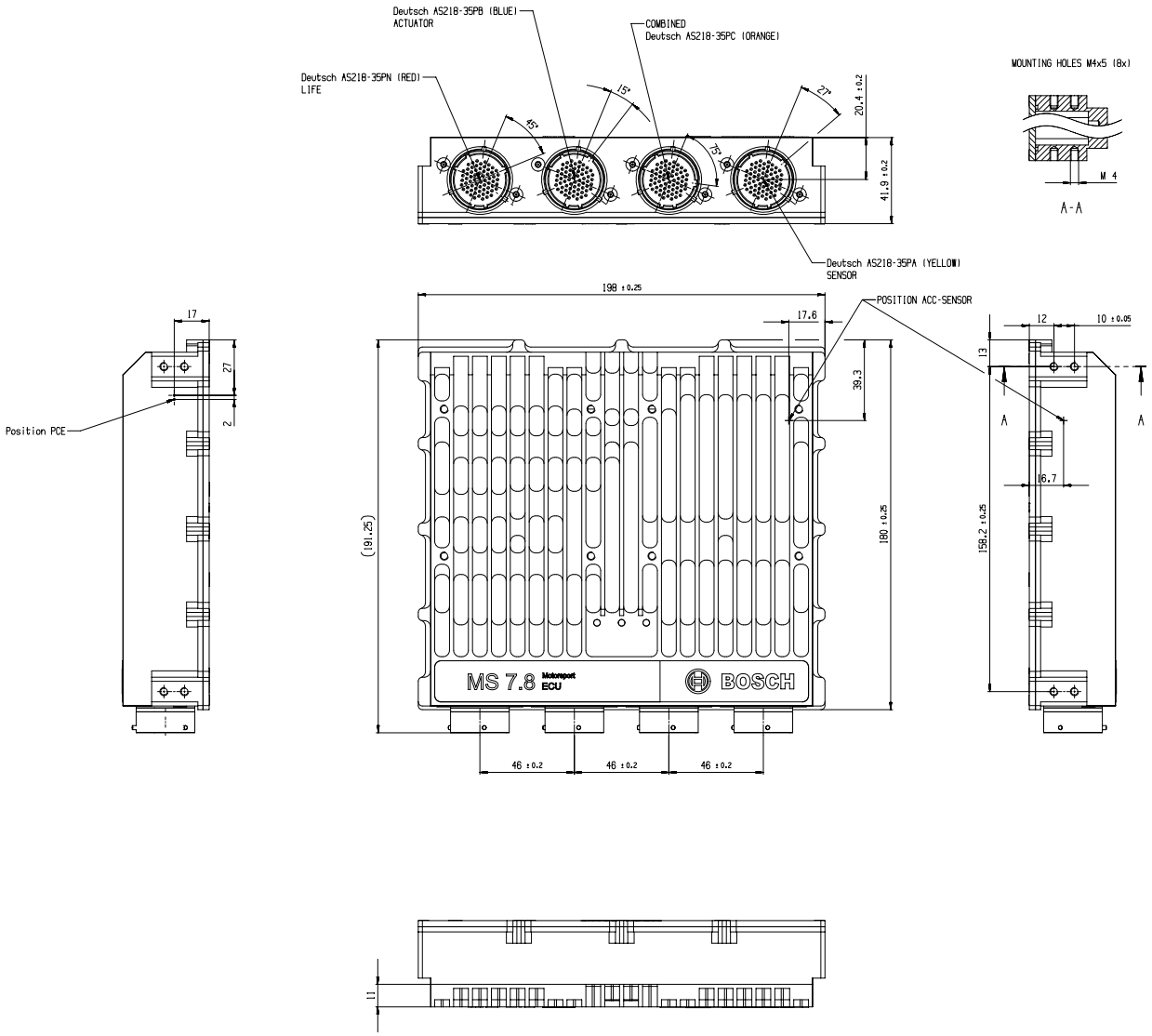
Breakout Box BOB 66-pole, Connector code yellow
Order number **F02U.V02.298-01**

Breakout Box BOB MS 7, LIFE-Connector code red
Order number **F02U.V02.293-02**

Programming interface cable
Order number **F02U.V02.327-01**

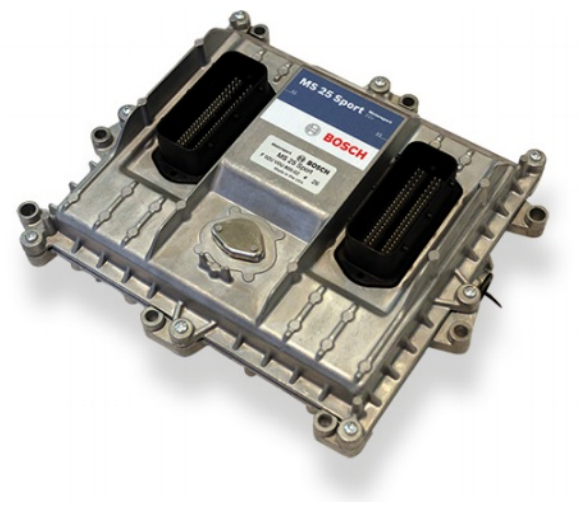
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Dimensions



See Offer Drawing for further information

Engine Control Unit MS 25 Sport



Features

- 8 injection output stages
- For solenoid injectors
- 96 data inputs
- Software options available

The MS 25 Sport is an ECU for Diesel engines with up to 8 cylinders. It is developed for use with Bosch solenoid injectors. The MS 25 Sport utilizes a software development process based on MATLAB® & Simulink®.
The MS 25 Sport is able to operate in 12 V or 24 V systems. The base SW is able to control one hydraulic bank configuration with Fuel Metering Unit (FMU) and Pressure Control Valve (PCV).

Application

Engine layout	3, 4, 5, 6, 8, <3 on request
Injector type	Solenoid valve injectors
Control strategy	Quantity based
Hydraulic system	Fuel metering unit + Pressure control valve (2 bank optional)
Injection timing	2 pilot injections 1 main injection 2 post injections
Turbo boost control	Single or Bi-Turbo
Lambda measurement	Optional controls on request
Two bank hydraulic control	Optional
Traction control	Optional
Gear cut for sequential gearbox	Optional
Speed limiter	
Optional function packages available	
Calibration interface	CCP via CAN
Interface to Bosch Data Logging System	3 CAN interfaces
Max. vibration	Vibration Profile 1 (see Downloads or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data

Aluminum product housing	Base plate with fluid cooling incl. pressure compensation element (PCE)
2 production type connectors with 192 pins	Separate coding each (192 x 1.2 mm pins)
Vibration damped circuit boards	Engine mountable with additional dampers
8 housing fixation points	
Size	260 x 250 x 81 mm
Protection classification	IP x 6k and IP x 9K
Weight	1,800 g
Temperature range	-40 to 85°C

Electrical Data

Power supply	12 or 24 V
1 internal atmospheric pressure sensor	
1 internal ECU temperature sensor for max. temperature	

Inputs

1 lambda interface LSU	LSU 4.9
7 general frequency inputs	4 wheel speed and one vehicle speed hall effect sensor inputs and 2 inductive turbo speed
1 input for inductive crankshaft sensor	Hall optional
1 input for Hall-effect camshaft sensor	Inductive optional
29 analog inputs	
14 digital inputs	

Sensor supplies and screens

3 sensor supply 5 V	

Outputs

8 injection power stages	3 banks for 8 cylinders
2 Fuel Metering Unit (High Pressure Pump)	2 bank system optional
2 Pressure Control Valve (Rail)	2 bank system optional
12 power stages (low side)	
1 power stage for lambda heater	

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2 H-bridges	

Software

RaceCon Calibration Software	free download
WinDarab Analysis Software	free download

Optional Functionality

Traction control SW upgrade
2 bank hydraulic control SW upgrade

Environment (not included)

Programming interface MSA-Box II	F02U.V00.327-03

Mating connectors (not included)

Mating connector I CONNECTOR KIT; MS 25 SPORT - X1 (Vehicle)	F02U.V0U.147-01
Mating connector II CONNECTOR KIT; MS 25 SPORT - X2 (Engine)	F02U.V0U.148-01

Communication

3 CAN interfaces (dash, application, customer use)	J1939 optional
1 LIN	Optional
1 SENT	Optional

Installation Notes

Depending on your experiences with calibration of Diesel ECUs we recommend calibration support from Bosch Motorsport.

Please remember that mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Engine Control Unit MS 25 Sport
Order number **F02U.V0U.800-02**

Overview

Vehicle Control Unit MS 50.4



- 667 MHz Dual Core Processor exclusively for vehicle control functionality (MATLAB based)
- Identical, dedicated 667 MHz Dual Core Processor exclusively for logging purposes
- High Speed Logging 200 kHz of 6 analog inputs (optional)
- Event logging, Configurable pre-event logging

Vehicle Control Unit MS 50.4P incl. CCA



- 866 MHz Dual Core Processor exclusively for vehicle control functionality (MATLAB based)
- Identical, dedicated 866 MHz Dual Core Processor exclusively for logging purposes
- High Speed Logging 200 kHz of 6 analog inputs (optional)
- Event logging, Configurable pre-event logging

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Vehicle Control Unit MS 50.4



Features

- 667 MHz Dual Core Processor exclusively for vehicle control functionality (MATLAB based)
- Identical, dedicated 667 MHz Dual Core Processor exclusively for logging purposes
- High Speed Logging 200 kHz of 6 analog inputs (optional)
- Event logging, Configurable pre-event logging

The VCU MS 50.4 is a highly powerful processing / logging unit for race applications.
Based on our broad base of platform function, we support you with customized VCU functions for a tailor-made solution.
In addition, you can quickly develop your individual customer software based on MATLAB/Simulink to significantly speed up algorithm development (automatic code and documentation generation, requires CCA package) – including extensive simulation capabilities.

Application

Processor for customer code	667 MHz Dual Core
Processor for logger	667 MHz Dual Core
Configurable math channels	
User configurable CAN in/out messages	
Online data compression	

Internal logger

- 1,500 channels
- FULL_LOG_1 (4 GB memory on Recording 1) enabled
- PERF_LOG_1 (16 GB memory on Partition 1) optional
- FULL_LOG_2 (4 GB memory on Recording 2) enabled
- High Speed Logging Package (Sampling rate 5 µs) optional
- DATA_USB (Data copy to USB flash drive) enabled

Logging rates

- Usage of all features: 600 kB/s
- Primary logging use case: >1,200 kB/s
- Logging data download rate: up to 6.2 MB/s

LTE Ethernet telemetry support

RS232 interface for GPS

Technical Specifications

Mechanical Data

Size	166 x 121 x 41 mm
Weight	≤ 660 g
Protection classification	IP67
3 motorsport connectors, 198 pins in total	
Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)
Operating temperature internal	-20 to 80°C

Electrical Data

Supply voltage	5 to 18 V

Inputs

20 xAnalog channels 0 to 5 V, 0.5 % precision between 0.2 and 4.8 V, switchable pull-up

8 x Digital PWM inputs f_max=30 kHz Hall-type speed measurement possible,
Switchable pullup 2.15 kOhm, (required for Hall), Tooth count differential*

4 x Digital PWM inputs f_max=30 kHz Hall- and DF11 type speed measurement possible,
Fixed pullup 2.15 kOhm (required for Hall), Tooth count differential*

4 x universal Thermocouple

1 x Bosch Laptrigger

1 x TimeSync master and slave (specific to Bosch measurement system)

Internal measurements:
1 x ambient pressure
1 x ECU temperature
20 x supply voltage
20 x supply current
1 x battery voltage (external VCU supply)
1 x external VCU supply current
4 x HS output current
1 x 3-axis acceleration plus roll/pitch/yaw rate

Outputs

2* x 7.5 A each, PWM High side, 50 Hz

4* x 2.2 A each, PWM Low side, 10 kHz

*can be enhanced by Upgrade I/O Package

Sensor Supplies and Screens

5* x 12 V, 400 mA each

5* x Switchable 5 V/12 V, 400 mA each

4 A max overall current on all 12 V 2 A max overall current on all 5 V	
12 V ± 1 % precision on the pin 5 V ± 0.1 % precision on the pin	
20 x Sensor ground	
*can be enhanced by Upgrade I/O Package	

Adaptation and Documentation

Function documentation	Automatically created during code generation
MatLab code generation	Support for customer own MatLab function development

Software Tools (free download)

Data Analysis tool WinDarab 7	
System Configuration tool RaceCon	Logger configuration, calibration, and online measurement

Connectors

Connector LIFE (red) AS018-35PN	Mating connector AS618-35SN (not included)
Connector SENS-A (yellow) AS018-35PA	Mating connector AS618-35SA (not included)
Connector SENS-B (blue) AS018-35PB	Mating connector AS618-35SB (not included)

Communication

3 Ethernet 100 Mbit
4 CAN (+4 with Upgrade I/O Package)
1 LIN
1 USB
1 RS232 interface for GPS or Telemetry, switchable depending on SW version
1 Time sync synchronization Ethernet

Installation Notes

Maintenance Interval: 220 h or a maximum of two years
Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch device

Multi CCA Hardware Upgrade per device

Enables the use of an extra core to utilize more computing power in the device

I/O Package

Communication

4 CAN

Inputs

4 Analog channels 0 to 5 V, 0.5 % precision between 0.2 and 4.8 V, switchable pull-up
4 Digital PWM inputs f_max=30 kHz Hall-type speed measurement possible, Fixed pullup 2.15 kOhm (required for Hall), Tooth count differential**
4 LVDT, 5 pin configuration, excitation frequency 1 to 20 kHz, excitation voltage 0 to 5 V (rms)

Outputs

4 “TTL” Digital output, 10 kHz, PWM, 25 mA each
2 PWM High side; 7.5 A each, PWM, 50 Hz
4 PWM Low side; 2.2 A each, PWM, 10 kHz

Power Supplies

5 x12 V, 400 mA each
5 switchable 5 V/12 V, 400 mA each

** The tooth count differential between any two of the PWM inputs is available to measure e.g., shaft torsion.

High Speed Logging Package

6 ANA	0 to 5 V, 200 kHz logging rate

CCP/XCP_MASTER

Enables CCP/XCP master functionality to request data from foreign devices via CAN/CCP protocol, XCP over Ethernet (UDP) or XCP via CAN. (ASAP2 file from ECU manufacturer required)

1

Ordering Information

Vehicle Control Unit MS 50.4
Order number **F02U.V02.965-02**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Breakout Box BOB 66-pole
Connector code: blue
Order number **F02U.V02.295-01**

Breakout Box BOB 66-pole
Connector code: yellow
Order number **F02U.V02.298-01**

Vehicle Control Unit MS 50.4 incl. CCA Hardware Upgrade
Order number **F02U.V03.012-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

Multi CCA Hardware Upgrade VCU per device
Order number **F02U.V03.222-01**

I/0 Package
Order number **F02U.V02.777-01**

High Speed Logging Package
Order number **F02U.V02.779-01**

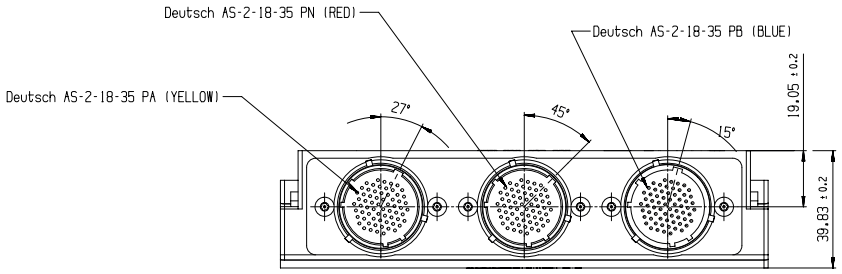
CCP/XCP_MASTER
Order number **F02U.V02.213-01**

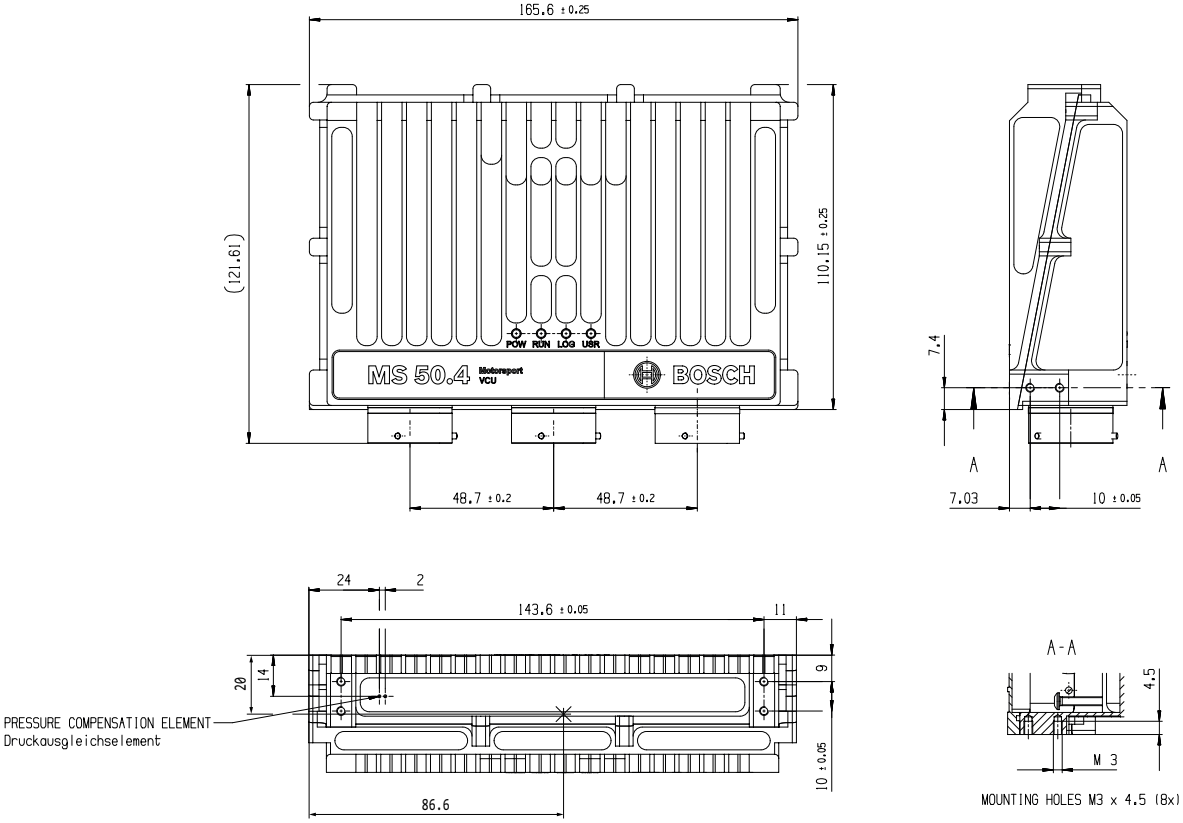
Accessories

Opening tool for shellsize 18
Order number **F02U.V01.394-01**

Breakout Box BOB MS 7
Connector code: red
Order number **F02U.V02.293-01**

Dimensions




165.6 ±0.25
(121.61)
110.15 ±0.25
POW RUN LOG USR
MS 50.4 Motorsport VCU
BOSCH
48.7 ±0.2
48.7 ±0.2
7.4
A
A
7.03
10 ±0.05
24
2
143.6 ±0.05
11
20
14
9
PRESSURE COMPENSATION ELEMENT
Druckausgleichselement
10 ±0.05
86.6
A-A
4.5
M 3
MOUNTING HOLES M3 x 4.5 (8x)
YAW RATE SENSOR
Drehratensensor
16
86.6

1

Vehicle Control Unit MS 50.4P incl. CCA



Features

- 866 MHz Dual Core Processor exclusively for vehicle control functionality (MATLAB based)
- Identical, dedicated 866 MHz Dual Core Processor exclusively for logging purposes
- High Speed Logging 200 kHz of 6 analog inputs (optional)
- Event logging, Configurable pre-event logging

The VCU MS 50.4P (Performance) is a highly powerful processing / logging unit for race applications.
Based on our broad base of platform function, we support you with customized VCU functions for a tailor-made solution.
In addition, you can quickly develop your individual customer software based on MATLAB/Simulink to significantly speed up algorithm development (automatic code and documentation generation) – including extensive simulation capabilities.

Application

Processor for customer code	866 MHz Dual Core
Processor for logger	866 MHz Dual Core

Configurable math channels

User configurable CAN in/out messages

Online data compression

Internal logger
- 1,500 channels
- FULL_LOG_1 (4 GB memory on Recording 1) enabled
- PERF_LOG_1 (16 GB memory on Partition 1) optional
- FULL_LOG_2 (4 GB memory on Recording 2) enabled
- High Speed Logging Package (Sampling rate 5 µs) optional
- DATA_USB (Data copy to USB flash drive) enabled

Logging rates
- Usage of all features: 800 kB/s
- Primary logging use case: >1,500 kB/s
- Logging data download rate: up to 7.5 MB/s

LTE Ethernet telemetry support

RS232 interface for GPS

Customer Code Area CCA
Provides the option to run customer developed software code on Bosch device

Multi CCA
Enables the use of an extra core to utilize more computing power in the device for running a second customer model

Technical Specifications

Mechanical Data

Size	166 x 121 x 41 mm
Weight	≤ 660 g
Protection classification	IP67

3 motorsport connectors, 198 pins in total

Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)
Operating temperature internal	0 to 85°C

Operation outside the temperature limits can be tested on request during the manufacturing tests.

Electrical Data

Supply voltage	5 to 18 V

Inputs

20 Analog channels 0 to 5 V, 0.5 % precision between 0.2 and 4.8 V, switchable pull-up

8 Digital PWM inputs f_max=30 kHz Hall-type speed measurement possible,
Switchable pullup 2.15 kOhm, (required for Hall), Tooth count differential*

4 Digital PWM inputs f_max=30 kHz Hall- and DF11 type speed measurement possible,
Fixed pullup 2.15 kOhm (required for Hall), Tooth count differential*

4 universal Thermocouple

1 Bosch Laptrigger

1 TimeSync master and slave (specific to Bosch measurement system)

Internal measurements:
1 x ambient pressure
1 x ECU temperature
20 x supply voltage
20 x supply current
1 x battery voltage (external VCU supply)
1 x external VCU supply current
4 x HS output current
1 x 3-axis acceleration plus roll/pitch/yaw rate

Outputs

2* x PWM High side; 7.5 A each, PWM, 50 Hz

4* x PWM Low side; 2.2 A each, PWM, 10 kHz

*can be enhanced by Upgrade I/O Package

Sensor Supplies and Screens

5* x 12 V, 400 mA each

5* x Switchable 5 V/12 V, 400 mA each

4 A max overall current on all 12 V
2 A max overall current on all 5 V

12 V ± 1 % precision on the pin
5 V ± 0.1 % precision on the pin

20 x Sensor ground

*can be enhanced by Upgrade I/O Package

Adaptation and Documentation

Function documentation	Automatically created during code generation
MatLab code generation	Support for customer own MatLab function development

Software Tools (free download)

Data Analysis tool WinDarab 7

System Configuration tool RaceCon	Logger configuration, calibration, and online measurement

Connectors

Connector LIFE (red) AS018-35PN	Mating connector AS618-35SN (not included)
Connector SENS-A (yellow) AS018-35PA	Mating connector AS618-35SA (not included)
Connector SENS-B (blue) AS018-35PB	Mating connector AS618-35SB (not included)

Communication

3 Ethernet 100 Mbit

4 CAN (+4 with Upgrade I/O Package)

1 LIN

1 USB

1 RS232 interface for GPS or Telemetry, switchable depending on SW version

1 Time sync synchronization Ethernet

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

I/O Package

Communication

4 CAN

Inputs

4 Analog channels
0 to 5 V,
0.5 % precision between 0.2 and 4.8 V, switchable pull-up

4 Digital PWM inputs
f_max=30 kHz
Hall-type speed measurement possible,
Fixed pullup 2.15 kOhm (required for Hall),
Tooth count differential**

4 LVDT, 5 pin configuration,
excitation frequency 1 to 20 kHz,
excitation voltage 0 to 5 V (rms)

Outputs

4 “TTL” Digital output, 10 kHz, PWM, 25 mA each

2 PWM High side; 7.5 A each, PWM, 50 Hz

4 PWM Low side; 2.2 A each, PWM, 10 kHz

Power Supplies

5 x12 V, 400 mA each

5 switchable 5 V/12 V, 400 mA each

** The tooth count differential between any two of the PWM inputs is available two measure e.g. shaft torsion.

PERF_LOG_1

Increase logging Partition 1 from 4 GB to 16 GB memory

High Speed Logging Package

6 ANA	0 to 5 V, 200 kHz logging rate

CCP/XCP_MASTER

Enables CCP/XCP master functionality to request data from foreign devices via CAN/CCP protocol, XCP over Ethernet (UDP) or XCP via CAN.
(ASAP2 file from ECU manufacturer required)

1

Ordering Information

Vehicle Control Unit MS 50.4P incl. CCA
Order number **F02U.V03.014-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Breakout Box BOB 66-pole
Connector code: blue
Order number **F02U.V02.295-01**

Breakout Box BOB 66-pole
Connector code: yellow
Order number **F02U.V02.298-01**

Software Options

I/0 Package
Order number **F02U.V02.777-01**

PERF_LOG_1
Order number **F02U.V03.054-01**

High Speed Logging Package
Order number **F02U.V02.779-01**

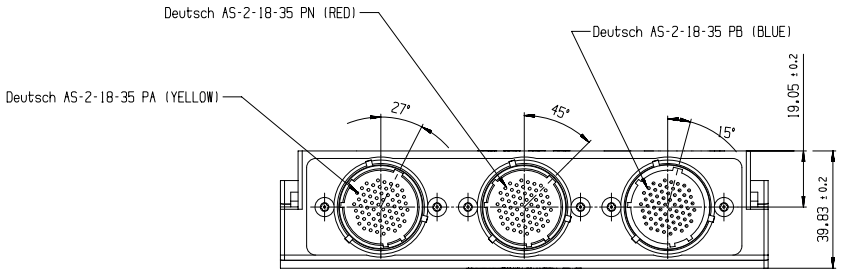
CCP/XCP_MASTER
Order number **F02U.V02.213-01**

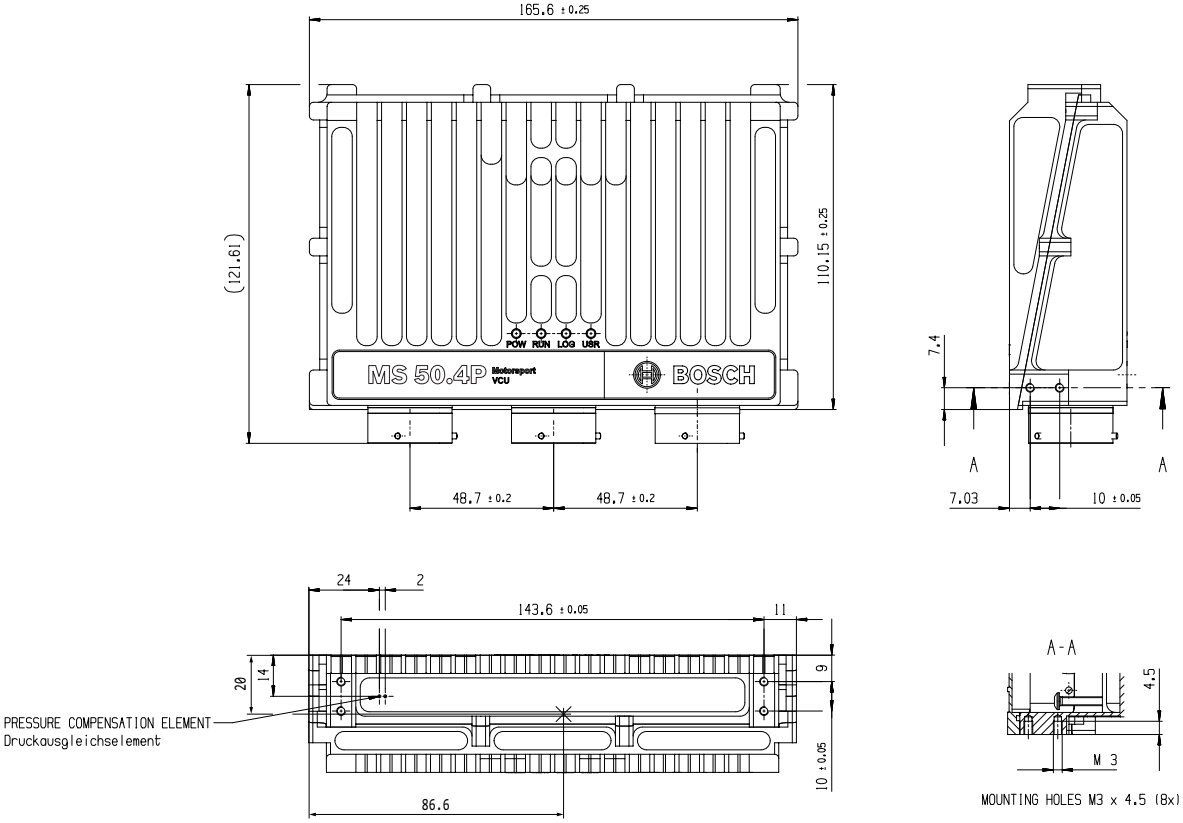
Accessories

Opening tool for shellsize 18
Order number **F02U.V01.394-01**

Breakout Box BOB MS 7
Connector code: red
Order number **F02U.V02.293-01**

Dimensions




165.6 ±0.25
(121.61)
110.15 ±0.25
POW RUN LOG USR
MS 50.4P Motorsport VCU
BOSCH
48.7 ±0.2
48.7 ±0.2
7.4
A
A
7.03
10 ±0.05
24
2
143.6 ±0.05
11
20
14
9
10 ±0.05
86.6
PRESSURE COMPENSATION ELEMENT
Druckausgleichselement
A-A
4.5
M 3
MOUNTING HOLES M3 x 4.5 (8x)
YAW RATE SENSOR
Drehratensensor
16
86.6

Displays 2

Displays 62

Overview

Display DDU 10



- Features user interface menu
- Features display element design generator
- 10 top-LEDs and 5 side-LEDs on both sides
- Supports GPS laptrigger, predated lap time etc.
- Page change based on events possible

Display DDU 11



- Features user interface menu
- Features display element design generator
- 8 top-LEDs and 5 side-LEDs on both sides
- Supports GPS laptrigger, predated lap time etc.
- Page change based on events possible

Display DDU 10



Features

- Features user interface menu
- Features display element design generator
- 10 top-LEDs and 5 side-LEDs on both sides
- Supports GPS laptrigger, pre-dated lap time etc.
- Page change based on events possible

The Display DDU 10 integrates a programmable full colour dashboard display with a data logging system for motorsport applications. Additional input devices can be connected via Ethernet, CAN buses, and RS 232.
Data Analysis Software WinDarab is available free of charge as “WinDarab V7 free” on our website. A basic logging function of 100 channels with recording of 50 ms (4 GB) is always included. The logger can be upgraded to full logging performance (max. 1 ms). In addition, a 2nd logging partition of 4 GB can be activated.
With the DDU 10, a completely new library of graphical elements for the individual design of display pages was implemented and an all-new user interface menu has been developed for the device. A configurable input activates the menu structure and the user can reset for example laptime, fuel consumption and many more, without having to connect a laptop to the DDU. The user can also install own graphics, pictures etc. on the 12 freely configurable display pages. For quick data transfer from the car, e.g. during pit stop, data copy to a USB stick is available as an option.

Application

Display	• 7” graphic color display • 12 user configurable display pages • 20 multicolor freely configurable (RGB) LEDs
Resolution	800 x 480 pixel
Supported image file formats	PNG, BMP, JPG, GIF
Processor	667 MHz Dual Core
Converters	10 kHz 12 bit AD converters with digital low pass filter
Internal power source	Li/Ion capacitor
Configurable math channels	
User configurable CAN in/out messages	Up to 256 IDs (128 in and out)
Online data compression	
Internal logger • 4 GB memory on Recording 1 enabled • 100 channels enabled • 50 ms Sampling rate enabled • FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional • FULL_LOG_2 (4 GB memory on Recording 2) optional	
Logging rates • Usage of all features: 600 kB/s • Primary logging use case: 800 kB/s • Logging data download rate: up to 4 MB/s	
Ambient light sensor	

Technical Specifications

Mechanical Data

Size	198 x 134 x 35 mm
Weight	875 g
Protection classification	IP67
Operating temperature internal	-20 to 85°C
Max. vibration	Vibration profile 1 (see Downloads or bosch-motorsport.com)

Electrical Data

Supply voltage	6 to 18 V
Current consumption (w/o sensor supply)	2 A (at 12 V)

Inputs

4 x analog channels, plus 12 optional
0 to 5 V input range
12 bit resolution
Switchable pull up resistors for all analog inputs
4 x Hall-effect or DF11 wheel speed inputs, switchable

Sensor Supplies and Screens

2 x Sensor supply 5 V ± 1 % (250 mA)
1 x Sensor supply 10 V ± 1 % (250 mA)
1 x Sensor supply U_Bat (250 mA)
4 x Sensor ground

2

Environment

External switch for page selection, 12 steps	B 261 209 658-01
External switch for brightness adjustment or page selection, 6 steps	B 261 209 659-01

Connectors and Wires

LIFE connector on display AS216-35PN	
Mating connector AS616-35SN	F02U.000.466-01
Auxiliary connector on display AS212-35PN	
Mating connector AS612-35SN	F02U.000.443-01

Pin Configuration

LIFE connector

Pin	Name	Comment	Status
1	KL_31		Incl.
2	KL_15		Incl.
3	KL_30		Incl.
4	Rev_In_3	Hall or DF11 switchable	Incl.
5	Rev_In_1	Hall or DF11 switchable	Incl.
6	KL_31		Incl.
7	CAN_2_L	CAN speed selectable	Incl.
8	Ethernet_2_TXP		Incl.
9	Ethernet_2_TXN		Incl.
10	Sens_Power_12V	over current protected	Incl.
11	Rev_In_4	Hall or DF11 switchable	Incl.
12	Rev_In_2	Hall or DF11 switchable	Incl.
13	Laptrigger_In		Incl.
14	CAN_2_H	CAN speed selectable	Incl.
15	CAN_1_H	CAN speed selectable	Incl.
16	Ethernet_2_RXP		Incl.
17	Sens_Gnd_4	fused	Incl.
18	Sens_Power 5V	over current protected	Incl.
19	ANA_IN_3	3.01 kOhm switchable	Incl.
20	ANA_IN_4	3.01 kOhm switchable	Incl.
21	Time_Sync	connection to Bosch ECU	Incl.
22	CAN_1_L	CAN speed selectable	Incl.
23	Ethernet_screen		Incl.
24	Ethernet_2_RXN		Incl.
25	Sens_Gnd_3	fused	Incl.
26	Sens_Power 5V	over current protected	Incl.
27	ANA_IN_7	3.01 kOhm switchable	Opt.
28	ANA_IN_1	3.01 kOhm switchable	Incl.
29	USB_Device_DP	to Bosch USB stick	Opt.

LIFE connector

30	RS232_TX_Telemetry	Transmit Telemetry data	Incl.
31	Ethernet_1_TXP		Incl.
32	Sens_Gnd_2	fused	Incl.
33	Sens_Power_10V	over current protected	Incl.
34	ANA_IN_8	3.01 kOhm switchable	Opt.
35	ANA_IN_10	3.01 kOhm switchable	Opt.
36	USB_Device_Gnd	to Bosch USB stick	Opt.
37	USB_Device_DN	to Bosch USB stick	Opt.
38	RS232_RX_Telemetry	Receive Telemetry data	Incl.
39	Ethernet_1_TXN		Incl.
40	Sens_Gnd_1	fused	Incl.
41	ANA_IN_11	3.01 kOhm switchable	Opt.
42	ANA_IN_9	3.01 kOhm switchable	Opt.
43	RS232_TX_GPS	Transmit GPS data	Incl.
44	ANA_IN_16	3.01 kOhm switchable	Opt.
45	USB_Device_Power	to Bosch USB stick	Opt.
46	Ethernet_1_RXP		Incl.
47	ANA_IN_12	3.01 kOhm switchable	Opt.
48	ANA_IN_6	3.01 kOhm switchable	Opt.
49	ANA_IN_2	3.01 kOhm switchable	Incl.
50	ANA_IN_13	3.01 kOhm switchable	Opt.
51	ANA_IN_15	3.01 kOhm switchable	Opt.
52	Ethernet_1_RXN		Incl.
53	ANA_IN_5	3.01 kOhm switchable	Opt.
54	RS232_RX_GPS	Receive GPS data	Incl.
55	ANA_IN_14	3.01 kOhm switchable	Opt.

Auxiliary connector

Pin	Name	Comment	Status
1		Unused	
2		Unused	
3		Unused	
4		Unused	
5		Unused	
6		Unused	
7		Unused	
8		Unused	
9	Ethernet_3_TXP		Incl.
10	Ethernet_3_RXP		Incl.
11	Ethernet_3_RXN		Incl.
12	CAN_4_H		Opt.
13		Unused	
14		Unused	
15		Unused	

Auxiliary connector			
16		Unused	
17		Unused	
18	Ethernet_screen		Incl.
19	Ethernet_3_TXN		Incl.
20	CAN_4_L		Opt.
21	CAN_3_H		Opt.
22	CAN_3_L		Opt.

Communication

CAN interfaces	2 standard, plus 2 optional
Ethernet 100BaseT	3
Laptrigger input	1
RS232	Telemetry, GPS
Configuration via RaceCon	Over Ethernet or MSA-Box II
CCP-Master, data acquisition from ECU that support CAN calibration protocol (optional)	

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

This product may contain open source software. Information about license terms and other obligations is given in the manual.

Ordering Information

Display DDU 10
Order number **F02U.V02.659-03**

Software Options

CCP/XCP_MASTER
Order number **F02U.V02.213-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

IO_EXTENS
Order number **F02U.V02.205-01**

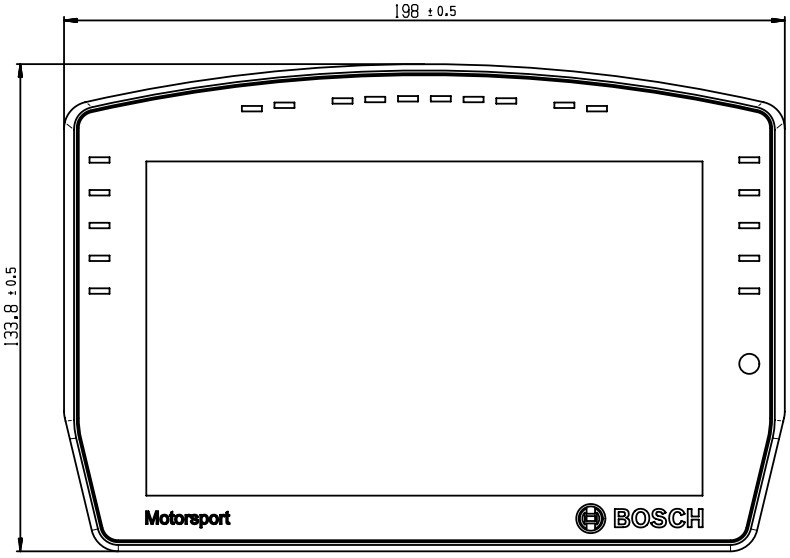
Accessories

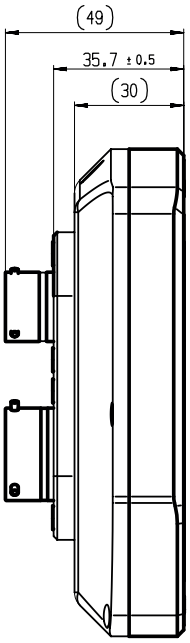
USB_DATA Kit
Order number **F02U.V02.214-01**

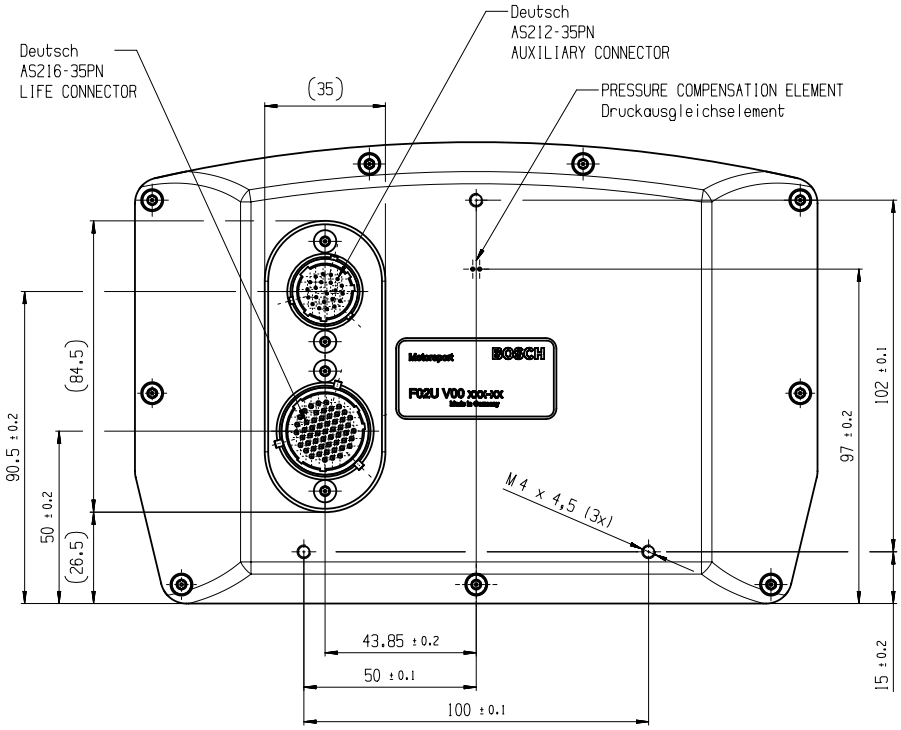
Vehicle Loom Basic
Order number **F02U.V02.735-01**

Bench Loom
Order number **F02U.V02.349-01**

Dimensions






Deutsch
AS216-35PN
LIFE CONNECTOR
Deutsch
AS212-35PN
AUXILIARY CONNECTOR
PRESSURE COMPENSATION ELEMENT
Druckausgleichselement
(35)
BOSCH
F02U V00 xxx-xx
M4 x 4,5 (3x)
90.5 ±0.2
(84.5)
50 ±0.2
(26.5)
97 ±0.2
102 ±0.1
15 ±0.2
43.85 ±0.2
50 ±0.1
100 ±0.1

Display DDU 11



Features

- Features user interface menu
- Features display element design generator
- 8 top-LEDs and 5 side-LEDs on both sides
- Supports GPS laptrigger, pre-dated lap time etc.
- Page change based on events possible

The display DDU 11 integrates a programmable full colour dashboard display with a data logging system for motorsport applications. Additional input devices can be connected via Ethernet, CAN buses, and RS 232.
A basic logging function of 100 channels with recording rate of 20 Hz (50 ms) (4 GB) is always included. The logger can be upgraded to full logging performance (max. 1 kHz (1 ms)). In addition, a 2nd logging partition of 4 GB can be activated. An optional external GPS Sensor keeps track of position on the racetrack.
With the DDU 11, a library of graphical elements for the individual design of display pages and a state-of-the-art user interface menu is available. For quick data transfer from the car, e.g., during pit stop, data logging to a USB stick is available as an option.

Application

Display
6.5" graphic color display
48 user configurable pages (12 pages organized in 4 switchable page sets)

Resolution	800 x 480 pixel
Supported image file formats	PNG, BMP, JPG, GIF
Processor	667 MHz Dual Core
AD-Converters	10 kHz sampling rate with digital downsampling filter
Real time clock supply	Ultracap™, sustains realtime for 2 weeks
Configurable math channels	
User configurable CAN in/out messages	Up to 256 IDs (128 in and out)
Sampling rate	20 Hz (50 ms) standard, max. 1 kHz (1 ms) as optional upgrade (FULL_LOG_1/ FULL_LOG_2)
Online data compression	

Internal logger
- 4 GB memory on Recording 1 enabled
- 100 channels enabled
- 50 ms Sampling rate enabled
- FULL_LOG_1 (1,500 channels/1 kHz sampling rate on Recording 1) optional
- FULL_LOG_2 (4 GB memory on Recording 2) optional

Logging rates
- Usage of all features: 600 kB/s
- Primary logging use case: >800 kB/s
- Logging data download rate: up to 6.2 MB/s

Ambient light sensor

Technical Specifications

Mechanical Data

Size	203 x 128 x 38.5 mm
Weight	649 g
Protection classification	IP67
Operating temperature internal	-20 to 85°C
Max. vibration	Vibration profile 1 (see Downloads or bosch-motorsport.com)

Electrical Data

Supply voltage	6 to 18 V
Current consumption (w/o sensor supply)	<2 A (at 12 V)

Inputs (option)

4 x analog In (5 V/12 bit), Digital In, Wheelspeed HALL, or Wheelspeed DF11

1 x analog In (5 V/12 bit), Digital In or Laptrigger In

Switchable 3.01 kOhm pull-up resistors for all analog inputs

Sensor Supplies and Screens

1 x Sensor supply 5 V +/- 1 % or UBAT switched (max. 250 mA)

1 x Sensor ground

Connectors and Wires

Mating Connector: TE Connectivity 3-1437290-7

Connector Pins: TE Connectivity 3-1447221-4

2

Pin Configuration

Pin	Name	Status
1	KL30_KL15/UBAT	Incl.
2	SENSGND	Incl.
3	SENSPWR (5 V or UBAT switched)	Incl.
4	SIG2_IN (Analog In, Digital In, Wheelspeed HALL, Wheelspeed DF11, switchable Pull-Up 3.01 k)	Opt.
5	SIG4_IN (Analog In, Digital In, Wheelspeed HALL, Wheelspeed DF11, switchable Pull-Up 3.01 k)	Opt.
6	USB_GND	Opt.
7	USB_PWR	Opt.
8	KL31/GND	Incl.
9	SIG5_IN_LAPTRG (Analog In, Digital In, switchable Pull-Up 3.01 k)	Opt.
10	SIG1_IN (Analog In, Digital In, Wheelspeed HALL, Wheelspeed DF11, switchable Pull-Up 3.01 k)	Opt.
11	SIG3_IN (Analog In, Digital In, Wheelspeed HALL, Wheelspeed DF11, switchable Pull-Up 3.01 k)	Opt.
12	USB_DN	Opt.
13	USB_DP	Opt.
14	CAN_2_H_RS232_TX (switchable CAN or RS232)	Opt.
15	CAN_1_H	Incl.
16	ETH_CHANNEL0_TXN (Ethernet 100BaseTX)	Incl.
17	ETH_CHANNEL0_TXP	Incl.
18	ETH_CHANNEL0_RXN	Incl.
19	ETH_CHANNEL0_RXP	Incl.
20	TIMESTMP_INOUT (Timesync)	Incl.
21	CAN_2_L_RS232_RX (switchable CAN or RS232)	Opt.
22	CAN_1_L	Incl.
23	ETH_CHANNEL1_TXN (Ethernet 100BaseTX)	Incl.
24	ETH_CHANNEL1_TXP	Incl.
25	ETH_CHANNEL1_RXN	Incl.
26	ETH_CHANNEL1_RXP	Incl.

Communication

CAN interfaces	1
2nd CAN interface or RS232 with IO_EXTENS	e.g., Telemetry or GPS
Ethernet 100BaseTX	2
Laptrigger input	1
Configuration via RaceCon	Over Ethernet or MSA-Box II

CCP-Master, data acquisition from ECU that support CAN Calibration Protocol (CCP_MASTER option)

XCP-Master, data acquisition from ECU that support eXtended Calibration Protocol over UDP or CAN (CCP_MASTER option)

Installation Notes

Inspection services recommended after 220 h or 2 years, no components to replace.

This product may contain open source software. Information about license terms and other obligations is given in the manual.

Ordering Information

Display DDU 11
Order number **F02U.V03.208-03**

Software Options

CCP/XCP_MASTER
Order number **F02U.V02.213-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

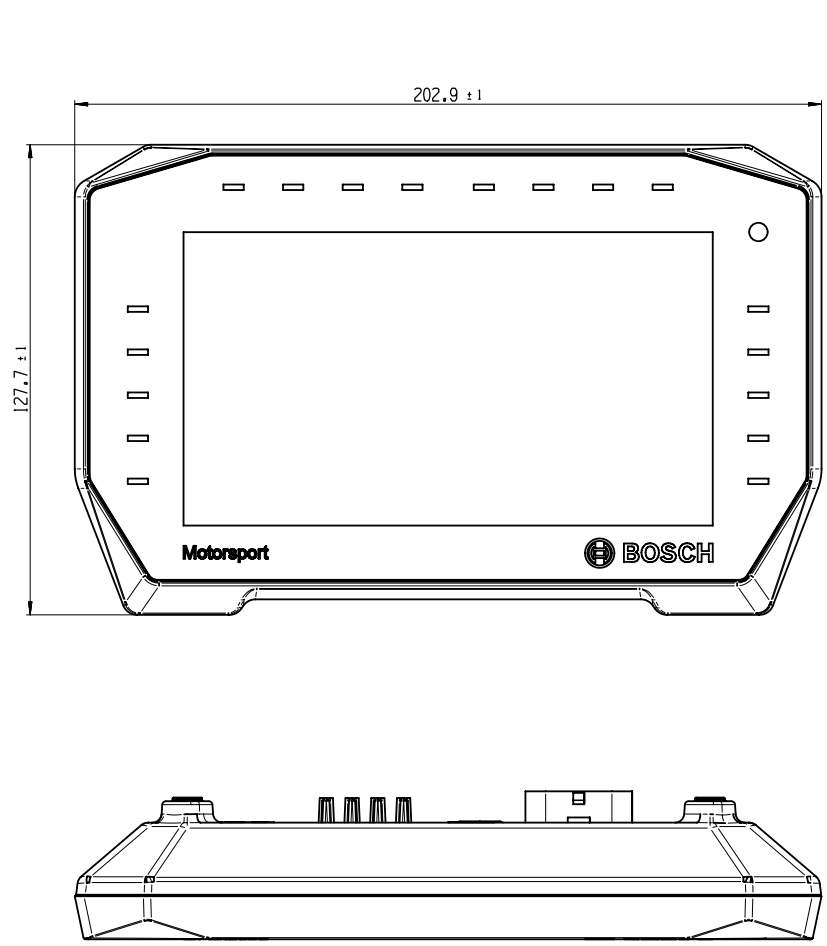
FULL_LOG_2
Order number **F02U.V02.305-01**

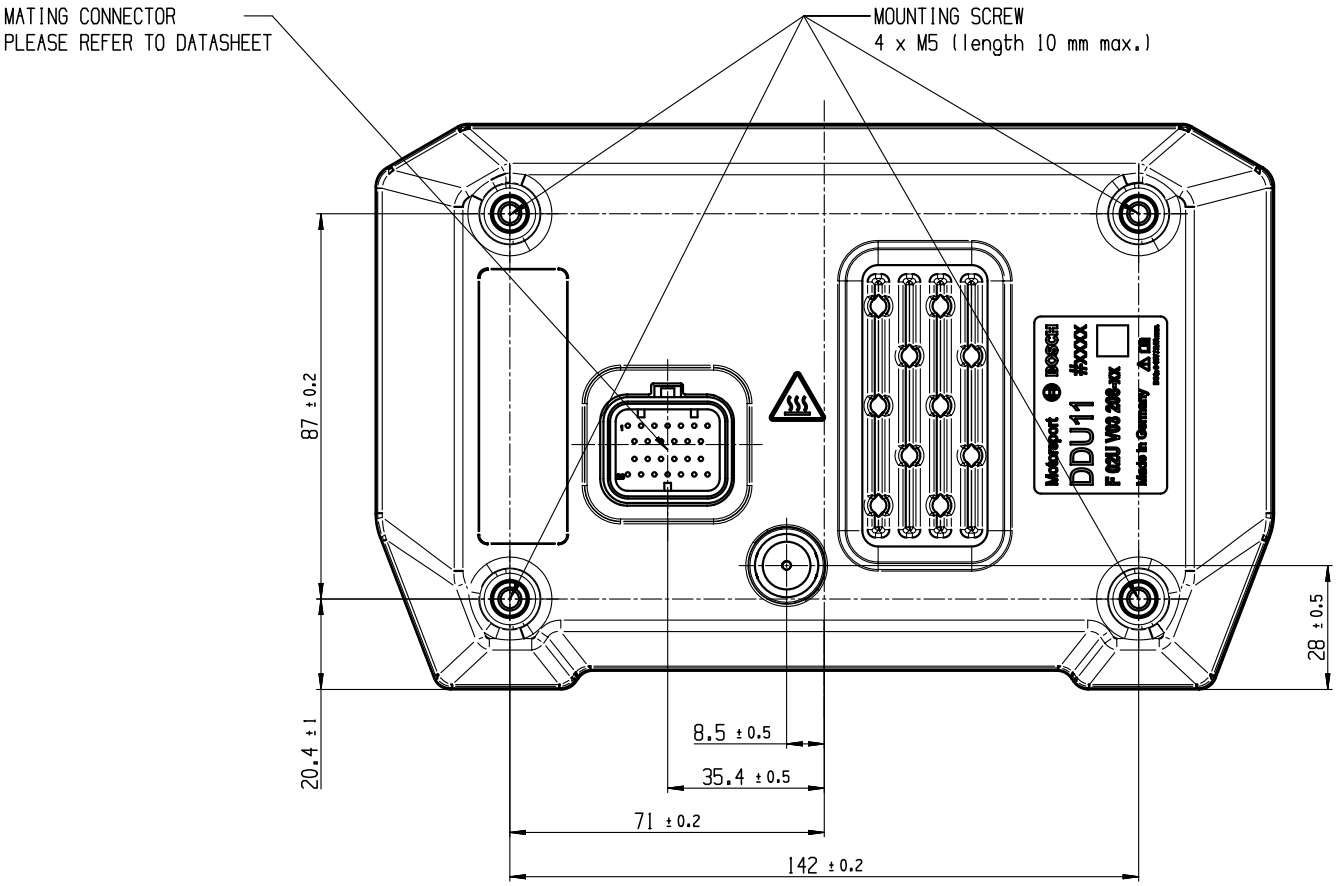
IO_EXTENS
Order number **F02U.V02.205-01**

Accessories

USB_DATA Kit
Order number **F02U.V02.214-01**

Dimensions




MATING CONNECTOR
PLEASE REFER TO DATASHEET
MOUNTING SCREW
4 x M5 (length 10 mm max.)
87 ±0.2
20.4 ±1
28 ±0.5
8.5 ±0.5
35.4 ±0.5
71 ±0.2
142 ±0.2
DDU11

Electronics 3

CAN Keypad 72

Collision Avoidance Systems 76

Data Loggers 85

Power Boxes 96

Sensor Interfaces 105

Test System 118

CAN Keypad CK-M12





Features

- 12 standard buttons with color indicator rings
- 9 additional digital switch inputs
- Moveable button inserts
- CAN input / output

The CAN Keypad CK-M12 allows for simplification of the dashboard by offering 12 buttons and 9 additional wired inputs to be evaluated and transmitted via CAN bus to other devices on the bus. Each button has an individually addressable LED indicating ring that can be used to acknowledge a button press event, indicate status of a device, or alert the driver to a fault condition. No special configuration software is needed, all feedback logic is done by PBX, DDU or ECU. Each keypad is supplied with 15 black inserts, optional insert kits are also available.

Application

Usage	PBX / DDU / ECU Interface
Temperature range	-40 to 85°C

Technical Specifications

Mechanical Data

Size	78 x 187 x 21 mm
Weight	280 g
Max. vibration	11 ms 30 G peak
Protection Classification	IP68

Electrical Data

Power supply Vs	9 to 32 V
Average current draw	100 mA
Max current draw	250 mA

Characteristics

Signal output	CAN
CAN transmit rate	100 Hz*
CAN baud rate	1 Mbaud*
TX ID	0x800*
RX ID	0x801*
TX Data	1 bit status for each input
RX Data	4 bit integer for each indicator color, 4 bit integer for brightness

* Custom CAN IDs / baud Rate Optional Upon Request

Note: CK-M12 DBC file available for CAN configuration

Connectors and Wires

CK-M12 Termination	Flying Lead 24AWG

Recommended Connectors

CK-M12	AS610-35PN
Mating	AS110-35SN

Wire Identification

Wire	Function
Red	12/24 V Power
Black	Ground
Yellow	CAN high (CANH)
Green	CAN low (CANL)
White, Black Trace	Digital Input 1 activated by Ground
White, Brown Trace	Digital Input 2 activated by Ground
White, Red Trace	Digital Input 3 activated by Ground
White, Orange Trace	Digital Input 4 activated by Ground
White, Yellow Trace	Digital Input 5 activated by Ground
White, Green Trace	Digital Input 6 activated by Ground
White, Blue Trace	Digital Input 7 activated by Ground
White, Purple Trace	Digital Input 8 activated by Ground
White, Grey Trace	Digital Input 9 activated by Ground

Insert Kits

Insert Road Race Kit
A/C
ABS
Alarm Reset
Anti-Lag

Insert Road Race Kit

- Arrow x 4
- Brake Spray
- Boost Decrease
- Boost Increase
- Brightness Down
- Brightness Up
- Close Menu
- Cool Suit
- Cooling Fan
- Day/Night Mode
- Drink
- Flash Hi Beam
- Fuel Reserve
- Fuel Reset
- Full Course Yellow
- Function Toggle
- Gearbox Emergency
- Hazard Flasher
- Heated Windshield
- Helmet Fan
- High Beam
- Horn
- Launch
- Low Beam
- Map Down
- Map Up
- Neutral
- Open Menu
- Page Down
- Page Up
- PDU Reset
- Pit Switch
- Power
- Power Steering Reset
- Pump Out
- Push to Pass
- Radiator Spray
- Rain Light
- Reset

Insert Road Race Kit

- Reverse
- Select
- Starter
- Traction Control Down
- Traction Control Up
- Wet Mode
- Windshield Spray
- Windshield Wiper

Insert Drag Race Kit

- A/C
- Alarm Reset
- Anti-Lag
- Arrow x 4
- Boost Decrease
- Boost Increase
- Brightness Down
- Brightness Up
- Burnout
- Close Menu
- Cooling Fan
- Day/Night Mode
- Function Toggle
- Hazard Flasher
- High Beam
- Horn
- Launch
- Line Lock
- Low Beam
- Map Down
- Map Up
- Nitrous Arm
- Nitrous Purge
- Open Menu
- Page Down
- Page Up
- PDU Reset

Insert Road Race Kit	
 Power	
 Pump Out	
 Push to Pass	
 Reset	
 Select	
 Starter	
 Traction Control Down	
 Traction Control Up	
 Transmission Brake	
 Windshield Spray	
 Windshield Wiper	

Insert Alpha/Numeric Kit	
A	V
B	W
C	X
D	Y
E	Z
F	!
G	-
H	+
I	0
J	1
K	2
L	3
M	4

Insert Road Race Kit	
N	5
O	6
P	7
Q	8
R	9
S	10
T	11
U	12

Installation Notes

Installation on flat surface recommended	
Bolt size	#10-32
Tightening Torque	0.7 +/- 0.1 Nm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

CAN Keypad CK-M12
Order number **F02U.V0U.328-04**

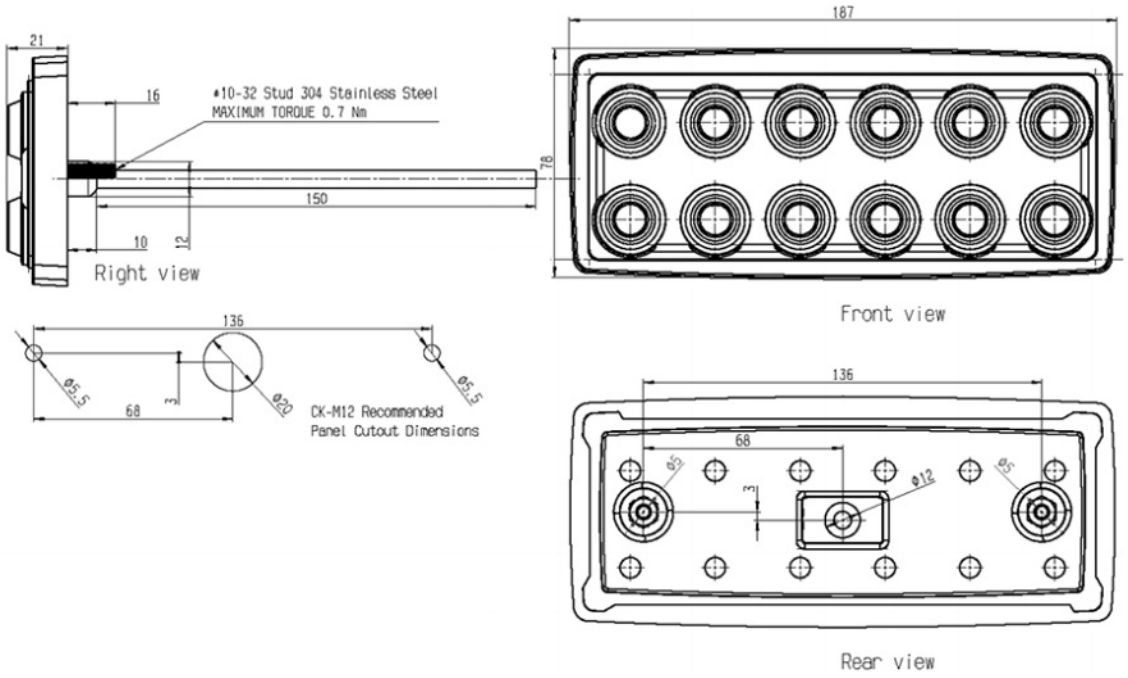
Accessories

Insert Road Race Kit
Order number **F02U.B0U.022-01**

Insert Drag Race Kit
Order number **F02U.B0U.023-01**

Insert Alpha/Numeric Kit
Order number **F02U.B0U.024-01**

Dimensions


21
16
#10-32 Stud 304 Stainless Steel
MAXIMUM TORQUE 0.7 Nm
150
10
12
Right view
187
78
Front view
136
Ø5.5
68
3
Ø20
CK-M12 Recommended
Panel Cutout Dimensions
Ø5.5
136
68
Ø5
3
Ø12
Ø5
Rear view

Overview

Collision Avoidance System CAS-M light



- Radar sensor with integrated logic
- Warning for overtake situations
- Easy system adaptation
- Universal CAN interface for various displays
- Visualization via display LEDs

Collision Avoidance System CAS-M 3 EVO



- Approaching vehicle tracking
- Left/right passing alerts
- Improves visibility of objects in rain, mist or darkness
- Full Bosch Motorsport tool integration

Collision Avoidance System CAS-M light



Features

- Radar sensor with integrated logic
- Warning for overtake situations
- Easy system adaptation
- Universal CAN interface for various displays
- Visualization via display LEDs

The collision avoidance system CAS-M light helps the driver to focus on the track and warns him if a car is approaching from behind. The system provides information about relative speed and distance of the closest vehicle on the CAN bus. An additional display with CAN bus interface is required (e.g. DDU 9).
The information is based on a Bosch radar sensor which contains a FMCW radar transceiver operating in the frequency range of 76.0 - 77.0 GHz. Targets in front of the sensor are reflecting the radar signal and the relative speed and distance is determined via Doppler-effect and beat frequency.
The benefit is even more increased during darkness or in bad weather conditions. The system interface is very intuitive and adaptable to the drivers liking.

Application

Operating temperature	-40 to 85°C
Storage temperature	-20 to 95°C
Range	150 m
Tracks	1 Object (nearest)
Interface	CAN
CAN rate	500 kbaud or 1 Mbaud
CAN update rate	50 Hz
Horizontal field of view Radar	85° from 0 to 29 m 70° from 29 to 46 m 50° from 46 to 73 m 42° from 73 to 78 m 20° from 78 to 95 m

Technical Specifications

Mechanical Data

Weight of radar sensor MRR	199 g
Size	60x70x32 mm
Protection Classification	IP 6K6K (DIN 40 050) IP 6K7 (DIN 40 050)
Max. vibration	Randome vibration aeff = 30.8 m/s^2, 3x8 h (according ISO/DIS 16750-3)

Electrical Data

Supply voltage	6.5 to 18 V
An external fuse has to be provided (rec. 10 A). External overvoltage protection is required (internal overvoltage protection up to 35 V).	
Reverse polarity voltage protection	-14 V max. t ≤ 60 sec

Connectors and Wires

Mating connector	F037.B00.168-01
Pin 1	GND
Pin 2	CAN-H
Pin 3	CAN-L
Pin 4	n.c.
Pin 5	n.c.
Pin 6	n.c.
Pin 7	n.c.
Pin 8	V+

Installation Notes

The system includes a radar sensor and a detailed user manual.

Ordering information for suitable wiring looms for the different CAS-M light packages are specified in the user manual.

The system needs to be connected to the vehicle CAN bus (connection to display needed) and supplied with 12 V from the supply system on board.

The rear unit must be mounted 90° to the vehicles vertical and horizontal axis and within ± 200 mm of the vehicle lateral centerline.

Mounting distance of radar over ground: 300 to 1,000 mm

To achieve the expected performance from the radar sensor, it must have a clear and unobstructed view. There should be no material over the radar sensor and the sensor should be allowed a clear 180-degree field of view.

The system needs yaw rate and vehicle speed information.

Cat 6 A standard for Gigabit Ethernet.

See CAS-M light in action on http://youtu.be/EzpSy-eJRi4

Legal

The CAS-M 3 radar sensor is based on the Bosch Engineering MRRe14HBW radar sensor. The MRRe14HBW is frequency certified for the following countries:

Country
Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Iceland, Liechtenstein, Norway, Switzerland
USA
Canada
Japan
Australia
New Zealand

Country
United Kingdom

If the MRRe14HBW and hence the CAS-M 3 radar sensor SCU is not operated within this context, it lies within the customer's responsibility to ensure compliance of the application with national regulations and standards, e.g., electromagnetic compatibility and radio spectrum matters.
Link to the up-to-date EU Declaration of Confirmity DoC:
http://eu-doc.bosch.com
(Please enter the model MRRe14HBW on which CAS-M sensors are based on to find the correct DoC in the database.)

Legal Restrictions

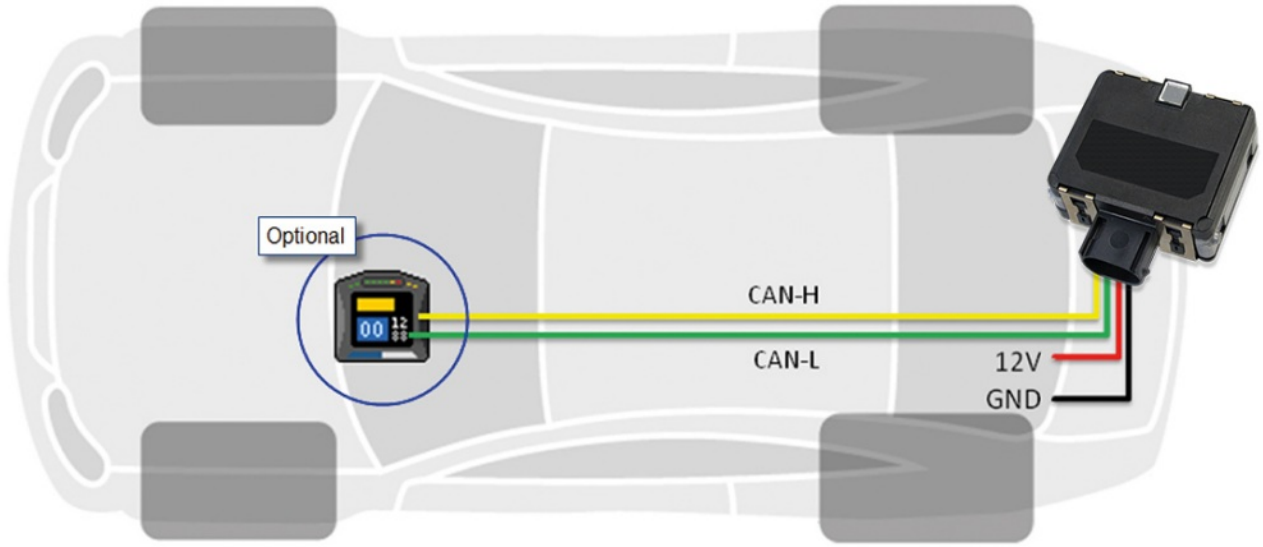
The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

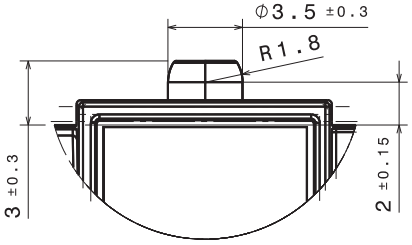
CAS-M light (500 kbaud)
Order number **F02U.V02.021-01**

CAS-M light (1 Mbaud)
Order number **F02U.V02.220-01**

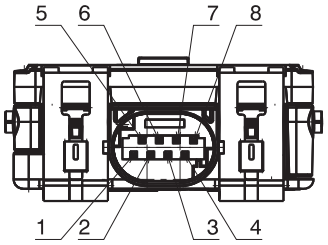
Dimensions

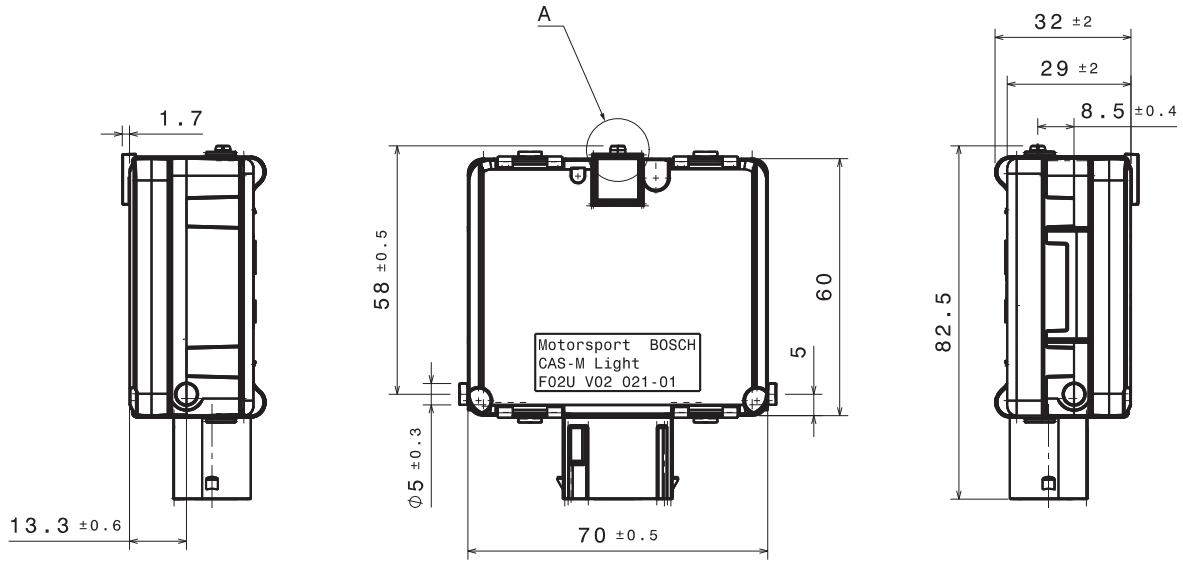


Wiring schematic



Detail A





Right view

Front view

Left view

Dimensions

Collision Avoidance System CAS-M 3 EVO



Features

- Approaching vehicle tracking
- Left/right passing alerts
- Improves visibility of objects in rain, mist or darkness
- Full Bosch Motorsport tool integration

The Collision Avoidance System-Motorsport 3 EVO (CAS-M 3 EVO) features a high-performance Bosch Motorsport **Display Unit** for fast video processing (right in the picture), and a **Rear Module**, composed from a Bosch mid-range radar sensor for a wider field of view in close-up range and a fast response high definition camera (left in the picture).
The CAS-M 3 EVO system provides real time visualization and warns the driver about approaching or overtaking cars via intuitive marking of the cars on the display. It helps prevent the most common collisions and allows drivers to focus on the race. With a momentary glance, the driver can tell how many cars are following and their classification depending on distance and relative speed. The radar tracks up to 40 objects and marks up to four objects on the display. In addition, bright flashing LEDs alert the driver when any car attempts a passing maneuver. All of these features work at night or in the rain when visibility is typically poor. Furthermore, the real time gap of a marked object is measured and can be provided over CAN or Ethernet.
The CAS-M 3 EVO system is fully integrated in the Bosch Motorsport Tool environment and can be configured with RaceCon.

Application

Range	95 m
Horizontal field of view	
Radar	85° from 0 to 29 m 70° from 29 to 46 m 50° from 46 to 73 m 42° from 73 to 78 m 20° from 78 to 95 m
Camera	78°
Number of tracked objects	Max. 40
Number of displayed classified objects	Max. 4
Display format	7”
Display resolution	800 x 480 pixel
User configurable CAN in/out messages	
User configurable LEDs	

Technical Specifications

Mechanical Data

Display Unit	
Size	198 x 134 x 35 mm
Weight	830 g
Protection Classification	IP67
Operating temperature internal	-20 to 85°C
Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)

Rear Module	
Size	120 x 150 x 115 mm
Weight	880 g
Protection classification	IP67
Operating temperature	0 to 70°C (rearview camera internal temperature*)
Max. vibration	Vibration profile 1 (See Downloads or www.bosch-motorsport.com)

*If the temperature limit is reached, forced air cooling of the camera is recommended.

Electrical Data

Supply voltage (Display and Rear Unit)	6 to 18 V

Current consumption	
Display Unit	2 A (at 12 V)
Rear Module	0.7 A (at 12 V)

Communication

Display Unit	
CAN	1x private CAN for radar, 1x CAN
Ethernet	1x private 1GBase-T Ethernet for camera, 1x 100Base-T Ethernet
Time sync synchronization Ethernet	1

Rear Module	
CAN	1x private CAN for radar
Ethernet	1x private 1GBase-T Ethernet for camera

Software Tools (free download)

Data analysis tool	WinDarab 7 Light
System configuration tool	RaceCon

Connectors and Wires

Display Unit	
Motorsport connector on device	AS212-35PN
Mating connector AS612-35SN	F02U.000.443-01
Rear Module	
Motorsport connector on device	AS212-35PN
Mating connector AS612-35SN	F02U.000.443-01

Pin Configuration

Display Unit		Rear Module for Vehicle Harness
Pin No.		Pin No.
1	GigEthernet_TR3_N (private Eth camera **PEC**)	14
2	GigEthernet_TR3_P (PEC)	1
3	GigEthernet_TR2_N (PEC)	2
4	GigEthernet_TR2_P (PEC)	3
5	GigEthernet_TR1_N (PEC)	4
6	GigEthernet_TR1_P (PEC)	5
7	GigEthernet_TR0_N (PEC)	6
8	GigEthernet_TR0_P (PEC)	7
9	Ethernet_TXP	n/a - Connect to Bosch System Ethernet BSE
10	Ethernet_RXP	n/a - Connect to BSE
11	Ethernet_RXN	n/a - Connect to BSE
12	CAN_High_Vehicle	n/a - Connect to Bosch System CAN
13	+12 V KL30	n/a - Connect to Vehicle System Power **VSP**
14	+12 V KL15	n/a - Connect to VSP
15	GND KL31	n/a - Connect to VSP
16	GND KL31	n/a - Connect to VSP
17	Time_Sync	n/a – Connect Display to Bosch Logging System Time Sync
18	ETH_Screen	n/a - Connect to BSE
19	Ethernet_TXN	n/a - Connect to BSE
20	CAN Low Vehicle	n/a - Connect to Bosch System CAN
21	CAN High Radar (private CAN radar **PCR**)	11
22	CAN Low Radar (PCR)	12

Rear Module		Display Unit for Vehicle Harness
1	GigEthernet_TR3_P (private Eth camera PEC)	2
2	GigEthernet_TR2_N (PEC)	3
3	GigEthernet_TR2_P (PEC)	4
4	GigEthernet_TR1_N (PEC)	5
5	GigEthernet_TR1_P (PEC)	6
6	GigEthernet_TR0_N (PEC	7
7	GigEthernet_TR0_P (PEC)	8
8	+12 V Ubat	n/a - Connect to VSP
9	+12 V Ubat	n/a - Connect to VSP
10	+12 V Ubat (opt. to display)	13 (opt. if KL30 not connected)
11	CAN High Radar (PCR)	21
12	CAN Low Radar (PCR)	22
13	n.c.	
14	GigEthernet_TR3_N (PEC)	1
15	GigEthernet Screen	
16	n.c.	
17	CAN Screen	n/c
18	GND	
19	+12 V Ubat (opt. to display)	13 (opt. if KL30 not connected)
20	GND	n/a - Connect to VSP
21	GND (opt. to display)	15 (opt. if KL31 not connected)
22	GND (opt. to display)	15 (opt. if KL31 not connected)

Communication

Display Unit	
CAN	1x private CAN for radar, 1x CAN
Ethernet	1x private 1GBase-T Ethernet for camera, 1x 100Base-T Ethernet
Time sync synchronization Ethernet	1
Rear Module	
CAN	1x private CAN for radar
Ethernet	1x private 1GBase-T Ethernet for camera

Installation Notes

The rear unit must be mounted 90° to the vehicles vertical and horizontal axis and within ± 200 mm of the vehicle lateral centerline.

Mounting distance of radar over ground: 300 to 1,000 mm

To achieve the expected performance from the radar sensor, it must have a clear and unobstructed view. There should be no material over the radar sensor and the sensor should be allowed a clear 180 degree field of view.

Consider the maximum vibration limits for the mounting position of the rear module. The system is approved referred to vibration profile 1, see Downloads or www.bosch-motorsport.com.

Check the radar sensor for travel inside the radar bracket. In this case, remove the radar sensor and check the locking pins at both sides of the sensor. Due to vibrations, these pins can be deformed. Exceeding travel of the sensor can damage the electric contacts.

The system needs yaw rate and vehicle speed information.

Cat 6 A standard for Gigabit Ethernet.

This product may contain open source software. Information about license terms and other obligations is given in the manual.

For the private CAN network between display and rear module, no termination resistor is needed in the wiring harness. There are preinstalled termination resistors in the radar sensor and the display.

Safety Notes

It is not permitted to use the system as mirror replacement.

Legal

The CAS-M 3 radar sensor is based on the Bosch Engineering MRRe14HBW radar sensor. The MRRe14HBW is frequency certified for the following countries:

Country
Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Iceland, Liechtenstein, Norway, Switzerland
USA
Canada
Japan
Australia
New Zealand
Country
United Kingdom

If the MRRe14HBW and hence the CAS-M 3 radar sensor SCU is not operated within this context, it lies within the customer's responsibility to ensure compliance of the application with national regulations and standards, e.g., electromagnetic compatibility and radio spectrum matters.
Link to the up-to-date EU Declaration of Confirmity DoC:
http://eu-doc.bosch.com
(Please enter the model MRRe14HBW on which CAS-M sensors are based on to find the correct DoC in the database.)

Legal Restrictions

The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Collision Avoidance System CAS-M 3 EVO
Order number **F02U.V02.648-03**

Acceleration Sensor MM5.10
Without wire (1)
Order number **F02U.V01.511-02**

Acceleration Sensor MM5.10
Wire with open end (2)
Order number **F02U.V01.511-92**

Acceleration Sensor MM5.10
Wire with motorsport connector (3)
Order number **F02U.V01.512-03**

Accessories

Display Unit
Order number **F02U.V02.660-03**

Rear Module
Consisting of parts (A) to (E)
Order number **F02U.V02.630-02**

Radar Bracket (A)
Order number **F037.D00.084-01**

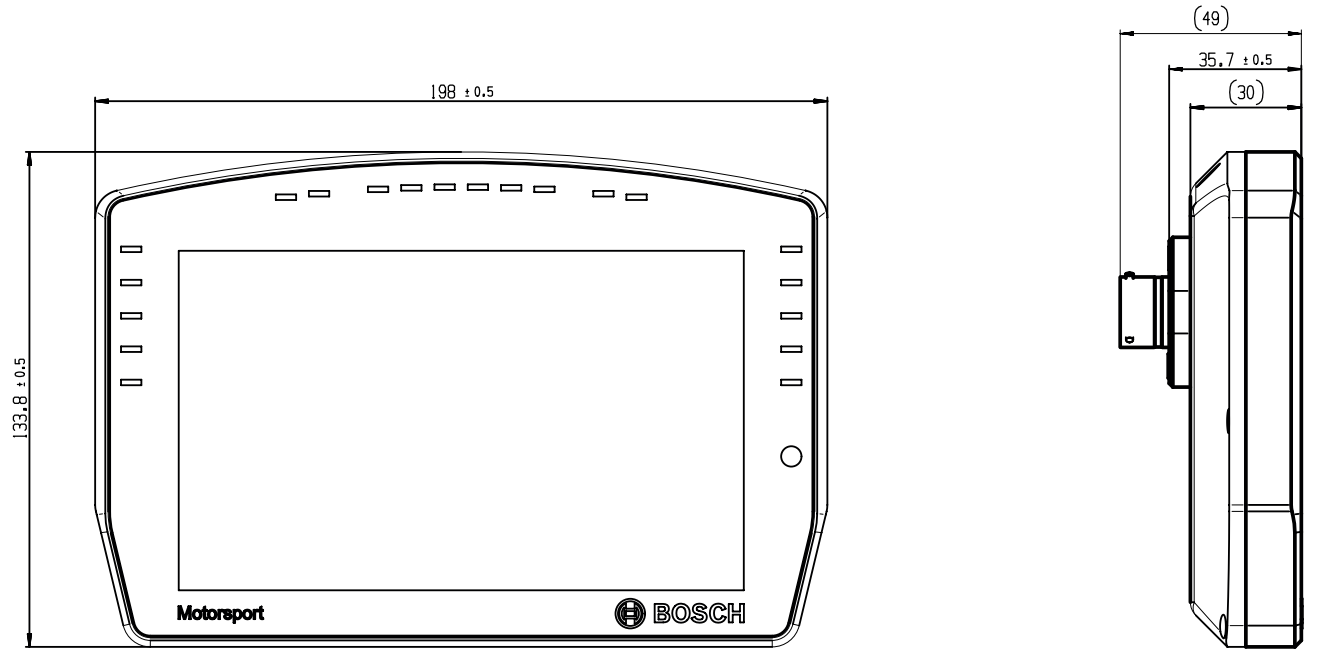
Radar Unit (B)
Order number **F02U.V02.647-01**

Camera Unit (C)
Order number **F02U.V02.799-01**

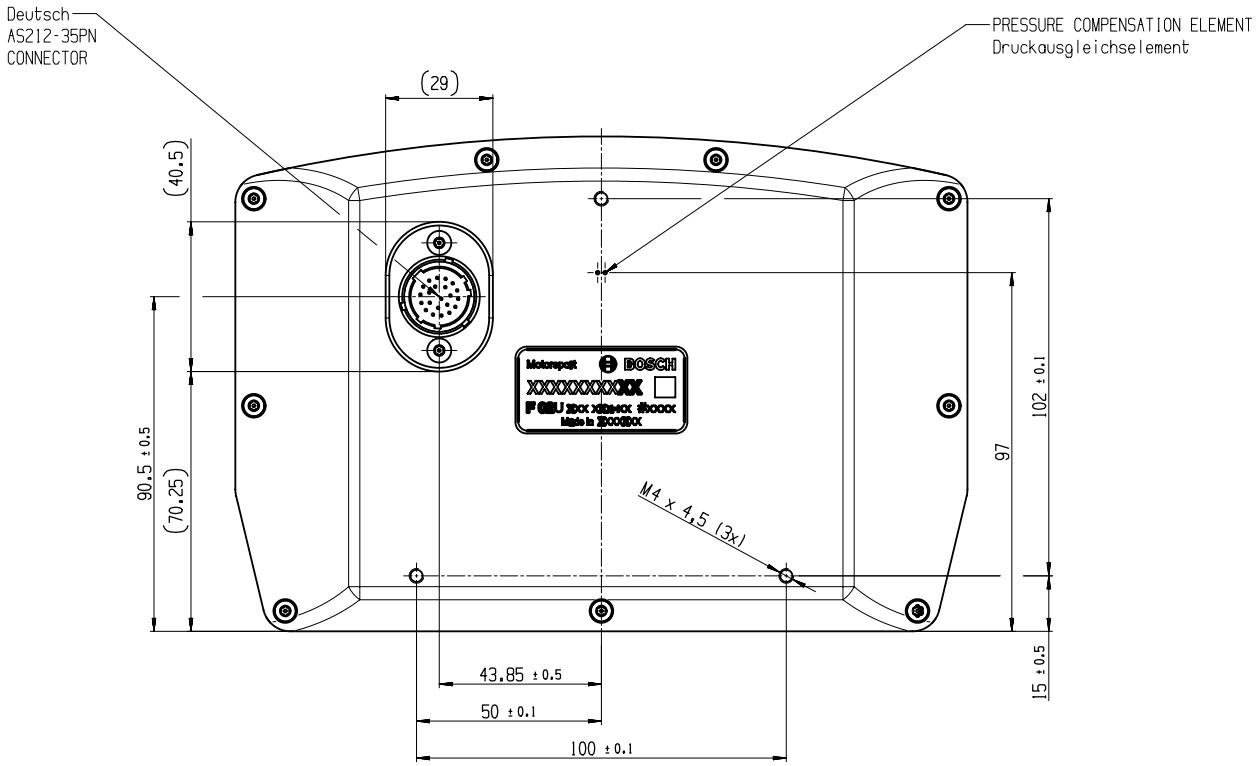
Wiring Harness (D)
Order number **F02U.V02.802-01**

Interface Module (Housing and Electronics) (E)
Order number **F02U.V02.639-01**

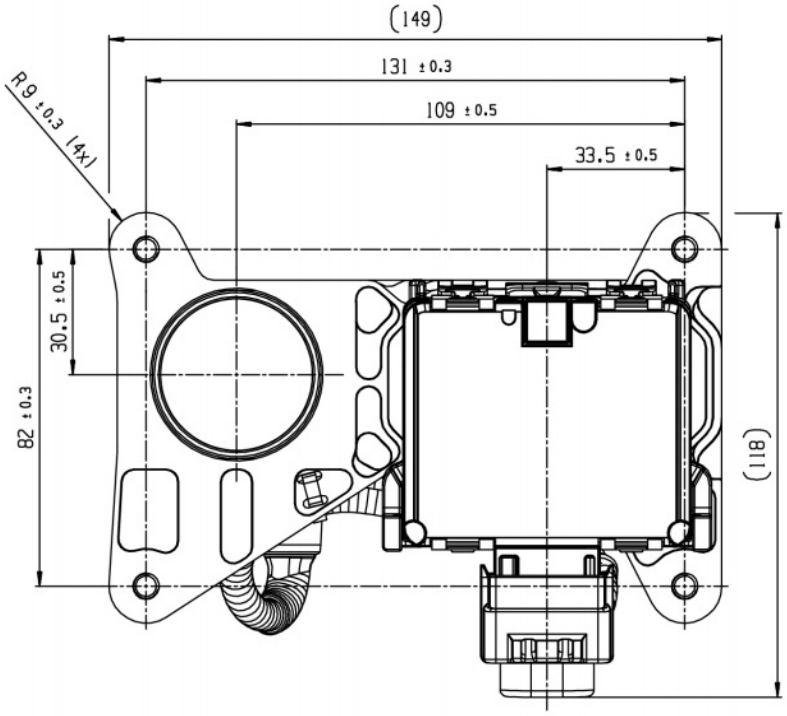
Dimensions



.



Display



Rear Module



A: Radar Bracket
B: Radar Sensor
C: Camera
D: Wiring Harness for Radar and Camera
E: Interface Module (Housing and Electronics)

Spare Parts of the Rear Module

Overview

Data Logger C 70



- Cutting-edge 667 MHz Dual Core Processor
- Recording on USB flash drive (opt.)
- Supports GPS lap trigger, pre-dated lap time etc.
- High programming flexibility using mathematical functions and conditional channels

Data Logger and Sensor Interface C 80



- Aluminum housing
- Powerful data logger with up to 20 GB memory
- Supports Bosch multi-logger configuration
- USB recording and full telemetry support

USB Data Components



- Capacity 32 GB
- Robust brass housing
- High performance push-pull connector
- Compatible with ECUs, VCUs, DDUs, Data Loggers, ...

Data Logger C 70



Features

- Cutting-edge 667 MHz Dual Core Processor
- Recording on USB flash drive (opt.)
- Supports GPS lap trigger, pre-dated lap time etc.
- High programming flexibility using mathematical functions and conditional channels

The data logger C 70 integrates a programmable data logging system for motorsport applications for a very competitive price. Additional input devices can be connected via Ethernet and CAN buses. Data Analysis Software WinDarab is available free of charge as “WinDarab V7 free” on our website. The logger can be upgraded to a 2nd logging partition of 4 GB (e.g. for long term recording).
For quick data transfer from the car e.g. during pit stop, data copy to a USB stick is available as an option. The stick is connected to the wiring harness for the C 70.
The device comes with 4 analog and 4 speed inputs as standard; further 12 analog inputs are available as optional upgrade.

Application

Processor	667 MHz Dual Core
Converters	10 kHz 12 bit AD converters with digital low pass filter
Internal power source	Li/Ion capacitor
Configurable math channels	
User configurable CAN in/out messages	
Online data compression	

Internal logger

- 4 GB memory on Recording 1 enabled
- 1,500 channels enabled
- 1 ms sampling rate enabled
- FULL_LOG_2 (4 GB memory on Recording 2) optional
- DATA_USB (Data copy to USB flash drive) optional

Logging rates

- Usage of all features: 600 kB/s
- Primary logging use case: >1,200 kB/s
- Logging data download rate: up to 6.2 MB/s

LTE Ethernet telemetry support, GSM telemetry support

Technical Specifications

Mechanical Data

Size	151 x 126 x 25.5 mm
Weight	450 g
Protection Classification	IP54 to DIN 40050, Section 9, Issue 2008
Operating temperature internal	-20 to 85°C
Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)

Electrical Data

Supply voltage	5 to 18 V

Inputs

4 x analog channels, additional 12 optional
0 to 5 V input range
12 bit resolution
switchable pull up resistor for all ANA_IN
4 x Hall-effect or DF11 wheel speed inputs, switchable

Sensor Supplies and Screens

2 x Sensor supply 5 V ± 1 % (250 mA)
1 x Sensor supply 10 V ± 1 % (250 mA)
1 x Sensor supply U_Bat (250 mA)
4 x Sensor ground

Connectors and Wires

Motorsport connector on logger	AS216-35PN
Mating connector AS616-35SN	F02U.000.466-01

Pin Configuration

Pin	Name	Comment	Status
1	KL_31		Incl.
2	KL_15		Incl.
3	KL_30		Incl.
4	Rev_In_3	Hall or DF11 switchable	Incl.
5	Rev_In_1	Hall or DF11 switchable	Incl.
6	KL_31		Incl.
7	CAN_2_L	CAN speed selectable	Incl.
8	Ethernet_2_TXP		Incl.
9	Ethernet_2_TXN		Incl.

Pin	Name	Comment	Status
10	Sens_Power_12V	over current protected	Incl.
11	Rev_In_4	Hall or DF11 switchable	Incl.
12	Rev_In_2	Hall or DF11 switchable	Incl.
13	Laptrigger_In		Incl.
14	CAN_2_H	CAN speed selectable	Incl.
15	CAN_1_H	CAN speed selectable	Incl.
16	Ethernet_2_RXP		Incl.
17	Sens_Gnd_4	fused	Incl.
18	Sens_Power 5V	over current protected	Incl.
19	ANA_IN_3	3.01 kOhm switchable	Incl.
20	ANA_IN_4	3.01 kOhm switchable	Incl.
21	Time_Sync	connection to Bosch ECU	Incl.
22	CAN_1_L	CAN speed selectable	Incl.
23	Com_screen	Ethernet and USB screen	Incl.
24	Ethernet_2_RXN		Incl.
25	Sens_Gnd_3	fused	Incl.
26	Sens_Power 5V	over current protected	Incl.
27	ANA_IN_7	3.01 kOhm switchable	Opt.
28	ANA_IN_1	3.01 kOhm switchable	Incl.
29	USB_Device_DP	to Bosch USB stick	Opt.
30	RS232_TX_Telemetry	Transmit Telemetry data	Incl.
31	Ethernet_1_TXP		Incl.
32	Sens_Gnd_2	fused	Incl.
33	Sens_Power_10V	over current protected	Incl.
34	ANA_IN_8	3.01 kOhm switchable	Opt.
35	ANA_IN_10	3.01 kOhm switchable	Opt.
36	USB_Device_Gnd	to Bosch USB stick	Opt.
37	USB_Device_DN	to Bosch USB stick	Opt.
38	RS232_RX_Telemetry	Receive Telemetry data	Incl.
39	Ethernet_1_TXN		Incl.
40	Sens_Gnd_1	fused	Incl.
41	ANA_IN_11	3.01 kOhm switchable	Opt.
42	ANA_IN_9	3.01 kOhm switchable	Opt.
43	RS232_TX_GPS	Transmit GPS data	Incl.
44	ANA_IN_16	3.01 kOhm switchable	Opt.
45	USB_Device_Power	to Bosch USB stick	Opt.
46	Ethernet_1_RXP		Incl.
47	ANA_IN_12	3.01 kOhm switchable	Opt.
48	ANA_IN_6	3.01 kOhm switchable	Opt.
49	ANA_IN_2	3.01 kOhm switchable	Incl.
50	ANA_IN_13	3.01 kOhm switchable	Opt.
51	ANA_IN_15	3.01 kOhm switchable	Opt.
52	Ethernet_1_RXN		Incl.
53	ANA_IN_5	3.01 kOhm switchable	Opt.
54	RS232_RX_GPS	Receive GPS data	Incl.
55	ANA_IN_14	3.01 kOhm switchable	Opt.

Communication

CAN interfaces	2
Ethernet 100BaseT	2
Laptrigger input	1
RS232	Telemetry, GPS
Configuration via RaceCon	Over Ethernet or MSA-Box II

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCP/XCP_MASTER

Enables CCP/XCP master functionality to request data from foreign devices via CAN/CCP protocol or XCP over Ethernet (UDP). (ASAP2 file from ECU manufacturer required)

FULL_LOG_2

4 GB memory on Recording 2

IO_EXTENS

Additional 12 analog input channels

DATA_USB

Data copy to USB flash drive

Ordering Information

Data Logger C 70
Order number **F02U.V02.302-02**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCP/XCP_MASTER
Order number **F02U.V02.213-01**

FULL_LOG_2
Order number **F02U.V02.305-01**

IO_EXTENS
Order number **F02U.V02.205-01**

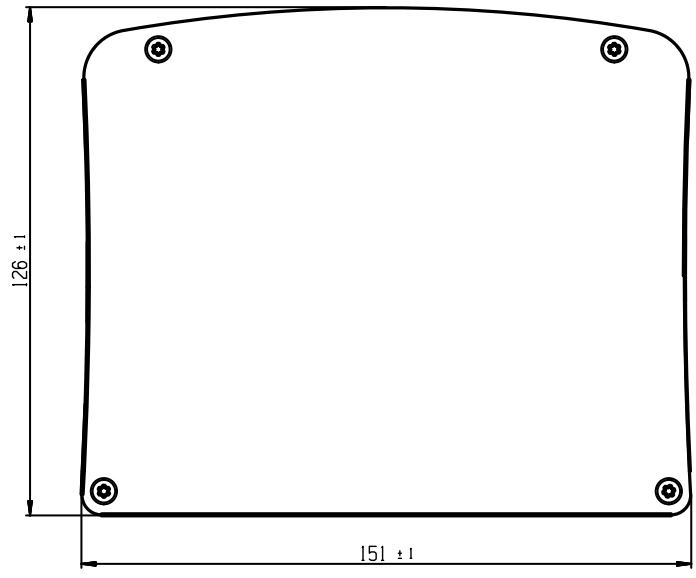
DATA_USB
Order number **F02U.V03.476-01**

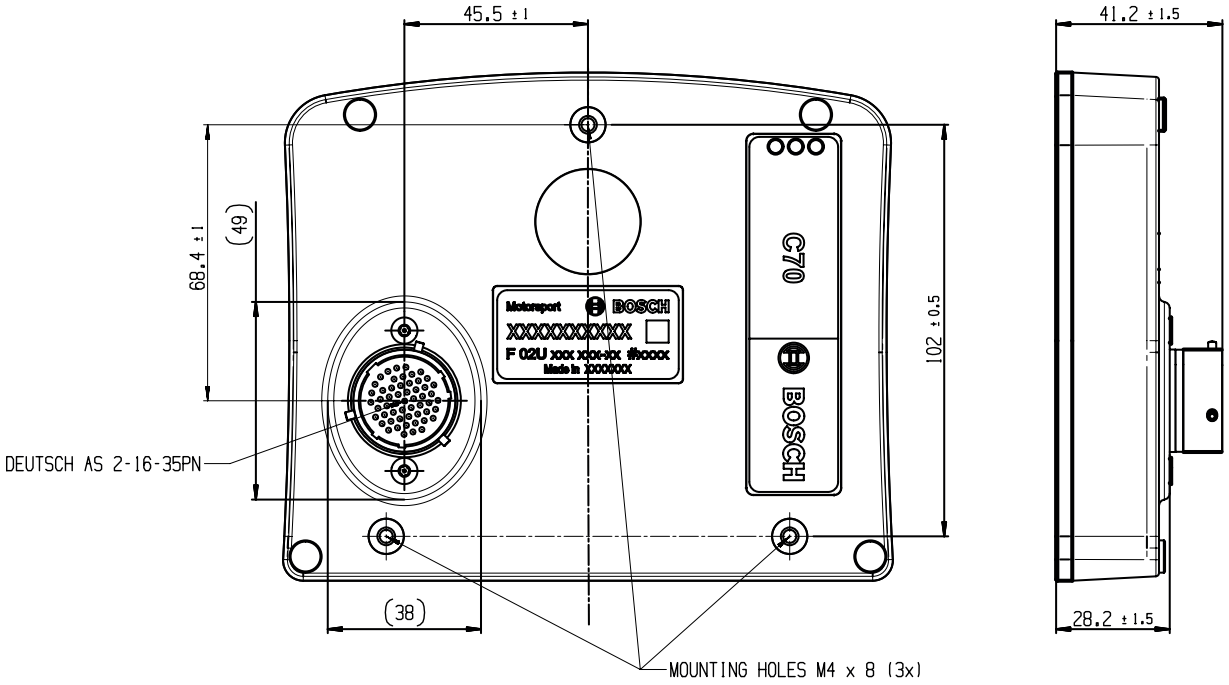
Accessories

Vehicle Loom Basic
Order number **F02U.V02.735-01**

Bench Loom
Order number **F02U.V02.349-01**

Dimensions




45.5 ±1
41.2 ±1.5
68.4 ±1
(49)
102 ±0.5
C70
BOSCH
Motorsport
BOSCH
XXXXXXXXXX
F 02U xxx xxx-xx #xxxx
Made in xxxxxxx
DEUTSCH AS 2-16-35PN
(38)
28.2 ±1.5
MOUNTING HOLES M4 x 8 (3x)

Data Logger and Sensor Interface C 80



Features

- Aluminum housing
- Powerful data logger with up to 20 GB memory
- Supports Bosch multi-logger configuration
- USB recording and full telemetry support

We offer the C 80 in two basic versions, on the one hand as a data logger and on the other hand as a sensor interface. Choose between these basic variants and combine or add functionalities now or later.
The data logger C 80 is a professional data logging system for motorsport applications. This allows for synchronized acquisition of engine data from the ECU and chassis data from up to 26 analog and 4 digital input channels. Additional input devices can be connected via Ethernet and CAN buses.
Recorded data from the up to 16 GB logger can be downloaded via high speed Ethernet.
Software upgrades for the C 80 (field upgradable by entering a key) activate tailored configurations like a second logging partition of 4 GB, USB recording, CCP/XCP-master for simple data access to third party devices, as well as additional input channels.

Application

Converters	10 kHz 12 bit AD converters with digital low pass filter
Configurable math channels	
User configurable CAN in/out messages	
Sampling rate	
Online data compression	
Internal logger	

- FULL_LOG_1 (4 GB memory on Recording 1) enabled, optional in C80 Sensor Interface
- PERF_LOG_1 (16 GB memory on Partition 1) optional
- FULL_LOG_2 (4 GB memory on Recording 2) optional
- 1,500 channels enabled
- 1 ms sampling rate enabled
- DATA_USB (Data copy to USB flash drive) optional

Logging rates
- Usage of all features: 800 kB/s
- Primary logging use case: >1,500 kB/s
- Logging data download rate: up to 7.5 MB/s

3-port network switch

Telemetry Support via Ethernet (recommended) and RS232

Technical Specifications

Mechanical Data

Size	105 x 34.5 x 137.5 mm
Weight	462 g
Protection Classification	IP67 to DIN 40050, Section 9, Issue 2008
Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)
Operating temperature (internal)	0 to 85°C

Operation outside the temperature limits can be tested on request during the manufacturing tests.

Electrical Data

Supply voltage	8 to 18 V
Max. power consumption (w/o loads)	10 W at 14 V

Inputs

6 x analog channels

0 to 5 V input range

12 bit resolution

1 x 3 kOhm switchable pull up resistor

Sensor Supplies and Screens

4 x PWM outputs (low side switch 2 A each)

1 x sensor supply 5 V ± 1 % (250 mA)

Connectors and Wires

Motorsport connectors double density	2 x 41 pins
Mating connector I ASDD612-41SN	F02U.002.216-01
Mating connector II ASDD612-41SA	F02U.004.180-01

Pin Layout ASDD212-41PN

Pin	Name	Description
1	KL30	

Pin	Name	Description
2; 3	KL15	
4; 5	KL31	
6	Ethernet Channel0 Tx plus	Wire Ethernet_0 - TX+
7	Ethernet Channel0 Tx minus	Wire Ethernet_0 - TX-
8	Ethernet Channel0 Rx plus	Wire Ethernet_0 - RX+
9	Ethernet Channel0 Rx minus	Wire Ethernet_0 - RX-
10	Ethernet Schirm	Ethernet Schirm
11	Ethernet Channel1 Tx plus	Wire Ethernet_0 - TX+
12	Ethernet Channel1 Tx minus	Wire Ethernet_0 - TX-
13	Ethernet Channel1 Rx plus	Wire Ethernet_0 - RX+
14	Ethernet Channel1 Rx minus	Wire Ethernet_0 - RX-
15	Ethernet Channel2 Tx plus	Wire Ethernet_0 - TX+
16	Ethernet Channel2 Tx minus	Wire Ethernet_0 - TX-
17	Ethernet Channel2 Rx plus	Wire Ethernet_0 - RX+
18	Ethernet Channel2 Rx minus	Wire Ethernet_0 - RX-
19	CAN_A_H	CAN_A - HIGH
20	CAN_A_L	CAN_A - LOW
21	CAN_B_H	CAN_B - HIGH
22	CAN_B_L	CAN_B - LOW
23	USB Power	500mA USB_Power
24	USB Data Plus	USB_OTG_Plus
25	USB Data Minus	USB_OTG_Minus
26	USB GND	USB_Ground
27	SENSPWR5_1	
28	SENSGND	
29	Timestamp	
30	LS_GND_1	Low-Side Ground2
31	LS_SWITCH_1	lowside switch 2A
32	LS_SWITCH_2	lowside switch 2A
33	LS_SWITCH_3	lowside switch 2A
34	LS_SWITCH_4	lowside switch 2A
35	LS_GND_2	Low-Side Ground2
36	ANAIN_M1_1	0 to 5V Analog
37	ANAIN_M1_2	0 to 5V Analog
38	ANAIN_M1_3	0 to 5V Analog
39	ANAIN_M1_4	0 to 5V Analog
40	ANAIN_M1_5	0 to 5V Analog
41	ANAIN_M1_6	0 to 5V Analog

Pin Layout ASDD212-41PA

Pin	Name	Description
1	UBATT_FUSE1	
2	SENSPWR10_1	
3	SENSPWR5_2	
4	SENSPWR5_3	
5	SENSPWR5_4	
6; 7	SENSGND	
8	RS232A TX	Transmit Telemetry data
9	RS232A RX	Receive Telemetry data
10	RS232B TX	Transmit GPS data
11	RS232B RX	Receive GPS data
12	RS232_GND	RS232 Ground
13	REV1_P	Hall / Inductive
14	REV1_M	Hall / Inductive
15	REV2_P	Hall / Inductive
16	REV2_M	Hall / Inductive
17	REV3_P	Hall / Inductive
18	REV3_M	Hall / Inductive
19	REV4_P	Hall / Inductive
20	REV4_M	Hall / Inductive
21	ANAIN_M1_7	0 to 5V Analog
22	ANAIN_M1_8	0 to 5V Analog
23	ANAIN_M1_9	0 to 5V Analog
24	ANAIN_M1_10	0 to 5V Analog
25	ANAIN_M1_11	0 to 5V Analog
26	ANAIN_M1_12	0 to 5V Analog
27	ANAIN_M1_13	0 to 5V Analog
28	ANAIN_M1_14	0 to 5V Analog
29	ANAIN_M1_15	0 to 5V Analog
30	ANAIN_M1_16	0 to 5V Analog
31	ANAIN_M2_1	0 to 5V Analog
32	ANAIN_M2_2	0 to 5V Analog
33	ANAIN_M2_3	0 to 5V Analog
34	ANAIN_M2_4	0 to 5V Analog
35	ANAIN_M2_5	0 to 5V Analog
36	ANAIN_M2_6	0 to 5V Analog
37	ANAIN_M2_7	0 to 5V Analog
38	ANAIN_M2_8	0 to 5V Analog
39	ANAIN_M2_9	0 to 5V Analog
40	ANAIN_M2_10	0 to 5V Analog
41	LAPTRIGGER	

Communication

Configuration via RaceCon over Ethernet or MSA-Box II	
CAN interfaces	2
Ethernet 100BaseT	3
Telemetry	Ethernet or RS232
Lap trigger input	1

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experience calibrating Bosch ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA Box II are not included and must be ordered separately.

Not reverse polarity protected on supply or outputs.

Software

The required software (.pst file) for this device is available in the download area of our homepage www.bosch-motorsport.com.

Download data and save configurations before sending device, as it will be reset during service.

Legal Restrictions

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Upgrades

CCP/XCP_MASTER

Enables CCP/XCP master functionality to request data from foreign devices via CAN/CCP protocol, XCP over Ethernet (UDP) or XCP via CAN.
(ASAP2 file from ECU manufacturer required)

FULL_LOG_1 (enabled in C 80 logger)

4 GB memory on Recording 2, 600 kB/s (600 MHz)

PERF_LOG_1 (requires FULL_LOG_1)

16 GB memory on Partition 1, 800 kB/s (866 MHz)

FULL_LOG_2

4 GB memory on Recording 2

IO_EXTENS (included in C 80 Sensor Interface)

20 additional analog channels

4 rotational channels, input Hall
(Input inductive on request, hardware change required)

3 additional sensor supply 5 V (250 mA each)

1 sensor supply 10 V (250 mA)

1 sensor supply 12 V (1 A), non-regulated

RS232	GPS

DATA_USB

Data copy to USB flash drive

Ordering Information

Data Logger C 80
FULL_LOG_1 included
Order number **F02U.V03.083-01**

Sensor Interface C 80
IO_EXTENS included
Order number **F02U.V03.082-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCP/XCP_MASTER
Order number **F02U.V02.213-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

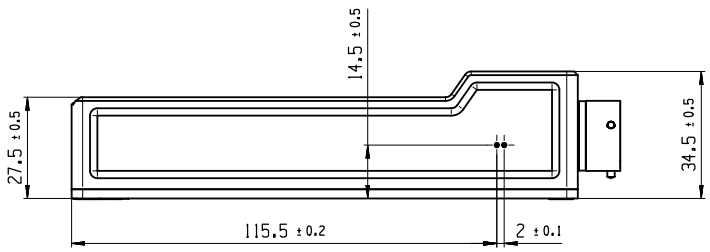
PERF_LOG_1
Order number **F02U.V03.054-01**

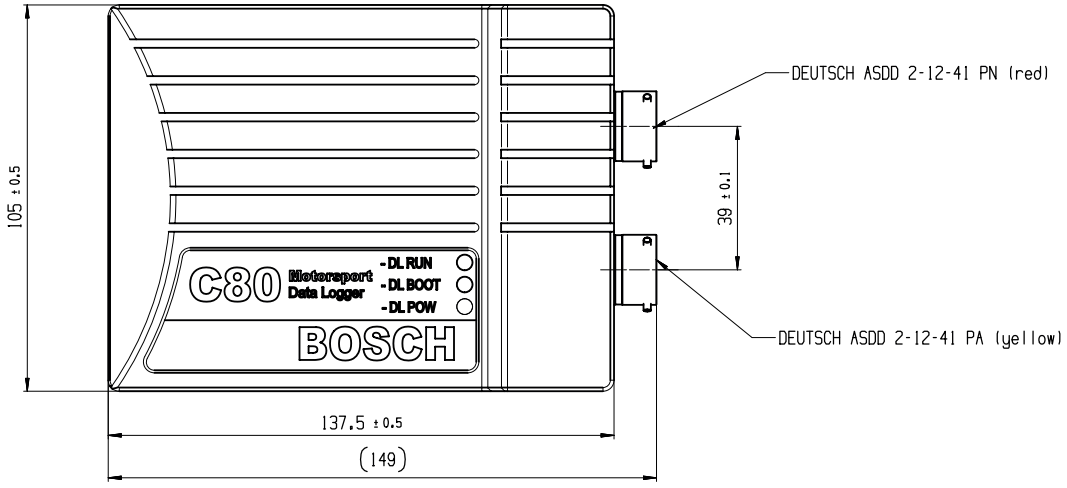
FULL_LOG_2
Order number **F02U.V02.305-01**

IO_EXTENS
Order number **F02U.V02.205-01**

DATA_USB
Order number **F02U.V03.476-01**

Dimensions




DEUTSCH ASDD 2-12-41 PN (red)
DEUTSCH ASDD 2-12-41 PA (yellow)
105 ±0.5
39 ±0.1
C80
Motorsport
Data Logger
-DL RUN
-DL BOOT
-DL POW
BOSCH
137.5 ±0.5
(149)

USB Data Components



Features

- Capacity 32 GB
- Robust brass housing
- High performance push-pull connector
- Compatible with ECUs, VCUs, DDUs, Data Loggers, ...

Our USB Data Components enable your Bosch device to store data on a USB flash drive. We offer a rugged USB flash drive, a mating connector to the car loom side and an adapter cable to USB-port. The rugged USB flash drive is securely mounted within a rugged brass housing designed to provide full protection against extreme environmental conditions. It is IP68 protected and resistant to extreme operating temperatures (-30 to 85°C). The USB flash drive is equipped with a rugged protection cap.

Application

Operating temperature range	-30 to 85°C
Protection class	IP68
Tightening torque of Backnut for connection socket	1.5 to 2.0 Nm
Max. vibration	Vibration Profile 3 (see Downloads or www.bosch-motorsport.com)

Technical Specifications

Mechanical Data USB flash drive

Housing material	Brass
Weight	42 g
Length	72 mm
Bore diameter	15.5 mm

Electrical Data

Capacity	32 GB
Specification	USB 1.1/2.0
Data rate	USB 2.0 up to 480 MBit/s

Connectors and Wires

Pin layout for connection to vehicle loom (see also Dimensions)

Pin 1	Data -
Pin 2	+5 V
Pin 3	GND
Pin 4	Data +

USB Data Components

- Rugged USB flash drive
- Mating connector for USB flash drive on car loom side
- Adapter cable to PC USB-Port

Installation Notes

The USB flash drive should be fixed on a soft surface to reduce stress.

Legal Restrictions

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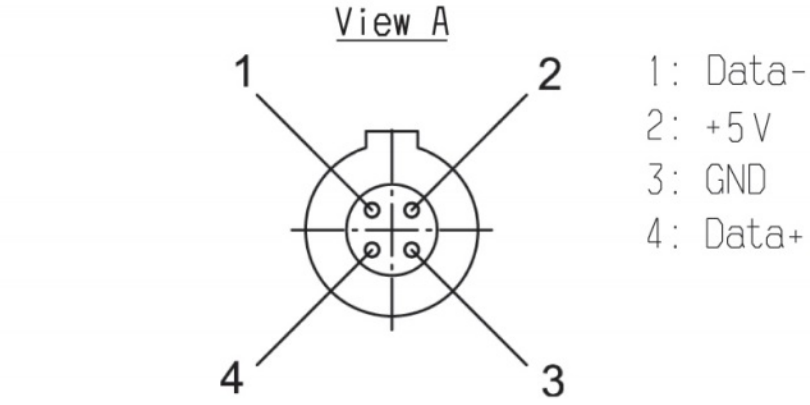
Ordering Information

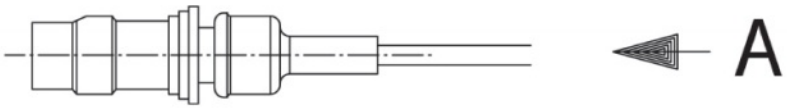
Rugged USB flash drive
Order number **F02U.V03.534-01**

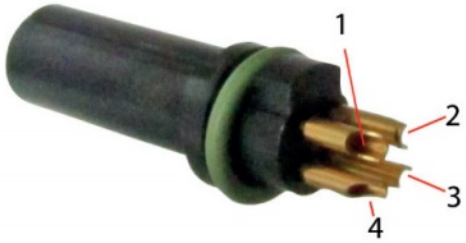
Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Dimensions







Overview

PowerBox PBX 90



- 120 A continuous current
- 36 outputs, 80 A high side switches
- Ethernet, CAN and LIN communication
- Software-tool integrated
- Easy programming of complex functions

PowerBox PBX 190



- 250 A continuous current
- 52 outputs, 48 V high side switches
- Ethernet, CAN and LIN communication
- Precision current measurement
- Easy programming of complex functions

PowerBox PBX 90



Features

- 120 A continuous current
- 36 outputs, 80 A high side switches
- Ethernet, CAN and LIN communication
- Software-tool integrated
- Easy programming of complex functions

The PowerBox is an intelligent control and distribution unit for the electric grid in a modern racing car, which is seamlessly integrated into the Bosch Motorsport system architecture. It is capable to replace all conventional relays, fuses and circuit breakers, simplifies wiring harnesses and provides diagnostic capabilities. The integrated PBX-software guarantees an easy programming of complex functions by intuitive handling.

Technical Specifications

Mechanical Data

Size	214 x 159 x 57.5 mm
Weight	830 g
Protection Classification	Protected against ingress of particles > 1 mm, splash water proof
Temp. range (at internal sensors)	-20 to 85°C
Max. vibration	Vibration profile 1 (see Downloads)

Electrical Data

Supply voltage range	5 to 20 V
Current consumption	<1 A
Maximum recommended output current	120 A continuously >180 A peak current (2 s)

Inputs

12 x analog inputs (16 bit resolution) switchable pull-up resistors

4 x digital inputs switchable pull-up/pull-down resistors

Sensor Supplies and Screens

1 x sensor supply 5 V 400 mA with individual ground pin

Outputs

4 x high power channels up to 40 A (parallel up to 80 A)

4 x high power channels up to 25 A

22 x high power channels up to 15 A

6 x multi purpose outputs up to 15 A (low side, high side, push-pull, PWM; two output stages can be combined to form an H-bridge)

Software

Function development and calibration tool	Bosch Motorsport PBX Suite

Connector X1: 38 way (ABS/ESR) Code 1

Pin	Signal	Cont. [A]	Peak [A]
1	HP_OUT3	40	150
2	OUT22	15	100
3	PWM_OUT6	15	75
4	OUT21	15	100
5	ANA_IN07	0 to 5 V, Pull-up	
6	ANA_IN08	0 to 5 V, Pull-up	
7	PWM_OUT4	15	75
8	CAN_3_H	1 Mbaud max.	
9	SENSGND	GND for AIN[x]	
10	SENSPWR_5V	0.4	
11	PWM_OUT2	15	75
12	PWM_OUT1	15	75
13	HP_OUT4	40	150
14	ANA_IN03	0 to 5 V, Pull-up	
15	ANA_IN04	0 to 5 V, Pull-up	
16	DIG_IN3	0 to 12 V, Pull-up, Pull-down	
17	DIG_IN4	0 to 12 V, Pull-up, Pull-down	
18	ANA_IN09	0 to 5 V, Pull-up	
19	ANA_IN10	0 to 5 V, Pull-up	
20	CAN_3_L	1 Mbaud max.	

Connector X1: 38 way (ABS/ESR) Code 1			
21	BAT_GND	15	100
22	BAT_GND	15	100
23	BAT_GND	15	100
24	BAT_GND	15	100
25	HP_OUT7	25	150
26	OUT19	15	100
27	ANA_IN05	0 to 5 V, Pull-up	
28	OUT20	15	100
29	ANA_IN06	0 to 5 V, Pull-up	
30	OUT17	15	100
31	OUT18	15	100
32	ANA_IN11	0 to 5 V, Pull-up	
33	OUT15	15	100
34	OUT16	15	100
35	ANA_IN12	0 to 5 V, Pull-up	
36	PWM_OUT3	15	75
37	PWM_OUT5	15	75
38	HP_OUT8	25	150

Connector X2: 38 way (ABS/ESR) Code 2			
Pin	**Used for**	**Cont. [A]**	**Peak [A]**
1	HP_OUT1	40	150
2	OUT14	15	100
3	OUT13	15	100
4	OUT02	15	100
5	OUT01	15	100
6	TIMESTAMP_INOUT	1 kHz open drain	
7	CAN_2_H	1 Mbaud max.	
8	CAN_1_H	1 Mbaud max.	
9	ETH_1_RXN	10/100 Mbps	
10	ETH_1_TXN	10/100 Mbps	
11	ETH_2_RXN	10/100 Mbps	
12	ETH_2_TXN	10/100 Mbps	
13	HP_OUT2	40	150
14	BAT_GND	15	100
15	ANA_IN01	0 to 5 V, Pull-up	
16	ANA_IN02	0 to 5 V, Pull-up	
17	DIG_IN1	0 to 12 V, Pull-up, Pull-down	

Connector X2: 38 way (ABS/ESR) Code 2			
18	DIG_IN2	0 to 12 V, Pull-up, Pull-down	
19	CAN_2_L	1 Mbaud max.	
20	CAN_1_L	1 Mbaud max.	
21	ETH_1_RXP	10/100 Mbps	
22	ETH_1_TXP	10/100 Mbps	
23	ETH_2_RXP	10/100 Mbps	
24	ETH_2_TXP	10/100 Mbps	
25	HP_OUT5	25	150
26	OUT11	15	100
27	OUT09	15	100
28	OUT12	15	100
29	OUT10	15	100
30	OUT07	15	100
31	OUT08	15	100
32	LIN	Control of Bosch Motorsport LIN devices included. Support of other devices on request.	
33	OUT05	15	100
34	SHIELD_GND	shield	
35	OUT06	15	100
36	OUT03	15	100
37	OUT04	15	100
38	HP_OUT6	25	150

Connector X3: Amphenol Radsok Automotive Pinlock Connector 8 mm (35 mm^2, 50 mm^2)			
Pin	**Used for**	**Cont. [A]**	**Peak [A]**
1	BATT_POS	120	180

Communication

3 x CAN

2 x Ethernet

1 x LIN, Control of Bosch Motorsport LIN devices included. Support of other devices on request.

Installation Notes

Inspection services recommended after 220 h or 2 years, no components to replace.

Legal Restrictions

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Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch device

Ordering Information

PowerBox PBX 90
Order number **F02U.V01.794-06**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

Accessories

Mating Connector X1
Order number **F02U.B00.760-01**

Mating Connector X2
Order number **F02U.B00.761-01**

Mating Connector X3
Order number **F02U.B01.279-01**

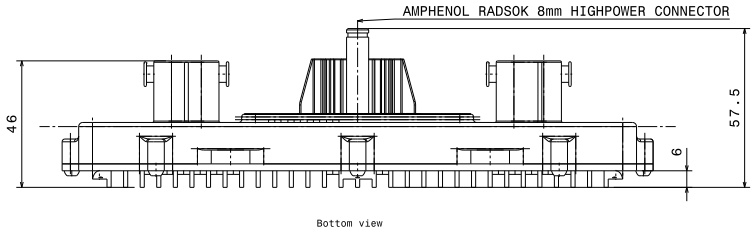
Power Cable 16 mm²
L: 2,000 mm
Order number **F02U.V03.552-01**

Power Cable 35 mm²
L: 2,000 mm
Order number **F02U.V03.553-01**

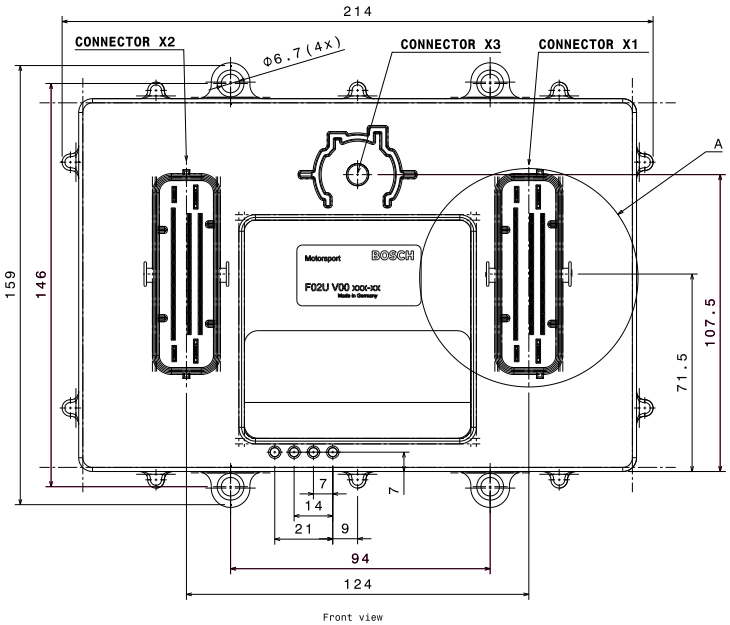
Breakout Box BOB PBX 90
Order number **F02U.V02.292-01**

CAN Keypad CK-M12
Order number **F02U.V0U.328-04**

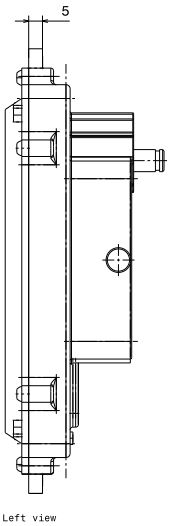
Dimensions



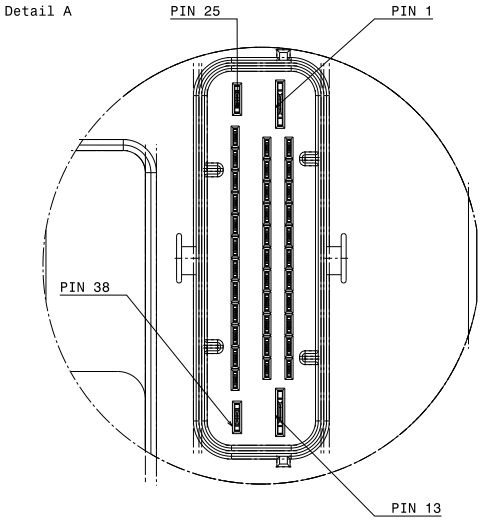
Bottom view



Front view



Left view



PowerBox PBX 190



Features

- 250 A continuous current
- 52 outputs, 48 V high side switches
- Ethernet, CAN and LIN communication
- Precision current measurement
- Easy programming of complex functions

The PowerBox is an intelligent control and distribution unit for the electric grid in a modern racing car, which is seamlessly integrated into the Bosch Motorsport system architecture. It is capable to replace all conventional relays, fuses and circuit breakers, simplifies wiring harnesses and provides diagnostic capabilities. The integrated PBX-software guarantees an easy programming of complex functions by intuitive handling.

Technical Specifications

Mechanical Data

Size	245 x 183 x 37 mm
Weight	1,270 g
Protection Classification	IP67
Internal G-sensors	
Temp. range (at internal sensors)	-20 to 85°C
Max. vibration	Vibration profile 1 (see Downloads)

Electrical Data

Supply voltage range	5 to 16 V
Current consumption	<1 A continuously
Maximum recommended output current	250 A continuously; >310 A peak current (2 s)

Inputs

18 x analog inputs (16 bit resolution) switchable pull-up resistors

10 x digital inputs switchable pull-up/pull-down resistors

Sensor Supplies and Screens

2 x sensor supplies 5 V 400 mA with individual ground pin

Outputs

4 x high power channels up to 40 A (parallel up to 80 A)

10 x high power channels up to 25 A

26 x high power channels up to 15 A

4 x high side channels up to 25 A, up to 48 V

8 x multi-purpose outputs up to 15 A (low side, high side, push-pull, PWM; two output stages can be combined to form an H-bridge)

Software

Function development and calibration tool	Bosch Motorsport PBX Suite

Pin Configuration

Connector X1: 37 Pins / 8STA62437SA

Pin	Signal	Cont. [A]	Peak [A]
A	HS_15A X1_A	15	100
B	HS_15A X1_B	15	100
C	HS_15A X1_C	15	100
D	HS_15A X1_D	15	100
E	HS_15A X1_E	15	100
F	HS_15A X1_F	15	100
G	HS_15A X1_G	15	100
H	HS_15A X1_H	15	100
J	HS_15A X1_J	15	100
K	HS_15A X1_K	15	100
L	HS_15A X1_L	15	100
M	HS_15A X1_M	15	100
N	HS_15A X1_N	15	100
P	PWM_15A X1_P	15	60
R	PWM_15A X1_R	15	60
S	PWM_15A X1_S	15	60
T	PWM_15A X1_T	15	60
U	HS_15A X1_U	15	100
V	HS_15A X1_V	15	100
W	HS_15A X1_W	15	100
X	HS_15A X1_X	15	100
Y	HS_15A X1_Y	15	100
Z	HS_15A X1_Z	15	100
a	HS_15A X1_a	15	100
b	HS_15A X1_b	15	100
c	PWM_15A X1_c	15	60
d	PWM_15A X1_d	15	60

Connector X1: 37 Pins / 8STA62437SA			
e	PWM_15A X1_e	15	60
f	PWM_15A X1_f	15	60
g	HS_15A X1_g	15	100
h	HS_15A X1_h	15	100
k	HS_15A X1_k	15	100
m	HS_15A X1_m	15	100
n	HS_15A X1_n	15	100
p	Power KL31	15	-
q	Power KL31	15	-
r	Power KL31	15	-

Connector X2: 1 Pin / 8STA61201BN261			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
1	Power Supply 12 V	200	240

Connector X3: 19 Pins / 8STA62419SN			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
A	HS_25A X3_A	25	150
B	HS_25A X3_B	25	150
C	HS_25A X3_C	25	150
D	HS_25A X3_D	25	150
E	HS_25A X3_E	25	150
F	HS_25A X3_F	25	150
G + H	HS_40A X3_G_H	40	150
J + T	HS_40A X3_J_T	40	150
K + U	HS_40A X3_K_U	40	150
L + N	HS_40A X3_L_N	40	150
M	HS_25A X3_M	25	150
P	HS_25A X3_P	25	150
R	HS_25A X3_R	25	150
S	HS_25A X3_S	25	150
V	Power KL31	25	-

Connector X4: 6 Pins / 8STA61606SA			
Pin	**Signal**	**Cont. [A]**	**Peak [A]**
A	HS48V_25A X4_A	25	50
B	HS48V_25A X4_B	25	50
C	HS48V_25A X4_C	25	50
D	HS48V_25A X4_D	25	50
E	Supply up to 48 V for X4	25	35
F	Supply up to 48 V for X4	25	35

Connector X5: 66 Pins / 8STA6-18-35SN		
Pin	**Signal**	
1	Analog Input X5_01	0 to 5 V, Pull-up
2	Analog Input X5_02	0 to 5 V, Pull-up
3	Analog Input X5_03	0 to 5 V, Pull-up
4	Analog Input X5_04	0 to 5 V, Pull-up

Connector X5: 66 Pins / 8STA6-18-35SN		
5	Analog Input X5_05	0 to 5 V, Pull-up
6	Analog Input X5_06	0 to 5 V, Pull-up
7	Analog Input X5_07	0 to 5 V, Pull-up
8	Analog Input X5_08	0 to 5 V, Pull-up
9	CAN 3 Interface Low-Level	Max. 1 Mbaud
10	Analog Input X5_10	0 to 5 V, Pull-up
11	Analog Input X5_11	0 to 5 V, Pull-up
12	Analog Input X5_12	0 to 5 V, Pull-up
13	Digital Input X5_13	0 to 12 V, Pull-up, Pull-down
14	Digital Input X5_14	0 to 12 V, Pull-up, Pull-down
15	CAN 3 Interface High-Level	Max. 1 Mbaud
16	LIN	Control of Bosch Motorsport LIN devices included. Support of other devices on request.
17	Analog Input X5_17	0 to 5 V, Pull-up
18	Analog Input X5_18	0 to 5 V, Pull-up
19	DGND-fused	5 A
20	DGND-fused	5 A
21	Digital Input X5_21	0 to 12 V, Pull-up, Pull-down
22	Digital Input X5_22	0 to 12 V, Pull-up, Pull-down
23	SERCOS1 TXP	
24	SERCOS1 TXN	
25	do not connect (use for internal debugging)	
26	do not connect (use for internal debugging)	
27	Analog Input X5_27	0 to 5 V, Pull-up
28	Digital Input X5_28	0 to 12 V, Pull-up, Pull-down
29	Digital Input X5_29	0 to 12 V, Pull-up, Pull-down
30	Analog Input X5_30	0 to 5 V, Pull-up
31	KL31-fused	
32	SERCOS1 RXP	
33	SERCOS1 RXN	
34	do not connect (use for internal debugging)	
35	do not connect (use for internal debugging)	
36	Digital Input X5_36	0 to 12 V, Pull-up, Pull-down
37	Digital Input X5_37	0 to 12 V, Pull-up, Pull-down
38	Analog_Screen	
39	Analog Input X5_39	0 to 5 V, Pull-up

Connector X5: 66 Pins / 8STA6-18-35SN		
40	KL31-fused	
41	SERCOS2 RXP	
42	SERCOS2 RXN	
43	Digital Input X5_43	0 to 12 V, Pull-up, Pull-down
44	Digital Input X5_44	0 to 12 V, Pull-up, Pull-down
45	Sensor GND for X5_51	5 A
46	Timesync	
47	COM_Screen	
48	CAN 1 Interface High-Level	Max. 1 Mbaud
49	SERCOS2 TXP	
50	SERCOS2_TXN	
51	Powersupply_5V X5_51	400 mA
52	Sensor GND for X5_58	5 A
53	ETHERNET1 RXN	10/100 Mbps
54	ETHERNET0 RXN	10/100 Mbps
55	CAN 2 Interface Low-Level	Max. 1 Mbaud
56	CAN 1 Interface Low-Level	Max. 1 Mbaud
57	Analog Input X5_57	0 to 5 V, Pull-up
58	Powersupply_5V X5_58	400 mA
59	ETHERNET1 RXP	10/100 Mbps
60	ETHERNET1 TXN	10/100 Mbps
61	ETHERNET0 TXN	10/100 Mbps
62	CAN 2 Interface High-Level	Max. 1 Mbaud
63	Analog Input X5_63	0 to 5 V, Pull-up
64	ETHERNET1 TXP	10/100 Mbps
65	ETHERNET0 RXP	10/100 Mbps
66	ETHERNET0 TXP	10/100 Mbps

Communication

3 x CAN

2 x Ethernet

1 x LIN, Control of Bosch Motorsport LIN devices included. Support of other devices on request.

Installation Notes

Inspection services recommended after 220 h or 2 years, no components to replace.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCA Hardware Upgrade per device

Provides the option to run customer developed software code on Bosch device

Ordering Information

PowerBox PBX 190
Order number **F02U.V02.626-04**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

Accessories

Mating Connector X1
Order number **F02U.004.387-01**

Mating Connector X2
Socket 25 mm^2
Order number **F02U.B01.044-01**

Mating Connector X2
Socket 35 mm^2
Order number **F02U.B01.045-01**

Mating Connector X3
Order number **F02U.004.386-01**

Mating Connector X4
Order number **F02U.004.388-01**

Mating Connector X5
Order number **F02U.000.472-02**

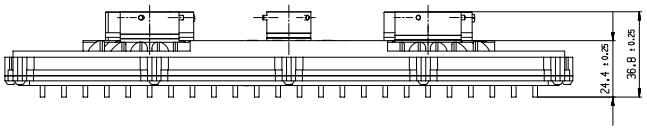
Connector Opening Tool for Shellsize 24
Order number **F02U.V02.434-01**

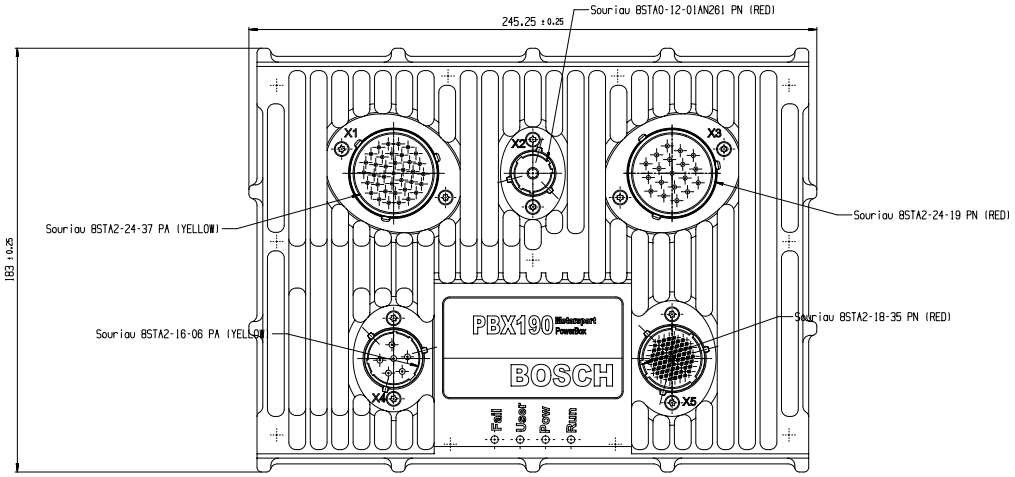
Breakout Box
Order number **F02U.V02.523-01**

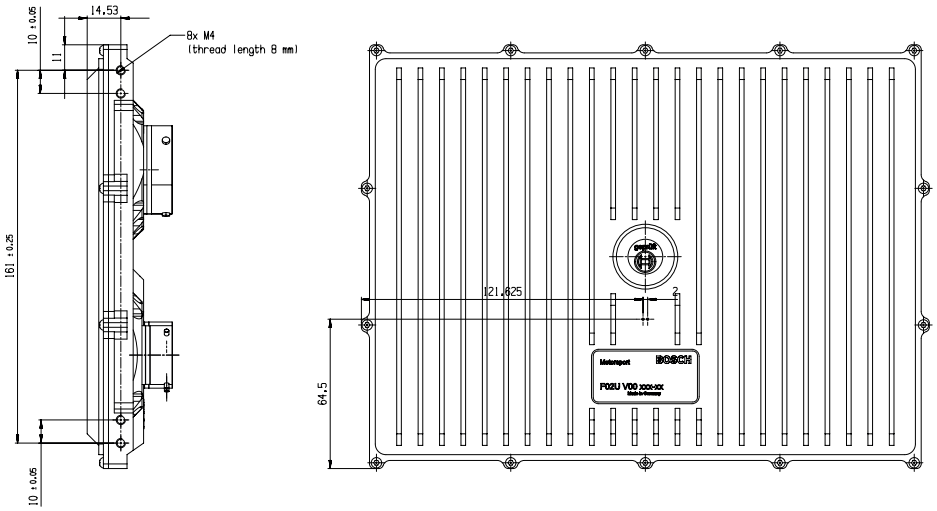
CAN Keypad CK-M12
Order number **F02U.V0U.328-04**

3

Dimensions







Overview

Data Logger and Sensor Interface C 80



- Aluminum housing
- Powerful data logger with up to 20 GB memory
- Supports Bosch multi-logger configuration
- USB recording and full telemetry support

Lambdatronic LT4



- Supply of up to 4 Bosch lambda sensors, type LSU 4.2, LSU 4.9 or Mini-LSU 4.9
- Integrated voltage compensation for sensor heater

Lambdatronic LT4 ADV



- Supply of up to 4 Bosch lambda sensors, type LSU ADV
- Integrated voltage compensation for sensor heater

Wheel Speed Signal Splitter



- ABS Wheel Speed Sensor Interface
- Lightweight Aluminum Housing

Data Logger and Sensor Interface C 80



Features

- Aluminum housing
- Powerful data logger with up to 20 GB memory
- Supports Bosch multi-logger configuration
- USB recording and full telemetry support

We offer the C 80 in two basic versions, on the one hand as a data logger and on the other hand as a sensor interface. Choose between these basic variants and combine or add functionalities now or later.
The data logger C 80 is a professional data logging system for motorsport applications. This allows for synchronized acquisition of engine data from the ECU and chassis data from up to 26 analog and 4 digital input channels. Additional input devices can be connected via Ethernet and CAN buses.
Recorded data from the up to 16 GB logger can be downloaded via high speed Ethernet.
Software upgrades for the C 80 (field upgradable by entering a key) activate tailored configurations like a second logging partition of 4 GB, USB recording, CCP/XCP-master for simple data access to third party devices, as well as additional input channels.

Application

Converters	10 kHz 12 bit AD converters with digital low pass filter
Configurable math channels	
User configurable CAN in/out messages	
Sampling rate	
Online data compression	
Internal logger	

- FULL_LOG_1 (4 GB memory on Recording 1) enabled, optional in C80 Sensor Interface
- PERF_LOG_1 (16 GB memory on Partition 1) optional
- FULL_LOG_2 (4 GB memory on Recording 2) optional
- 1,500 channels enabled
- 1 ms sampling rate enabled
- DATA_USB (Data copy to USB flash drive) optional

Logging rates
- Usage of all features: 800 kB/s
- Primary logging use case: >1,500 kB/s
- Logging data download rate: up to 7.5 MB/s

3-port network switch

Telemetry Support via Ethernet (recommended) and RS232

Technical Specifications

Mechanical Data

Size	105 x 34.5 x 137.5 mm
Weight	462 g
Protection Classification	IP67 to DIN 40050, Section 9, Issue 2008
Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)
Operating temperature (internal)	0 to 85°C

Operation outside the temperature limits can be tested on request during the manufacturing tests.

Electrical Data

Supply voltage	8 to 18 V
Max. power consumption (w/o loads)	10 W at 14 V

Inputs

6 x analog channels

0 to 5 V input range

12 bit resolution

1 x 3 kOhm switchable pull up resistor

Sensor Supplies and Screens

4 x PWM outputs (low side switch 2 A each)

1 x sensor supply 5 V ± 1 % (250 mA)

Connectors and Wires

Motorsport connectors double density	2 x 41 pins
Mating connector I ASDD612-41SN	F02U.002.216-01
Mating connector II ASDD612-41SA	F02U.004.180-01

Pin Layout ASDD212-41PN

Pin	Name	Description
1	KL30	

Pin	Name	Description
2; 3	KL15	
4; 5	KL31	
6	Ethernet Channel0 Tx plus	Wire Ethernet_0 - TX+
7	Ethernet Channel0 Tx minus	Wire Ethernet_0 - TX-
8	Ethernet Channel0 Rx plus	Wire Ethernet_0 - RX+
9	Ethernet Channel0 Rx minus	Wire Ethernet_0 - RX-
10	Ethernet Schirm	Ethernet Schirm
11	Ethernet Channel1 Tx plus	Wire Ethernet_0 - TX+
12	Ethernet Channel1 Tx minus	Wire Ethernet_0 - TX-
13	Ethernet Channel1 Rx plus	Wire Ethernet_0 - RX+
14	Ethernet Channel1 Rx minus	Wire Ethernet_0 - RX-
15	Ethernet Channel2 Tx plus	Wire Ethernet_0 - TX+
16	Ethernet Channel2 Tx minus	Wire Ethernet_0 - TX-
17	Ethernet Channel2 Rx plus	Wire Ethernet_0 - RX+
18	Ethernet Channel2 Rx minus	Wire Ethernet_0 - RX-
19	CAN_A_H	CAN_A - HIGH
20	CAN_A_L	CAN_A - LOW
21	CAN_B_H	CAN_B - HIGH
22	CAN_B_L	CAN_B - LOW
23	USB Power	500mA USB_Power
24	USB Data Plus	USB_OTG_Plus
25	USB Data Minus	USB_OTG_Minus
26	USB GND	USB_Ground
27	SENSPWR5_1	
28	SENSGND	
29	Timestamp	
30	LS_GND_1	Low-Side Ground2
31	LS_SWITCH_1	lowside switch 2A
32	LS_SWITCH_2	lowside switch 2A
33	LS_SWITCH_3	lowside switch 2A
34	LS_SWITCH_4	lowside switch 2A
35	LS_GND_2	Low-Side Ground2
36	ANAIN_M1_1	0 to 5V Analog
37	ANAIN_M1_2	0 to 5V Analog
38	ANAIN_M1_3	0 to 5V Analog
39	ANAIN_M1_4	0 to 5V Analog
40	ANAIN_M1_5	0 to 5V Analog
41	ANAIN_M1_6	0 to 5V Analog

Pin Layout ASDD212-41PA

Pin	Name	Description
1	UBATT_FUSE1	
2	SENSPWR10_1	
3	SENSPWR5_2	
4	SENSPWR5_3	
5	SENSPWR5_4	
6; 7	SENSGND	
8	RS232A TX	Transmit Telemetry data
9	RS232A RX	Receive Telemetry data
10	RS232B TX	Transmit GPS data
11	RS232B RX	Receive GPS data
12	RS232_GND	RS232 Ground
13	REV1_P	Hall / Inductive
14	REV1_M	Hall / Inductive
15	REV2_P	Hall / Inductive
16	REV2_M	Hall / Inductive
17	REV3_P	Hall / Inductive
18	REV3_M	Hall / Inductive
19	REV4_P	Hall / Inductive
20	REV4_M	Hall / Inductive
21	ANAIN_M1_7	0 to 5V Analog
22	ANAIN_M1_8	0 to 5V Analog
23	ANAIN_M1_9	0 to 5V Analog
24	ANAIN_M1_10	0 to 5V Analog
25	ANAIN_M1_11	0 to 5V Analog
26	ANAIN_M1_12	0 to 5V Analog
27	ANAIN_M1_13	0 to 5V Analog
28	ANAIN_M1_14	0 to 5V Analog
29	ANAIN_M1_15	0 to 5V Analog
30	ANAIN_M1_16	0 to 5V Analog
31	ANAIN_M2_1	0 to 5V Analog
32	ANAIN_M2_2	0 to 5V Analog
33	ANAIN_M2_3	0 to 5V Analog
34	ANAIN_M2_4	0 to 5V Analog
35	ANAIN_M2_5	0 to 5V Analog
36	ANAIN_M2_6	0 to 5V Analog
37	ANAIN_M2_7	0 to 5V Analog
38	ANAIN_M2_8	0 to 5V Analog
39	ANAIN_M2_9	0 to 5V Analog
40	ANAIN_M2_10	0 to 5V Analog
41	LAPTRIGGER	

Communication

Configuration via RaceCon over Ethernet or MSA-Box II	
CAN interfaces	2
Ethernet 100BaseT	3
Telemetry	Ethernet or RS232
Lap trigger input	1

Installation Notes

Maintenance Interval: 220 h or a maximum of two years

Depending on your experience calibrating Bosch ECUs, we recommend calibration support from Bosch Motorsport.

Please remember that the mating connectors and the programming interface MSA Box II are not included and must be ordered separately.

Not reverse polarity protected on supply or outputs.

Software

The required software (.pst file) for this device is available in the download area of our homepage www.bosch-motorsport.com.

Download data and save configurations before sending device, as it will be reset during service.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Upgrades

CCP/XCP_MASTER

Enables CCP/XCP master functionality to request data from foreign devices via CAN/CCP protocol, XCP over Ethernet (UDP) or XCP via CAN.
(ASAP2 file from ECU manufacturer required)

FULL_LOG_1 (enabled in C 80 logger)

4 GB memory on Recording 2, 600 kB/s (600 MHz)

PERF_LOG_1 (requires FULL_LOG_1)

16 GB memory on Partition 1, 800 kB/s (866 MHz)

FULL_LOG_2

4 GB memory on Recording 2

IO_EXTENS (included in C 80 Sensor Interface)

20 additional analog channels

4 rotational channels, input Hall
(Input inductive on request, hardware change required)

3 additional sensor supply 5 V (250 mA each)

1 sensor supply 10 V (250 mA)

1 sensor supply 12 V (1 A), non-regulated

RS232	GPS

DATA_USB

Data copy to USB flash drive

Ordering Information

Data Logger C 80
FULL_LOG_1 included
Order number **F02U.V03.083-01**

Sensor Interface C 80
IO_EXTENS included
Order number **F02U.V03.082-01**

Rugged USB flash drive
Order number **F02U.V03.534-01**

Connector for USB flash drive on car loom side
Order number **F02U.002.996-01**

Adapter cable to PC USB-Port
Order number **F02U.V01.343-01**

Software Options

CCP/XCP_MASTER
Order number **F02U.V02.213-01**

FULL_LOG_1
Order number **F02U.V02.304-01**

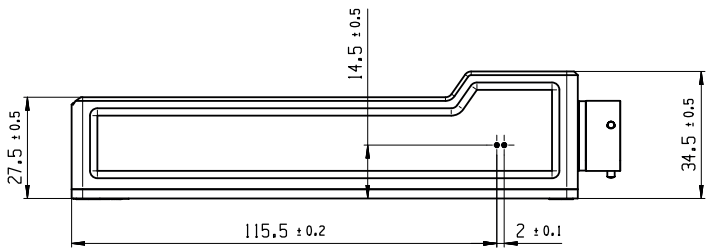
PERF_LOG_1
Order number **F02U.V03.054-01**

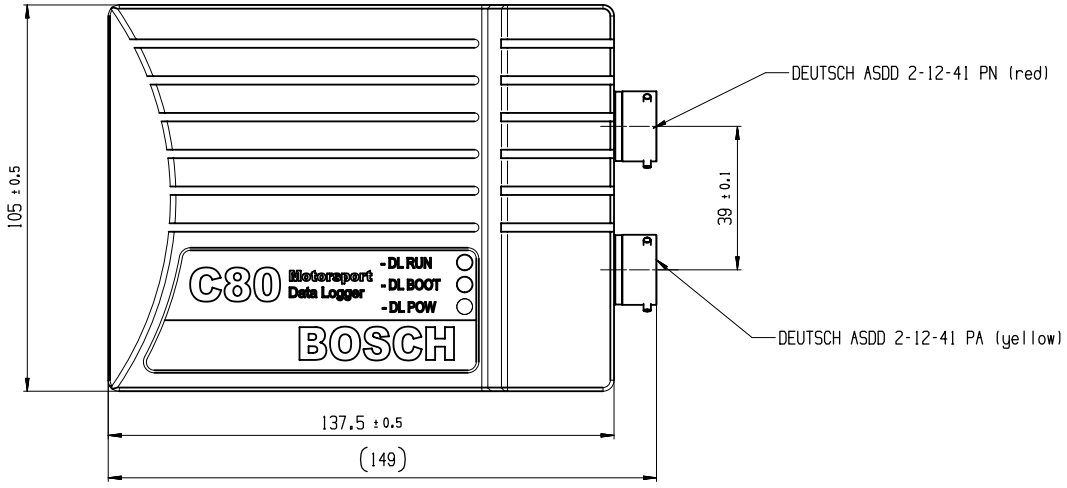
FULL_LOG_2
Order number **F02U.V02.305-01**

IO_EXTENS
Order number **F02U.V02.205-01**

DATA_USB
Order number **F02U.V03.476-01**

Dimensions




105 ±0.5
C80
Motorsport
Data Logger
-DL RUN
-DL BOOT
-DL POW
BOSCH
137.5 ±0.5
(149)
39 ±0.1
DEUTSCH ASDD 2-12-41 PN (red)
DEUTSCH ASDD 2-12-41 PA (yellow)

Lambdatronic LT4



Features

- Supply of up to 4 Bosch lambda sensors, type LSU 4.2, LSU 4.9 or Mini-LSU 4.9
- Integrated voltage compensation for sensor heater

The Lambdatronic LT4 provides controlled pumping current to supply up to 4 Bosch lambda sensors, type LSU 4.2, LSU 4.9 or Mini-LSU 4.9. The lambda value, the sensor temperature and diagnostics are available via CAN and analog signal.
The LSU contains a Nernst and a pump cell. The lambda in the Nernst cell is controlled to lambda = 1.013 independent of the oxygen contents on the emission side, through a current through the pump cell. The current proportional output voltage of the IC is a measure of the lambda value.
The main feature and benefit of this unit is the combination of the Bosch well known lambda IC and a very compact box size with motorsport specification. Furthermore the analog signal output can be configured freely.

Application

Application	Lambda 0.75 to 10.12
Compatible Bosch sensor type	LSU 4.2, LSU 4.9, Mini-LSU 4.9
Channels	4
Heater	Internal

Technical Specifications

Mechanical Data

Weight with wire	98 g
Sealing	100 % humidity
Mounting	Velcro
Size w/o wire (w*l*h)	54 x 59 x 13 mm
Operating temp. range (housing)	-20 to 85°C
Storage temp. range	-20 to 85°C
Max. vibration	Vibration Profile 1 (see Downloads or www.bosch-motorsport.com)

Electrical Data

Power supply U_S	(6.5) 10 to 14 V
Max power supply (1 min) U_S	Max. 26 V
Thermal dissipation loss	3 W at 14 V
Current Is	5 A
Current Is (Heating up)	26 A

Software Tool (free download)

System Configuration tool RaceCon 2.7.0.9 or later

Characteristic

Signal output 1	CAN
Signal output 2	4 x 0 to 5 V “analog”
CAN- baud rate	500 kbaud or 1 Mbaud
Signal resolution	2,5 * 10-4 lambda
Signal sampling rate	100 Hz
CAN refresh rate	100 Hz

Connectors and Wires

Connector	AS614-35PN
Connector loom AS114-35SN	F02U.000.365-01
Sleeve	Viton
Wire size	26
Wire length L	20 cm

Pin Assignment

Pin	Function
1	+ 12 V (Battery +)
2	+ 12 V (Battery +)
3	Ground (Battery -)
4	Ground (Battery -)
5	K-Line diagnostic connection
6	CAN1 + (high)
7	CAN1 - (low)
8	Analog out 1
9	Analog out 2
10	Analog out 3
11	Analog out 4
12	Reference GND for analog out
13	Shield
14	Pump current LSU 1 IP1
15	Virtual GND LSU 1 VM1
16	Heater PWM LSU 1 Uh-1

17	Heater (Batt +) LSU 1 Uh+1
18	Setup current LSU 1 IA1
19	Nernst voltage LSU 1 UN1
20	Pump current LSU 2 IP2
21	Virtual GND LSU 2 VM2
22	Heater PWM LSU 2 Uh-2
23	Heater (Batt. +) LSU 2 Uh+2
24	Setup current LSU 2 IA2
25	Nernst voltage LSU 2 UN2
26	Pump current LSU 3 IP3
27	Virtual GND LSU 3 VM3
28	Heater PWM LSU 3 Uh-3
29	Heater (Batt +) LSU 3 Uh+3
30	Setup current LSU 3 IA3
31	Nernst voltage LSU 3 UN3
32	Pump current LSU 4 IP4
33	Virtual GND LSU 4 VM4
34	Heater PWM LSU 4 Uh-4
35	Heater (Batt. +) LSU 4 Uh+4
36	Setup current LSU 4 IA4
37	Nernst voltage LSU 4 UN4

Communication

Communication link	K-Line / CAN

Installation Notes

Typical lifetime: max. 220 h / 2 years

For application with severe conditions and/or high volume, please contact your Bosch Motorsport counterpart in order to define the most appropriate validation program

The LT4 is designed to supply 4 Bosch lambda sensors, type LSU 4.2, LSU 4.9 or Mini-LSU 4.9

The LT4 is featured with voltage compensation for the heating profile

The unit can be connected to any CAN system (500 kbaud or 1 Mbaud) and analog measuring device.

To avoid signal errors, a cable length of maximum 1.5 m between sensor and box is recommended.

The unit is secure from miss-pinning.

The reference ground (GND_REF) has to be connected either to the measuring device or to the system ground.

A ground offset of 2 V (max.) between GND and GND_REF has not to be exceeded.

See the LT4 function sheet for software documentation (e.g. CAN protocol).

Please find further application hints in the offer drawing at our homepage.

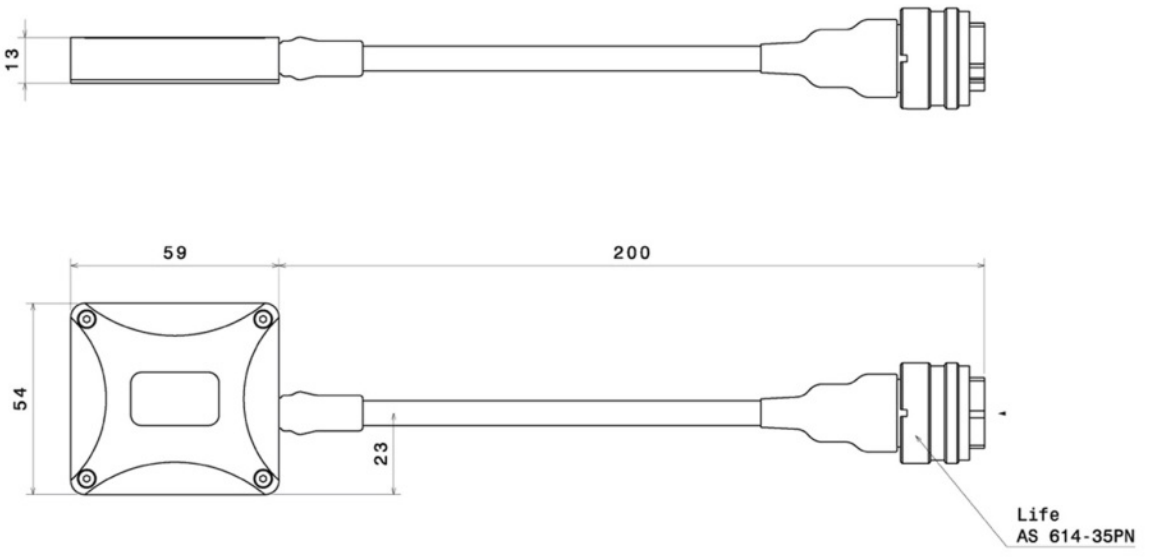
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Lambdatronic LT4
Order number **F01T.A20.070-09**

Dimensions



Lambdatronic LT4 ADV



Features

- Supply of up to 4 Bosch lambda sensors, type LSU ADV
- Integrated voltage compensation for sensor heater

The Lambdatronic LT4 ADV is a control module designed to supply and control up to four Bosch LSU ADV. The lambda sensor LSU ADV offers extended features as an improved robustness, a shorter heating time and less influence from the ambient pressure.
The LSU ADV contains a Nernst cell and a pump cell. The lambda value between the Nernst cell and an internal oxygen reference chamber is controlled to lambda 1.013, independent of the oxygen concentration on the emission side. This happens thanks to the pump current throw the pump cell, responsible for the transmission of oxygen atoms in the sensor ceramic. The current proportional output voltage of the IC is translated in a lambda value. The LT4 ADV provides the sensors temperature and other diagnostics parameters over CAN. The 4 lambda signals can be read by using the CAN or analog output.
The main feature and benefit of this unit is its compact design, its lightweight construction, as well as the possibility to control up to 4 Lambda Sensors LSU ADV with multiple user-configurable parameters.

Application

Application	Lambda 0.75 to 5
Compatible Bosch sensor type	LSU ADV
Channels	4
Heater	Internal

Technical Specifications

Mechanical Data

Weight with wire	98 g
Sealing	100 % humidity
Mounting	Velcro
Size w/o wire (w*l*h)	54 x 59 x 13 mm
Operating temp. range (housing)	-20 to 85°C
Storage temp. range	-20 to 85°C
Max. vibration	Vibration Profile 1 (see Downloads or www.bosch-motorsport.com)

Electrical Data

Power supply U_S	(6.5) 10 to 14 V
Max power supply (1 min) U_S	Max. 26 V
Thermal dissipation loss	3 W at 14 V
Current Is	5 A
Current Is (Heating up)	26 A

Software Tool (free download)

System Configuration tool RaceCon 2.7.0.9 or later

Characteristic

Signal output 1	CAN
Signal output 2	4 x 0 to 5 V “analog”
CAN- baud rate	500 kbaud or 1 Mbaud
Signal resolution	2,5 * 10-4 lambda
Signal sampling rate	100 Hz
CAN refresh rate	100 Hz

Connectors and Wires

Connector	AS614-35PN
Connector loom AS114-35SN	F02U.000.365-01
Sleeve	Viton
Wire size	26
Wire length L	20 cm

Pin Assignment

Pin	Function
1	+ 12 V (Battery +)
2	+ 12 V (Battery +)
3	Ground (Battery -)
4	Ground (Battery -)
5	K-Line diagnostic connection
6	CAN1 + (high)
7	CAN1 - (low)
8	Analog out 1
9	Analog out 2

10	Analog out 3
11	Analog out 4
12	Reference GND for analog out
13	Shield
14	Pump current LSU 1 IP1
15	Virtual GND LSU 1 VM1
16	Heater PWM LSU 1 Uh-1
17	Heater (Batt +) LSU 1 Uh+1
18	Not connected
19	Nernst voltage LSU 1 UN1
20	Pump current LSU 2 IP2
21	Virtual GND LSU 2 VM2
22	Heater PWM LSU 2 Uh-2
23	Heater (Batt. +) LSU 2 Uh+2
24	Not connected
25	Nernst voltage LSU 2 UN2
26	Pump current LSU 3 IP3
27	Virtual GND LSU 3 VM3
28	Heater PWM LSU 3 Uh-3
29	Heater (Batt +) LSU 3 Uh+3
30	Not connected
31	Nernst voltage LSU 3 UN3
32	Pump current LSU 4 IP4
33	Virtual GND LSU 4 VM4
34	Heater PWM LSU 4 Uh-4
35	Heater (Batt. +) LSU 4 Uh+4
36	Not connected
37	Nernst voltage LSU 4 UN4

Communication

Communication link	K-Line / CAN

Installation Notes

Typical lifetime: max. 220 h / 2 years

For application with severe conditions and/or high volume, please contact your Bosch Motorsport counterpart in order to define the most appropriate validation program

The LT4 ADV is designed to supply 4 Bosch lambda sensors, type LSU ADV

The LT4 ADV is featured with voltage compensation for the heating profile.

The unit can be connected to any CAN system (500 kbaud or 1 Mbaud) and analog measuring device.

To avoid signal errors, a cable length of maximum 1.5 m between sensor and box is recommended.

The unit is secure from miss-pinning.

The reference ground (GND_REF) has to be connected either to the measuring device or to the system ground.

A ground offset of 2 V (max.) between GND and GND_REF has not to be exceeded.

See the LT4 ADV function sheet for software documentation (e.g. CAN protocol).

Please find further application hints in the offer drawing at our homepage.

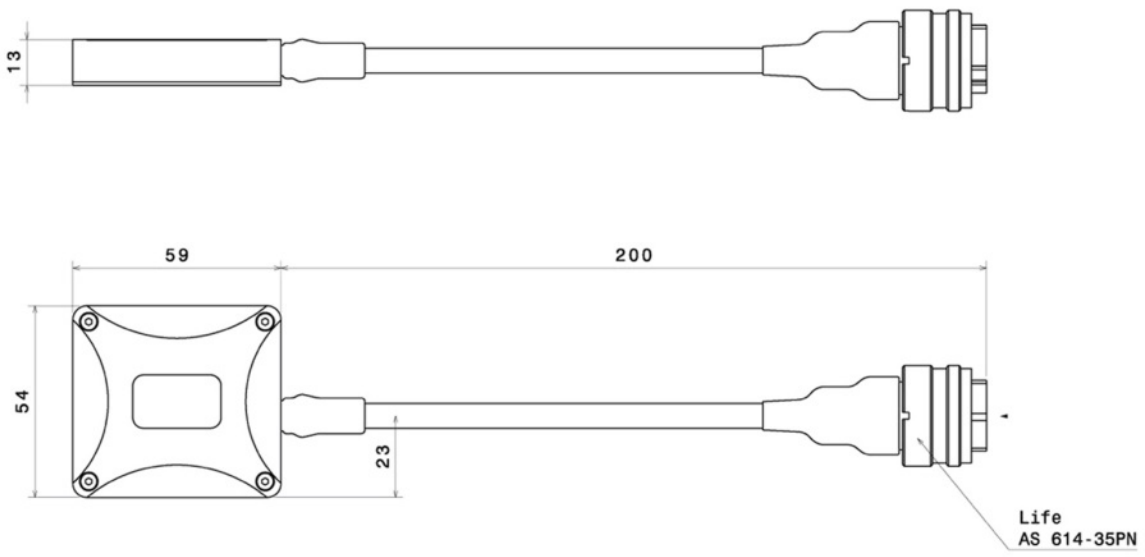
Legal Restrictions

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Ordering Information

Lambdatronic LT4 ADV
Order number **F02U.V01.111-04**

Dimensions



Wheel Speed Signal Splitter



Features

- ABS Wheel Speed Sensor Interface
- Lightweight Aluminum Housing

Bosch Motorsport has developed a wheel speed module that converts the Bosch DF11 (differential dual hall sensors) signals to a signal that can be processed by peripheral engine controlling devices and data recording systems. The adapter can be plugged into any Bosch ABS M4 loom.
The operation principle is that it forwards the sensor information to the ABS. In addition it converts the speed info into a digital signal. The type of output is open collector. The connected device needs to contain an internal pull up resistor of 2.15 kOhm to 12 V.
The interface is available in two different housings supporting one connector or two connectors (see photo). The single connector type is used if the signal is fed back into an especially pre-defined ABS loom which connects e.g. to the original chassis loom. The double connector type is used if the speed signal is broadcast to the peripheral device via a separate loom.
The wheel speed signal splitter is designed to be used in combination with the Bosch Motorsport ABS system. Due to safety reasons it is not designed for usage in combination with other ABS systems.

Application

Application	ABS wheel speed sensor interface
Compatible sensor type	Bosch DF 11
Operating temperature range	-20 to 85°C
Storage temperature range	-20 to 85°C

Technical Specifications

Mechanical Data

Weight	53 g
Size (Single connector type)	101.8 x 63.5 x 30.3 mm
Size (Double connector type)	112.1 x 63.5 x 30.3 mm
Max. vibration	Vibration profile 1 (see Downloads or www.bosch-motorsport.com)

Electrical Data

Power supply	12 V
Max. power supply (1 min)	25 V

Connectors

Connector 1 (wide)	AS212-35PN
Mating connector AS612-35SN	F02U.000.443-01
Connector 2 (small)	AS208-35PN
Mating connector AS608-35SN	F02U.000.430-01

Pinout Connector 1 (wide)

Pin	Description for one connector	Description for two connectors
1	Supply to DF11 (RR)	Supply to DF11 (RR)
2	Signal from DF11 (RR)	Signal from DF11 (RR)
3	Supply to DF11 (RL)	Supply to DF11 (RL)
4	Signal from DF11 (RL)	Signal from DF11 (RL)
5	Supply to DF11 (FR)	Supply to DF11 (FR)
6	Signal from DF11 (FR)	Signal from DF11 (FR)
7	Supply to DF11 (FL)	Supply to DF11 (FL)
8	Signal from DF11 (FL)	Signal from DF11 (FL)
9	Signal to ABS (FL)	Signal to ABS (FL)
10	DF11 supply from ABS (FL)	DF11 supply from ABS (FL)
11	Signal to ABS (FR)	Signal to ABS (FR)
12	DF11 supply from ABS (FR)	DF11 supply from ABS (FR)
13	Signal to ABS (RL)	Signal to ABS (RL)
14	DF11 supply from ABS (RL)	DF11 supply from ABS (RL)
15	Signal to ABS (RR)	Signal to ABS (RR)
16	DF11 supply from ABS (RR)	DF11 supply from ABS (RR)
17	Open collector Signal to ECU (FL)	Not used
18	Open collector Signal to ECU (FR)	Not used
19	UBat 12V	UBat 12V
20	Open collector Signal to ECU (RL)	Not used
21	Open collector Signal to ECU (RR)	Not used

22	ECU Ground	Not used

Pinout Connector 2 (small)

Pin	Description for one connector	Description for two connectors
1	n.a.	Open collector Signal to ECU (FL)
2	n.a.	Open collector Signal to ECU (FR)
3	n.a.	Open collector Signal to ECU (RL)
4	n.a.	Open collector Signal to ECU (RR)
5	n.a.	Not used
6	n.a.	ECU Ground

Legal Restrictions

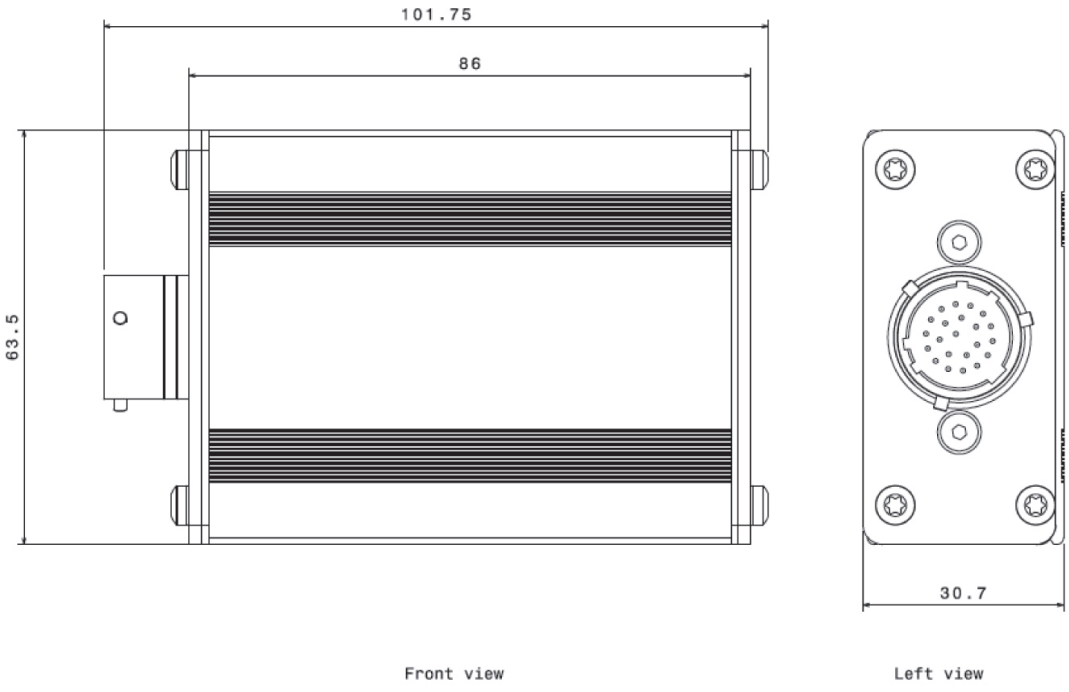
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Ordering Information

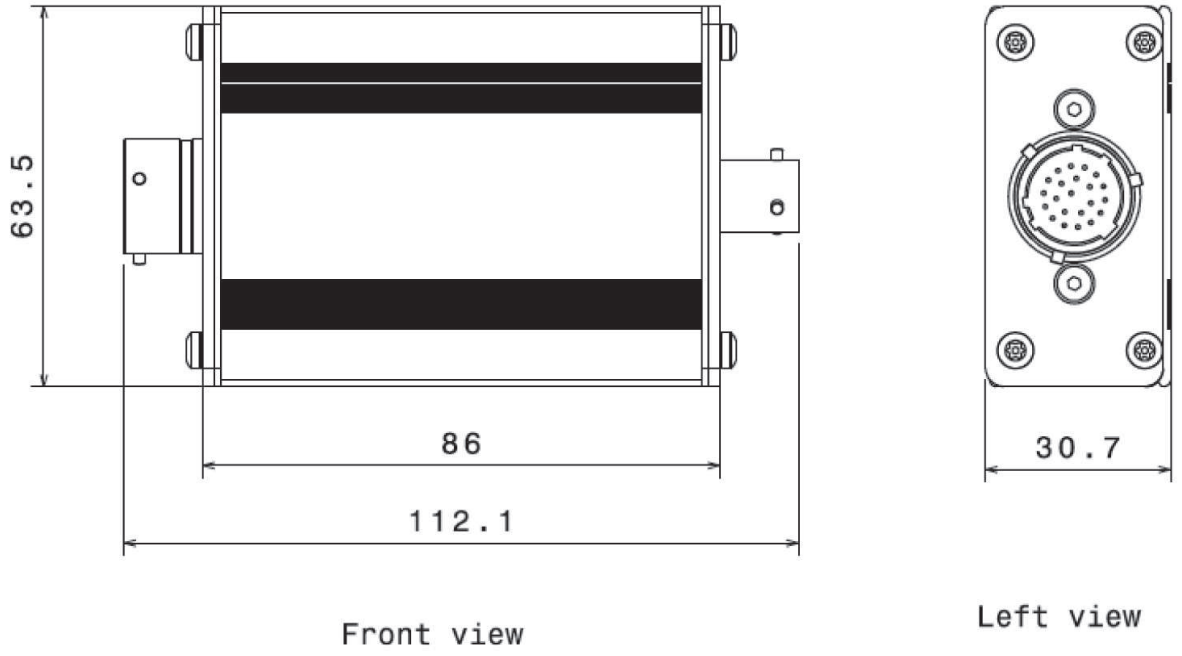
Single Connector Type
Order number **F02U.V00.335-03**

Double Connector Type
Order number **F02U.V00.203-03**

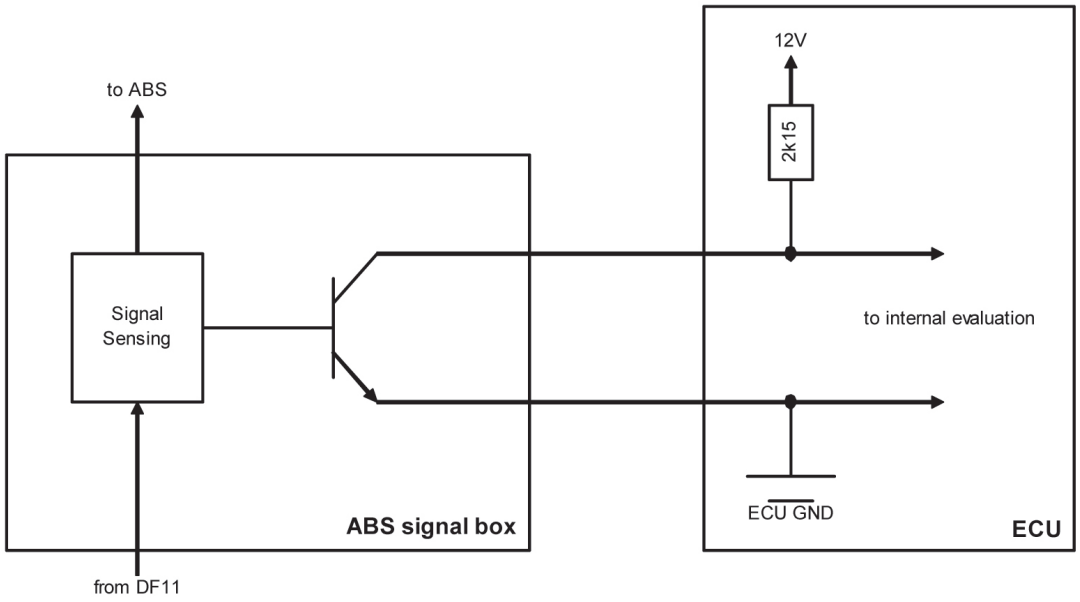
Dimensions



Single Connector Type Housing



Double Connector Type Housing



Connection Scheme

3

µLC Test System



Features

- User-friendly interface
- Functions can be extended with Expansion Boards
- Prepared for test automation
- Favorable test setup, consuming low space
- Simulation of typical automotive interfaces combined in one unit

The new and modern hardware-in-the-loop test system µLC Test System is suitable for mobile application, measuring a compact 17 x 11 x 6 cm. Initial test setup typically takes under ten minutes, since the system allows for a simple test setup.
It is a compact open-loop test system for quality assurance of control unit development and combines the simulation of all typical automotive sensors and communication protocols in one unit. Its interface is user-friendly and enables an easy operation and evaluation.
The µLC Test System is especially used for automotive control units with typical interfaces for sensors and bus systems such as analog/digital inputs and outputs, PWM signals, SENT, CAN, LIN and speed sensors.

Application

Engine Speed Simulation

- Up to 20,000 rpm
- Supported sensors: Hall, inductive, DG23i, TL4953
- Up to 2 crankshafts, up to 4 camshafts
  - each is independently configurable
  - auxiliary shaft
  - -180 to 180° camshaft adjustment
- Oscilloscope trigger signal for easier monitoring
- Error simulation for engine position management EPM

Vehicle Busses

- 2 * CAN, up to 1 MBit/s,
  switchable 120 Ohm CAN bus terminator
- LIN Master/Slave
- SENT, full J2716 Jan. 2012 standard
  4 Outputs, alternative to PWM output

Analog Interfaces

- 8 * 10 bit DAC 0 to 5 V, max. 5 mA
  Internal or external supply
- 4 * 12 bit DAC 0 to 5 V, max. 5 mA
- 6 * 12 bit ADC 0 to 40 V, GND reference

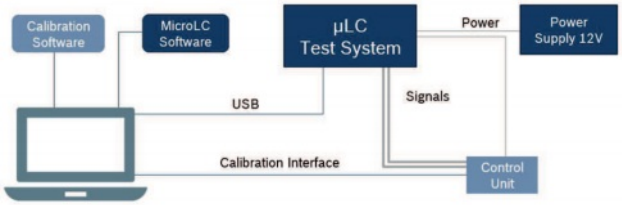
Digital Interfaces

- 6 * Digital Out, max. 200 mA in total
  Output modes: Ground, 12 V, High impedance
- 2 * Relays, max. 10 A, separate ECU power supply possible and incl. main relay sensing
- 2 * PWM input, 1 Hz to 20 kHz
- 4 * PWM output, max. 90 mA in total,
  0.1 Hz to 20 kHz
  Output voltages: 12 V, 5 V, GND
- Complex PWM with sub signals, each separately adjustable in frequency, duty cycle and pulse count

Additional Features

- Throttle body simulation
- Cylinder pressure simulation
  - Up to 8 cylinders with one device
  - Expandable with multiple devices
- USB connection completely galvanic decoupled
- All in- and outputs short-circuit protected and ESD protected
- EMC tested
- Expansion boards for additional HW features
- Multi device support with sync option for engine speed signals

Test Setup



Note: Calculation intensive modules like cylinder pressure simulation can cause a limitation of e.g. the max. engine speed.

Technical Specifications

Operating voltage	12 V DC
Current consumption	typ. < 1 A
ECU voltage	12 V / 24 V DC
ECU current	10 A
Permissible operation temperature	0 to 40°C
Housing material	Aluminum
Dimensions	175 x 107 x 61 mm
Weight	690 g



The screenshot shows the MicroLC Software with analog outputs, crank-/ camshaft, RPM and complex PWM.

Update and Support Subscription

- Free in the first year of use, chargeable from the second year

Legal Restrictions

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Ordering Information

µLC Test System
Order number **F02U.V02.303-02**

Software Options

Update and Support Subscription
Order number **F02U.V02.838-01**

Accessories

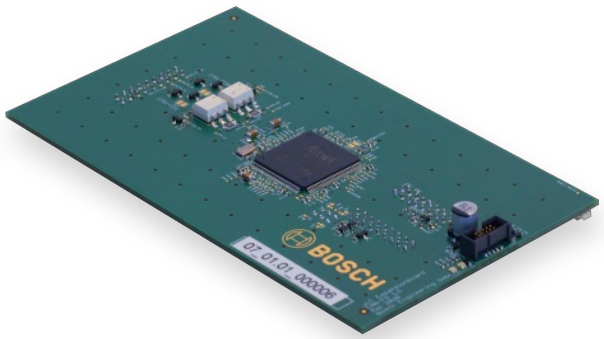
Expansion Board CAN-FD
Order number **F02U.V03.095-01**

Expansion Board Current Loop Interface
Order number **F02U.V02.889-01**

Expansion Board Digital Multichannel Pot.
Order number **F02U.V03.129-01**

Expansion Board Digital Outputs
Order number **F02U.V02.904-01**

Expansion Board CAN-FD



Features

- 2 independent channels
- Compatible with CAN and CAN-FD
- Switchable termination resistor

The **Expansion Board CAN-FD** extends the functions of the **µLC Test System** without intervening in the software and without additional enabling mechanisms. The card has two channels that are compatible with classic CAN as well as with CAN-FD. For CAN-FD, data bit rates of up to 5 Mbit/s are supported.

- Adjustable bit rates and sample points with optional Transmission Delay compensation for high bit rates
- Direct import of dbc and Fibex files
- Short circuit proof

Technical Specifications

Parameter	Value
$U_{Bus,prot}$	±56 V
U_{CM}	±30 V
R_{Term}	120 Ohm

Parameter	Value
Max. data rate (CAN)	1 Mbit/s
Max. data rate (CAN-FD)	5 Mbit/s
Filter	Range-Filter for 11bit- and 29bit-IDs
Resolution timestamp	1 ms
Adjustable cycle times	1 ms - 65 s

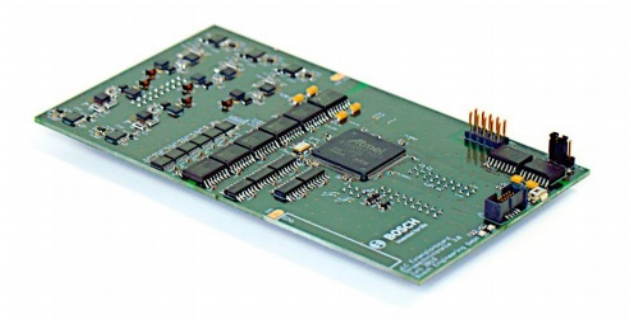
Legal Restrictions

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Ordering Information

Expansion Board CAN-FD
Order number **F02U.V03.095-01**

Expansion Board Current Loop Interface



Features

- All common wheel speed sensors can be simulated
- Simulation of gear speeds possible
- Speed calculation based on wheel circumference
- Current limits freely adjustable from 0 mA to 40 mA

The **Expansion Board Current Loop Interface** extends the functions of the **µLC Test System** without intervening the software and without activating additional mechanisms. The numbered outputs are available for this purpose. Using the five provided channels it is possible to simulate up to five independent sensors. With integrated Lua scripting and the provided API it is possible to create automated tests.

Technical Specifications

TS	
Engine speed	-3,000 to 12,000 rpm
Local pattern / teeth	48 to 60
Signal duration forwards	35 to 55 µs
Signal duration backwards	80 to 100 µs
Gaps	0 to 10

TS		
Prefixed bit	35 to 45	(de)activatable
Duty Cycle	737,000 µs	
Stand still signal duration	1,340 to 1,540 µs	
Stand still signal	150,000 µs	(de)activatable

AK		
Engine speed	-3,125 to 3,125 rpm	
Local pattern / teeth	48 to 60	
Parity	Even / odd parity	
LR-Bit		(de)activatable
LM0-Bit		(de)activatable
LM1-Bit		(de)activatable
LM2-Bit		(de)activatable
Stand still signal	150,000 µs	

PWM-i		
Engine speed	-2,500 to 2,500 rpm	
Local pattern / teeth	48 to 60	
Duration LR	35 to 55 µs	(de)activatable
Duration DR_L	80 to 100 µs	
Duration DR_R	170 to 190 µs	
Duration DR_L_EL	350 to 370 µs	(de)activatable
Duration DR_R_EL	710 to 730 µs	(de)activatable
Stand still signal duration	1,430 to 1,450 µs	
Stand still signal period	737,000 µs	

PWM-s	
Engine speed	-5,000 to 5,000 rpm
Local pattern / teeth	48 to 60

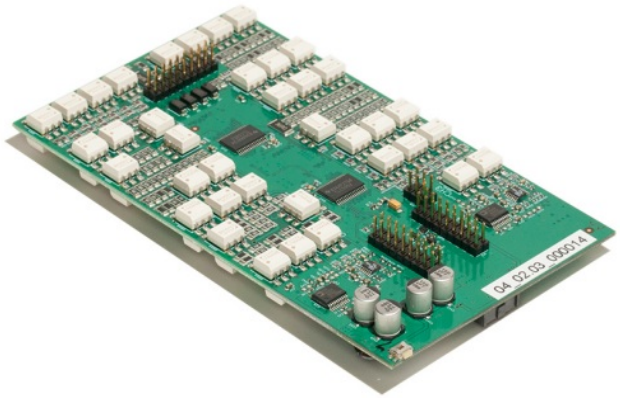
Legal Restrictions

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Ordering Information

Expansion Board Current Loop Interface
Order number **F02U.V02.889-01**

Expansion Board Digital Multichannel Pot.



Features

- 4 independent, galvanically isolated, AC-capable channels
- Wide range of resistance: 50 Ohm to 500 kOhm
- High accuracy and 19 Bit Resolution
- Overcurrent protection
- Non-mechanical solid-state switches

The **Digital Multichannel Potentiometer Expansion Board** extends the functionality of the **µLC Test System** by seamless integration into an existing device. It offers four independently configurable, galvanically isolated digital potentiometers with a wide range of resistance and excellent accuracy. All four channels feature individual protection by an automatic overcurrent shutdown with automatic retry.

Application

Emulating Sensor Data

Designed to work for example with the sensor interface L9966 (FlexI)

Technical Specifications

Maximum voltage on any input referred to µLC-GND	-24 to 24 V

Electrical Characteristics

Parameter	Value	Unit
Minimum Resistance	50	Ohm
Maximum Resistance	500	kOhm
Step Size	1	Ohm
Resolution	19	Bit

Accuracy

Parameter	Value
Entire Range	±0.5 Ohm ±1 %

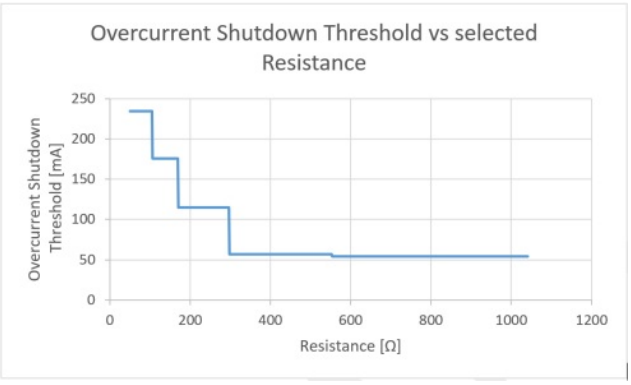
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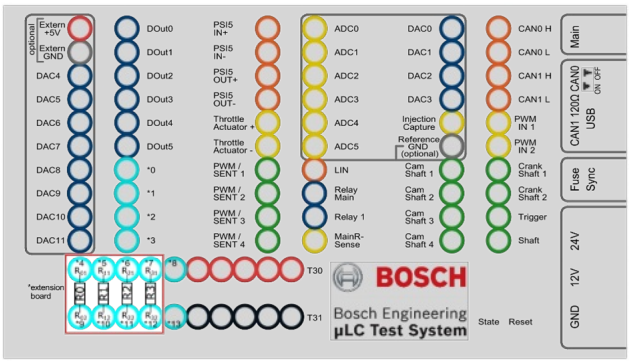
Ordering Information

Expansion Board Digital Multichannel Pot.
Order number **F02U.V03.129-01**

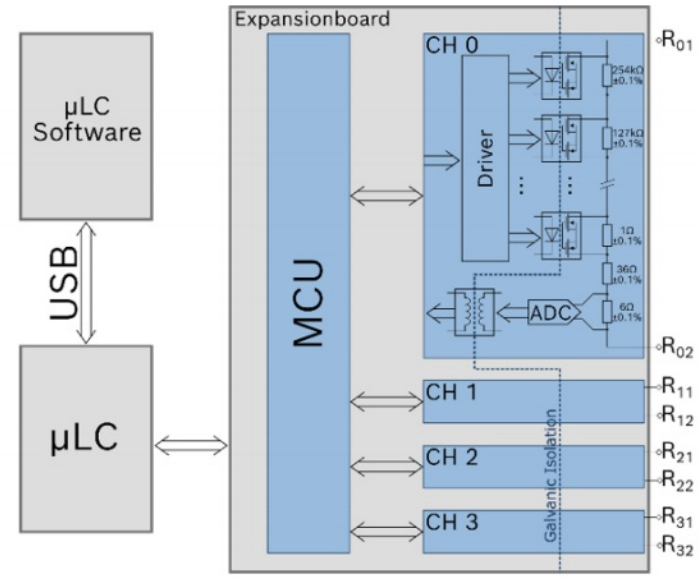
Dimensions



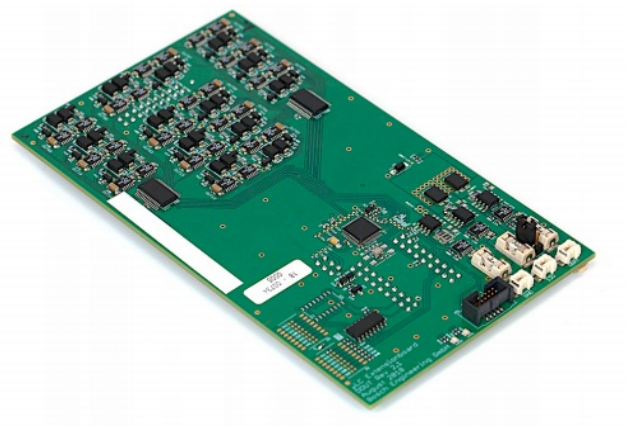
Pinout



Block diagram:



Expansion Board Digital Outputs



Features

- 14 additional digital outputs included
- Short circuit proof
- Change to individual states possible: Low, High, High-Z

The **Expansion Board Digital Outputs** extends the functions of the **µLC Test System** without interventing the software and without activating additional mechanisms. Digital Outputs provides 14 digital outputs, which can be switched individually to the states **Low**, **High** or **High-Z**. All outputs can be switched simultaneously.

Application

Output voltage	Min	Max
µLC 3.1	-1 V	24 V

Technical Specifications

DC characteristics

Parameters	Conditions	Value
U_{out}	Output = Low	<1.1 V
U_{in}-U_{out}	Output = High	<1.8 V
R_{out}	Output = High-Z	>10 MOhm
$I_{out,\ prot}$	Channel shutdown threshold	±1 A
$\sum I_{out,\ prot}$	Shutdown threshold total current all outputs	±3.33 A

Timing measured at U_{in} = 24 V

Parameters	Conditions	Value
t_{rise}	Load of 500 Ohm to GND	58 µs
	Load of 500 Ohm to 24 V	0.3 µs
	Without load	62 µs
t_{fall}	Load of 500 Ohm to GND	0.8 µs
	Load of 500 Ohm to 24 V	5.5 µs
	Without load	12 µs
$t_{restart}$*		33.6 ms

*: Restart time after overcurrent

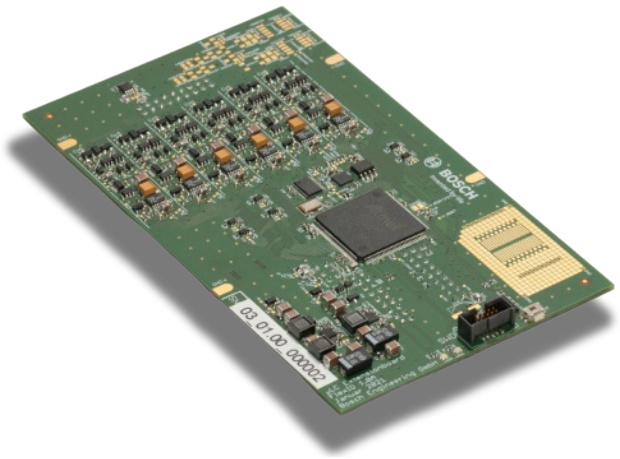
Legal Restrictions

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Ordering Information

Expansion Board Digital Outputs
Order number **F02U.V02.904-01**

Expansion Board FlexIO



Features

- 6 additional channels, freely selectable between ADC, DAC, DOut, PWM, SENT
- SENT signals according to SAE J2716 standard from 2016 with integrated fault simulation
- Manipulation of analogue, PWM, and SENT signals

The Expansion Board FlexIO extends the functions of the µLC Test System by adding six versatile channels that can handle various types of signals, including analog and digital. It enables manipulation of different signal types, such as PWM and SENT, and supports complex configurations for advanced testing scenarios.
With features like error simulation and flexible signal processing, the board is well-suited for automotive and engineering applications where precision and adaptability are essential.

Technical Specifications

Channel	Specification
ADC	Input voltage 0 to 56 V ± 100 mV
DAC	Output voltage 0 to 5 V ± 50 mV
DOut	Output voltage 12 V or high impedance
PWM-Out	Frequency 0.1 to 25,000 HZ ± 0,05 % Duty cycle 0 to 100 % ± 0,5 % Output voltage 0, 3.3 to 12 V, or high impedance
PWM-In	Frequency 1 to 20,000 Hz ± 0,5 % Duty cycle 0 to 100 % ± 1 %
SENT	Sensor types in the SAE J2716 Norm Tick length 2 to 90 µs Message type Short 8, enhanced 12 or 16 Bit Multiplexing Error simulation

Edge steepness for DOut, PWM-Out, SENT

Output	Conditions	trise max	tfall max
0 V / 3,3 V	*Ulow* = 0,5 V, *Uhigh* = 2,5 V, *RL* = 390 Ohm	120 ns	120 ns
0 V / 5 V	*Ulow* = 0,5 V, *Uhigh* = 4,1 V, *RL* = 390 Ohm	312 ns	66 ns
0 V / 12 V	*Ulow* = 1,2 V, *Uhigh* = 10,8 V, *RL* = 390 Ohm	58 ns	120 ns

To determine the slew rate, an upper (*Uhigh*) and a lower (*Ulow*) threshold voltage were defined. Subsequently, the maximum time span required for a switching process to transition from one voltage range to the other was determined. A load resistor (*RL*) value of 390 Ohm was selected.

Legal Restrictions

The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

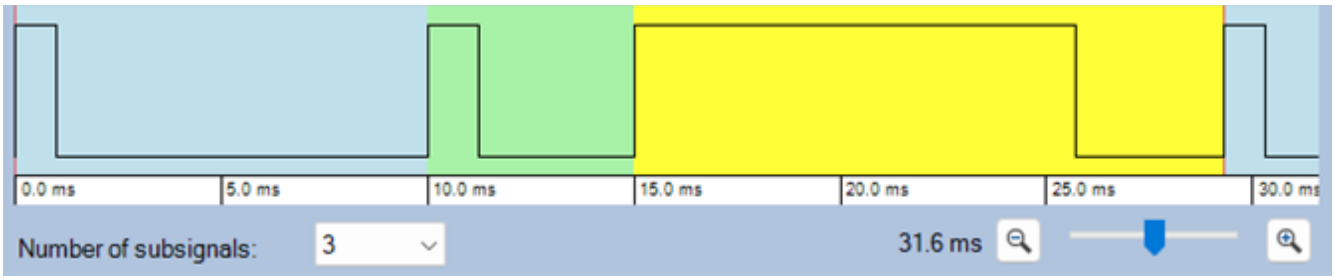
Ordering Information

Expansion Board FlexIO
Order number **F02U. V03.360-01**

Dimensions



Manipulation
The manipulation module is used to manipulate analogue, PWM and SENT signals. To do this, the respective signal is read in via one of the six channels, manipulated and then output via one of the six channels. This means that up to three manipulations can be carried out simultaneously.
The output voltage of the analog signals, the frequency, the duty cycle, and the output voltage of the PWM signal as well as the fast channel data of the SENT signal can be manipulated. Additionally, you can limit the SENT data by defining a maximum and minimum value for the data.



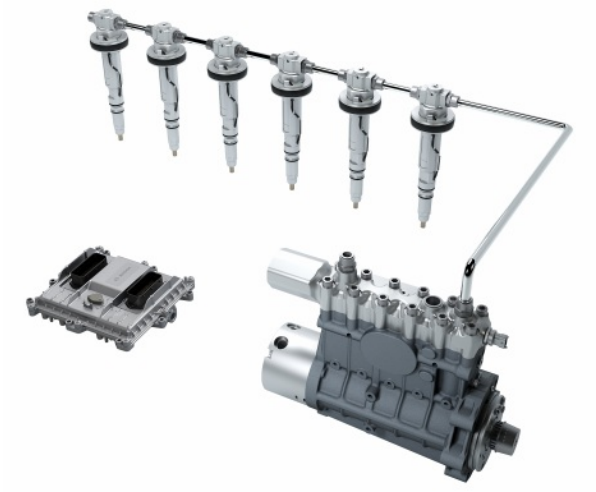
PWM
The PWM signals can be set and inverted according to the table. Furthermore, it is possible to generate complex PWM signals, which consist of up to 7 partial signals. The frequency and duty cycle of the partial signals can be freely adjusted.

Fuel & Spark

4

Diesel System Components	128
Fuel Pressure Regulators	129
Fuel Pumps	136
Ignition Coils	145
Ignition Modules	172
Injection Valves	177

Diesel System Components



Features

- Modification of Common Rail systems
- Different modification levels available
- All hydraulic parts available

The geometry and characteristics of Diesel engine components are more dependent upon the application than those for gasoline engines. A single injector design will not fit all Diesel engines due to varying mechanical and nozzle geometry requirements. In addition, the injection system can vary from year to year even within the same make of car.
Bosch Motorsport uses the same Common Rail technology for racing that was developed for production vehicle applications. This includes both solenoid (magnetic) technology and the latest cutting-edge piezo technology.
Bosch Motorsport can offer a wide variety of modifications to fit the system to your specifications. These modifications include:

- Definition of suitable base components from other (or larger) engine applications.
- Adaptation of components for mating, fit and orientation to suit the selected application.
- Flow enhancement of injectors and rails.
- Injector nozzle adaptation (flow rate, number of holes, spray cone angle etc.).

Technical Specifications

Common Rail Pumps	CP1H, CP3, CP4	
Rails		Max. 6 cyl./bank
Pressure Sensors	RDS	Max. 2,400 bar
Injectors	CRI 2 (Solenoid), CRI 3 (Piezo)	
Pressure Control Valves	DRV	Max. 2,400 bar

Installation Notes

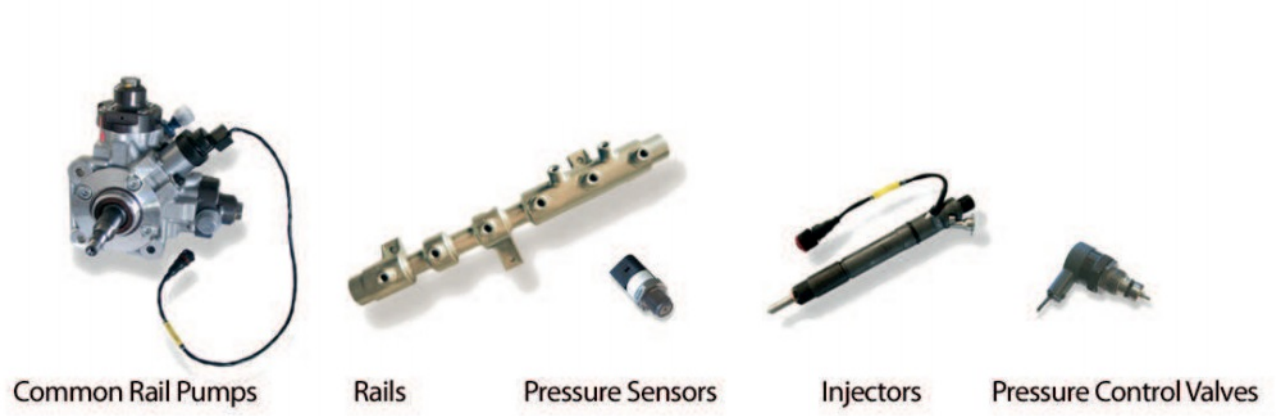
When contacting us for more information on our Diesel components, please have the following information ready so that we may best determine components required for your application:

- The base engine / the car where this engine originally is installed
- Model year and type of car / engine
- The base output level and the desired output level for the engine
- If it is originally equipped with Bosch components: the part numbers of the Bosch components
- Alternatively the car / engine manufacturer part number of the original injection system.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Dimensions



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Overview

Fuel Pressure Regulator Mini 2



- 5 to 8 bar
- 30 to 400 l/h reflow
- Adjusted at 105 l/h
- Aluminum housing
- All versions Methanol compatible

Fuel Pressure Regulator Mini 5



- 5 bar
- 15 to 220 l/h reflow
- Adjusted at 105 l/h
- Sheet steel housing

Fuel Pressure Regulator Mini A



- 2.2 to 3.5 bar/3.5 to 5 bar
- 15 to 220 l/h reflow
- Pressure adjustable
- Sheet steel housing

FPR Adaptor light



- Aluminum housing
- Fits to production type regulators and Motorsport regulators (FPR Mini 2, Mini 5, Mini A)
- Very light weight

Fuel Pressure Regulator Mini 2



Features

- 5 to 8 bar
- 30 to 400 l/h reflow
- Adjusted at 105 l/h
- Aluminum housing
- All versions Methanol compatible

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.
We offer this regulator for gasoline as well as for methanol applications.
The main benefit of this regulator includes a higher pressure range and a higher return flow rate in comparison to the production type regulators.

Application

Pressure range	See ordering information
Reflow quantity	30 to 400 l/h
Fuel compatibility	Gasoline, E85, M100
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<600 m/s^2 at 5 to 250 Hz
Valve leakage	Q_{leck} [cm^3/min] ≤ 9 (pneumatic) at p [kPa] = 0.8 x P_{nom}

Technical Specifications

Variations

Please see Ordering Information

Mechanical Data

Diameter	38.1+0.1-0.2 mm
Weight	Ca. 61 g
Mounting	Fastening with a clip

Connectors and Wires

Connector supply	Diam. 25 mm, O-ring 25x2.5
Connector reflow	Diam. 9.1 mm, O-ring 5x2.5

Installation Notes

Never run the regulator without the integrated filter.

Please oil O-rings lightly with clean and silicone free engine oil before you install the regulator.

Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation of the pressure regulator with a medium other than gasoline is not allowed.

Using the FPR Adaptor light F02U.V02.248-01, you can rebuild the regulator an inline type.

This pressure regulator is not designed for in-tank mounting.

Legal Restrictions

The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Fuel Pressure Regulator Mini 2
Pressure Range 5.0 bar
Order number **F02U.V02.166-01**

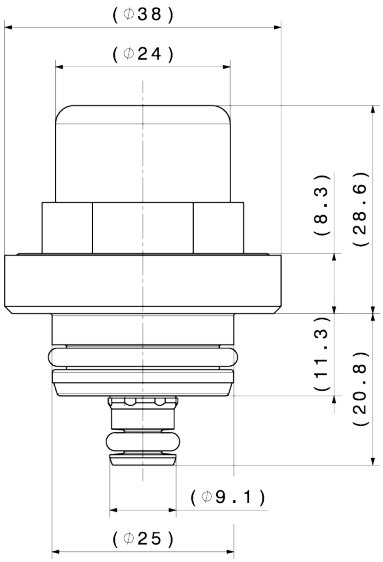
Fuel Pressure Regulator Mini 2
Pressure Range 6.0 bar
Order number **F02U.V02.168-01**

Fuel Pressure Regulator Mini 2
Pressure Range 7.0 bar
Order number **F02U.V02.170-01**

Fuel Pressure Regulator Mini 2
Pressure Range 8.0 bar
Order number **F02U.V02.171-01**

FPR Adaptor light
Order number **F02U.V02.248-01**

Dimensions



Complete dimensions on offer drawing at www.bosch-motorsport.com

Fuel Pressure Regulator Mini 5



4

Features

- 5 bar
- 15 to 220 l/h reflow
- Adjusted at 105 l/h
- Sheet steel housing

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.
We modified this production type based regulator especially for motorsport use and increased the pressure level.
The main benefit of this regulator include the competitively priced high quality and the high return flow rate.

Application

Pressure range	5 bar
Reflow quantity	15 to 220 l/h
Reference pressure connector	Diam. 5 mm, tube connector
Fuel compatibility	Gasoline (E85 or M15 with shortened lifetime)
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<600 m/s² at 5 to 250 Hz
Valve leakage	Q_{leck} [cm³/min] ≤ 9 (pneumatic) at p [kPa] = 0.8 x P_{nom}

Technical Specifications

Mechanical Data

Diameter	34.9 mm
Weight	48.5 g
Mounting	Fastening with a clip

Characteristic

Set pressure accuracy	±2 % at 105 l/h

Connectors and Wires

Connector supply	Diam. 25 mm, O-ring
Connector reflow	Diam. 9.15 mm, O-ring

Installation Notes

The tube connector at the housing can be used to supply reference pressure to the regulator. This can be atmospheric pressure, air box pressure or manifold pressure.

Never run the regulator without the integrated filter.

Please oil O-rings lightly with clean and silicone free engine oil before you install the regulator.

Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation of the pressure regulator with a medium other than gasoline is not allowed.

This pressure regulator is not designed for in-tank mounting.

Legal Restrictions

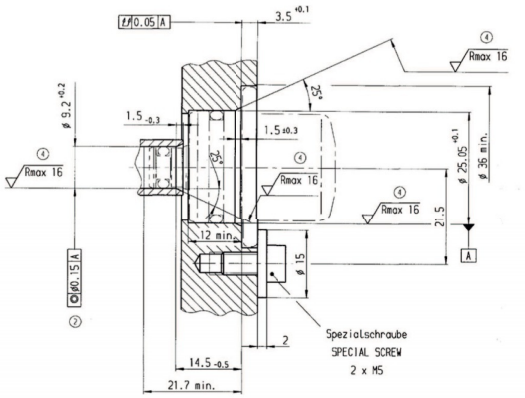
The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Fuel Pressure Regulator Mini 5
Order number **0280.B02.722-03**

FPR Adaptor light
Order number **F02U.V02.248-01**

Dimensions



Fuel Pressure Regulator Mini A



Features

- 2.2 to 3.5 bar/3.5 to 5 bar
- 15 to 220 l/h reflow
- Pressure adjustable
- Sheet steel housing

Fuel pressure regulators are used to maintain constant fuel pressure at the injection valves.
This regulator based on a production type regulator was specially designed for motorsport applications. The main benefit of this regulator is the adjustability of the fuel pressure.

Application

Pressure range	2.2 to 3.5 bar 3.5 to 5.0 bar
Reflow quantity	15 to 220 l/h
Reference pressure connector	Diam. 5 mm, tube connector
Fuel compatibility	Gasoline, E85, M15
Operating temperature	-40 to 120°C
Storage temperature	-40 to 100°C
Max. vibration	<400 m/s^2 at 5 to 250 Hz
Valve leakage	Q_{leck} [cm^3/min] ≤ 9 (pneumatic) at p [kPa] = 0.8 x P_{nom}

Technical Specifications

Mechanical Data

Diameter	34.9 mm
Weight	58 g
Mounting	Fastening with a clip

Connectors and Wires

Connector supply	Diam. 25 mm, O-ring
Connector reflow	Diam. 9.15 mm, O-ring

Installation Notes

The tube connector at the housing can be used to supply reference pressure to the regulator. This can be atmospheric pressure, air box pressure or manifold pressure.

Never run the regulator without the integrated filter.

Please oil O-rings lightly with clean and silicone free engine oil before you install the regulator.

Please make a leak test after you have installed the regulator.

When the pressure regulator is removed and will be reused, the O-rings must be tested for fractures.

Operation of the pressure regulator with a medium other than gasoline is not allowed.

This pressure regulator is not designed for in-tank mounting.

Legal Restrictions

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Ordering Information

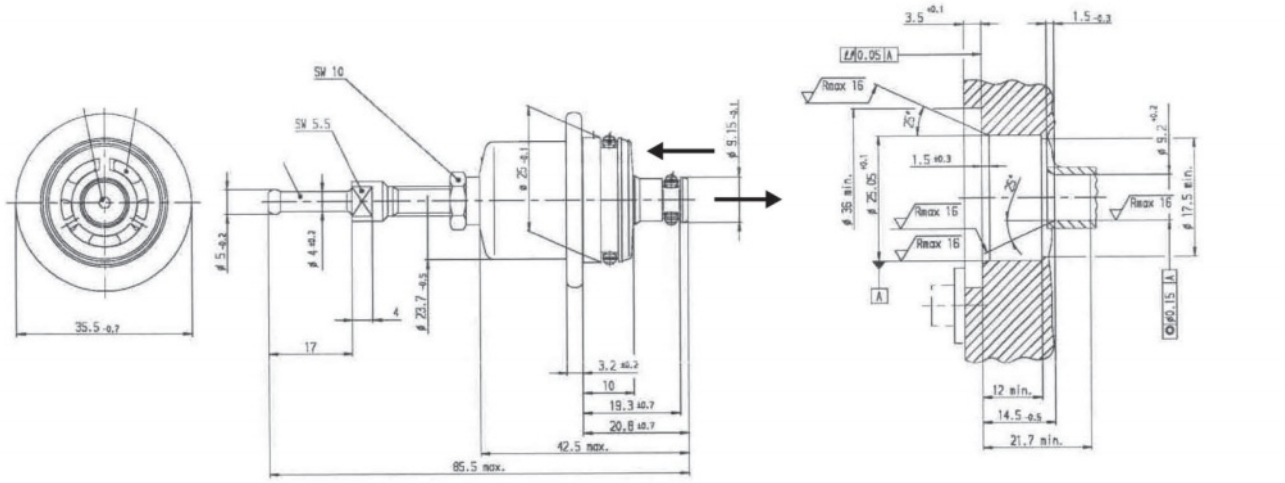
Fuel Pressure Regulator Mini A
Pressure Range 2.2 to 3.5 bar
Order number **B280.550.340-03**

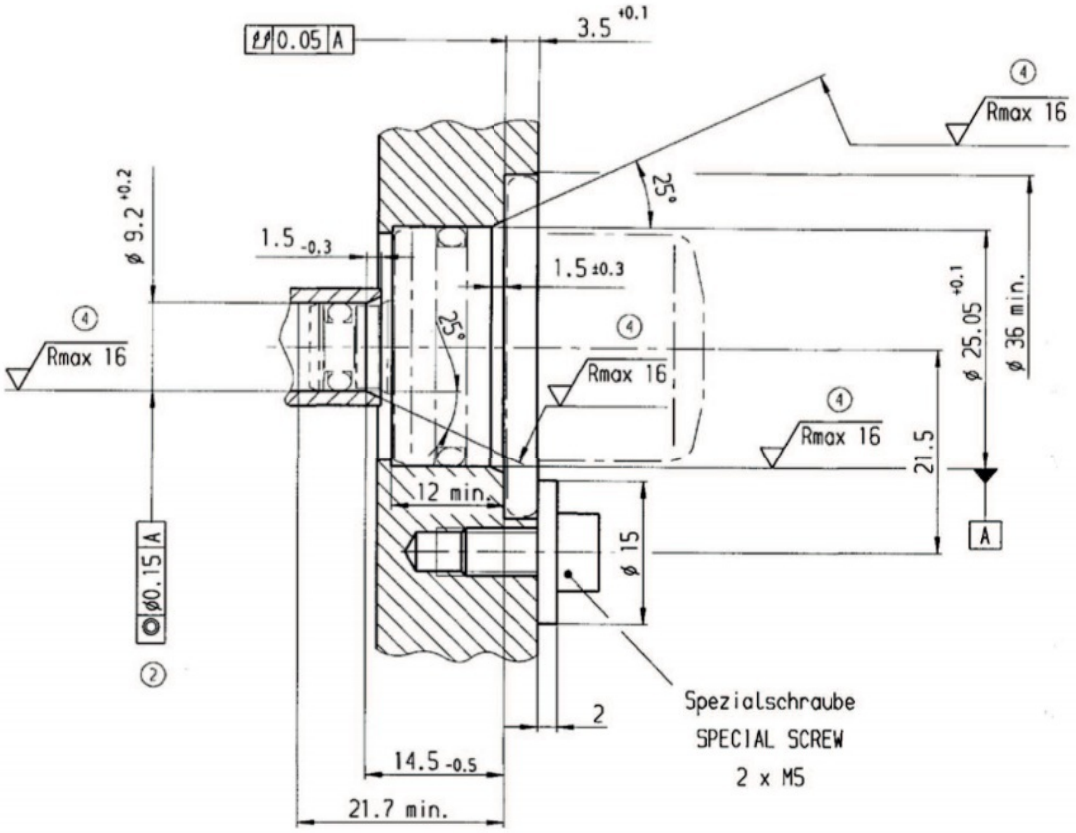
Fuel Pressure Regulator Mini A
Pressure Range 3.5 to 5.0 bar
Order number **B280.550.341-04**

FPR Adaptor light
Order number **F02U.V02.248-01**

4

Dimensions





Installation Recommendation

FPR Adaptor light



Features

- Aluminum housing
- Fits to production type regulators and Motorsport regulators (FPR Mini 2, Mini 5, Mini A)
- Very light weight

This adaptor offers the opportunity to convert a rail pressure regulator into an inline pressure regulator. The adaptor is able to hold a production type regulator as well as a motorsport regulator. Delivery without regulator.

Application

Fuel compatibility	Gasoline, E85/M100
Operating temperature range	-40 to 120°C
Storage temperature range	-40 to 100°C
Max. vibration	<600 m/s^2 at 5 to 250 Hz

Technical Specifications

Mechanical Data

Diameter	50 mm
Heigth	55 mm
Weight	92 g
Mounting	Screw fastening with M6 screws into housing or M5 screws through housing

Connectors and Wires

Connector supply	2 x M14 x 1.5
Connector reflow	M14 x 1.5

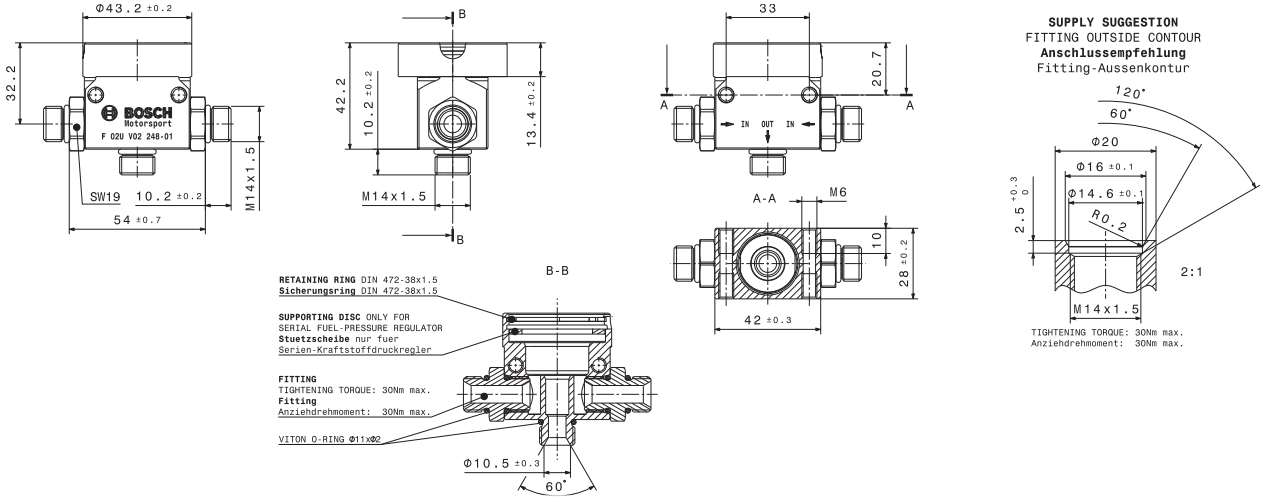
Legal Restrictions

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Ordering Information

FPR Adaptor light
Order number **F02U.V02.248-01**

Dimensions



Overview

Fuel Pump FP 165-E



- >165 l/h
- Max. 6 bar
- 700 g
- Fuel lines screwed
- Internal pre-filter on suction side with 300 µm

Fuel Pump FP 200-7



- >200 l/h
- Internal pressure limiting valve
- 750 g
- Fuel lines screwed
- Internal pre-filter on suction side with 300 µm

Fuel Pump FP 200-E



- >200 l/h
- No internal pressure limiting valve
- 750 g
- Fuel lines screwed
- Internal pre-filter on suction side with 300 µm

HP Fuel Pump HDP 5



- Max. 1.1 cm^3/rot_{cam}
- 200 bar
- 780 g
- Integrated Flow Control Valve
- Internal Pressure Relief Valve

Fuel Pump FP 165-E



Features

- >165 l/h
- Max. 6 bar
- 700 g
- Fuel lines screwed
- Internal pre-filter on suction side with 300 µm

The FP 165-E is an inline roller cell pump for the installation outside the fuel tank (installation in tank not proven).
It is capable of providing <165 l/h at 6 bar. Bio-fuel and Diesel can be delivered up to E100 (shortens lifetime!).
The FP 165-E is a production type fuel pump, combining good quality at a low price.

Application

Fuel pressure	0.5 up to 6 bar
Delivery rate at 5 bar and 22°C	190 l/h at 4.3 bar
Pressure limiting valve	8 to 10.0 bar rel.
Fuel compatibility	Up to E100 with shorter lifetime
Diesel compatibility	Given
Operating temperature range	-40 to 80°C ≤90°C for ≤5 h over 1.000 h lifetime ≤105°C for ≤1 h over 50 h lifetime
Storage temperature range	-40 to 60°C
Max. vibration IEC 60068-2-34	10 Hz 19,4 $(m/s^2)^2/Hz$ 300 Hz 0,654 $(m/s^2)^2/Hz$ 1.000 Hz 0,059 $(m/s^2)^2/Hz$

Technical Specifications

Mechanical Data

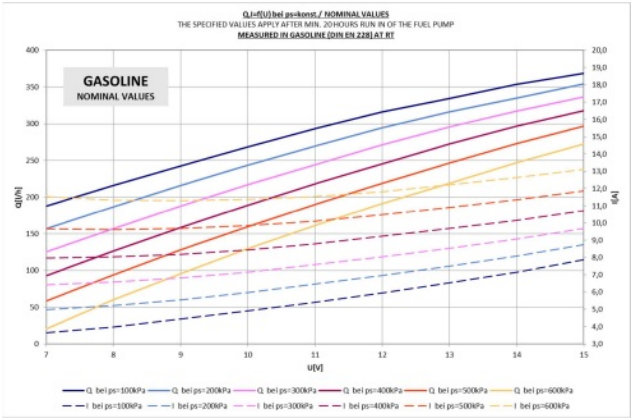
Diameter	60 mm
Length	162.6 mm
Weight	700 g
Mounting	Clamping

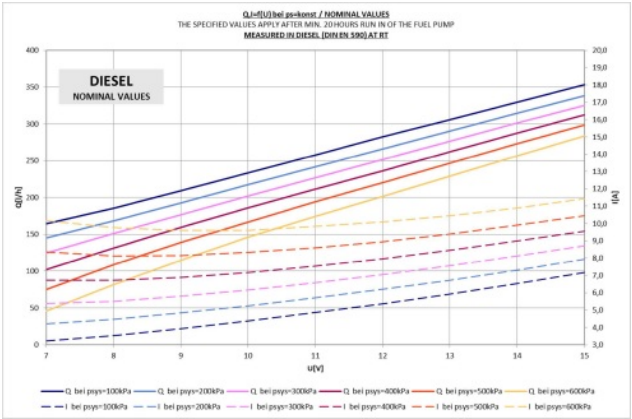
Electrical Data

Supply voltage	6 to 15 V
Operating voltage	13 V (26 V for 60 s)
Load current at 5 bar and 22°C	<14 A

Characteristic

Color	Silver
Non-return valve	Internal
Overpressure valve	Internal





Connectors and Wires

Electrical connector	+M4/-M5
Electrical mating connector	with ring wire M4 and M5
Mechanical connector intake side	M14x1.5
Mechanical connector pressure side	M12x1.5

Installation Notes

Up to E100 with shorter lifetime

For technical reasons the values may vary.

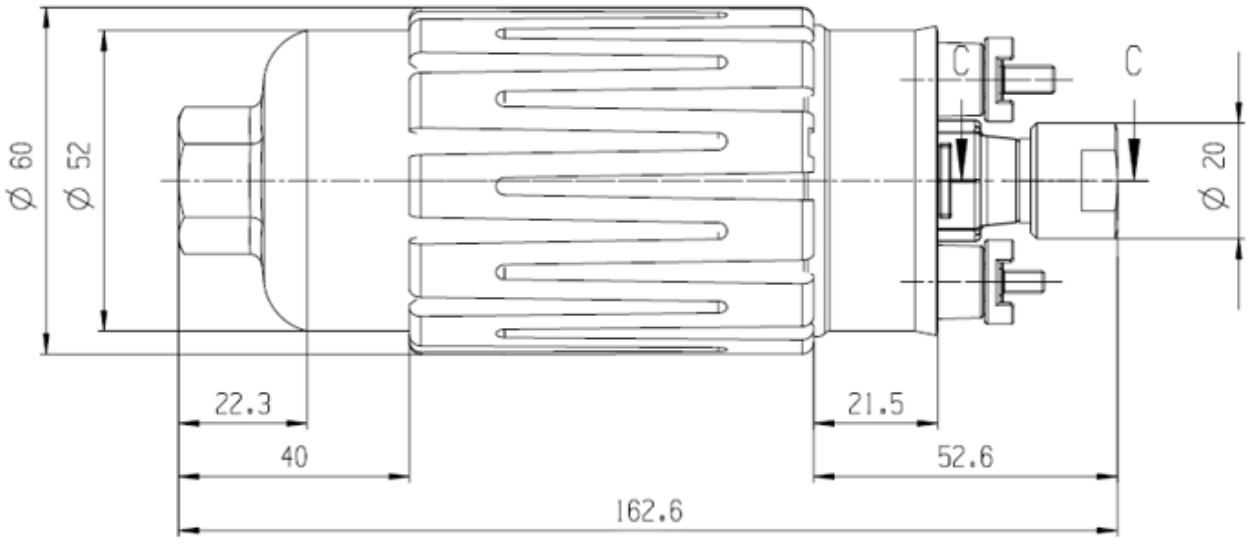
Please use within the specified limit values only.

Please find further application hints in the offer drawing at our homepage.

Ordering Information

Fuel Pump FP 165-E
Order number **F.02U.V03.137-01**

Dimensions



Fuel Pump FP 200-7



Features

- >200 l/h
- Internal pressure limiting valve
- 750 g
- Fuel lines screwed
- Internal pre-filter on suction side with 300 µm

The FP 200-7 is an inline roller cell pump for the installation outside the fuel tank (installation in the tank is not proven).
It is capable of providing 200 l/h at 7 bar. Bio-fuel can be delivered up to E100 (shortens lifetime!).
The FP 200-7 is compatible with Gasoline and Diesel fuel. It is the replacement for the 0580.254.044 aftermarket fuel pump with higher performance.

Application

Fuel pressure	Up to 7,5 bar
Gasoline delivery rate at 5 bar and 22°C	>220 to 270 l/h
Diesel delivery rate at 7 bar and 22°C	>185 to 235 l/h
Pressure limiting valve	8,0 to 10,0 bar
Fuel compatibility	Up to E100 with shorter lifetime
Diesel compatibility	Given
Operating temperature range	-40 to 80°C ≤90°C for ≤5 h over 1.000 h lifetime ≤105°C for ≤1 h over 50 h lifetime
Storage temperature range	-30 to 60°C
Max. vibration IEC 60068-2-34	10 Hz 19,4 $(m/s^2)^2/Hz$ 300 Hz 0,654 $(m/s^2)^2/Hz$ 1.000 Hz 0,059 $(m/s^2)^2/Hz$

Technical Specifications

Mechanical Data

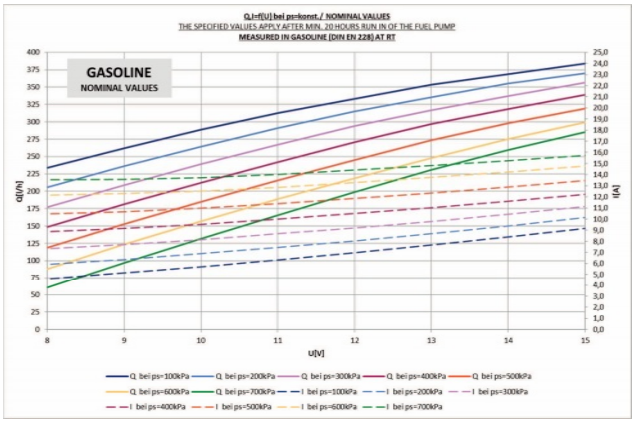
Diameter	60 mm
Length	197 mm
Weight	750 g (864 g incl. cable kit)
Mounting	Clamping

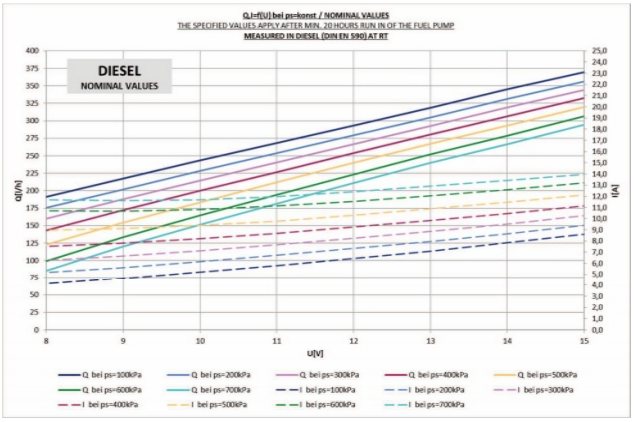
Electrical Data

Supply voltage	6 to 15 V (26 V for 60 s)
Operating voltage	13 V
Load current at 5 bar and 22°C	≤ 17 A

Characteristic

Color	Silver
Non-return valve	External
Fuel filtering	External, on pressure side
Over-pressure valve	Internal





Connectors and Wires

Electrical connector	+M4/-M5
Electrical mating connector	With ring wire M4 and M5
Mechanical connector intake side	M18x1.5

Mechanical connector pressure side	M12x1.5

Installation Notes

- Up to E100 with shorter lifetime
- For technical reasons the values may vary.
- Please use within the specified limit values only.
- Please find further application hints in the offer drawing at our homepage.

Legal Restrictions

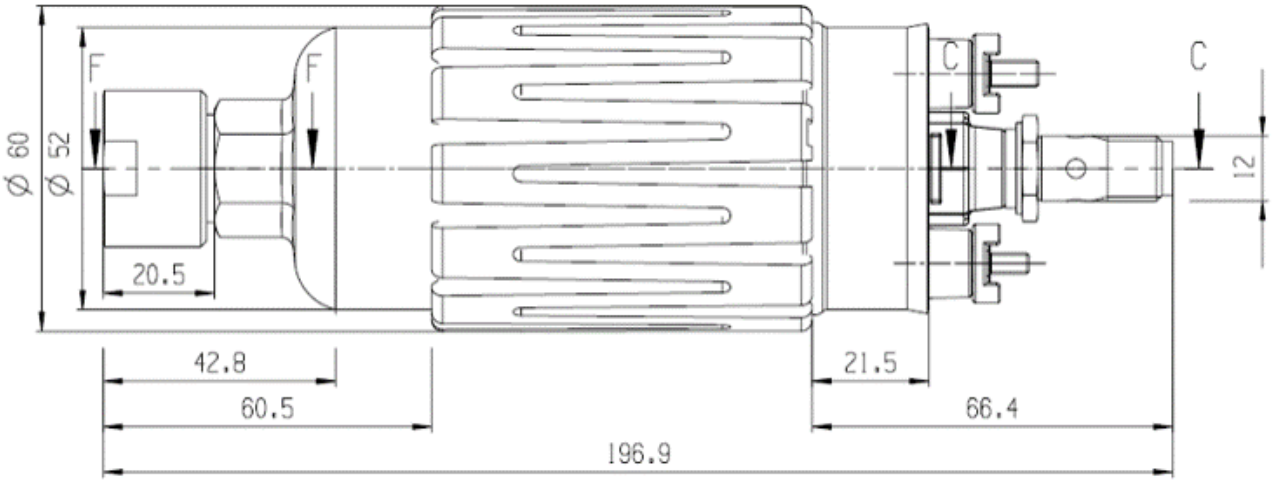
The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Fuel Pump FP 200-7
Order number **F.02U.V03.136-01**

4

Dimensions



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Fuel Pump FP 200-E



Features

- >200 l/h
- No internal pressure limiting valve
- 750 g
- Fuel lines screwed
- Internal pre-filter on suction side with 300 µm

The FP 200-E is an inline roller cell pump for the installation outside the fuel tank (installation in the tank is not proven).
It is capable of providing 200 l/h at 8 bar. Bio-fuel can be delivered up to E100 (shortens lifetime!).
The FP 200-E is compatible with Gasoline and Diesel fuel.

Application

Fuel pressure	Max. 8,0 bar
Gasoline delivery rate at 8 bar and 22°C	>200 l/h
Diesel delivery rate at 7 bar and 22°C	>180 l/h
Pressure limiting valve	Without. Subsequent assembly possible on pressure side by customer
Fuel compatibility	Up to E100 with shorter lifetime
Diesel compatibility	Given
Operating temperature range	-40 to 80°C ≤90°C for ≤5 h over 1.000 h lifetime ≤105°C for ≤1 h over 50 h lifetime
Storage temperature range	-30 to 60°C
Max. vibration IEC 60068-2-34	10 Hz 19,4 $(m/s^2)^2/Hz$ 300 Hz 0,654 $(m/s^2)^2/Hz$ 1.000 Hz 0,059 $(m/s^2)^2/Hz$

Technical Specifications

Mechanical Data

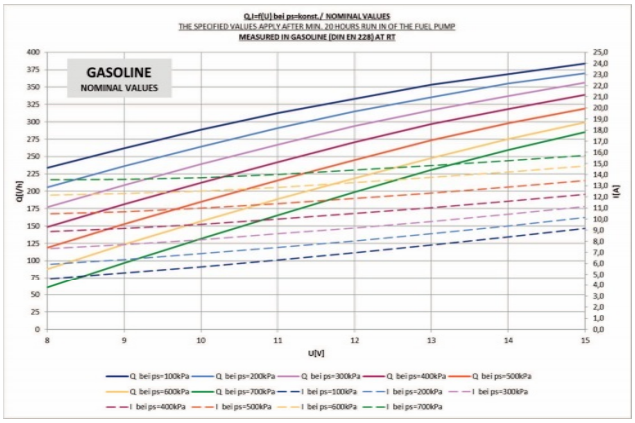
Diameter	60 mm
Length	197 mm
Weight	750 g (864 g incl. cable kit)
Mounting	Clamping

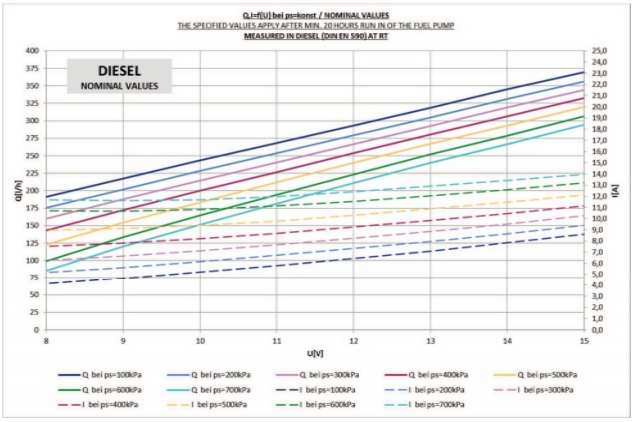
Electrical Data

Supply voltage	6 to 15 V (26 V for 60 s)
Operating voltage	13 V
Load current at 8 bar and 22°C	< 20 A

Characteristic

Color	Silver
Non-return valve	External
Fuel filtering	External, on pressure side
Over-pressure valve	Without





Connectors and Wires

Electrical connector	+M4/-M5
Electrical mating connector	With ring wire M4 and M5
Mechanical connector intake side	M18x1.5

Mechanical connector pressure side	M12x1.5

Installation Notes

- Up to E100 with shorter lifetime
- For technical reasons the values may vary.
- Please use within the specified limit values only.
- Please find further application hints in the offer drawing at our homepage.

- Be careful, there is no over-pressure valve inside.

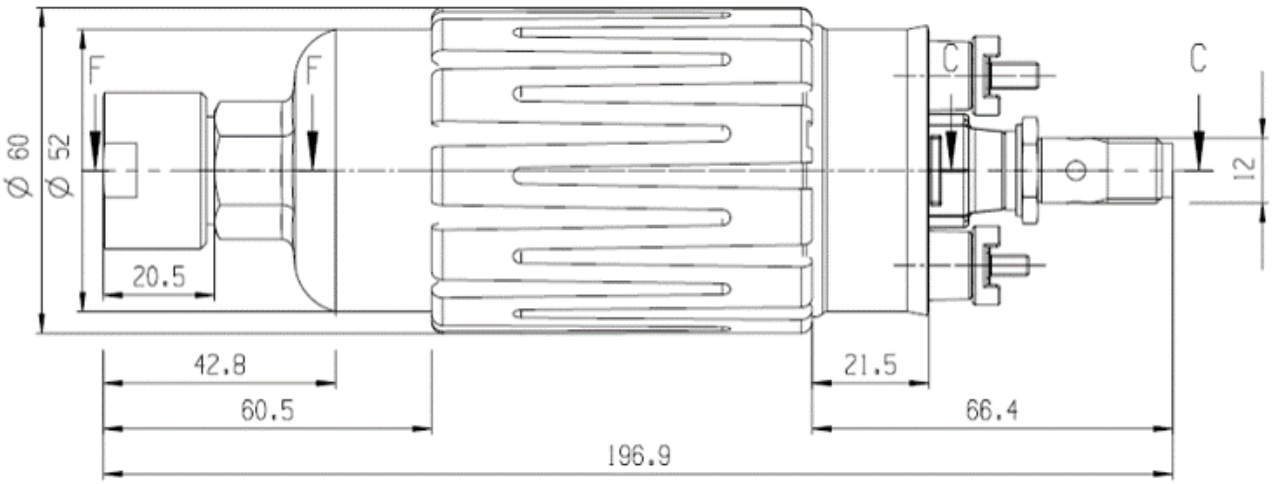
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Fuel Pump FP 200-E
Order number **0580.B00.12U-50**

Dimensions



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HP Fuel Pump HDP 5



Features

- Max. 1.1 cm^3/rot_{cam}
- 200 bar
- 780 g
- Integrated Flow Control Valve
- Internal Pressure Relief Valve

The HDP 5 is a compact high pressure single piston pump. The design allows achieving a big delivery volume as well as high efficiency, as needed in motorsport applications. Modifications in the number of cam lobes and cam lifts allow different flow requirements to be addressed.
The HDP 5 is equipped with an internal pressure relief valve to limit the maximum fuel pressure. It does not require a fuel return line into the fuel tank.
The pump has an integrated demand control for metering the amount of fuel supplied into the high pressure fuel system. It can be ordered with a compact connector or a motorsport connector.
Depending on the requirements of your engine (e.g. fuel consumption over rotation ratio) we recommend different types of tappets, piston springs and cam profiles. Please notice: Fuel delivery and maximum driveshaft speed depend on cam profile and type of tappet.

Application

For high pressure manifold injection or gasoline direct injection

Technical Specifications

Mechanical Data

Mass flow	Please see extra sheet
Efficiency	Please see extra sheet
Body design	Series
Flow capacity and max. engine speed	Depending on cam profile
Nominal pressure Standard version	200 bar
Weight	Approx. 780 g
Supply pressure	4 to 7 bar
Operating temperature	-40 to 120°C
Storage temperature	-40 to 70°C
Compatible fuels	Unleaded fuels, E22, E85, M15
Fuel temperature	80°C, short term 130°C
Max. vibration	300 m/s^2

Possible customization	
Rev B (iPRV)	500 bar or customization
Rev C (EVO)	= Rev B + reduced internal restrictions + introduction of EVO parts (outlet valve)
Rev D (Piston)	= Rev C + bigger piston diameter
Flange hole circle diameter	66 mm or 75 mm
Flange orientation	free
Electrical connector orientation	45° or customization
Hydraulic connection design	M14 x 1.5 or customization
Hydraulic connection orientation	LP 240° or customization, HP 180°, or customization

Connectors and Wires

Electrical connector design
Motorsport wire + open end
Motorsport wire + motorsport connector

Installation Notes

- Mounting on cylinder head or adapter flag.
- Available cam profiles on request.
- Select the cam profile on fuel consumption requirements.
- Avoid interference with FCV and hydraulic connections at flange orientation.
- Avoid interference with flange at electrical connector orientation.
- Please specify the electrical connector design and the wire length with your order.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Standard version
Motorsport wire + compact connector
Order number **0261.520.08F-01**

Standard version
Motorsport wire + motorsport connector
Order number **F02U.V03.542-01**

Rev B (iPRV)
Order number **on request**

Rev C (EVO)
Order number **on request**

Rev D (Piston)
Order number **on request**

Accessories

Flat tappet (26 mm)
Order number **F02U.V01.156-01**

Roller tappet (26 mm)
Order number **F02U.V01.163-01**

Overview

Ignition Coil C90i-E8



- Max. 40 kV
- Min. 90 mJ
- Max. 5.0 kV/µs
- Max. 15,000 1/min
- Fits to spark plugs with a ceramic diameter of 8 mm

Ignition Coil C90i-E10



- Max. 40 kV
- Min. 90 mJ
- Max. 5.0 kV/µs
- Max. 15,000 1/min
- Fits to spark plugs with a ceramic diameter of 10 mm

Ignition Coil C90i-pro



- Max. 40 kV
- Min. 90 mJ
- Max. 5.0 kV/µs
- Max. 15,000 1/min
- Developed for Turbo-GDI engines

Ignition Coil C90i-pro evo



- Max. 40 kV
- Min. 90 mJ
- Boosted spark current
- Max. 15,000 1/min
- Developed for engines with high gas turbulences

Ignition Coil C90i-WG



- Max. 35 kV
- Min. 90 mJ
- Connection for high voltage wire
- Max. 15,000 1/min
- Developed for Turbo-GDI engines

Ignition Coil P50/P50-M



- Max. 35 kV
- Min. 50 mJ
- Max. 3.0 kV/µs
- Max. 10,000 1/min
- High voltage contacting via high voltage wire and spark plug connector possible

Ignition Coil P65



- Max. 35 kV
- Min. 65 mJ
- Max. 10,000 1/min
- Developed for GDI engines

Ignition Coil P65-T



- Max. 33 kV
- Min. 65 mJ
- Max. 10,000 1/min (with reduced dwell time)
- Developed for GDI engines

Ignition Coil P65-TWG



- Max. 33 kV
- Min. 65 mJ
- Connection for high voltage wire
- Max. 10,000 1/min (with reduced dwell time)
- Developed for GDI engines

Ignition Coil P65-WG



- Max. 35 kV
- Min. 65 mJ
- Connection for 30 kV high voltage wire with locking pin (European standard)
- Max. 10,000 1/min
- Developed for GDI engines

Ignition Coil P65-WS



- Max. 35 kV
- Min. 65 mJ
- Connection for high voltage wire according to SAE (American standard)
- Max. 10,000 1/min
- Developed for GDI engines

Ignition Coil PS-T



- Max. 27 kV
- Min. 42 mJ
- Max. 1.5 kV/µs
- Max. 10,000 1/min

Ignition Coil C90i-E8



Features

- Max. 40 kV
- Min. 90 mJ
- Max. 5.0 kV/µs
- Max. 15,000 1/min
- Fits to spark plugs with a ceramic diameter of 8 mm

This single fire coil was developed for the use e.g. in GDI (turbocharged) high performance engines. It is designed for direct cylinder head mounting.
For this single fire coil the customer can define the length of the spark plug connector.
The main benefits of this high performance coil are its high energy capability and a very good provided high voltage.

Application

Spark energy	≥ 90 mJ
Primary current	≤ 16 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 480 m/s^2 at 50 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	90 to 225 mm, depending on customer requirements
Weight w/o wire	< 270 g
Mounting	Screw fastening
Fits to spark plugs with a ceramic diameter of 8 mm	

Electrical Data

Primary resistance	185 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage at 1 MOhm ‖ 10 pF	≤ 40 kV
Spark current	≤ 160 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 1.1 ms
Noise supression	Inductive and 1 kOhm resistance
Suppression diode / EFU	Internal

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} red
Pin 2	ECU ignition power stage blue
Pin 3	Engine GND black
Pin 4	White: Ionic current signal measurement preparation
Wire length	100 cm
Wire size	AWG 20/22

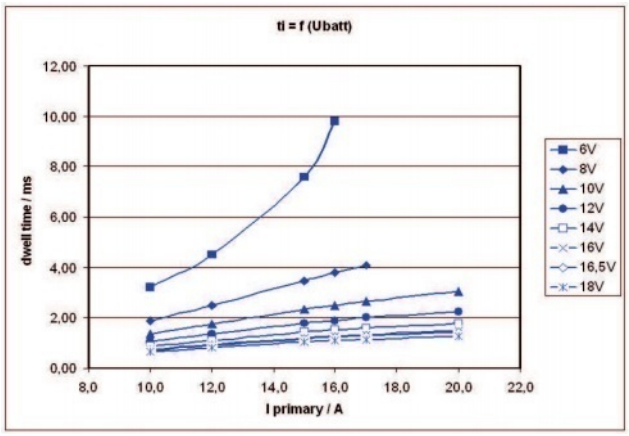
Various motorsport and automotive connectors are available on request.

Please specify the required wire length and the length of the spark plug connector with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	10 A	12 A	15 A	16 A	17 A	20 A
6 V	3.2	4.5	7.6	9.8		
8 V	1.88	2.49	3.47	3.79	4.10	
10 V	1.35	1.76	2.34	2.51	2.67	3.05
12 V	1.06	1.35	1.77	1.89	2.00	2.24
14 V	0.87	1.11	1.43	1.52	1.60	1.79
16 V	0.74	0.93	1.20	1.28	1.34	1.49
16.5 V	0.71	0.90	1.15	1.23	1.29	1.43
18 V	0.64	0.81	1.03	1.10	1.15	1.27

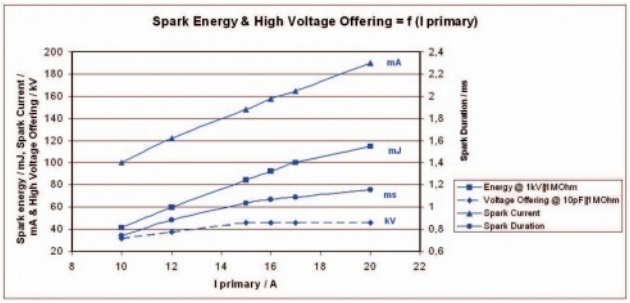
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
10 A	41.4 mJ	0.74 ms	100 mA	31.6 kV
12 A	59.5 mJ	0.882 ms	122 mA	37.4 kV
15 A	84.4 mJ	1.034 ms	148 mA	45.7 kV
16 A	92.6 mJ	1.07 ms	158 mA	46 kV
17 A	100 mJ	1.09 ms	165 mA	46 kV
20 A	115 mJ	1.16 ms	190 mA	46 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values (see “Electrical Data”).

Usage above Iprim = 16 A or 40 kV may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

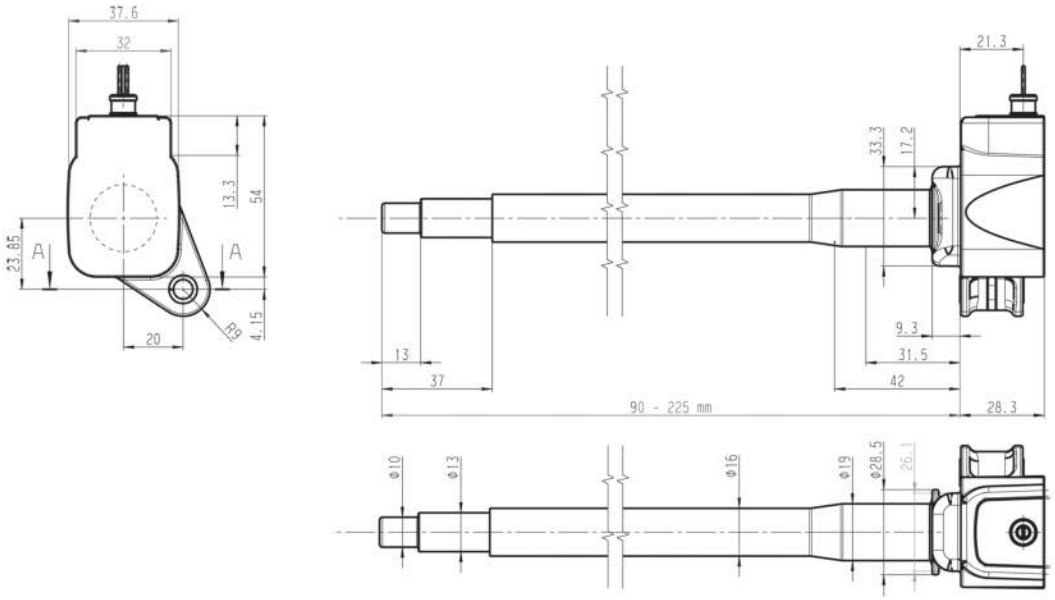
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil C90i-E8
Order number **depending on customer requirements**

Dimensions



See Offer Drawing for further information

Ignition Coil C90i-E10



4

Features

- Max. 40 kV
- Min. 90 mJ
- Max. 5.0 kV/µs
- Max. 15,000 1/min
- Fits to spark plugs with a ceramic diameter of 10 mm

This single fire coil was developed for the use e.g. in GDI (turbocharged) high performance engines. It is designed for direct cylinder head mounting.
For this single fire coil the customer can define the length of the spark plug connector.
The main benefits of this high performance coil are its high energy capability and a very good provided high voltage.

Application

Spark energy	≥ 90 mJ
Primary current	≤ 16 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 480 m/s^2 at 50 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	114 to 225 mm, depending on customer requirements
Weight w/o wire	< 270 g
Mounting	Screw fastening
Fits to spark plugs with a ceramic diameter of 10 mm	

Electrical Data

Primary resistance	185 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage at 1 MOhm ‖ 10 pF	≤ 40 kV
Spark current	≤ 160 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 1.1 ms
Noise suppression	Inductive and 1 kOhm resistance
Suppression diode / EFU	Internal

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	U_{batt} red
Pin 2	ECU ignition power stage blue
Pin 3	Engine GND black
Pin 4	White: Ionic current signal measurement preparation
Wire length	100 cm
Wire size	AWG 20/22

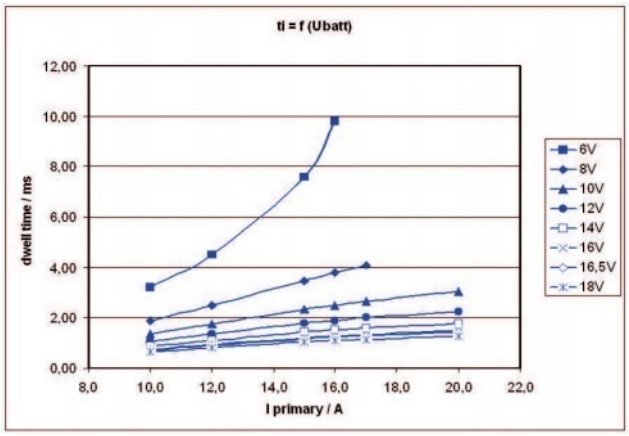
Various motorsport and automotive connectors are available on request.

Please specify the required wire length and the length of the spark plug connector with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	10 A	12 A	15 A	16 A	17 A	20 A
6 V	3.2	4.5	7.6	9.8		
8 V	1.88	2.49	3.47	3.79	4.10	
10 V	1.35	1.76	2.34	2.51	2.67	3.05
12 V	1.06	1.35	1.77	1.89	2.00	2.24
14 V	0.87	1.11	1.43	1.52	1.60	1.79
16 V	0.74	0.93	1.20	1.28	1.34	1.49
16.5 V	0.71	0.90	1.15	1.23	1.29	1.43
18 V	0.64	0.81	1.03	1.10	1.15	1.27

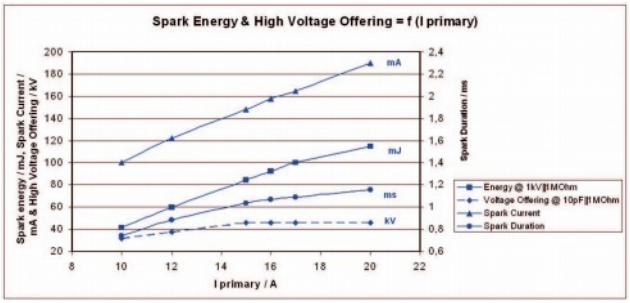
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
10 A	41.4 mJ	0.74 ms	100 mA	31.6 kV
12 A	59.5 mJ	0.882 ms	122 mA	37.4 kV
15 A	84.4 mJ	1.034 ms	148 mA	45.7 kV
16 A	92.6 mJ	1.07 ms	158 mA	46 kV
17 A	100 mJ	1.09 ms	165 mA	46 kV
20 A	115 mJ	1.16 ms	190 mA	46 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values (see “Electrical Data”).

Usage above Iprim = 16 A or 40 kV may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

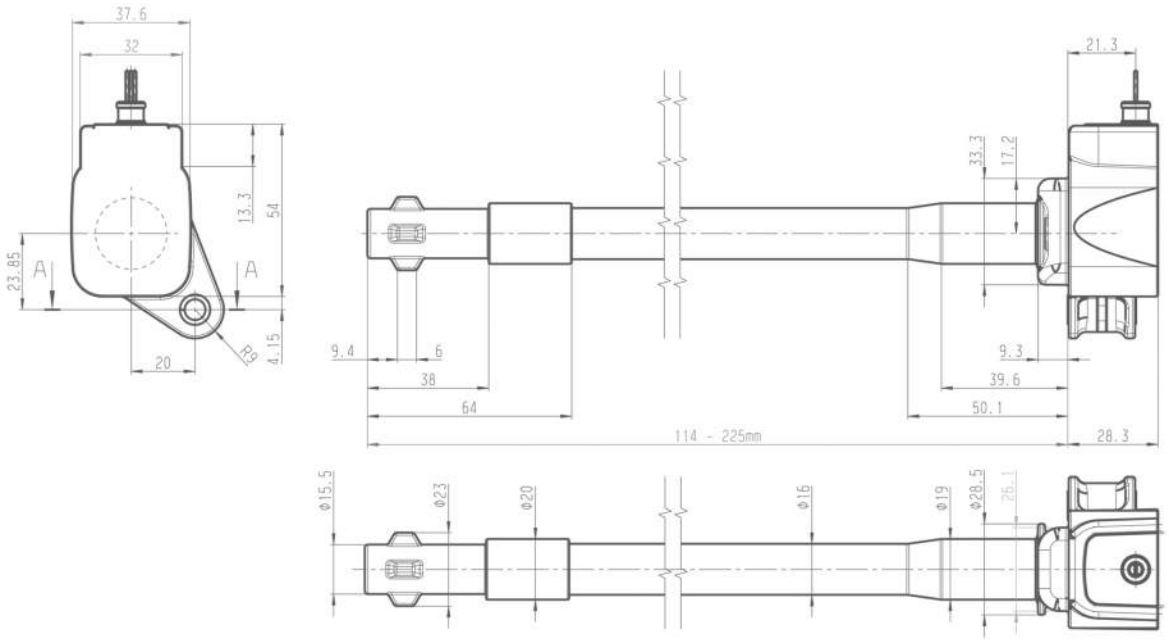
Legal Restrictions

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Ordering Information

Ignition Coil C90i-E10
Order number **depending on customer requirements**

Dimensions



See Offer Drawing for further information

Ignition Coil C90i-pro



4

Features

- Max. 40 kV
- Min. 90 mJ
- Max. 5.0 kV/µs
- Max. 15,000 1/min
- Developed for Turbo-GDI engines

This single fire coil was developed for the use e.g. in GDI (turbocharged) high performance engines. It is designed for direct cylinder head mounting.
The main benefits of this high performance coil are its high energy capability and a very good provided high voltage.

Application

Spark energy	≥ 90 mJ
Primary current	≤ 16 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 480 m/s^2 at 50 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	168 mm
Weight w/o wire	250 g
Mounting	screw fastening

Electrical Data

Primary resistance	185 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage at 1 MOhm ‖ 10 pF	≤ 40 kV
Spark current	≤ 160 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 1.1 ms
Noise suppression	Inductive
Suppression diode / EFU	Internal

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	Red: U_{batt}
Pin 2	Blue: ECU ignition power stage
Pin 3	Black: Engine GND
Pin 4	White: Ionic current signal measurement preparation
Wire length	100 cm
Wire size	AWG 20/22/24
For spark plugs	Ceramic diameter d = 10 mm

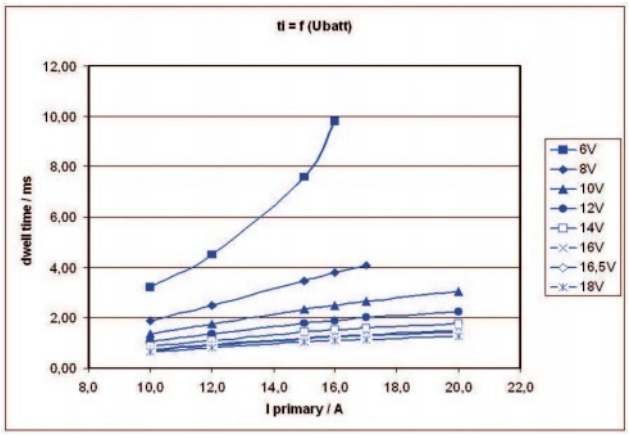
Various motorsport and automotive connectors are available on request.

Please specify the required wire length and the length of the spark plug connector with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	10 A	12 A	15 A	16 A	17 A	20 A
6 V	3.2	4.5	7.6	9.8		
8 V	1.88	2.49	3.47	3.79	4.10	
10 V	1.35	1.76	2.34	2.51	2.67	3.05
12 V	1.06	1.35	1.77	1.89	2.00	2.24
14 V	0.87	1.11	1.43	1.52	1.60	1.79
16 V	0.74	0.93	1.20	1.28	1.34	1.49
16.5 V	0.71	0.90	1.15	1.23	1.29	1.43
18 V	0.64	0.81	1.03	1.10	1.15	1.27

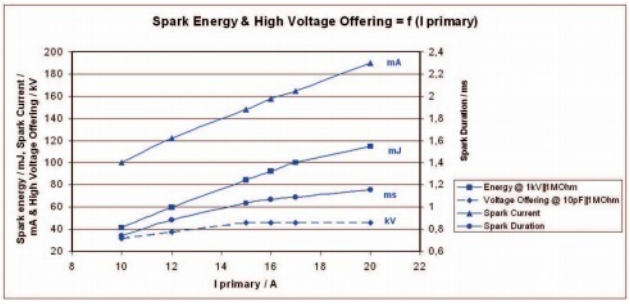
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
10 A	41.4 mJ	0.74 ms	100 mA	31.6 kV
12 A	59.5 mJ	0.882 ms	122 mA	37.4 kV
15 A	84.4 mJ	1.034 ms	148 mA	45.7 kV
16 A	92.6 mJ	1.07 ms	158 mA	46 kV
17 A	100 mJ	1.09 ms	165 mA	46 kV
20 A	115 mJ	1.16 ms	190 mA	46 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values (see “Electrical Data”).

Usage above Iprim = 16 A or 40 kV may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

Legal Restrictions

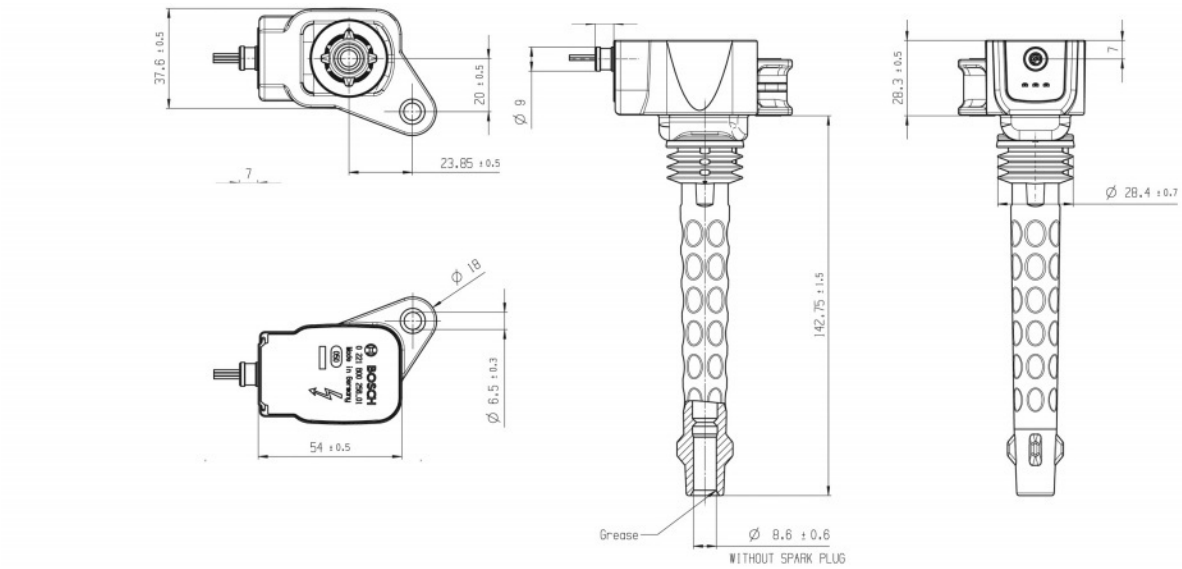
The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Single Fire Coil C90i-pro
Sample manufactured
Order number **0221.B00.256-01**

Single Fire Coil C90i-pro
Order number **F037.000.996**

Dimensions



See Offer Drawing for further information

Ignition Coil C90i-pro evo



4

Features

- Max. 40 kV
- Min. 90 mJ
- Boosted spark current
- Max. 15,000 1/min
- Developed for engines with high gas turbulences

This single fire coil was developed for engines that need a stable spark because of their higher turbulences at the air fuel mixture inside the cylinder. It is designed for direct cylinder head mounting.
The main benefits of this high performance coil are its high energy capability and a very good provided high voltage.

Application

Spark energy	≥ 90 mJ
Primary current	≤ 16 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 480 m/s^2 at 50 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	168 mm
Weight w/o wire	250 g
Mounting	screw fastening

Electrical Data

Primary resistance	185 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage at 1 MOhm || 10 pF	≤ 40 kV
Spark current	≤ 265 mA
Spark duration at 1 kV || 1 MOhm	≤ 0.65 ms
Noise suppression	Inductive
Suppression diode / EFU	Internal

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector	On request
Mating connector	On request
Pin 1	Red: U_{batt}
Pin 2	Blue: ECU ignition power stage
Pin 3	Black: Engine GND
Pin 4	White: Ionic current signal measurement preparation
Wire length	100 cm
Wire size	AWG 20/22/24
For spark plugs	Ceramic diameter d = 10 mm

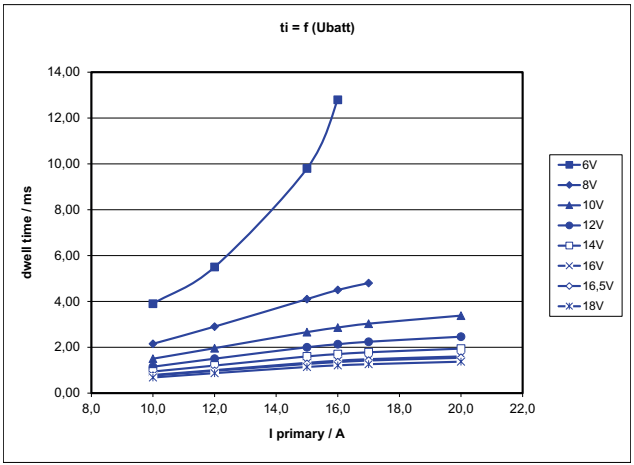
Various motorsport and automotive connectors are available on request.

Please specify the required wire length and the length of the spark plug connector with your order

Characteristic dwell times [ms]

U_{batt}	I primary					
	10 A	12 A	15 A	16 A	17 A	20 A
6 V	3.90	5.50	9.80	12.80		
8 V	2.15	2.90	4.10	4.50	4.80	
10 V	1.50	1.96	2.66	2.86	3.03	3.38
12 V	1.15	1.50	2.00	2.13	2.24	2.46
14 V	0.94	1.20	1.60	1.70	1.78	1.94
16 V	0.79	1.00	1.32	1.41	1.48	1.60
16.5 V	0.76	0.97	1.27	1.35	1.42	1.54
18 V	0.68	0.69	1.14	1.21	1.26	1.37

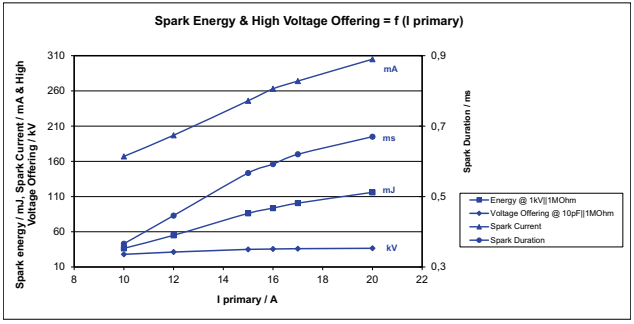
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
10 A	36.5 mJ	0.366 ms	167 mA	28 kV
12 A	55 mJ	0.446 ms	197 mA	31.3 kV
15 A	86.2 mJ	0.567 ms	246 mA	35 kV
16 A	93.6 mJ	0.592 ms	263 mA	35.6 kV
17 A	100.7 mJ	0.62 ms	274 mA	36 kV
20 A	116 mJ	0.67 ms	305 mA	36.6 kV



Spark Energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values (see “Electrical Data”).

Usage above Iprim = 16 A or 40 kV may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

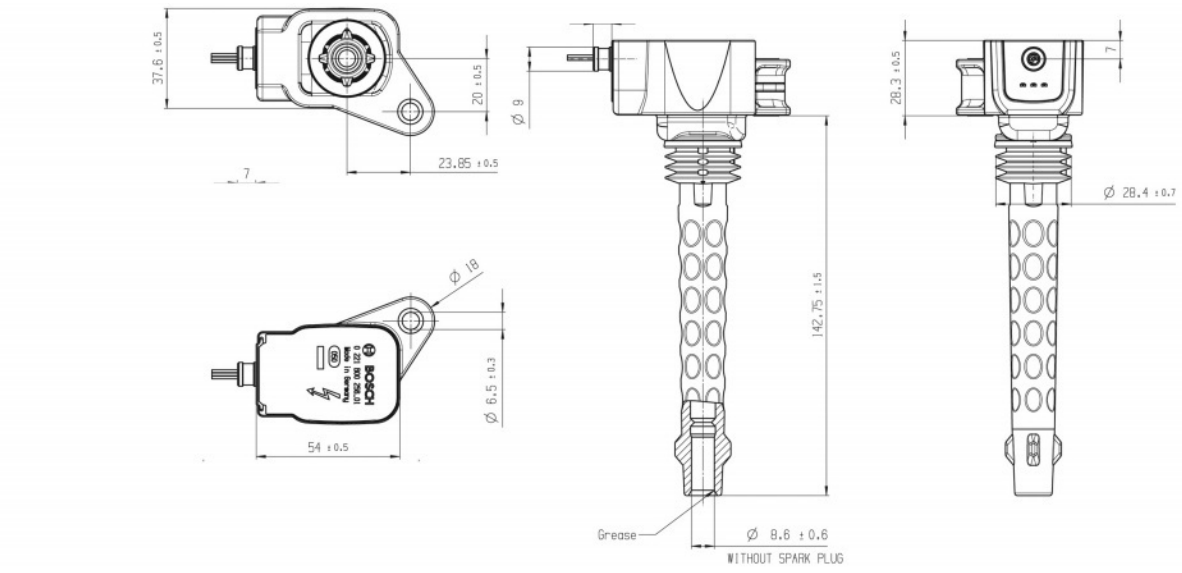
Legal Restrictions

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Ordering Information

Ignition Coil C90i-pro evo
Order number **F037.000.997**

Dimensions



See Offer Drawing for further information

Ignition Coil C90i-WG



4

Features

- Max. 35 kV
- Min. 90 mJ
- Connection for high voltage wire
- Max. 15,000 1/min
- Developed for Turbo-GDI engines

This single fire coil was developed for the use e.g. in GDI (turbocharged) high performance engines. It is designed to connect a high voltage wire on the coil. The main benefit of this high performance coil is its high energy capability.

Application

Spark energy	≥ 90 mJ
Primary current	≤ 16 A
Operating temperature range outer core	0 to 160°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 250 m/s² at 50 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	83 mm
Weight w/o wire	210 g
Mounting	screw fastening

Electrical Data

Primary resistance	185 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 5.0 kV/µs
Max. high voltage	≤ 35 kV
Spark current	≤ 160 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 1.1 ms
Noise suppression	Inductive
Suppression diode / EFU	Internal

Characteristic

Measured with power stage	IGBT IRG4BC40S (Uce=600 V)

Connectors and Wires

Connector primary side	On request
Mating connector primary side	On request
Pin 1	U_{batt} red
Pin 2	ECU ignition power stage blue
Pin 3	Engine GND black
Wire length	100 cm
Wire size	AWG 20/22
30 kV grid connectors	See Accessories

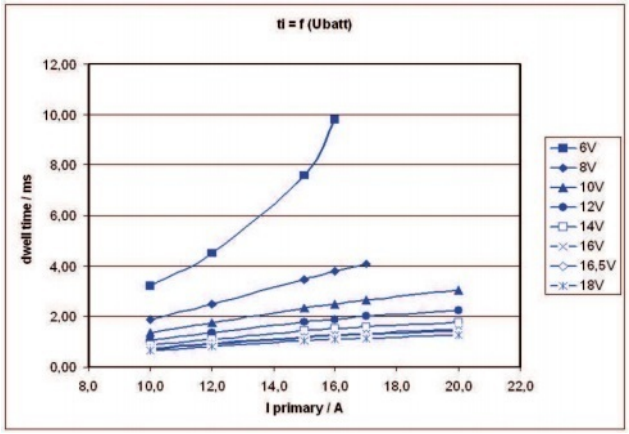
Various motorsport and automotive connectors are available on request.

Please specify the required wire length if you order the coil with a motorsport connector.

Characteristic dwell times [ms]

U_{batt}	I primary					
	10 A	12 A	15 A	16 A	17 A	20 A
6 V	3.2	4.5	7.6	9.8		
8 V	1.88	2.49	3.47	3.79	4.10	
10 V	1.35	1.76	2.34	2.51	2.67	3.05
12 V	1.06	1.35	1.77	1.89	2.00	2.24
14 V	0.87	1.11	1.43	1.52	1.60	1.79
16 V	0.74	0.93	1.20	1.28	1.34	1.49
16.5 V	0.71	0.90	1.15	1.23	1.29	1.43
18 V	0.64	0.81	1.03	1.10	1.15	1.27

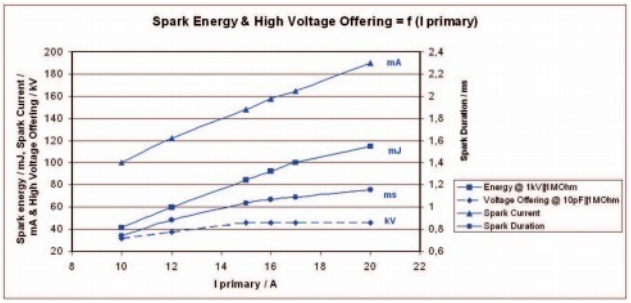
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
10 A	41.4 mJ	0.74 ms	100 mA	31.6 kV
12 A	59.5 mJ	0.882 ms	122 mA	37.4 kV
15 A	84.4 mJ	1.034 ms	148 mA	45.7 kV
16 A	92.6 mJ	1.07 ms	158 mA	46 kV
17 A	100 mJ	1.09 ms	165 mA	46 kV
20 A	115 mJ	1.16 ms	190 mA	46 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug (high voltage wire).

This coil is only for use with engine control units having an integrated ignition power stage, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values (see “Electrical Data”).

Usage above Iprim = 16 A or 35 kV may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

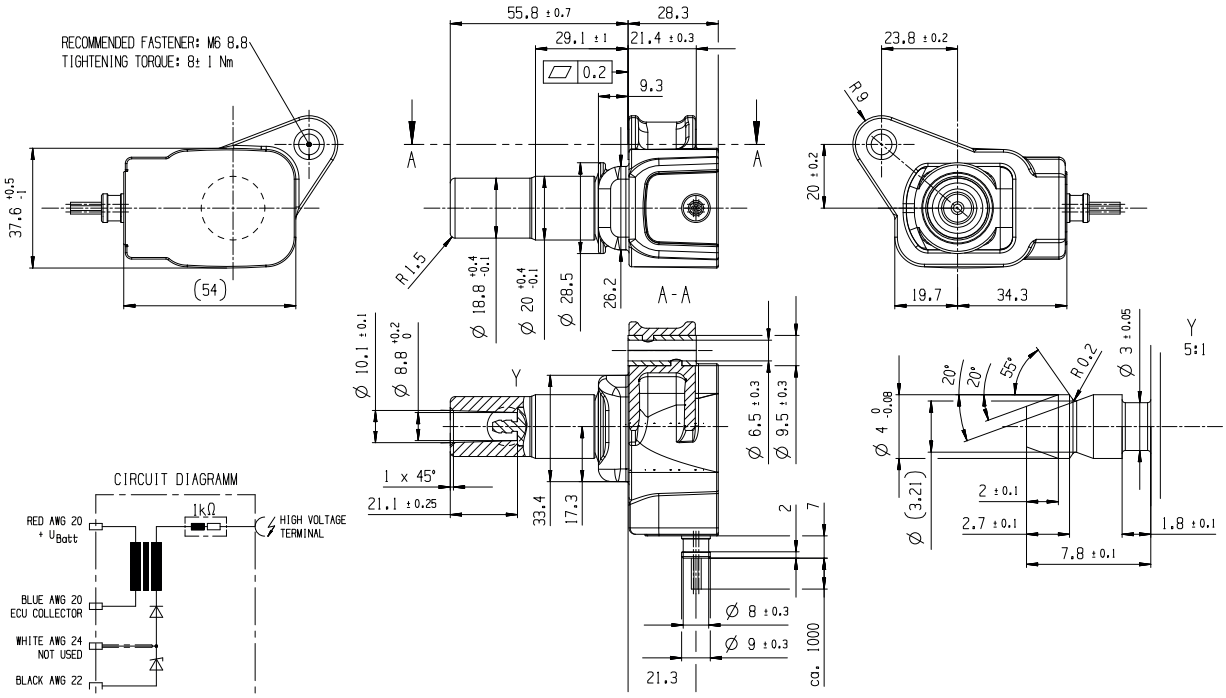
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil C90i-WG
Order number **F02U.V02.430-01**

Dimensions



See Offer Drawing for further information

Ignition Coil P50/P50-M



4

Features

- Max. 35 kV
- Min. 50 mJ
- Max. 3.0 kV/µs
- Max. 10,000 1/min
- High voltage contacting via high voltage wire and spark plug connector possible

The single fire coil P50 is a low cost concept designed for direct mounting to the cylinder head. A high voltage ignition wire can optionally be connected to the secondary output terminal.
The coil P50 requires an ECU with internal ignition power stages for each single fire coil.
The coil P50-M is specifically for motorsport applications. This coil is operable in higher vibration environments.

Application

Spark energy	≥ 50 mJ
Primary current	≤ 8.5 A
Operating temperature range at outer core	-20 to 140°C
Storage temperature range	-40 to 100°C
Max. vibration	Please see Variations

Technical Specifications

Variations

	P50	P50-M
Max. vibration	≤ 400 m/s² at 5 to 2,000 Hz	≤ 800 m/s² at 5 to 2,000 Hz
Weight	223 g	265 g
Spark plug connector	-	+

Mechanical Data

Weight	Please see Variations
Mounting	Pluggable

Electrical Data

Primary resistance with wire	370 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 3.0 kV/µs
Max. high voltage at 1 MOhm || 10 pF	≤ 35 kV
Spark current	≤ 92 mA
Spark duration at 1 kV || 1 MOhm	≤ 1.15 ms
Noise suppression	With spark plug connector
Suppression diode / EFU	Integrated

Characteristic

Measured with power stage	IGBT IRG4BC40S (U_{ce}=600 V)

Connectors and Wires

Connector	Bosch Compact
Mating connector 3-pole Compact	D261.205.335-01
Pin 1	ECU ignition power stage
Pin 2	Engine GND
Pin 3	U_{batt}

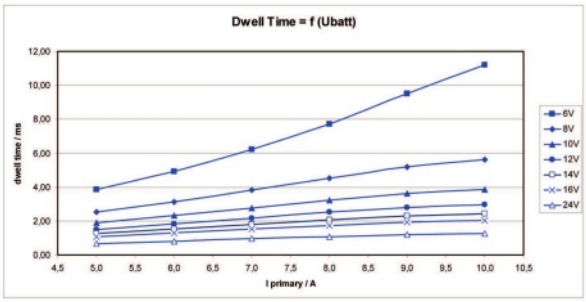
Various motorsport and automotive connectors are available on request.

For spark plugs	Ceramic diameter d=10 mm

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	6.0 A	7.0 A	8.0 A	9.0 A	10 A
6 V	3.84	4.93	6.2	7.7	9.5	11.2
8 V	2.54	3.14	3.81	4.51	5.17	5.61
10 V	1.9	2.33	2.76	3.21	3.62	3.87
12 V	1.51	1.84	2.17	2.51	2.8	2.97
14 V	1.26	1.52	1.79	2.06	2.29	2.42
16 V	1.07	1.3	1.53	1.74	1.93	2.04
18 V	0.94	1.13	1.32	1.51	1.67	1.77
24 V	0.68	0.81	0.95	1.08	1.19	1.26
30 V	0.53	0.63	0.74	0.84	0.93	0.98

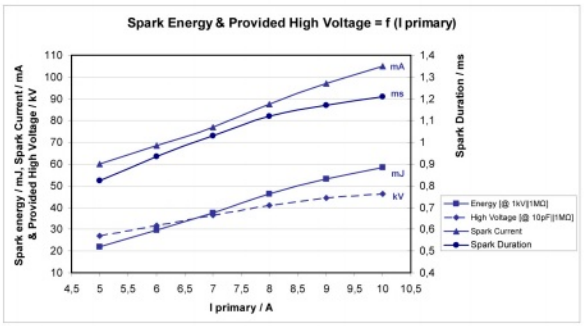
Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement



Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	22 mJ	0.82 ms	60 mA	26.8 kV
6 A	29.7 mJ	0.93 ms	68.5 mA	31.6 kV
7 A	37.5 mJ	1.03 ms	77 mA	36.4 kV
8 A	46.3 mJ	1.12 ms	87.5 mA	40.9 kV
9 A	53 mJ	1.17 ms	97 mA	44.4 kV
10 A	58.4 mJ	1.21 ms	105 mA	46.3 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

The coil P50 has no integrated transistor and requires an ECU with internal ignition power stages, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Usage above Iprim > 8.5 A or 35 kV may reduce the lifetime.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

Legal Restrictions

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Ordering Information

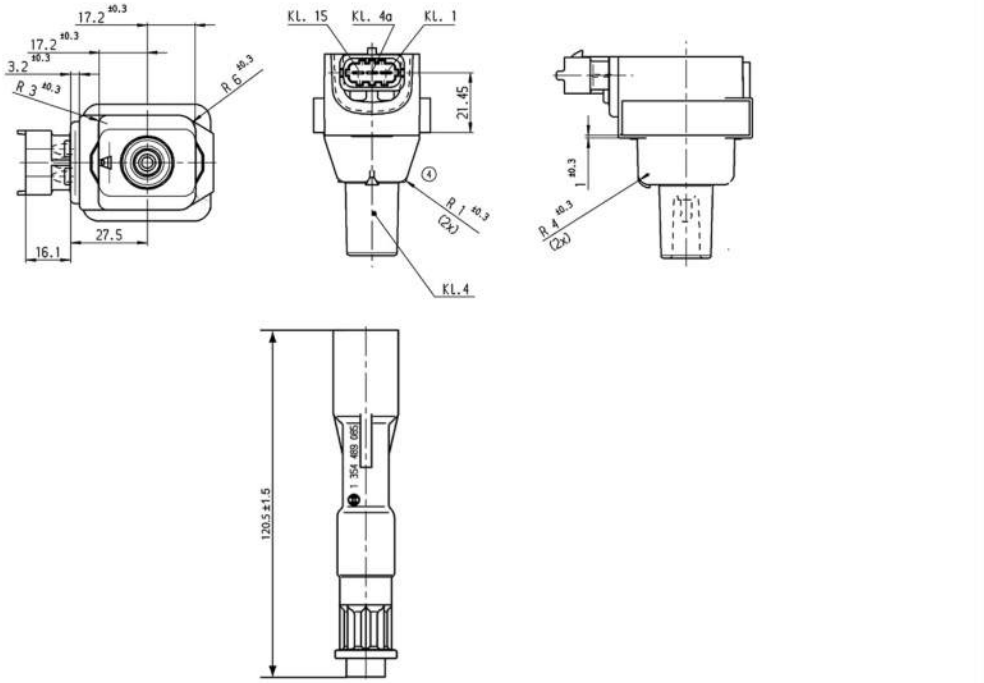
Ignition Coil P50
Order number **0221.504.001**

Ignition Coil P50-M
Motorsport version
Order number **F02U.V00.869-01**

Accessories

Accessory spark plug connector
Order number **1354.489.085**

Dimensions



See Offer Drawing for further information

Ignition Coil P65



Features

- Max. 35 kV
- Min. 65 mJ
- Max. 10,000 1/min
- Developed for GDI engines

This single fire coil is a low cost concept, designed to get connected to the spark plug via a high voltage wire. The high voltage connector is specified according to the SAE standard.
The performance of the coil fulfills the demands of modern GDI engines.
The main benefits of this product are the high packaging flexibility and its high electrical performance at low costs.

Application

Spark energy	≥ 65 mJ
Primary current	≤ 7.5 A
Operating temperature range at outer core	-20 to 140°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 250 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	180 mm
Weight w/o wire	225 g
Mounting	Screw fastening
Fits to spark plugs with a ceramic diameter of 10 mm	

Electrical Data

Primary resistance	570 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.9 kV/µs
Max. high voltage at 1 MOhm || 10 pF	≤ 35 kV
Spark current	≤ 74 mA
Spark duration at 1 kV || 1 MOhm	≤ 2.0 ms
Noise suppression	Inductive and 1 kOhm resistance
Suppression diode / EFU	Integrated

Characteristic

Measured with power stage	IGBT IRG4BC40S (U_{ce}=600 V)

Connectors and Wires

Connector	Tyco AMP
Mating connector	D261.205.350-01
Pin 1	Engine GND
Pin 2	U_{batt}
Pin 3	ECU ignition power stage

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	6.0 A	7.0 A	7.5 A	8.0 A	8.5 A
6 V	8.74	18.5				
8 V	4.5	6.4	9	10.8	13.9	
10 V	3.1	4.2	5.4	6	6.6	7.2
12 V	2.36	3.1	3.88	4.25	4.63	4.92
14 V	1.9	2.48	3.05	3.32	3.57	3.77
16 V	1.61	2.06	2.53	2.73	2.93	3.08
18 V	1.55	2	2.43	2.62	2.81	2.95
20 V	1.39	1.77	2.16	2.33	2.48	2.6
22 V	1.22	1.54	1.88	2.02	2.15	2.26
24 V	0.97	1.23	1.49	1.6	1.71	1.78

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	37.8 mJ	1.46 ms	49 mA	24.3 kV
6 A	54.5 mJ	1,74 ms	59 mA	28.9 kV
7 A	69.8 mJ	1.97 ms	69 mA	33.2 kV
7.5 A	77.6 mJ	2.04 ms	74 mA	35.8 kV
8 A	83.0 mJ	2.11 ms	77 mA	37.7 kV
8.5 A	88.0 mJ	2.16 ms	81 mA	39.0 kV

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

4

The coil P65 has no integrated transistor and requires an ECU with internal ignition power stages, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

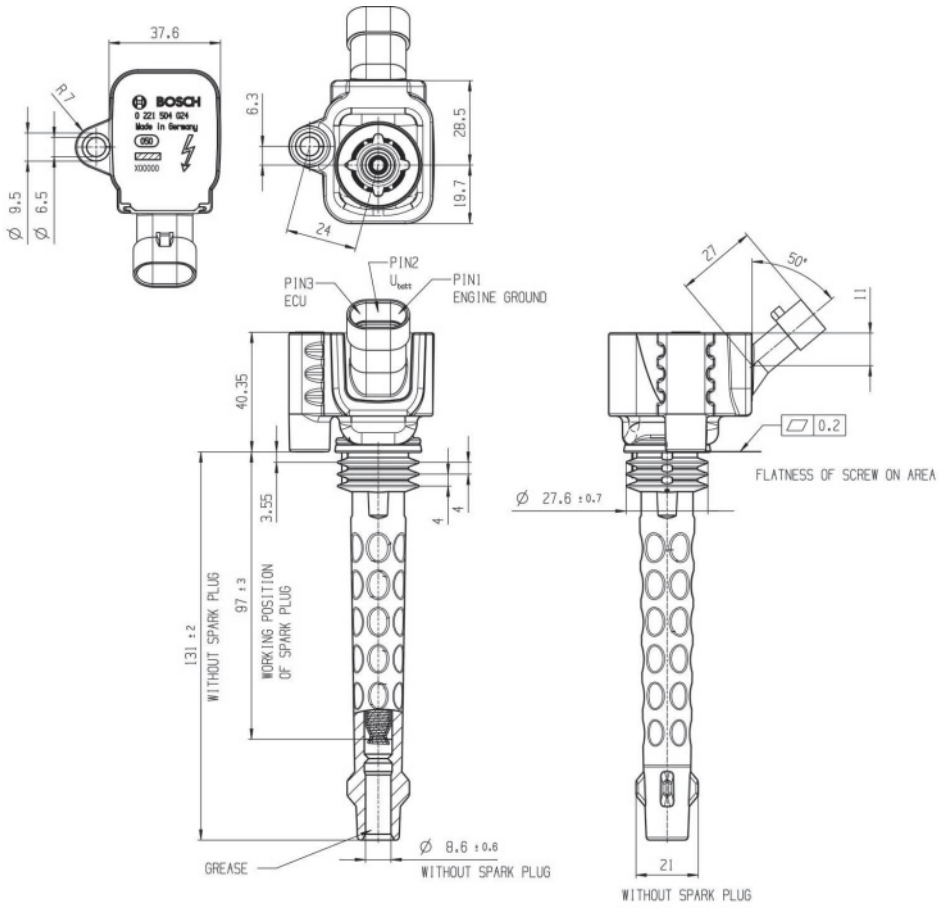
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil P65
Order number **0221.504.024**

Dimensions



See Offer Drawing for further information

Ignition Coil P65-T



Features

- Max. 33 kV
- Min. 65 mJ
- Max. 10,000 1/min (with reduced dwell time)
- Developed for GDI engines

This single fire coil is a low cost concept designed for direct mounting on the cylinder head.
The coil P65-T has an integrated transistor and requires an ECU with internal ignition drivers.

Application

Spark energy	≥ 65 mJ
Primary current	≤ 7.0 A
Operating temperature range at outer core	-40 to 140°C
Storage temperature range	-40 to 140°C
Max. vibration	≤ 480 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	143 mm
Weight	223 g
Mounting	Screw fastening
Fits to spark plugs with a ceramic diameter of 10 mm	

Electrical Data

Primary resistance with wire	Incapable of measurement
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.4 kV/µs
Max. high voltage at 1 MOhm || 10 pF	≤ 33 kV
Spark current	≤ 70 mA
Spark duration at 1 kV || 1 MOhm	≤ 1.85 ms
Noise suppression	Inductive and 1 kOhm resistance
Integrated suppression diode / EFU	
Integrated power stage	

Characteristic

Measured with power stage	BIP 385

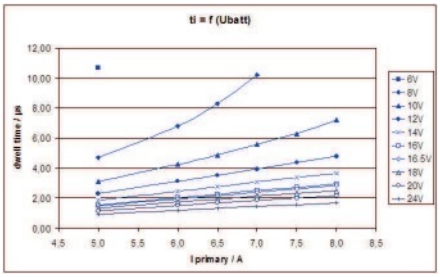
Connectors and Wires

Connector	Tyco 0-1488991-1
Mating connector	F02U.B00.555-01
Pin 1	ECU ignition signal
Pin 2	ECU GND
Pin 3	U_{batt}

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	5.5 A	6.0 A	6.5 A	7.0 A	7.5 A
Max. 1000 /min	10	9	8	7	6	5
6 V	10.7	11.6				
8 V	4.7	5.4	6.8	8.3	10.2	
10 V	3.1	3.55	4.25	4.87	5.6	6.3
12 V	2.32	2.66	3.12	3.51	3.94	4.36
14 V	1.86	2.1	2.45	2.75	3.07	3.36
16 V	1.55	1.77	2.03	2.26	2.51	2.73
16.5 V	1.49	1.7	1.95	2.17	2.40	2.61
18 V	1.34	1.51	1.73	1.92	2.13	2.31
20 V	1.16	1.33	1.51	1.67	1.85	2.0
24 V	0.93	1.05	1.19	1.32	1.45	1.57

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

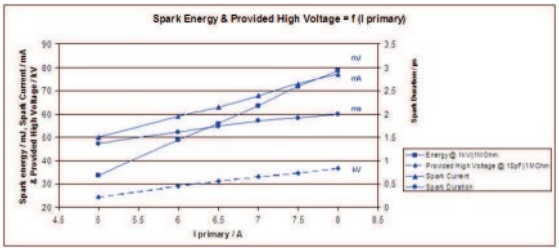


Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	33.7 mJ	1.37 ms	50 mA	24.4 kV
5.5 A	42 mJ	1.54 ms	54 mA	27.0 kV

6 A	48.9 mJ	1.62 ms	59 mA	29.1 kV
6.5 A	55.9 mJ	1.74 ms	63 mA	31.2 kV
7 A	63.6 mJ	1.85 ms	68 mA	33.2V
7.5 A	71.9 mJ	1.92 ms	73 mA	34.7 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

The coil P65-T has an integrated transistor and requires an ECU with internal ignition drivers with 10 to 20 mA current output.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

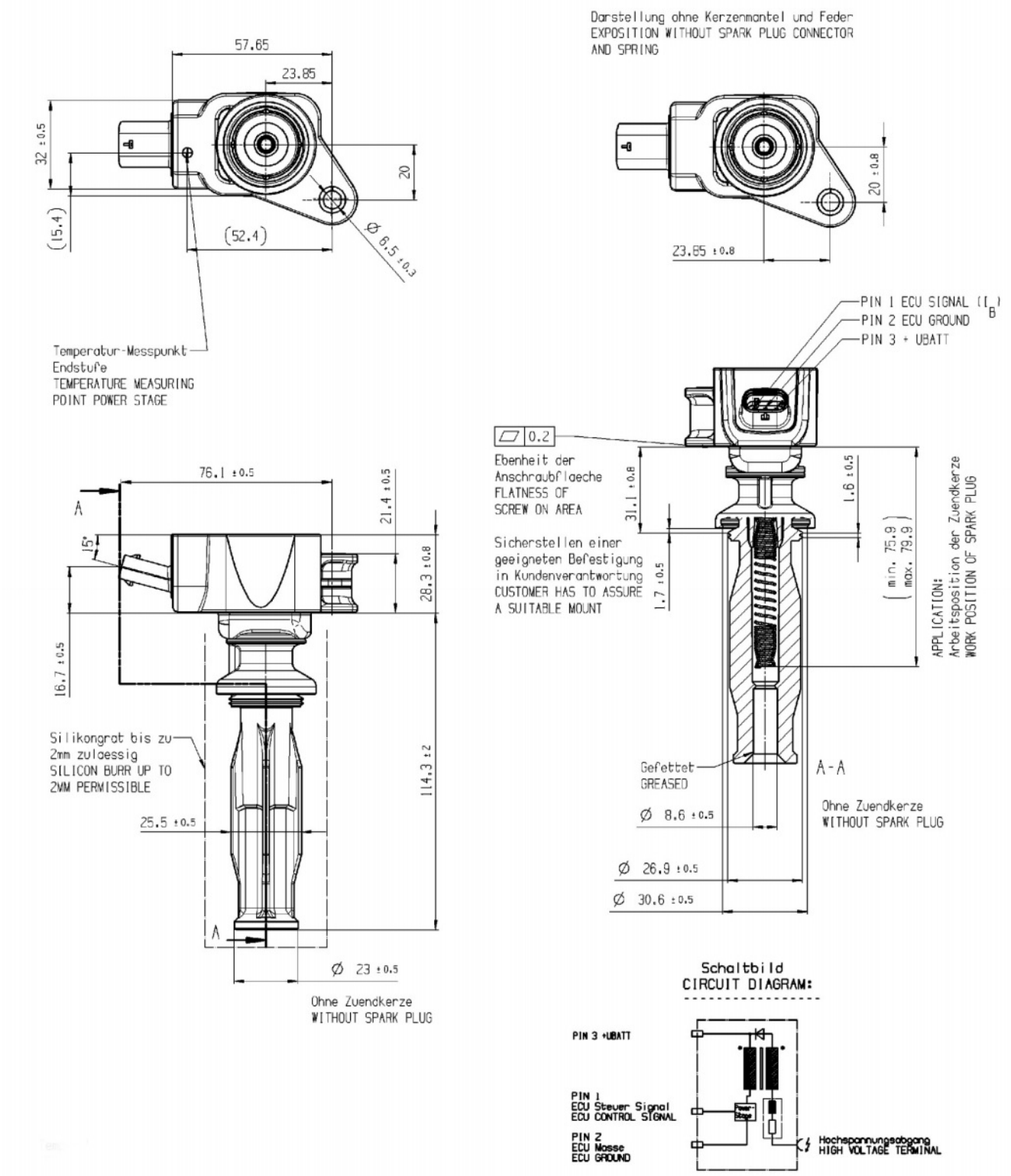
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil P65-T
Order number **0221.604.024**

Dimensions



See Offer Drawing for further information

Ignition Coil P65-TWG



Features

- Max. 33 kV
- Min. 65 mJ
- Connection for high voltage wire
- Max. 10,000 1/min (with reduced dwell time)
- Developed for GDI engines

This single fire coil is a low cost concept designed to connect a high voltage wire on the coil.
The coil has an integrated transistor and requires an ECU with internal ignition drivers.

Application

Spark energy	≥ 65 mJ
Primary current	≤ 7.0 A
Operating temperature range at outer core	-40 to 140°C
Storage temperature range	-40 to 140°C
Max. vibration	≤ 250 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

Length	83 mm
Weight	210 g
Mounting	Screw fastening

Electrical Data

Primary resistance with wire	Incapable of measurement
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.4 kV/µs
Max. high voltage at	≤ 33 kV
Spark current	≤ 70 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 1.85 ms
Noise suppression	Inductive and 1 kOhm resistance
Integrated suppression diode / EFU	
Integrated power stage	

Characteristic

Measured with power stage	BIP 385

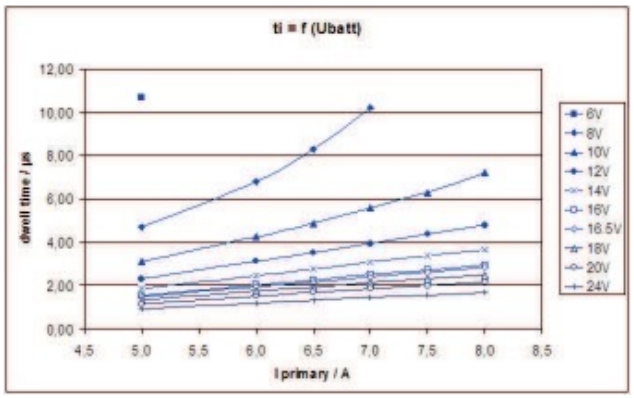
Connectors and Wires

Connector primary side	Tyco 0-1488991-1
Mating connector primary side	F02U.B00.555-01
Pin 1	ECU ignition signal
Pin 2	ECU GND
Pin 3	U_{batt}
30 kV grid connector	See Accessories

Characteristic dwell times [ms]

U_{batt}	I primary					
	5.0 A	5.5 A	6.0 A	6.5 A	7.0 A	7.5 A
Max. 1000 /min	10	9	8	7	6	5
6 V	10.7	11.6				
8 V	4.7	5.4	6.8	8.3	10.2	
10 V	3.1	3.55	4.25	4.87	5.6	6.3
12 V	2.32	2.66	3.12	3.51	3.94	4.36
14 V	1.86	2.1	2.45	2.75	3.07	3.36
16 V	1.55	1.77	2.03	2.26	2.51	2.73
16.5 V	1.49	1.7	1.95	2.17	2.40	2.61
18 V	1.34	1.51	1.73	1.92	2.13	2.31
20 V	1.16	1.33	1.51	1.67	1.85	2.0
24 V	0.93	1.05	1.19	1.32	1.45	1.57

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

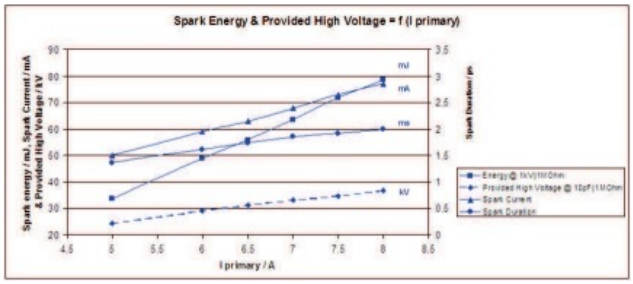


Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-current	Hi voltage

5 A	33.7 mJ	1.37 ms	50 mA	24.4 kV
5.5 A	42 mJ	1.54 ms	54 mA	27.0 kV
6 A	48.9 mJ	1.62 ms	59 mA	29.1 kV
6.5 A	55.9 mJ	1.74 ms	63 mA	31.2 kV
7 A	63.6 mJ	1.85 ms	68 mA	33.2V
7.5 A	71.9 mJ	1.92 ms	73 mA	34.7 kV



Spark Energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug (high voltage wire).

The coil P65-T has an integrated transistor and requires an ECU with internal ignition drivers with 10 to 20 mA current output.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

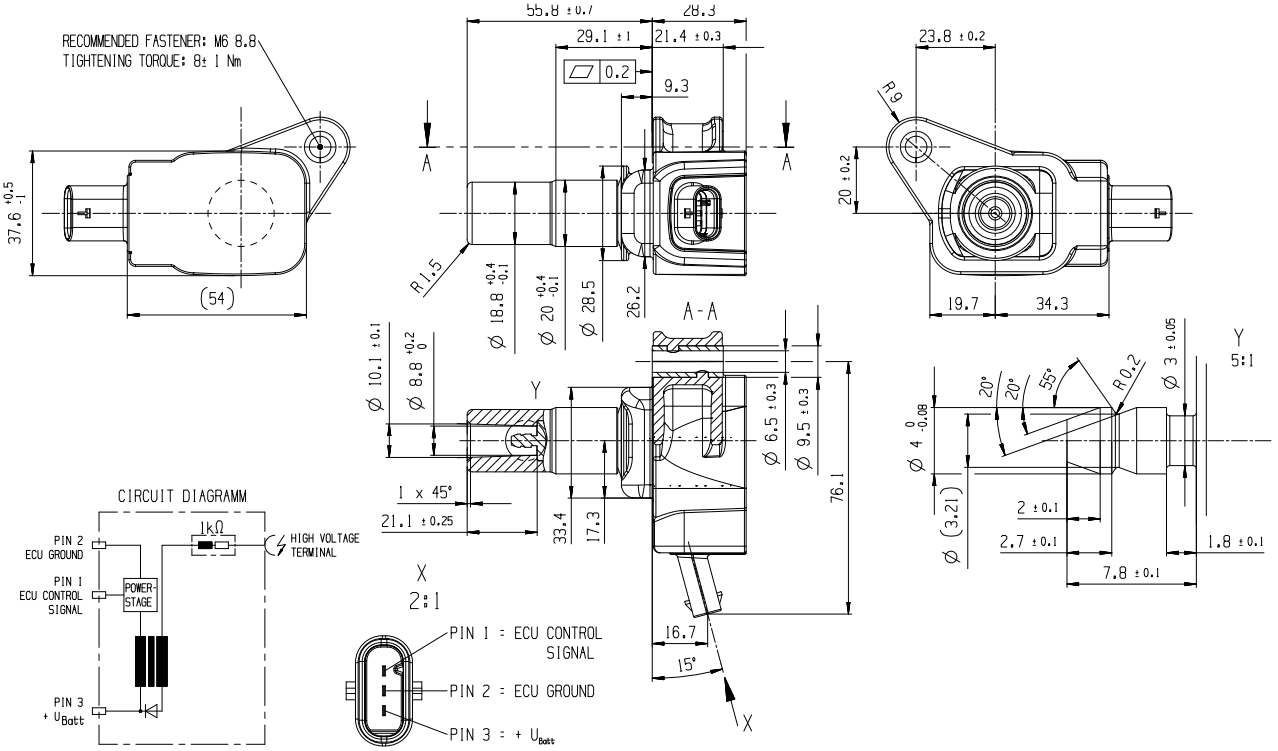
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil P65-TWG
Order number **F02U.V02.429-01**

Dimensions



See Offer Drawing for further information

Ignition Coil P65-WG



4

Features

- Max. 35 kV
- Min. 65 mJ
- Connection for 30 kV high voltage wire with locking pin (European standard)
- Max. 10,000 1/min
- Developed for GDI engines

This single fire coil is a low cost concept, designed to get connected to the spark plug via a high voltage wire. The high voltage connector is specified according to the European standard.
The performance of the coil fulfills the demands of modern GDI engines.
The main benefits of this product are the high packaging flexibility and its high electrical performance at low costs.

Application

Spark energy	≥ 65 mJ
Primary current	≤ 7.5 A
Operating temperature range at outer core	-20 to 140°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 250 m/s² at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	See offer drawing
Weight w/o wire	< 222 g
Mounting	Screw fastening

Electrical Data

Primary resistance	570 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.9 kV/µs
Max. high voltage at 1 MOhm ‖ 10 pF	≤ 35 kV
Spark current	≤ 74 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 2.0 ms
Noise suppression	Inductive and 1 kOhm resistance
Suppression diode / EFU	Integrated

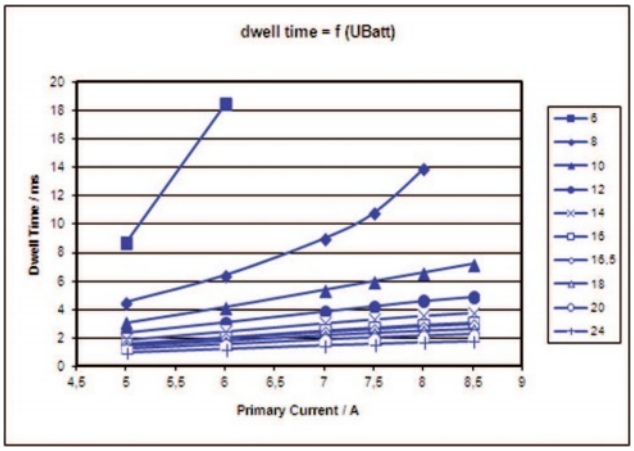
Characteristic

Measured with power stage	IGBT IRG4BC40S (U_{ce}=600 V)

Connectors and Wires

Connector	Tyco AMP
Mating connector	D261.205.350-01
Pin 1	Engine GND
Pin 2	U_{batt}
Pin 3	ECU ignition power stage

Characteristic dwell times [ms]

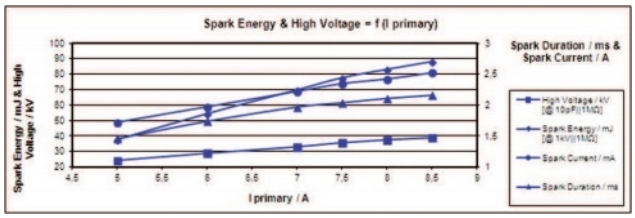


Dwell time

U_{batt}	I primary					
	5.0 A	6.0 A	7.0 A	7.5 A	8.0 A	8.5 A
6 V	8.74	18.5				
8 V	4.5	6.4	9	10.8	13.9	
10 V	3.1	4.2	5.4	6	6.6	7.2
12 V	2.36	3.1	3.88	4.25	4.63	4.92
14 V	1.9	2.48	3.05	3.32	3.57	3.77
16 V	1.61	2.06	2.53	2.73	2.93	3.08
18 V	1.55	2	2.43	2.62	2.81	2.95
20 V	1.39	1.77	2.16	2.33	2.48	2.6
22 V	1.22	1.54	1.88	2.02	2.15	2.26
24 V	0.97	1.23	1.49	1.6	1.71	1.78

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

Spark energy and provided high voltage



Spark energy

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	37.8 mJ	1.46 ms	49 mA	24.3 kV
6 A	54.5 mJ	1,74 ms	59 mA	28.9 kV
7 A	69.8 mJ	1.97 ms	69 mA	33.2 kV
7.5 A	77.6 mJ	2.04 ms	74 mA	35.8 kV
8 A	83.0 mJ	2.11 ms	77 mA	37.7 kV
8.5 A	88.0 mJ	2.16 ms	81 mA	39.0 kV

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

The coil P65 has no integrated transistor and requires an ECU with internal ignition power stages, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

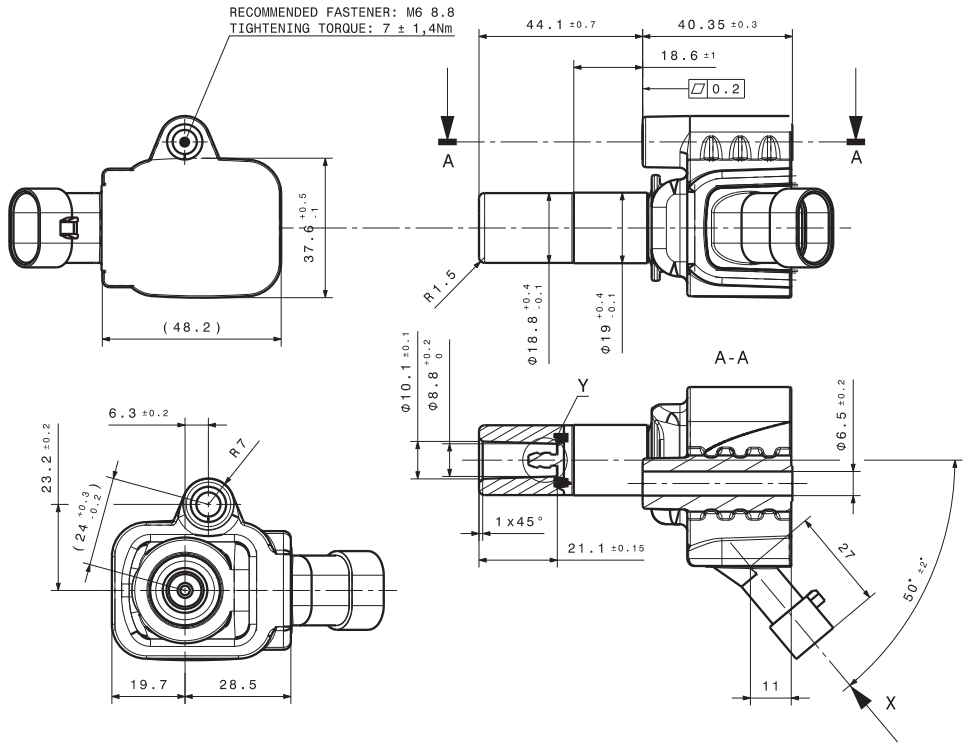
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil P65-WG
Order number **F02U.V01.927-01**

Dimensions



See Offer Drawing for further information

Ignition Coil P65-WS



4

Features

- Max. 35 kV
- Min. 65 mJ
- Connection for high voltage wire according to SAE (American standard)
- Max. 10,000 1/min
- Developed for GDI engines

This single fire coil is a low cost concept, designed to get connected to the spark plug via a high voltage wire. The high voltage connector is specified according to the SAE standard.
The performance of the coil fulfills the demands of modern GDI engines.
The main benefits of this product are the high packaging flexibility and its high electrical performance at low costs.

Application

Spark energy	≥ 65 mJ
Primary current	≤ 7.5 A
Operating temperature range at outer core	-20 to 140°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 250 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Length	See offer drawing
Weight w/o wire	< 222 g
Mounting	Screw fastening

Electrical Data

Primary resistance	570 mOhm
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.9 kV/µs
Max. high voltage at 1 MOhm ‖ 10 pF	≤ 35 kV
Spark current	≤ 74 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 2.0 ms
Noise suppression	Inductive and 1 kOhm resistance
Suppression diode / EFU	Integrated

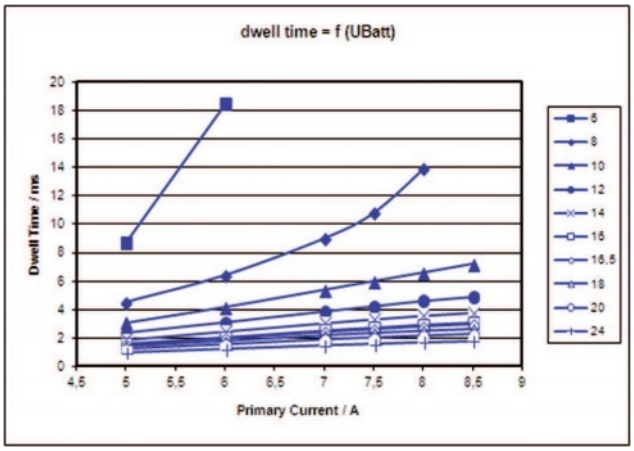
Characteristic

Measured with power stage	IGBT IRG4BC40S (U_{ce}=600 V)

Connectors and Wires

Connector	Tyco AMP
Mating connector	D261.205.350-01
Pin 1	Engine GND
Pin 2	U_{batt}
Pin 3	ECU ignition power stage

Characteristic dwell times [ms]

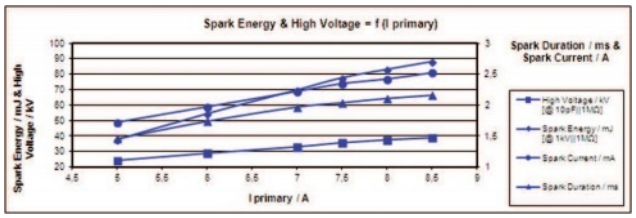


Dwell time

U_{batt}	I primary					
	5.0 A	6.0 A	7.0 A	7.5 A	8.0 A	8.5 A
6 V	8.74	18.5				
8 V	4.5	6.4	9	10.8	13.9	
10 V	3.1	4.2	5.4	6	6.6	7.2
12 V	2.36	3.1	3.88	4.25	4.63	4.92
14 V	1.9	2.48	3.05	3.32	3.57	3.77
16 V	1.61	2.06	2.53	2.73	2.93	3.08
18 V	1.55	2	2.43	2.62	2.81	2.95
20 V	1.39	1.77	2.16	2.33	2.48	2.6
22 V	1.22	1.54	1.88	2.02	2.15	2.26
24 V	0.97	1.23	1.49	1.6	1.71	1.78

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

Spark energy and provided high voltage



Spark energy

I prim.	Spark energy	-duration	-current	Hi voltage
5 A	37.8 mJ	1.46 ms	49 mA	24.3 kV
6 A	54.5 mJ	1,74 ms	59 mA	28.9 kV
7 A	69.8 mJ	1.97 ms	69 mA	33.2 kV
7.5 A	77.6 mJ	2.04 ms	74 mA	35.8 kV
8 A	83.0 mJ	2.11 ms	77 mA	37.7 kV
8.5 A	88.0 mJ	2.16 ms	81 mA	39.0 kV

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

The coil P65 has no integrated transistor and requires an ECU with internal ignition power stages, e.g. IGBT IRG4BC40S or BIP.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

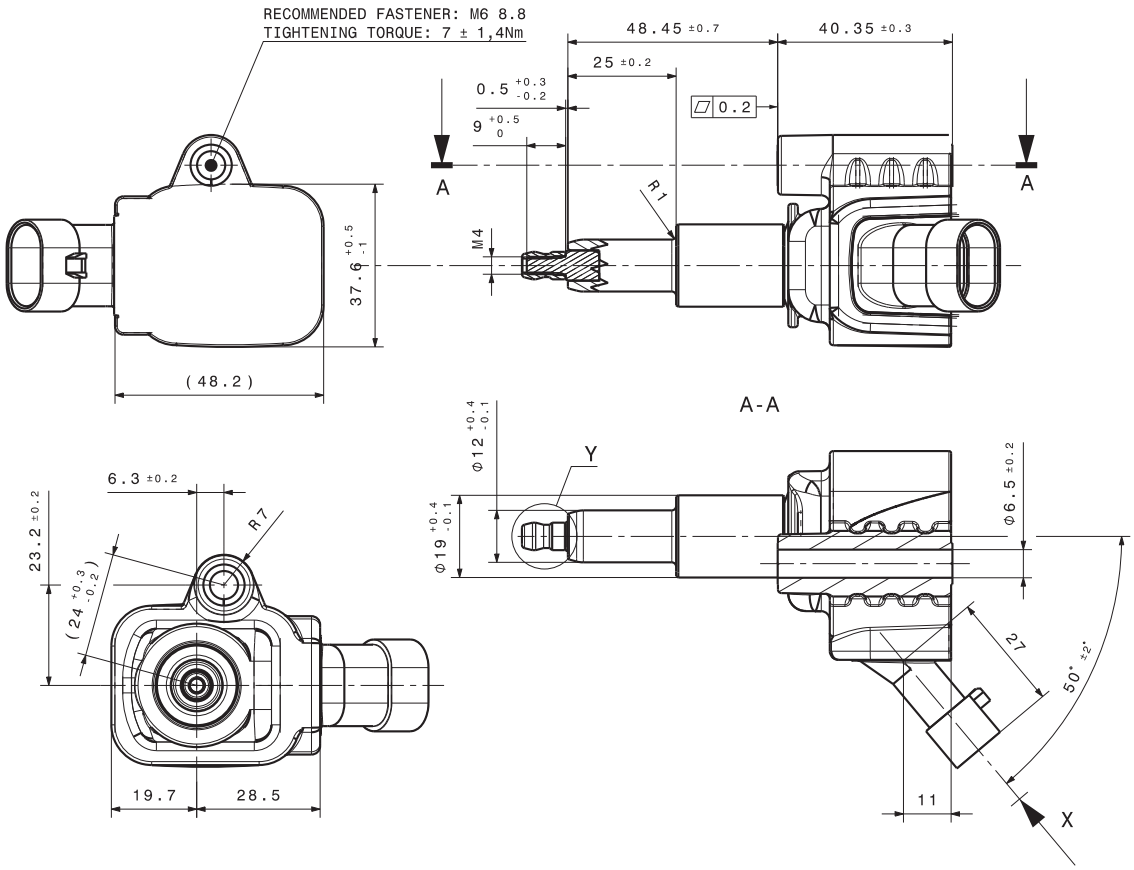
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Ignition Coil P65-WS
Order number **F02U.V01.926-01**

Dimensions



See Offer Drawing for further information

Ignition Coil PS-T



Features

- Max. 27 kV
- Min. 42 mJ
- Max. 1.5 kV/µs
- Max. 10,000 1/min

This pencil coil is a basic low cost concept designed for cylinder head installation.
The coil PS-T has an integrated transistor and requires an ECU with internal ignition drivers.
The coil is only designed for spark plug shaft mounting. It is a basic concept for ignition applications.

Application

Spark energy	≥ 42 mJ
Primary current	≤ 7.5 A
Operating temperature range at outer core	-20 to 140°C
Storage temperature range	-40 to 100°C
Max. vibration	≤ 800 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Diameter	22 mm
Weight	202 g
Mounting	Screw fastening

Electrical Data

Primary resistance with wire	Incapable of measurement
Secondary resistance	Incapable of measurement
High voltage rise time	≤ 1.5 kV/µs
Max. high voltage at 1 MOhm ‖ 10 pF	≤ 27 kV
Spark current	≤ 80 mA
Spark duration at 1 kV ‖ 1 MOhm	≤ 1.1 ms
Noise suppression	Inductive
Suppression diode / EFU	Integrated
Power stage	Integrated

Characteristic

Measured with power stage	BIP 355

Connectors and Wires

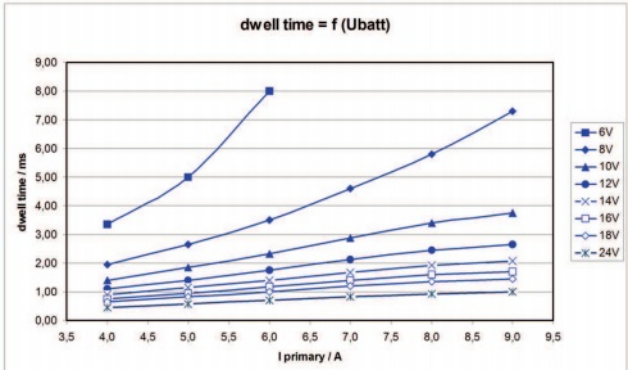
Connector	Bosch Compact
Mating connector 4-pole Compact	D261.205.336-01
Pin 1	ECU ignition signal
Pin 2	ECU GND
Pin 3	Engine GND
Pin 4	U_{batt}

Various motorsport and automotive connectors are available on request.

Characteristic dwell times [ms]

U_{batt}	I primary					
	4.0 A	5.0 A	6.0 A	7.0 A	8.0 A	9.0 A
6 V	2.90	4.20	6.30	14.4	-	-
8 V	1.83	2.45	3.17	4.10	5.10	6.20
10 V	1.33	1.74	2.18	2.68	3.16	3.49
12 V	1.05	1.35	1.68	2.02	2.33	2.53
14 V	0.86	1.11	1.35	1.62	1.85	1.99
16 V	0.73	0.93	1.14	1.35	1.54	1.65
20 V	0.56	0.71	0.86	1.02	1.15	1.23
22 V	0.50	0.64	0.77	0.91	1.02	1.09
24 V	0.46	0.58	0.70	0.82	0.92	0.98

Measured values are without loom resistance. Loom resistance must be less than the primary resistance. The needed dwell time is to be verified through current measurement

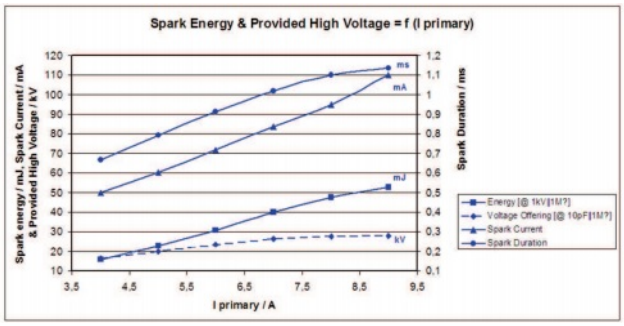


Dwell time

Spark energy and provided high voltage

I prim.	Spark energy	-duration	-currant	Hi voltage
4 A	15.0 mJ	0.650 ms	46 mA	15.6 kV
5 A	22.8 mJ	0.793 ms	62 mA	19.3 kV

6 A	30.2 mJ	0.904 ms	73 mA	22.7 kV
7 A	38.2 mJ	1.010 ms	84 mA	26.0 kV
8 A	47.9 mJ	1.101 ms	96 mA	28.8 kV
9 A	52.9 mJ	1.130 ms	100 mA	30.2 kV



Spark energy

Installation Notes

During mounting of the spark plug please pay attention that full clamping and proper contacts are made to ensure safe connection between coil and spark plug.

The coil PS-T has an integrated transistor and requires an ECU with internal ignition drivers, e.g. MS 4.x or MS 4.x Sport.

For technical reasons the values of the coils may vary.

Please regard the specified limit values.

Please find further application hints in the offer drawing at our homepage.

In case of ignition-caused malfunctions, please use screened sensor wires.

Design Note

We strongly recommend the design of the spark plug shaft has to ensure that there are no sharp edges in the shaft geometry due to design or machining. Only in compliance with this recommendation, a proper function can be ensured.

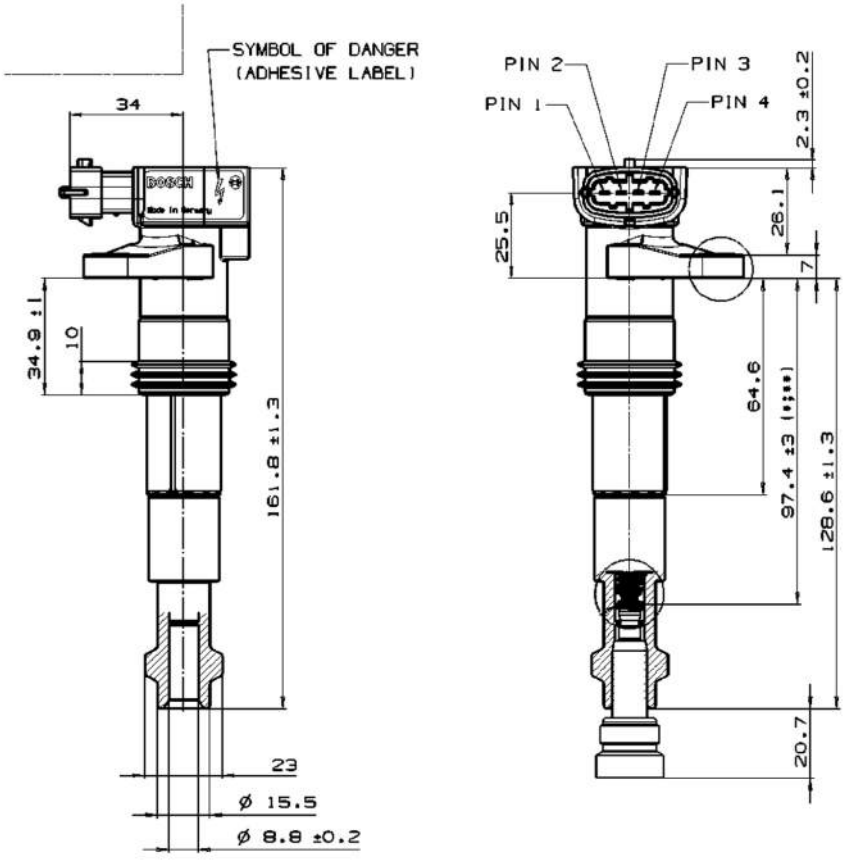
Legal Restrictions

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Ordering Information

Ignition Coil PS-T
Order number **0221.604.103**

Dimensions



See Offer Drawing for further information

Overview

Ignition Module IM 3.2



- Max. 3 cylinders
- 47 g
- Fits to all ECUs without internal ignition power stage like MS 6
- Especially adapted for Coils P50(-M) and P65

Ignition Module IM 4



- Max. 4 cylinders
- 54 g
- Fits to all ECUs without internal ignition power stage like MS 6
- Especially adapted for Coils P50(-M) and P65

Ignition Module IM 3.2



Features

- Max. 3 cylinders
- 47 g
- Fits to all ECUs without internal ignition power stage like MS 6
- Especially adapted for Coils P50(-M) and P65

This module is an external ignition power stage capable of supplying up to three non-transistorized ignition coils.
The IM input signal should be supplied by an ECU with ignition signal outputs in the range of 10 to 20 mA, e.g. MS 6.
The IM unit combines the robustness of a high quality production part with good electrical performance to provide an ideal solution for adapting non-transistorized coils to an ECU without internal ignition driver stages.

Application

Primary current	≤ 8.5 A
Clamp voltage	380 ± 30 V
Operating temperature range at measuring point	-40 to 120°C
Storage temperature range	-40 to 130°C
Max. rpm (ensure chilled mounting position)	8,000
Max. vibration	400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Size	71 x 48 x 21 mm
Weight w/o wire	47 g
Mounting	2 x M4 screws with spring washer
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C

Electrical Data

U_{Batt} typical	13.5 V
Voltage supply	6 to 16.5 V
I_B high active on	min. 10 mA
I_B low off	0 mA
I_B	10 to 22 mA
I_C typical	≤ 8.5 A
I_C max. at T_U < 120°C	< 10 A
U_{CE} satt at I_C = 5 A	< 3 V
U_{CE} satt at I_C max	< 9 V

Characteristic

Characteristic dwell time	See characteristic dwell time from the ignition coil used
Internal transistor	Triple Darlington

Connectors and Wires

Connector	Bosch Jetronic 7-pole
Mating connector 7-pole Jetronic	F02U.B00.252-01
Pin 1	Collector transistor 1
Pin 2	Basis transistor 1
Pin 3	Collector transistor 2
Pin 4	Gnd
Pin 5	Basis transistor 2
Pin 6	Collector transistor 3
Pin 7	Basis transistor 3

Installation Notes

This ignition module can be used with Coils P50(-M) and P65 or comparable coils.

Please ensure that the connectors are safe from water.

The IM has to be mounted onto a cooling body. The mounting surface needs a planarity of 0.2 mm.

A heat conductive paste has to be used.

This ignition module is designed for use with engine control units which have no integrated ignition transistor.

Please observe the specified limit values.

Please do not activate more than one ignition output stage parallel within a module.

Please find further application hints in the offer drawing at our homepage.

Legal Restrictions

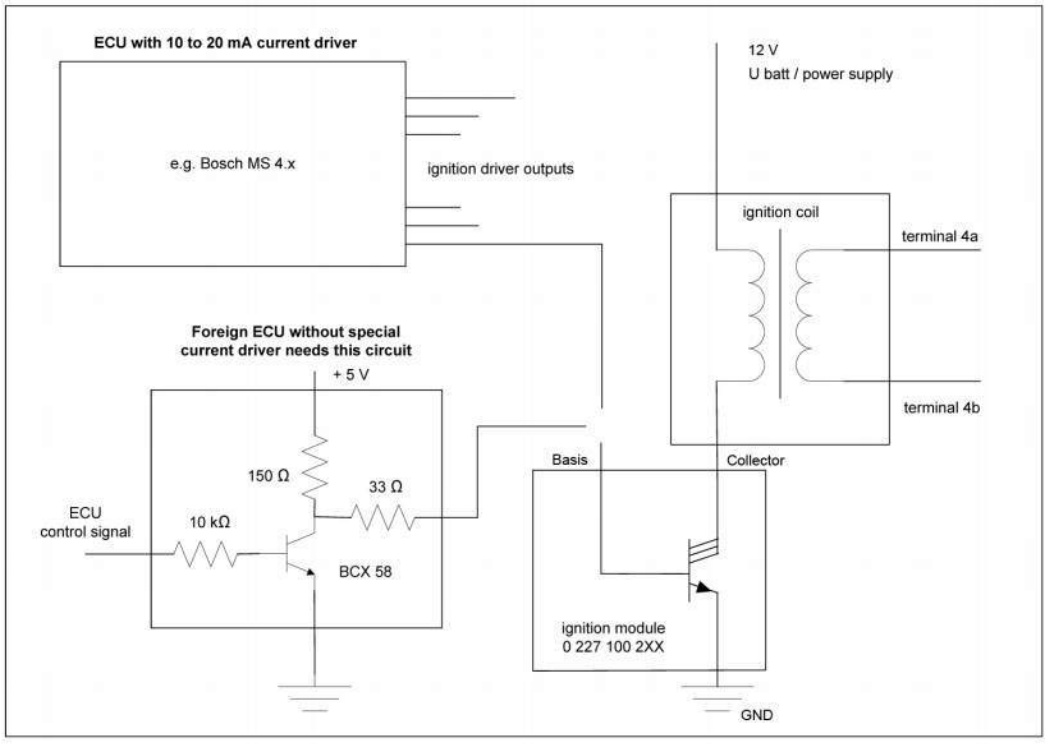
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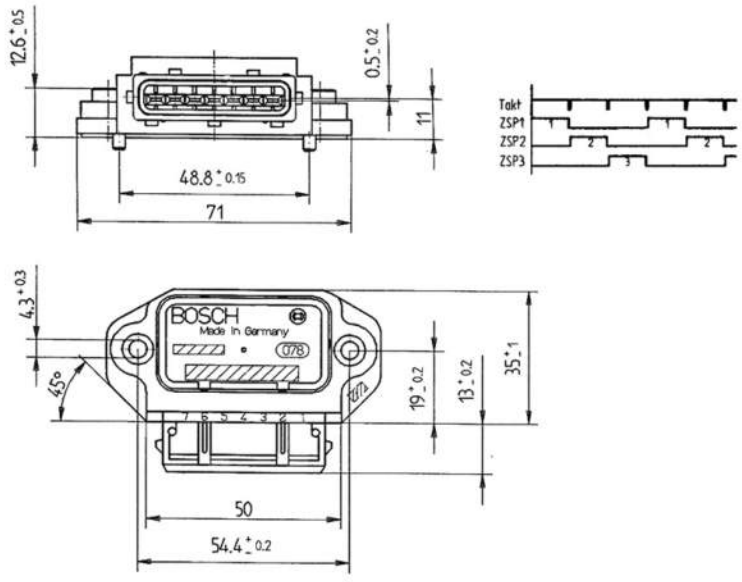
Ordering Information

Ignition Module IM 3.2
Order number **0227.100.203**

Dimensions

4





See Offer Drawing for further information

Ignition Module IM 4



Features

- Max. 4 cylinders
- 54 g
- Fits to all ECUs without internal ignition power stage like MS 6
- Especially adapted for Coils P50(-M) and P65

This module is an external ignition power stage capable of supplying up to four non-transistorized ignition coils.
The IM input signal should be supplied by an ECU with ignition signal outputs in the range of 10 to 20 mA, e.g. MS 6.
The IM unit combines the robustness of a high quality production part with good electrical performance to provide an ideal solution for adapting non-transistorized coils to an ECU without internal ignition driver stages.

Application

Primary current	≤ 8.5 A
Clamp voltage	380 ± 30 V
Operating temperature range at measuring point	-40 to 120°C
Storage temperature range	-40 to 130°C
Max. rpm (ensure chilled mounting position)	8,000
Max. vibration	400 m/s^2 at 5 to 2,500 Hz

Technical Specifications

Mechanical Data

Size	70.5 x 68 x 20 mm
Weight w/o wire	54 g
Mounting	2 x M4 screws with spring washer

Electrical Data

U_{Batt} typical	13.5 V
Voltage supply	6 to 16.5 V
I_B high active on	min. 10 mA
I_B low off	0 mA
I_B	10 to 22 mA
I_C typical	< 8.5 A
I_C max. at T_U < 120°C	< 10 A
U_{CE} satt at I_C = 5 A	< 3 V
U_{CE} satt at I_C max	< 9 V

Connectors and Wires

Connector (Coil T1)	**Bosch Jetronic 4-pole**
Mating connector Jetronic 4-pole	D261.205.351-01
Pin 1	Collector transistor 4
Pin 2	Collector transistor 3
Pin 3	Collector transistor 2
Pin 4	Collector transistor 1
Connector (ECU)	**Bosch Jetronic 5-pole**
Mating connector Jetronic 5-pole	D261.205.352-01
Pin 1	Basis transistor 1
Pin 2	Basis transistor 2
Pin 3	Gnd
Pin 4	Basis transistor 3
Pin 5	Basis transistor 4

Installation Notes

This ignition module can be used with Coils P50(-M) and P65 or comparable coils.

Please ensure that the connectors are safe from water.

The IM has to be mounted onto a cooling body. The mounting surface needs a planarity of 0.2 mm.

A heat conductive paste has to be used.

This ignition module is designed for use with engine control units which have no integrated ignition transistor.

Please observe the specified limit values.

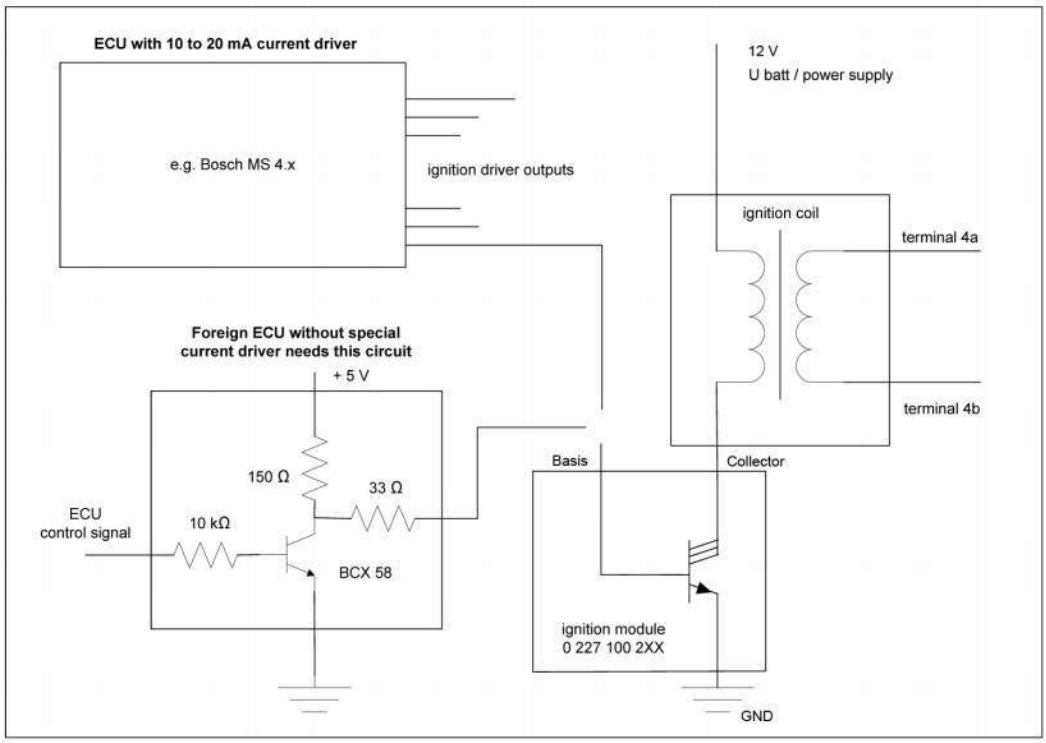
Legal Restrictions

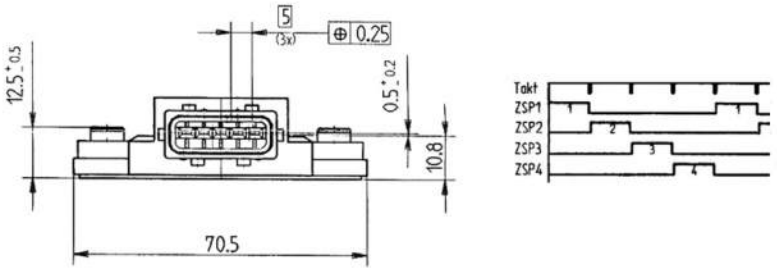
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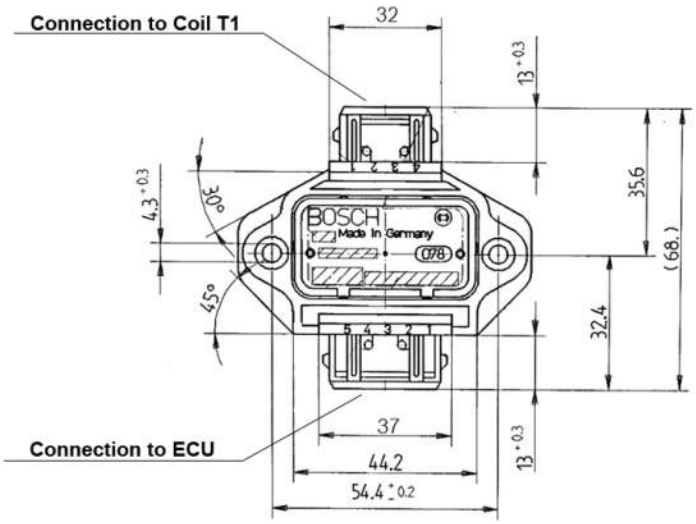
Ordering Information

Ignition Module IM 4
Order number **0227.100.211**

Dimensions







See Offer Drawing for further information

Overview

Injection Valve EV 14



- Flow rate at 3 bar: up to 1,000 g/min (n-heptane)
- Max. 8 bar
- Conical spray or 2-spray
- With or without extension
- Spray angle 15 to 85°

HP Injection Valve HDEV 5.2



- Flow rate at 100 bar: up to 2,000 g/min (n-heptane)
- Max. 350 bar (higher on request)
- Up to 20 holes
- Spray angle 8 to 20°

Injection Valve EV 14



Features

- Flow rate at 3 bar: up to 1,000 g/min (n-heptane)
- Max. 8 bar
- Conical spray or 2-spray
- With or without extension
- Spray angle 15 to 85°

EV 14 injection valves are the latest revision of the EV 6 injection valve technology. EV 14 xT are the latest revision of the EV 12.
EV 14 is designed for a wide range of flow rates and spray patterns. Compact size and three standard versions simplify mounting in a variety of applications.

Technical Specifications

Mechanical Data

System pressure	Max. 5 bar (8 bar for motorsport use)
Weight	≤ 30 g
Installation lengths	33.6, 48.65 or 60.65 mm
Fuel input	Top-feed injector
Operating temperature	-40 to 110°C
Permissible fuel temperatures	≤ 70°C
Climate-proof corresponding to saline fog test DIN 50 021	
Housing design	Compact (K), Standard (S), Long (L)
Spray type	C (Conical Spray) or E (2-Spray)
Flow rate at 3 bar (n-heptane)	151 to 1,462 cm^3/min 103.5 to 1,000 g/min
Spray angle α	15 to 85°
Bent angle γ	0 to 15°
Coil resistance	See variations
Fuel compatibility	E85 Use with different media is not permitted.

Electrical Data

Power supply	6 to 16.5 V

Connectors and Wires

Connectors	Jetronic, Sumitomo, Motorsport connectors

Installation Notes

Please ask for more information before ordering.

Legal Restrictions

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Ordering Information

EV 14 ES, 116 g/min n-heptane
Order number **0280.158.200**

EV 14 CL, 150 g/min n-heptane
Order number **0280.158.107**

EV 14 ES, 150 g/min n-heptane
Order number **0280.158.013**

EV 14 CKxT, 237 g/min n-heptane
Order number **0280.158.038**

EV 14 EL, 237 g/min n-heptane
Order number **0280.158.116**

EV 14 CS, 387 g/min n-heptane
Order number **B280.436.038-09**

EV 14 CS, 387 g/min n-heptane
Order number **B280.436.038-10**

EV 14 ESxT, 429 g/min n-heptane
Order number **0280.158.123**

EV 14 CS, 503 g/min n-heptane
Order number **B280.436.038-08**

EV 14 CS, 503 g/min n-heptane
Order number **B280.436.038-07**

EV 14 CKxT, 670 g/min n-heptane
Order number **0280.158.040**

EV 14 CS, 670 g/min n-heptane
Order number **B280.436.487-01**

EV 14 ES, 697 g/min n-heptane
Order number **B280.436.469-01**

Accessories

Clip for locking bush of plastic
Order number **2431.314.021**

Clip for locking bush of steel
Order number **2431.314.018**

Dimensions

Variations of Production Type Valves

Part No.	0280.158.200	0280.158.107	0280.158.013	0280.158.038	0280.158 116
Flow rate/min	116 g/170 cm^3	150 g/219 cm^3	150 g/219 cm^3	237 g/347 cm^3	237 g/347 cm^3
Type	E	C	E	C	E
Housing	S	L	S	KxT	L
α	15°	20°	19°	20°	22°
γ	90°	0°	0°	0°	5°
δ	0°	0°	90°	0°	90°
Resistance	12 Ohm	12 Ohm	12 Ohm	12 Ohm	12 Ohm

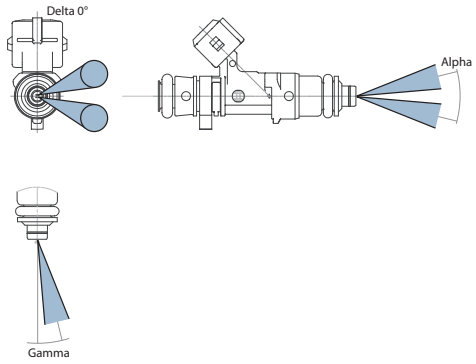
Part No.	0280.158.123	0280 .158.040
Flow rate/min	429 g/627 cm^3	670 g/980 cm^3
Type	E	C
Housing	SxT	KxT
α	25°	30°
γ	0°	0°
δ	90°	0°
Resistance	12 Ohm	12 Ohm

Variations of Motorsport Type Valves

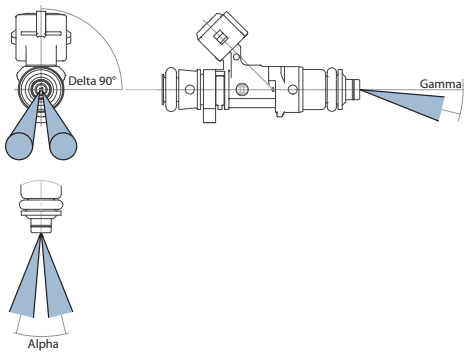
Part No.	B280.436.038-07	B280.436.038-08	B280.436.038-09	B280.436.038-10	B280.436.487-01
Flow rate/min	503 g/736 cm^3	503 g/736 cm^3	387 g/566 cm^3	387 g/566 cm^3	670 g/980 cm^3
Type	C	C	C	C	C
Housing	S	S	S	S	S
α	70°	25°	70°	25°	30°
γ	0°	0°	0°	0°	0°
δ	-	-	-	-	0°
Resistance	12 Ohm	12 Ohm	12 Ohm	12 Ohm	12 Ohm

Further variations are available on request.

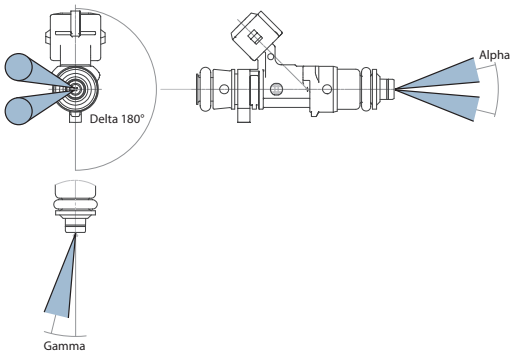
Spray bent to the „right“, Delta=0°



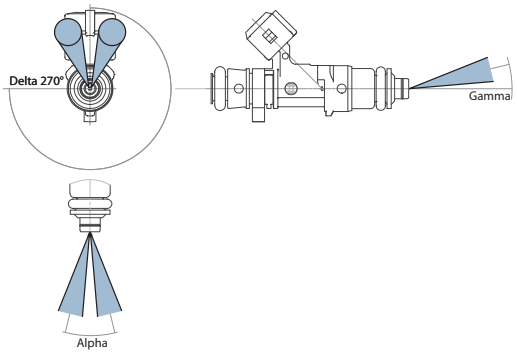
Spray bent „down“ (away from electr. connector), Delta=90°



Spray bent to the „left“, Delta=180°

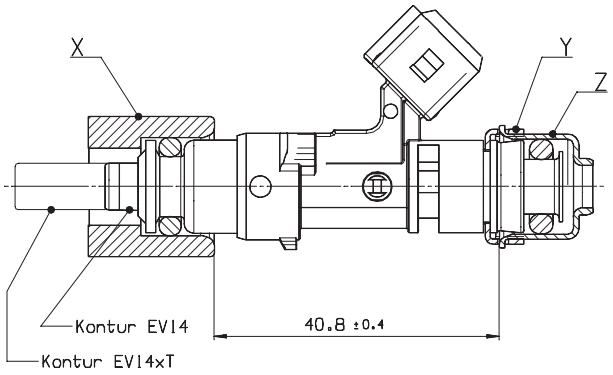


Spray bent „up“ (towards electr. connector), Delta=270°

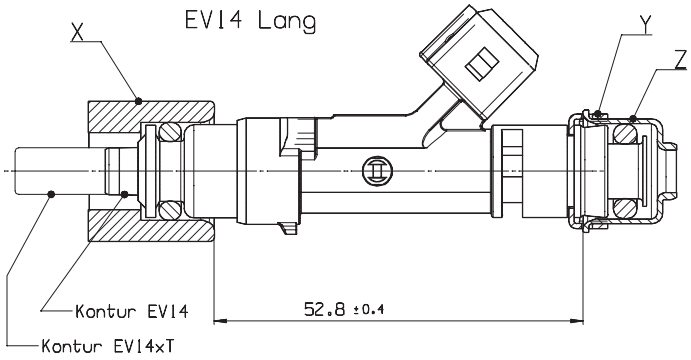


Delta Angles

EV14 Standard



EV14 Lang



Max. 2° Winkelabweichung zwischen Ventil-Achse und Aufnahmebohrung an Fuel Rail bzw. Saugrohr zulaessig.

MAX. 2° ANGLE DEVIATION IS PERMISSIBLE BETWEEN THE INJECTOR AXIS AND THE FUEL RAIL CUP, RESPECTIVELY TO THE INTAKE MANIFOLD.

X= Ø 14:
FOR STANDARD APPLICATIONS
(AVERAGE O-RING SQUEEZE AT NOMINAL
VALUE AND AXIAL ASSEMBLY: APP. 7%)
MAX. 2° ANGLE DEVIATION IS PERMISSIBLE BETWEEN
THE INJECTOR AXIS AND THE FUEL RAIL CUP,
RESPECTIVELY TO THE INTAKE MANIFOLD.

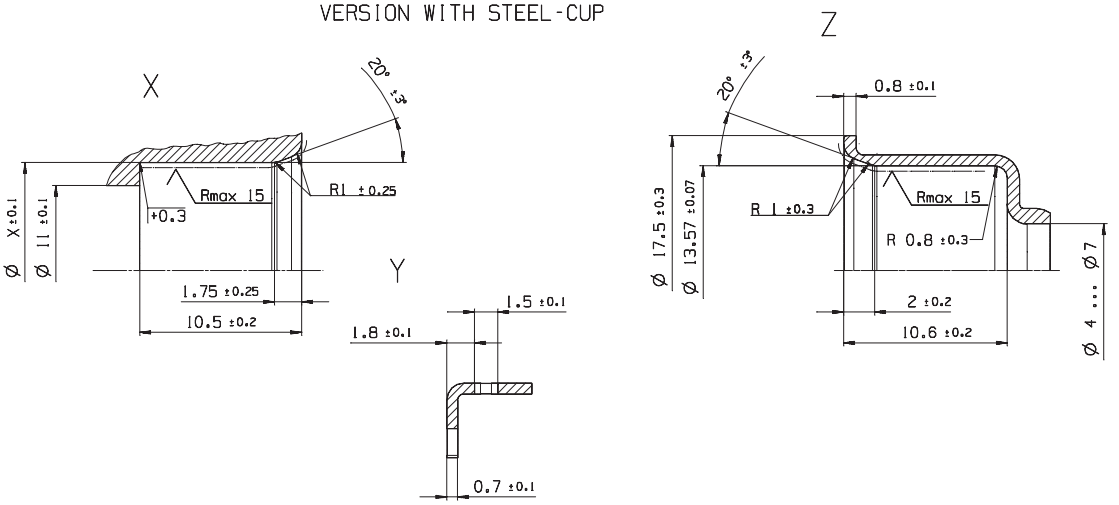
Fuer Standardanwendungen
(mittlere O-Ring Verpressung
bei axialem Einbau und Nennmassen: ca. 7%)
Max. 2° Winkelabweichung zwischen Ventil-Achse und
Aufnahmebohrung an Fuel Rail bzw. Saugrohr zulaessig.

X= Ø 13.6:
FOR APPLICATIONS WITH EXTENDED REQUIREMENTS
E. G. TURBO APPLICATION, EXPOSED INSTALLATION
(AVERAGE O-RING SQUEEZE AT NOMINAL
VALUE AND AXIAL ASSEMBLY: APP. 14%,
NOTE HIGHER ASSEMBLY FORCES)
MAX. 1° ANGLE DEVIATION IS PERMISSIBLE BETWEEN
THE INJECTOR AXIS AND THE FUEL RAIL CUP,
RESPECTIVELY TO THE INTAKE MANIFOLD.

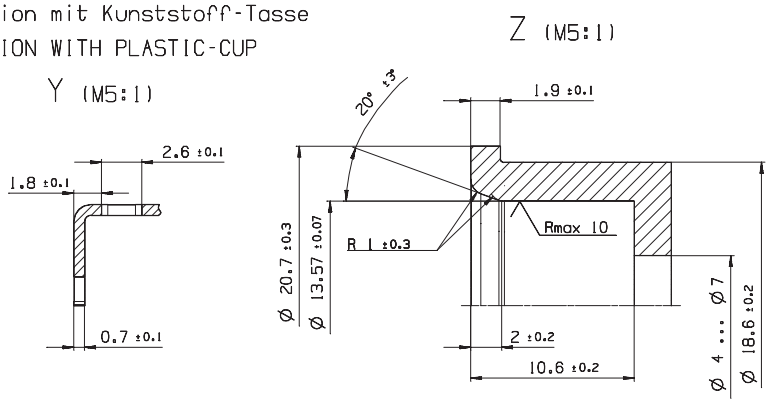
Fuer Anwendungen mit erhoehten Anforderungen,
z. B. Turboapplikation, exponierter Einbau
(mittlere O-Ring Verpressung bei axialem Einbau
und Nennmassen: ca. 14%,
hoehere Einbaukraefte beachten)
Max. 1° Winkelabweichung zwischen Ventil-Achse und
Aufnahmebohrung an Fuel Rail bzw. Saugrohr zulaessig.

4

Version mit Stahl-Tasse
VERSION WITH STEEL-CUP



Version mit Kunststoff-Tasse
VERSION WITH PLASTIC-CUP



Mounting Instructions

HP Injection Valve HDEV 5.2



Features

- Flow rate at 100 bar: up to 2,000 g/min (n-heptane)
- Max. 350 bar (higher on request)
- Up to 20 holes
- Spray angle 8 to 20°

The HDEV 5.2 is a high pressure injector, which is developed to be used as a port or a direct injector. The function of the HDEV 5.2 is both to meter out the fuel and to obtain a well-defined mixture of fuel and air. It is an inward opening solenoid injector which is optimized regarding very short opening and closing times which ensures a very stable linearity at short injection times.
The benefit of this injector is a high spray variability concerning spray angle and spray shape. Also the flow rate can be defined in a big range. Bosch offers the spray targeting design according to the individual customer requirements.
If your application conditions will not match the listed performance data, please ask for consultancy at Bosch Motorsport. In addition to the specific designed sample, Bosch offers cost effective production HDEV 5.2 on request.

Application

Application at 100 bar (typical)	308 to 2,000 g/min
Fuel input	Top-feed injector
Fuel	Gasoline
Operating pressure	Up to 350 bar (higher on request)
Operating temperature range	-31 to 130°C
Storage temperature range	-40 to 70°C
Max. vibration	600 m/s²

Technical Specifications

Mechanical Data

Weight w/o wire	68 g
Diameter body	20.7 mm
Diameter nozzle	7.5 mm
Length	87 mm
Flow rate at 100 bar (n-heptane)	up to 2,000 g/min
Number of holes	4 to 20 holes
Spray type	Multi hole
Spray angle overall	110° (typical)
Spray angle single beam	8 to 20°
Static flow tolerance	±4 %
Dynamic flow tolerance	±6 % at ti = 1.5 ms
Leakage	≤2.5 mm³/min at 23°C

Electrical Data

Booster supply	65 V
Booster current	13.4 A
Booster time	480 µs
Power supply	12 V
Pick up current	9.4 A
Pick up time	704 µs
Hold power supply	12 V
Hold current	3.7 A hysteresis 0.8 A
Coil resistance	1,500 mOhm (ambient temp.)

Connectors and Wires

Mating connector Compact	D261.205.359-01
Connector Jetronic (wire)	D261.205.288-01
Connector motorsport (wire)	On request
Pin 1	Pos
Pin 2	Gnd

Installation Notes

The injector has to be supplied by a Bosch Motorsport Power Stage Unit (e.g. HPI 5 or HPI 1.16).

Listed electrical values may vary according to the application.

The injector can be cleaned (mechanically or chemically), if the tip will not be damaged.

Do not use supersonic cleaning.

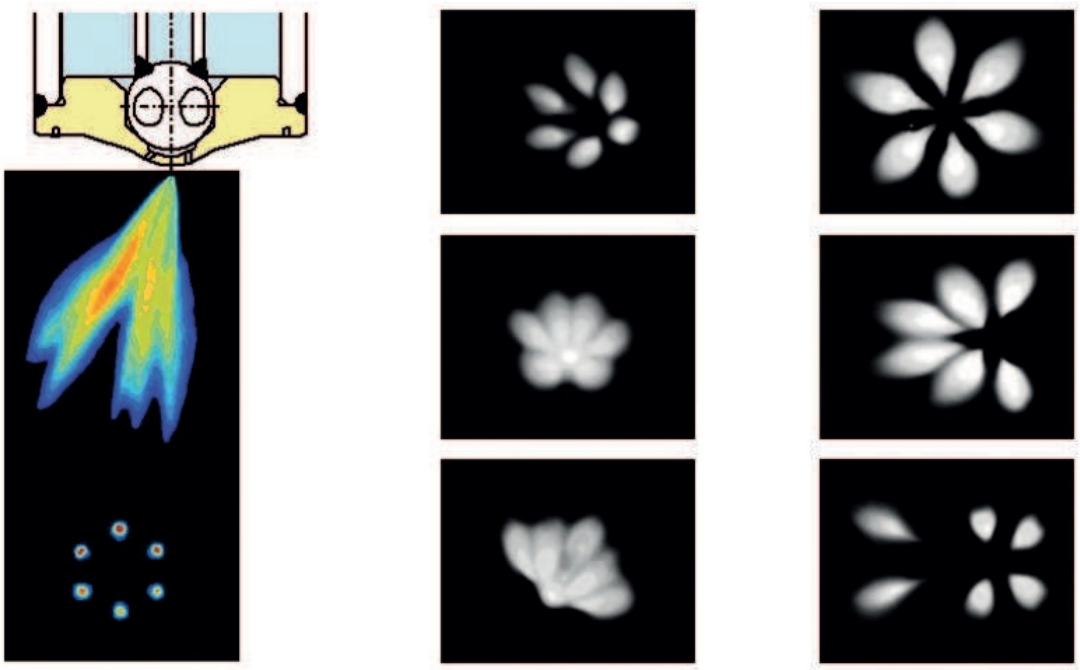
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

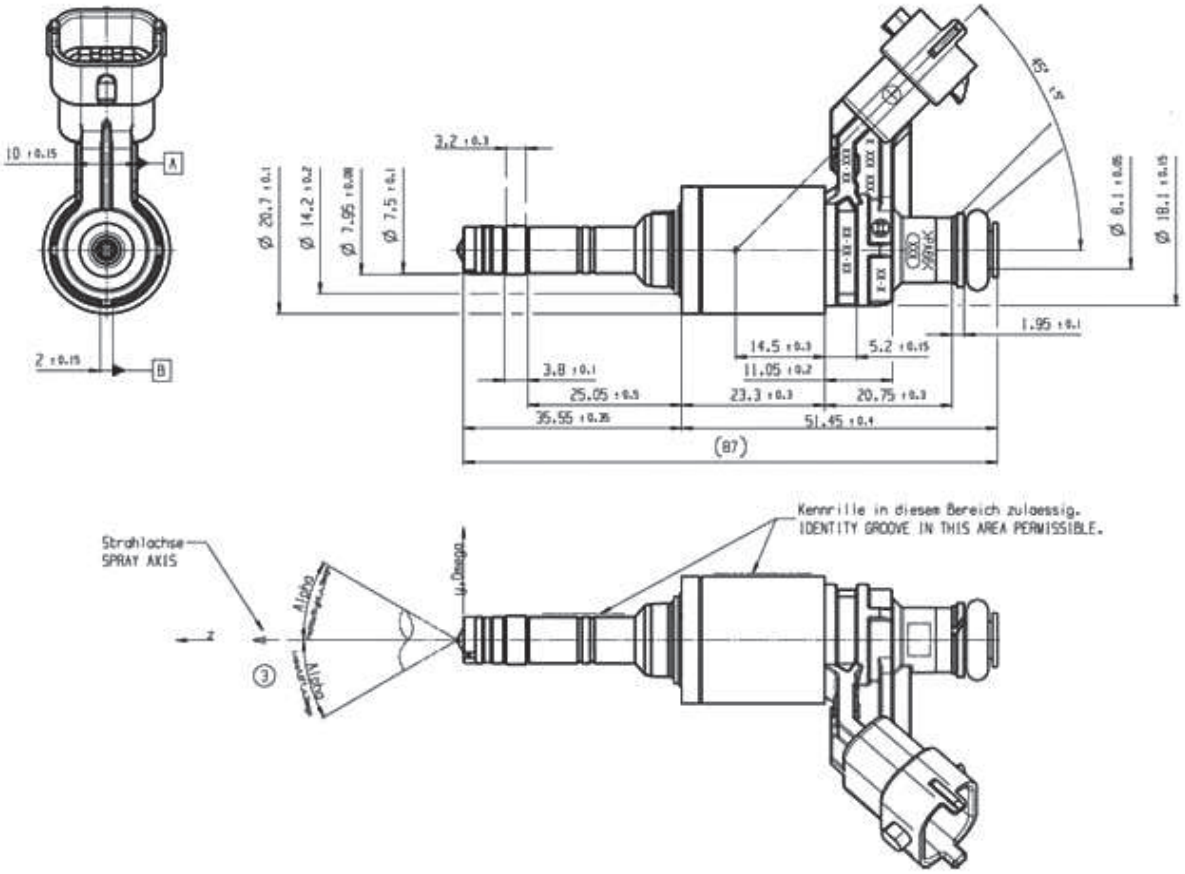
Ordering Information

HP Injection Valve HDEV 5.2
Order number **on request**

Dimensions



Spray variations, further variations on request


10 ±0.15
A
2 ±0.15
B
3.2 ±0.3
Ø 20.7 ±0.1
Ø 14.2 ±0.2
Ø 7.95 ±0.08
Ø 7.5 ±0.1
65° ±5
Ø 8.1 ±0.05
Ø 18.1 ±0.15
1.95 ±0.1
14.5 ±0.3
5.2 ±0.15
11.05 ±0.2
3.8 ±0.1
25.05 ±0.5
23.3 ±0.3
20.75 ±0.3
35.55 ±0.35
51.45 ±0.4
(87)
Kennrille in diesem Bereich zulaessig.
IDENTITY GROOVE IN THIS AREA PERMISSIBLE.
Strahlachse
SPRAY AXIS
Alpha
Alpha
+/- Omega
z
3

Actuators 5

Electronic Throttle Body 188

Wiper Motor 191

Electronic Throttle Body



Features

- Many bore diameters available
- Throttle position sensor is redundant
- For flex-fuel, CNG, LPG
- Idle default position

The throttle body is designed to control the fresh air of spark ignition engines in combination with an electronic throttle control system. ETB applications with flex-fuel, CNG and LPG are permissible if injected in the air flow after the throttle body.
A typical ETC system includes the following components: electronic throttle body, accelerator pedal module and electronic control unit.
You will find the available bore diameters in the variations table.

Application

Temperature range	-40 to 140°C
	50 to 250 m/s^2 at 50 Hz to 2 kHz

Technical Specifications

Mechanical Data

Available bore diameters	32 mm
	40 mm
	44 mm
	46 mm
	52 mm
	54 mm
	60 mm
	82 mm

Electrical Data

Supply voltage	6 to 16 V
Supply voltage sensor	5 ± 0.2 V
Max. allowed generator current	<10.0 A

Characteristic

Output signal I	0 to 5 V for 0 to 90°
Output signal II	5 to 0 V for 0 to 90°

Connectors and Wires

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

For correct mounting please respect the hints on the next page “Mounting position”.

The ETB can be connected directly to control units with ETC functionality.

Please find further application hints in the offer drawing at our homepage.

Two redundant sensors control the up to date throttle position.

All ETBs have an idle air position.

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Electronic Throttle Body 32 mm
Order number **0280.750.148**

Electronic Throttle Body 40 mm
Order number **0280.750.149**

Electronic Throttle Body 44 mm
Order number **0280.750.137**

Electronic Throttle Body 46 mm
Order number **F02U.V01.171-01**

Electronic Throttle Body 52 mm
Order number **F02U.V01.184-01**

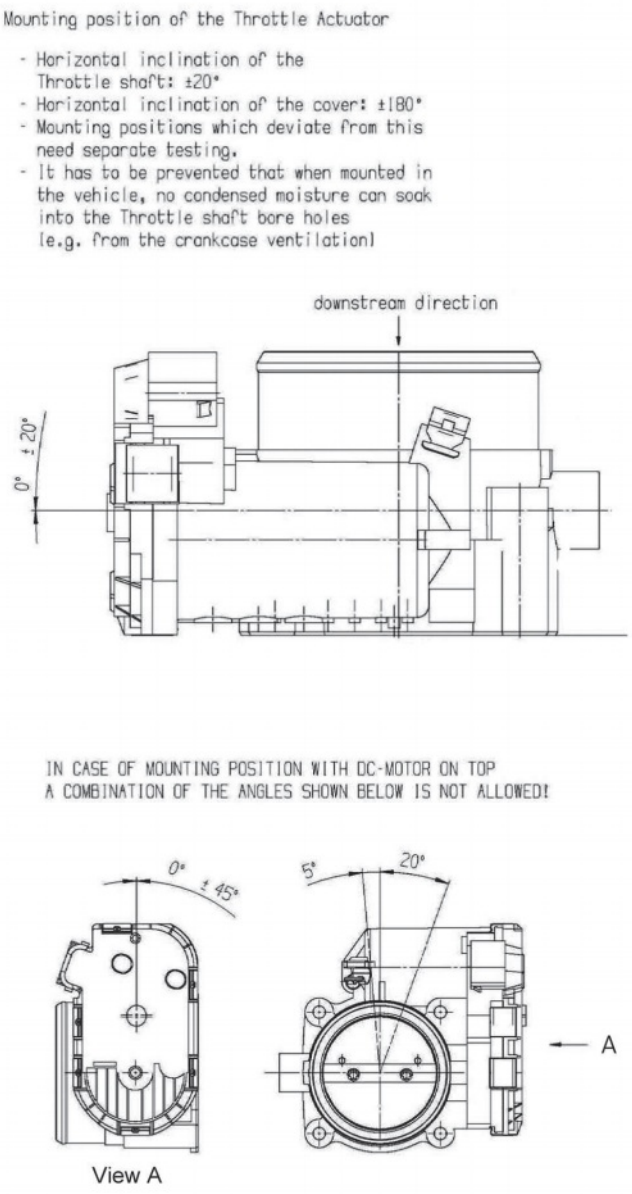
Electronic Throttle Body 54 mm
Order number **0280.750.150**

Electronic Throttle Body 60 mm
Order number **0280.750.151**

Electronic Throttle Body 82 mm
Order number **0280.750.101**

Dimensions

Mounting Position



Variations

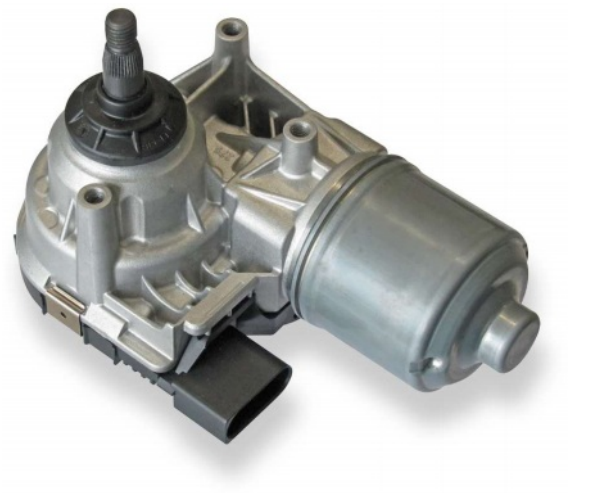
	Electronic Throttle Body 32 mm	Electronic Throttle Body 40 mm	Electronic Throttle Body 44 mm	Electronic Throttle Body 46 mm
Bore Diameter (mm)	32	40	44	46
Connector	D261.205.358-01	D261.205.358-01	D261.205.358-01	D261.205.356-01
Pin 1 A	Motor -	Motor -	Motor -	Motor -
Pin 2 B	Poti -	Poti -	Poti -	Poti -
Pin 3 C	Poti +	Poti +	Poti +	Poti +
Pin 4 D	Motor +	Motor +	Motor +	Motor +
Pin 5 E	Poti 2	Poti 2	Poti 2	Poti 2
Pin 6 F	Poti 1	Poti 1	Poti 1	Poti 1
Flange diameter (mm)	40	50	50	58
Hole circle diameter(mm)	50 x 50	50 x 50	50 x 50	53 x 53
Weight (kg)	0.9	0.9	0.9	0.95
Max. air flow rate*	394 kg/h at 85° angle	695 kg/h at 85° angle	not specified	978 kg/h at 85° angle
Opening direction**	counterclockwise	counterclockwise	counterclockwise	counterclockwise

	Electronic Throttle Body 52 mm	Electronic Throttle Body 54 mm	Electronic Throttle Body 60 mm	Electronic Throttle Body 82 mm
Bore Diameter (mm)	52	54	60	82
Connector	D261.205.356-01	D261.205.358-01	D261.205.358-01	D261.205.358-01
Pin 1 A	Poti 1	Motor -	Motor -	Motor -
Pin 2 B	Poti -	Poti -	Poti -	Poti -
Pin 3 C	Motor -	Poti +	Poti +	Poti +
Pin 4 D	Poti 2	Motor +	Motor +	Motor +
Pin 5 E	Motor +	Poti 2	Poti 2	Poti 2
Pin 6 F	Poti +	Poti 1	Poti 1	Poti 1
Flange diameter (mm)	58	70	68.5	90
Hole circle diameter (mm)	53 x 53	60 x 60	60 x 60	75 x 75
Weight (kg)	0.95	0.95	0.95	1.1
Max. air flow rate*	not specified	not specified	not specified	not specified
Opening direction**	counterclockwise	counterclockwise	counterclockwise	counterclockwise

** ambient conditions: Air pressure p=1000 mbar, Differential pressure Δp=600 mbar ±25 mbar, rel. humidity rF=40 %, Air temperature T=24°C*

*** Opening direction is related to view A. See drawings on bottom of chapter "Dimensions".*

Wiper Direct Actuator WDA



Features

- Analog and LIN versions available
- Optimized hardware for motorsport applications
- Customer specific calibration of wiping angles and speed

The WDA is a wiper motor designed to execute reversing movements instead of rotating 360° like a conventional wiper.
Its function and many operating modes are managed by integrated control electronics. The user is able to control the desired operating mode simply by switching its analog inputs to ground (Analog version) or via LIN (LIN version). The gear, the motor and the electronics are all installed in the same housing.
The main benefit of this wiper motor is its direct rotation movement which replaces external gears and the possibility of programming the operating speed and end positions of all its function modes, upon request.

Application

Operating temperature range	-40 to 85°C

Technical Specifications

WDA Analog Operating modes	• Stop • Interval • Speed 1 • Speed 2
WDA LIN Operating modes	• Stop • Interval • Speed 1 • Speed 2 • Single stroke

Mechanical Data

Size	104.7 x 174.7 x 117.1 mm
Max. wipe cycles/min	Depending on wipe angle
Max. wipe angle	160°
Max. torque	35 Nm
Weight	1,270 g
Max. vibration	30 % of Vibration Profile 1 or 100 % of Vibration Profile 1 in combination with silentblocks (see Downloads or www.bosch-motorsport.com)

Electrical Data

Power supply	9 to 16 V
Supply current at 40 cycles/min.	Typ. 3.4 A
Supply current at 60 cycles/min.	Typ. 6.3 A

LIN Protocol

LIN Version	2.0
LIN Speed	19.2 kbaud
Message ID	0x31

BYTE 0 Value	0	0	Kl. X	Kl. 15	Counter
Bit	7	6	5	4	3 2 1 0
BYTE 1 Value	SPD2	SPD1	INT	SST	INT Mode
Bit	7	6	5	4	3 2 1 0
BYTE 2 Value	0	0	0	0	0 0 0 0
Bit	7	6	5	4	3 2 1 0
BYTE 3 Value	0	0	0	0	0 0 0 0
Bit	7	6	5	4	3 2 1 0
BYTE 4 Value	0	0	0	0	0 0 0 0
Bit	7	6	5	4	3 2 1 0
BYTE 5 Value	0	0	0	0	0 0 0 0
Bit	7	6	5	4	3 2 1 0

Byte	Bit	Signal	Explanation	Values [dez]
0	0 to 3	Counter	The counter has to be increased with each LIN-message	0 to 15
0	4	Kl. 15	Clamp 15 Bit has to be enabled for operation	ON=1 OFF=0
0	5	Kl. X	Clamp X Bit has to be enabled for operation	ON=1 OFF=0

5

1	0 to 3	INT Mode	Interval Mode (enabled if operation mode interval is set)	Interval speed: 1=1 2=5 3=9 4=13
1	4	SST	Single stroke operation mode (enabled once if Bit is set temporary)	ON=1 OFF=0
1	5	INT	Operation mode interval	ON=1 OFF=0
1	6	SPD1	Operation mode speed 1	ON=1 OFF=0
1	7	SPD2	Operation mode speed 2	ON=1 OFF=0
		STOP	Operation mode stop is enabled if SST, INT, SPD1 and SPD2 are OFF (default)	

Connectors and Wires

Connector	CEP2M-AMP-4
Mating connector	F02U.B00.542-01

Various motorsport and automotive connectors available on request

Pinout Analog

Pin 1	AN2
Pin 2	AN1
Pin 3	Gnd
Pin 4	U_S

Pinout LIN

Pin 1	LIN
Pin 2	Not connected
Pin 3	Gnd
Pin 4	U_S

Installation Notes

Typical lifetime: max. 220 h / 1 year

For application with severe conditions and/or high volume, please contact your Bosch Motorsport counterpart in order to define the most appropriate validation program

The WDA Analog can be operated by switching the analog inputs between ground and voltage supply.

The WDA LIN can be operated by all ECUs with LIN 2.X Master function. Further information about the LIN-Frame available upon request.

Make sure that the wiper is in its workspace when restarting after a power failure (upper and lower limit).

Please contact us to define the desired angle of all the operating modes.

The acceleration values can be exceeded by using silentblocks (F02U 003 027-01).

Please ensure that the environmental conditions do not exceed the specifications.

Please find further application hints in the offer drawing at our homepage.

Please deliver the calibration sheet with your order placement.

LIN ID 0x32 (Tx) is used for internal WDA diacnostic porpouses. Make sure that the LIN ID 0x32 is not used in your LIN network by any other device.

Delivery Status

The motor will be delivered with three mounting screws. The screws are pre-assembled with a few thread turns.

- Self-tapping screw referred to DIN 7500
- PE M6x20
- Maximum tightening torque: 8 Nm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

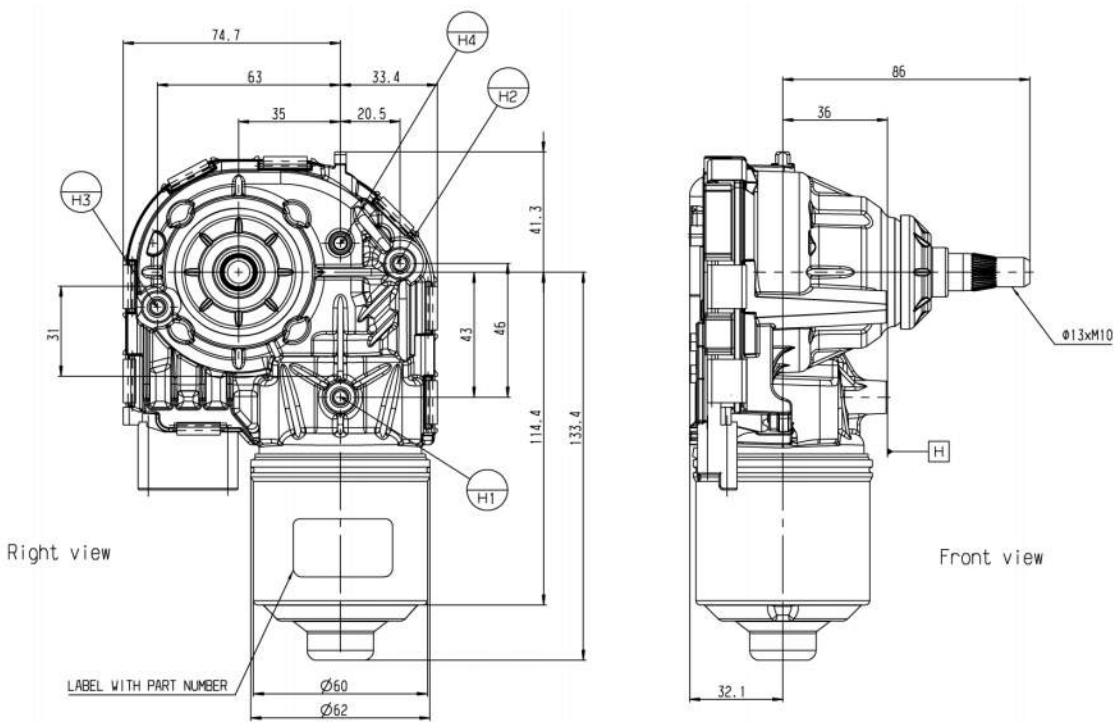
WDA LIN
Order number **F02U.V00.838-04**

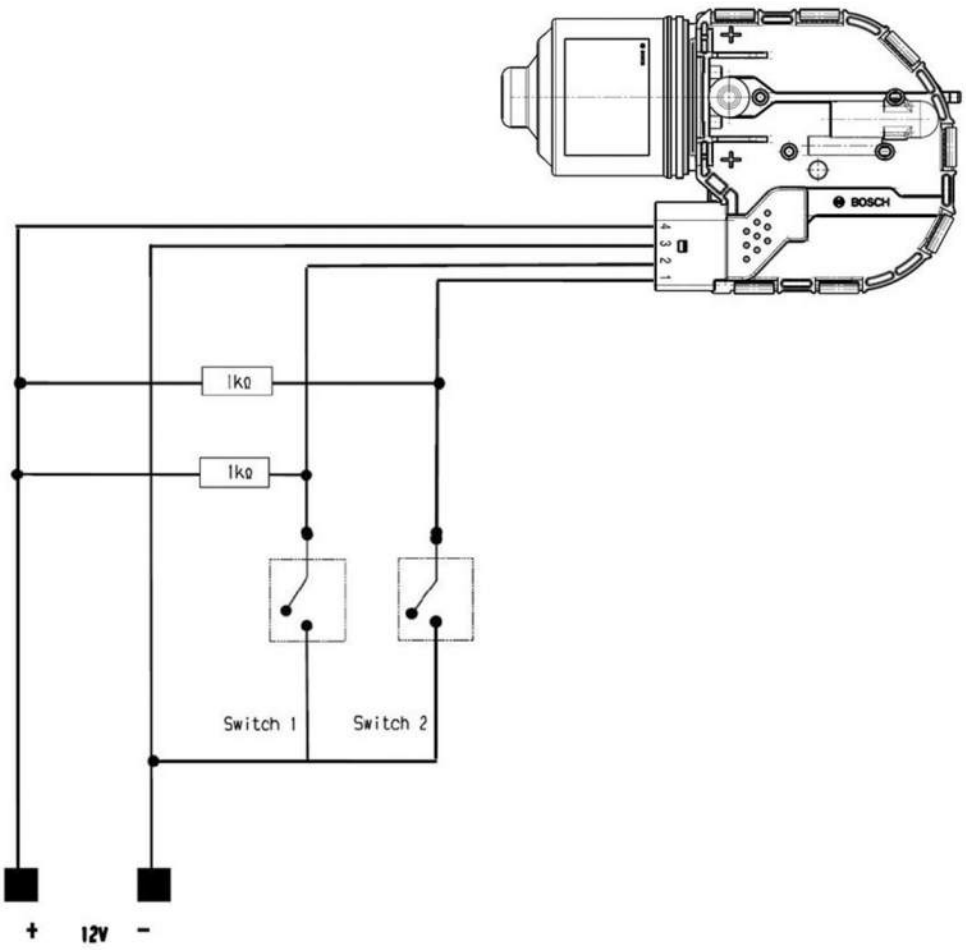
WDA Analog
Order number **F02U.V00.938-03**

Accessories

Silentblock
Order number **F02U.003.027-01**

Dimensions


74.7
63
33.4
35
20.5
H4
H2
H3
41.3
31
43
46
114.4
133.4
H1
Right view
LABEL WITH PART NUMBER
Ø60
Ø62
86
36
Ø13xM10
H
Front view
32.1



Operating modes referring analog inputs configuration

Operating Mode	AN1 (Pin 2)	AN2 (Pin 1)
Stop	Power Supply	Power Supply
Interval	Power Supply	GND
Speed 1	GND	GND
Speed 2	GND	Power Supply

Operating modes referring switch configuration

Operating Mode	Switch 1	Switch 2
Stop	opened	opened
Interval	opened	closed
Speed 1	closed	closed
Speed 2	closed	opened

Sensors 6

Air Pressure	196
Fluid Pressure	203
Knock	212
Lambda	219
Pressure & Temperature	229
Rotary Position	242
Speed	244
Steering Wheel Angle	262
Temperature	264
Vehicle Dynamics	277

Overview

Pressure Sensor Air PS-AA



- Application: 0.1 to 1.15 bar or 0.2 to 2.5 bar
- Response time: 1 ms
- Pressure reference type: Absolute
- Power supply: 5 V
- Weight: 20 g

Pressure Sensor Air PS-AS



- Application: 0.2 to 3.0 bar
- Response time: 1 ms
- Pressure reference type: Absolute
- Power supply: 5 V
- Weight: 21 g

Pressure Sensor Air PSA-N



- Application: 0.1 to 1.15 bar
- Response time: 0.1 ms
- Pressure reference type: Absolute
- Power supply: 11 to 16 V
- Weight: 21 g

Pressure Sensor Air PS-AA



Features

- Application: 0.1 to 1.15 bar or 0.2 to 2.5 bar
- Response time: 1 ms
- Pressure reference type: Absolute
- Power supply: 5 V
- Weight: 20 g

This sensor is designed to measure absolute air pressure, especially the air box pressure of gasoline or Diesel engines.
An integrated circuit combines a piezo-resistive sensor element and electronic systems for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratio metric signal. Two different pressure ranges are available (0.1 to 1.15 bar or 0.2 to 2.5 bar).

Application

Application	Please see variations
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	0 to 40°C
Max. vibration	According to ISO 16750-3

Technical Specifications

Variations

	PS-AA (0.1 to 1.15 bar)	**PS-AA** (0.2 to 2.50 bar)
Tolerance (FS) at U_S = 5 V	± 0.016 bar	± 0.034 bar
Tolerance (FS)	± 1.52 %	± 1.48 %
Sensitivity	4,048 mV/bar	1,848 mV/bar
Offset	-4.8 mV	30.4 mV

Mechanical Data

Mounting	M6
Fitting	12.05 ± 0.8 mm
Weight w/o wire	20 g
Sealing	O-ring 7.59 x 2.62 mm

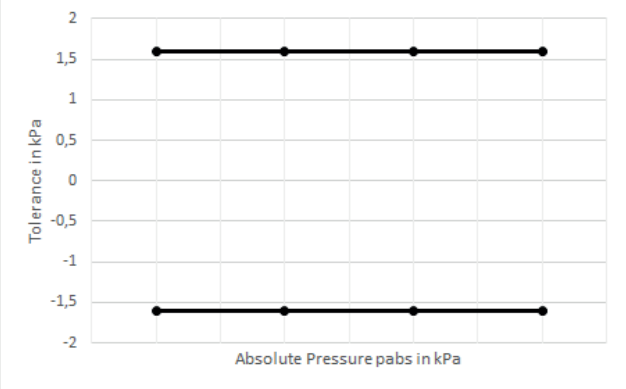
Electrical Dat

Power supply U_S	4.75 to 5.25 V
Max. power supply	16 V
Full scale output U_A at 5 V	0.4 to 4.65 V
Current I_S	9 mA

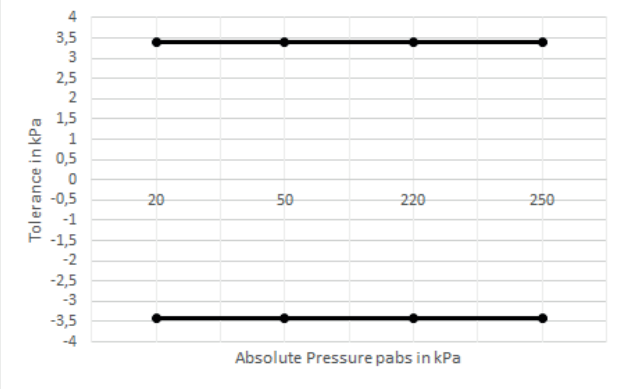
Characteristic

Response time T10/90	1 ms
Compensated range	10 to 85°C
Tolerance (FS) at U_S = 5 V	Please see variations
Tolerance (FS)	Please see variations
Sensitivity	Please see variations
Offset	Please see variations

Tolerance 0.1 to 1.15 bar

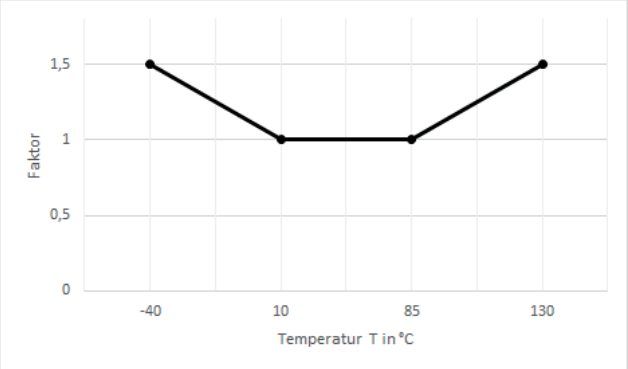


Tolerance 0.2 to 2.5 bar



6

Expansion of Tolerance



Connectors and Wires

Connector	RB-COMP 1.1a/3P/Kod.1
Mating connector	D261.205.366-01
Pin 1	U_S
Pin 2	Gnd
Pin 3	Sig

Various motorsport and automotive connectors are available on request.

Installation Notes

The PS-AA is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

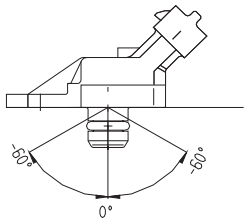
To avoid noise, an ECU-input circuit with a RC-low pass filter (tau = 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

To avoid damage caused by condensate the maximum mounting position from vertical is +-60°.



Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

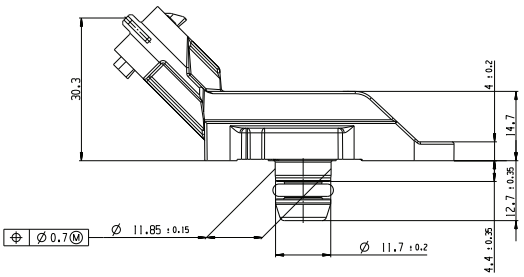
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

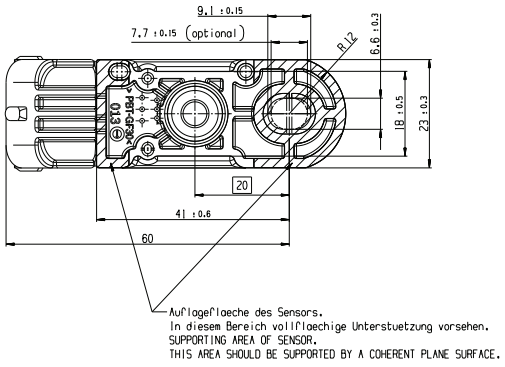
Ordering Information

Pressure Sensor Air PS-AA
0.1 to 1.15 bar
Order number **0261.230.216**

Pressure Sensor Air PS-AA
0.2 to 2.5 bar
Order number **0261.230.284**

Dimensions





Pressure Sensor Air PS-AS



Features

- Application: 0.2 to 3.0 bar
- Response time: 1 ms
- Pressure reference type: Absolute
- Power supply: 5 V
- Weight: 21 g

This sensor is designed to measure absolute air-pressure, especially the air box pressure of gasoline or Diesel engines.
An integrated circuit combines a piezo-resistive sensor element and an electronic for signal-amplification and temperature compensation. The output of the sensor is an analog, ratio metric signal.

Application

Application	0.2 to 3 bar (a)
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	0 to 40°C
Max. vibration	According to ISO 16750-3

Technical Specifications

Mechanical Data

Mounting	M6
Fitting	12.05 ± 0.8 mm
Weight w/o wire	21 g
Sealing	O-ring 7.59 x 2.62 mm

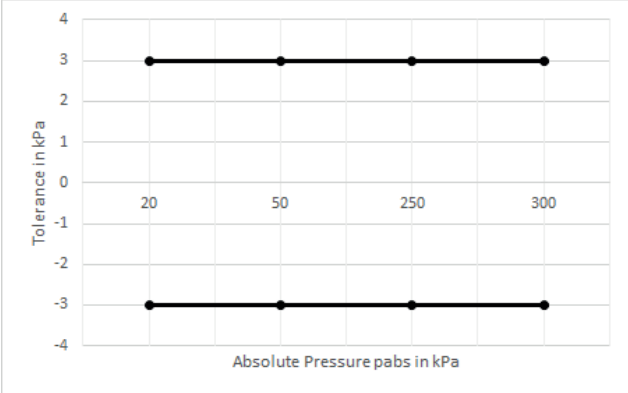
Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V
Full scale output U_A at 5 V	0.4 to 4.65 V
Current I_S	9 mA

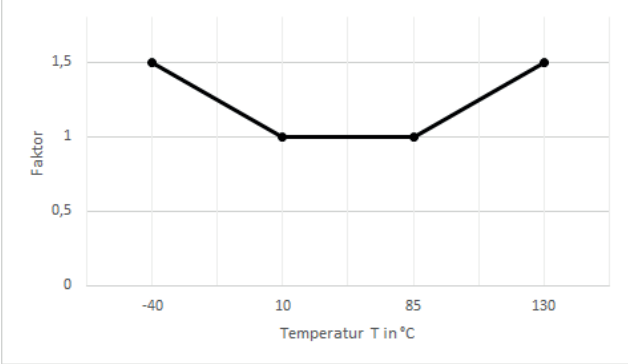
Characteristic

Response time T10/90	1 ms
Compensated range	10 to 85°C
Tolerance (FS) at U_S = 5 V	± 0.030 bar
Tolerance (FS)	± 1.07 %
Sensitivity	1,518 mV/bar
Offset	96 mV

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	RB-COMP 1.1a/3P/Kod.1
Mating connector	D261.205.366-01
Pin 1	U_S
Pin 2	Gnd
Pin 3	Sig

Various motorsport and automotive connectors are available on request.

Installation Notes

The PS-AS is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

6

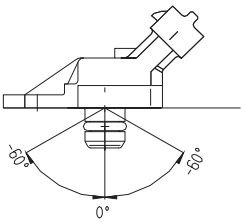
To avoid noise, an ECU-input circuit with a RC-low pass filter (tau = 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

To avoid damage caused by condensate the maximum mounting position from vertical is +-60°.



Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

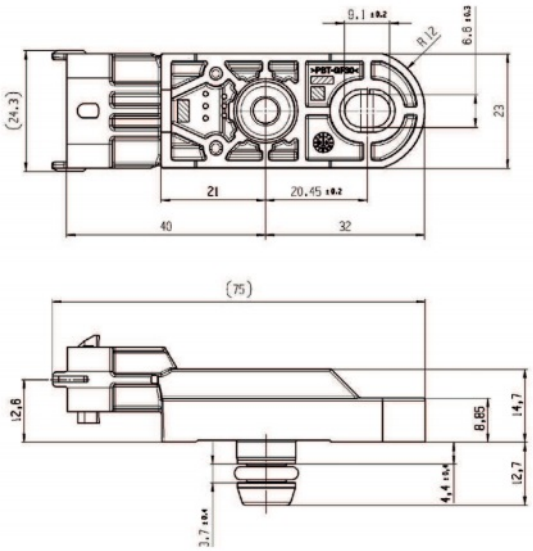
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Air PS-AS
Order number **0281.002.996**

Dimensions



Pressure Sensor Air PSA-N



Features

- Application: 0.1 to 1.15 bar
- Response time: 0.1 ms
- Pressure reference type: Absolute
- Power supply: 11 to 16 V
- Weight: 21 g

This sensor is designed to measure absolute air-pressure, especially the air box pressure of gasoline or Diesel engines.
An integrated circuit combines a piezo-resistive sensor element and electronics for signal-amplification and temperature compensation. The output of the sensor is analog.

Application

Application	0.1 to 1.15 bar
Pressure reference type	absolute
Max. pressure	5 bar
Operating temp. range	-40 to 125°C
Media temp. range	-40 to 125°C
Storage temp. range	-40 to 130°C
Max. vibration	0.19 mm at 100 to 200 Hz 250 m/s^2 at 200 to 500 Hz

Technical Specifications

Mechanical Data

Mounting	2 x #4-40 screws
Fitting	Flat O-ring boss
Weight w/o wire	21 g
Sealing	O-ring 4.5 x 1.5 mm

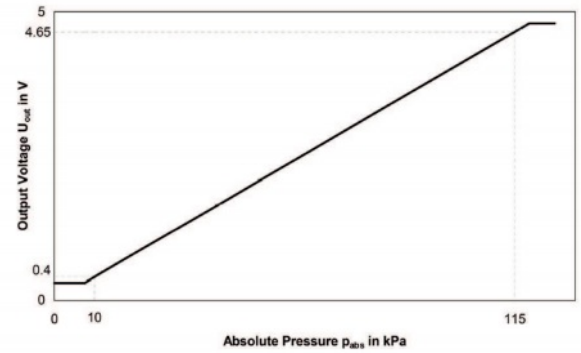
Electrical Data

Power supply U_S	11 to 16 V
Full scale output U_A	0.5 to 4.7 V
Typical current I_S	9 mA

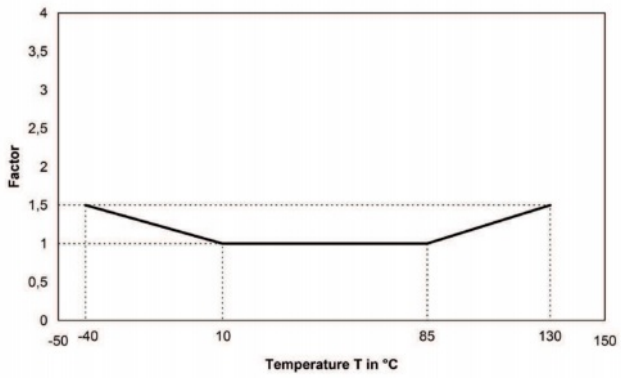
Characteristic

Response time T10/90	1.0 ms
Compensated range	10 to 85°C
Tolerance (FS)	± 0.016 bar
Tolerance (FS)	± 1.52 %
Sensitivity	4,041.62 mV/bar
Offset	-4.16 mV

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	ASL606-05PC-HE	
Mating connector ASL006-05SC-HE	F02U.000.228-01	
Pin	Function	Wire color
1	U_S	WHT/ORG
2	Gnd	WHT/BLU
3	Sig	WHT
4	-	
5	-	
Various motorsport and automotive connectors are available on request.		
Sleeve	DR-25	
Wire size	AWG 24	
Wire length L	64.5 cm	

6

Installation Notes

The PSA-N is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

To avoid noise, an ECU-input circuit with a RC-low pass filter (tau 0 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Surface finish of the mounting surface should not exceed 0.8 micro meters RMS.

Surface flatness tolerance at sensor mount interface must not exceed +/- 0.025 mm after sensor is torqued in place.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Fullfilled Legal Standards/Legal Requirements

EMC Requirement	UNECE10

Legal Restrictions

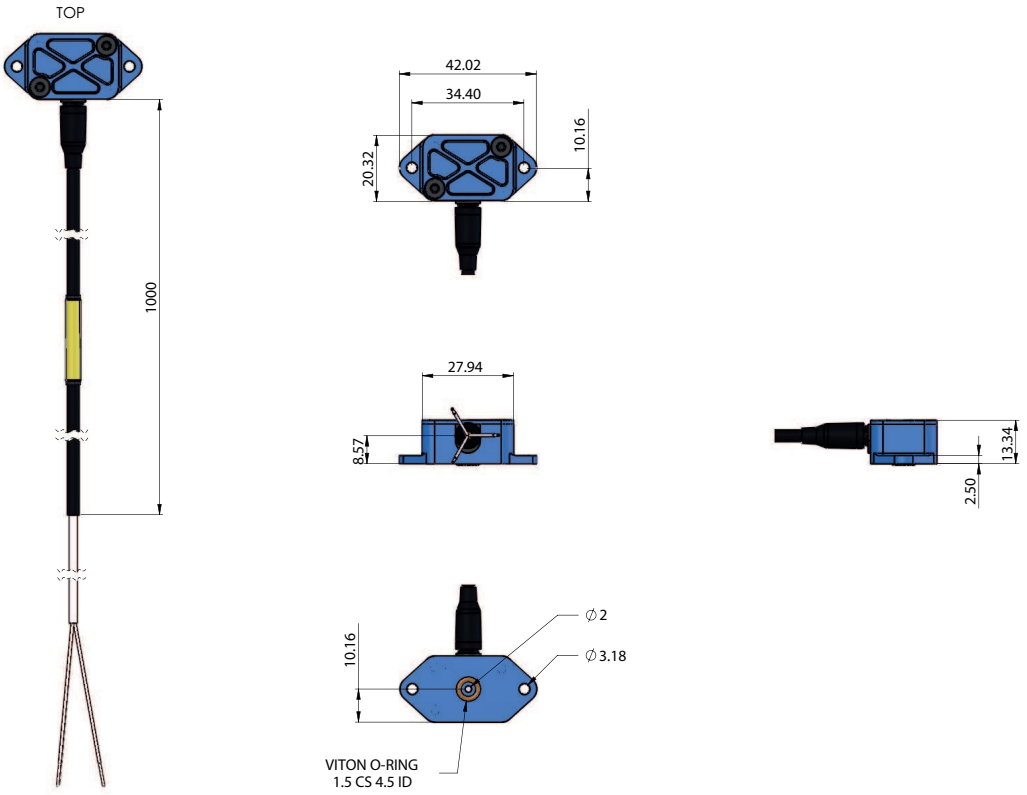
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Air PSA-N
AS terminated
Order number **F02U.V0U.197-03**

Pressure Sensor Air PSA-N
Flying Lead
Order number **F02U.V0U.197-91**

Dimensions



.

Overview

Pressure Sensor Fluid PSC-260



- Application: 0 to 260 bar
- Response time: 2 ms
- Pressure reference type: Absolut
- Power supply: 5 V
- Weight: 35 g

Pressure Sensor Fluid PSS-10



- Application: 1 to 11 bar
- Response time: 1.5 ms
- Pressure reference type: Absolut
- Power supply: 5 V
- Weight: 45 g

Pressure Sensor Fluid PSS-250R



- Application: 0 to 250 bar
- Response time: 1.5 ms
- Pressure reference type: Relative
- Power supply: 5 V
- Weight: 45 g

Pressure Sensor Fluid PSS-140/260/420/600



- Application: 0 to 140, 260, 420, 600 bar
- Response time: 2 ms
- Pressure reference type: Absolut
- Power supply: 5 V
- Weight: 35 g

Pressure Sensor Fluid PSC-260



Features

- Application: 0 to 260 bar
- Response time: 2 ms
- Pressure reference type: Absolut
- Power supply: 5 V
- Weight: 35 g

The PSC-260 is specially designed to measure absolute pressure in gasoline direct injection applications. This sensor is also compatible with other kind of fluids e.g. Diesel, engine oil, transmission oil or brake fluid.
The sensor uses a thin layer technique to achieve high accuracy pressure measurements. The stainless steel measuring cells with piezoresistive bridges are hermetically welded with stainless steel pressure ports. The internal reference ensures ambient pressure independent measurements.
The main benefits of this sensor are its high accuracy, its wide measurement range and its robust and compact design.

Application

Application	0 to 260 bar (a)
Pressure reference type	absolute
Max. pressure	320 bar
Operating temp. range	-40 to 130°C (140°C)
Media temp. range	-40 to 130°C (140°C)
Storage temp. range	-30 to 60°C
Max. vibration	560 m/s^2 at 800 to 900 Hz 350 m/s^2 at 1.000 to 2.500 Hz

Technical Specifications

Mechanical Data

Male thread	M10 x 1
Wrench size	27 mm
Installation torque	22 ± 2 Nm in aluminum 32.5 ± 2.5 Nm in steel
Weight w/o wire	35.2 g
Sealing	sealed cone

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V
Full scale output U_A	10 to 90 % U_S ratio metric
Current I_S	12 mA

Characteristic

Load capacity	10 nF
Output resistance	10 Ohm
Tolerance (FS)	+ 1 % (0 to 100°C) + 1.5 % (-40 to 0°C and 100 to 130°C)
Sensitivity	15.38 mV/bar at U_S = 5 V
Offset	500 mV at U_S = 5 V

Connectors and Wires

Connector	ASL606-05PC-HE
Mating connector ASL006-05SC-HE	F02U.000.228-01
Pin 1	-
Pin 2	Gnd
Pin 3	Sig
Pin 4	U_S
Pin 5	-
Various motorsport and automotive connectors are available on request.	
Please specify the required wire length with your order.	
Sleeve	DR-25
Wire length L	13 to 95 cm

Installation Notes

The PSC-260 can be connected directly to most control units. Please consider the TCI for the electrical connection of the sensor.

The sensor has a protection for overvoltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

Please consider using the adapter F02U.002.711-01.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

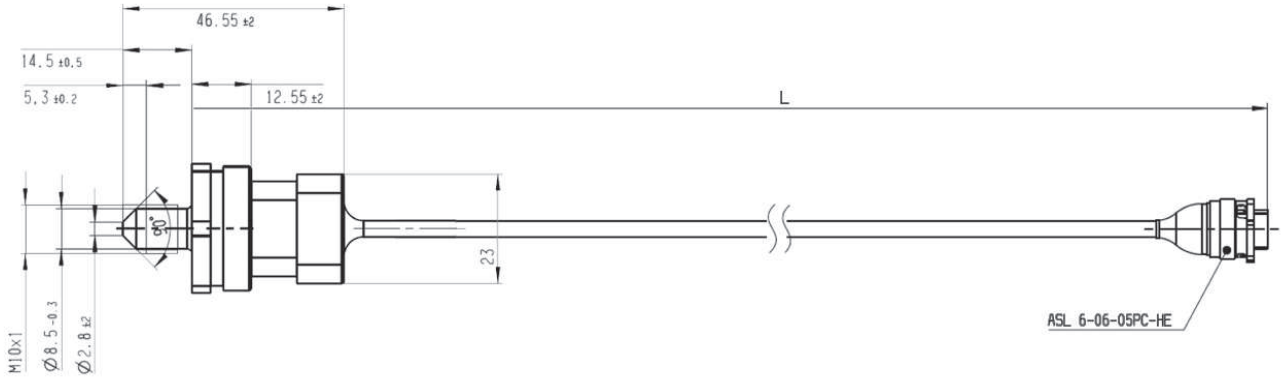
Ordering Information

Pressure Sensor Fluid PSC-260
Order number **F02U.V00.990-03**

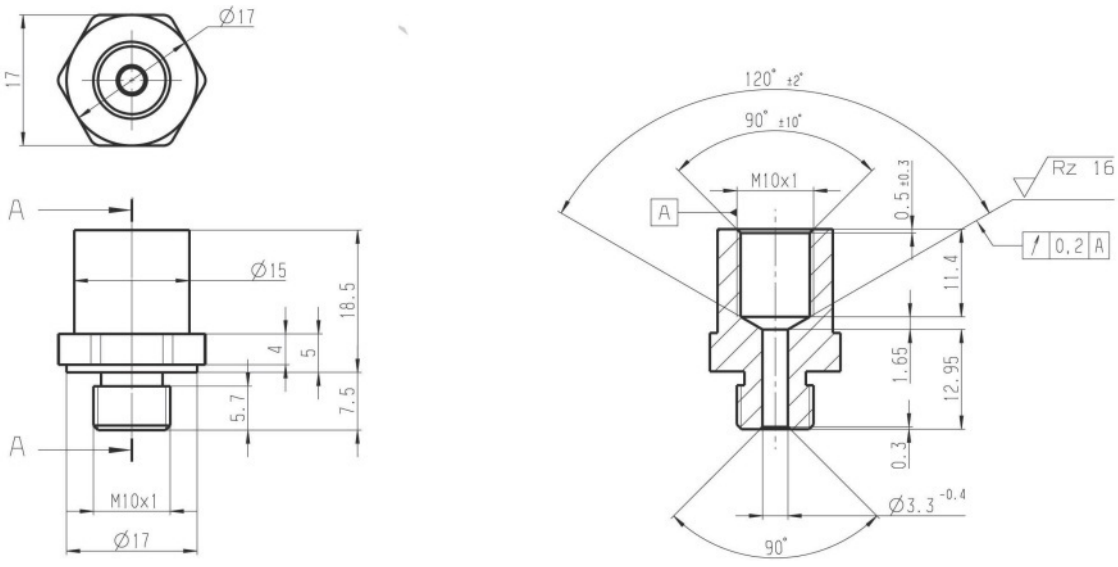
Accessories

Adapter
Order number **F02U.002.711-01**

Dimensions



Sensor



Adapter

Pressure Sensor Fluid PSS-10



Features

- Application: 1 to 11 bar
- Response time: 1.5 ms
- Pressure reference type: Absolut
- Power supply: 5 V
- Weight: 45 g

This sensor is designed to measure absolute pressure of various kinds of media e.g. Diesel, gasoline, water, engine oil, transmission oil or air.
The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique. These are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.
The main benefit of this sensor is the high quality of a production part at a low price.

Application

Application	1 to 11 bar (a)
Pressure reference type	absolute
Max. pressure	20 bar
Operating temp. range	-40 to 125°C (140°C)
Media temp. range	-40 to 125°C (140°C)
Storage temp. range	-20 to 50°C
Bio fuel compatibility	E 85 / M 100
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	± 30 V
Full scale output U_A	10 to 90 % U_S ratiometric
Current I_S	8 mA

Characteristic

Response time T10/90	1.5 ms
Compensated range	0 to 90°C
Tolerance (FS) at U_S = 5 V	± 0.1 bar
Tolerance (FS)	± 1 %
Sensitivity	400 mV/bar at U_S=5 V
Offset	100 mV at U_S=5 V

Connectors and Wires

Connector	Bosch Compact
Mating connector	3-pole Compact D261.205.339-01
Pin 1	Gnd
Pin 2	Sig
Pin 3	U_S
Pin 4	-
Pin 5	-

Installation Notes

The PSS-10 can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

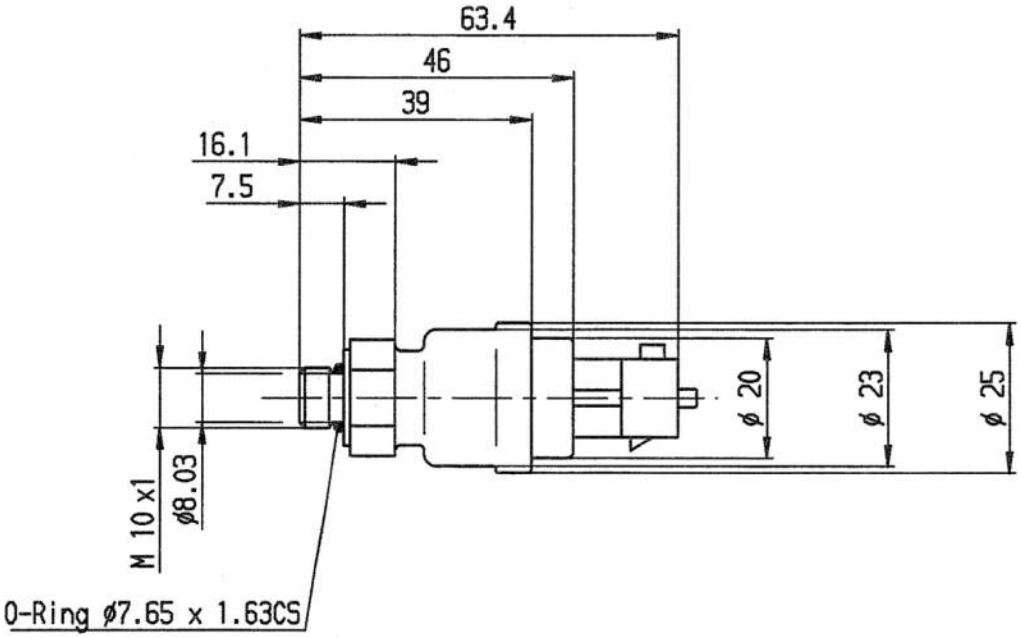
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Fluid PSS-10
Order number **B261.209.341-01**

Dimensions



Pressure Sensor Fluid PSS-250R



Features

- Application: 0 to 250 bar
- Response time: 1.5 ms
- Pressure reference type: Relative
- Power supply: 5 V
- Weight: 45 g

This sensor is designed to measure the pressure of media in relation to the ambient pressure (e.g. Diesel, gasoline, water, engine oil, transmission oil or air). The sensor is available for two different supply voltage ranges.
The sensor uses stainless steel measuring cells with piezo-resistive measuring bridges in thin layer technique, which are hermetically welded together with stainless steel pressure ports. This guarantees a complete media compatibility.
The main benefit of this sensor is the high quality of a production part at a low price

Application

Application	0 to 250 bar (r)
Pressure reference type	relative
Max. pressure	500 bar
Operating temp. range	-40 to 125°C (140°C)
Media temp. range	-40 to 125°C (140°C)
Storage temp. range	-20 to 50°C
Bio fuel compatibility	E 85 / M 100
Max. vibration	100 m/s^2 rms at 10 to 2,000 Hz

Technical Specifications

Mechanical Data

Male thread	M10x1
Wrench size	17 mm
Installation torque	15 Nm
Weight w/o wire	45 g
Sealing	O-ring 7.65 x 1.63 mm

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	± 30 V
Full scale output U_A	10 to 90 % U_S ratiometric
Current I_S	8 mA

Characteristic

Response time T10/90	1.5 ms
Compensated range	0 to 90°C
Tolerance (FS)	± 2.5 bar
Tolerance (FS)	± 1 %
Sensitivity	16 mV/bar at U_S = 5 V
Offset	500 mV at U_S = 5 V

Connectors and Wires

Connector	Bosch Compact
Mating connector	3-pole Compact D261.205.339-01
Pin 1	Gnd
Pin 2	Sig
Pin 3	U_S
Pin 4	-
Pin 5	-

Installation Notes

The PSS-250R can be connected directly to most control units.

The sensor has a protection for over voltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

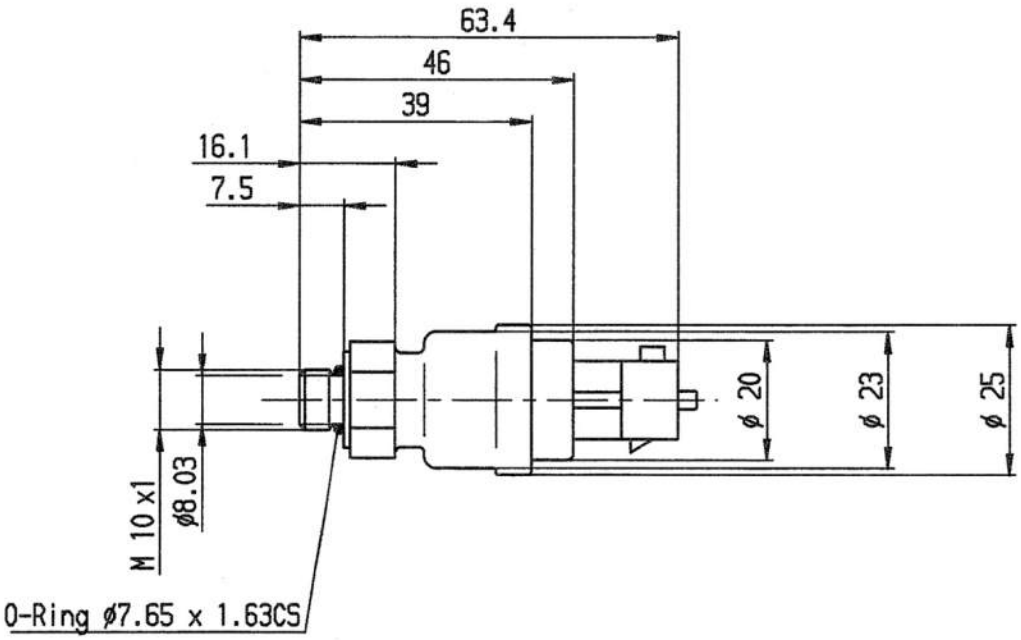
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Fluid PSS-250R
4.75 to 5.25 V
Order number **B261.209.965-01**

Dimensions



Pressure Sensor Fluid PSS-140/260/420/600



Features

- Application: 0 to 140, 260, 420, 600 bar
- Response time: 2 ms
- Pressure reference type: Absolut
- Power supply: 5 V
- Weight: 35 g

The PSS is specially designed to measure absolute pressure in gasoline direct injection applications. This sensor is also compatible with other kind of fluids e.g. Diesel, engine oil, transmission oil or brake fluid.
The sensor uses a thin layer technique to achieve high accuracy pressure measurements. The stainless steel measuring cells with piezoresistive bridges are hermetically welded with stainless steel pressure ports. The internal reference ensures ambient pressure independent measurements.
The main benefits of this sensor are its high accuracy, its wide measurement range and its robust and compact design.

Application

Application and max. pressure	Please see Variations
Pressure reference type	absolute
Operating and media temp. range	-40 to 130°C (140°C)
Storage temp. range	-30 to 60°C
Max. vibration	210 m/s^2 at 147 to 1,350 Hz 175 m/s^2 at 1,350 to 2,000 Hz

Technical Specifications

Variations

PSS	-140	-260	-420	-600
Application (bar) 0 to	140	260	420	600
Max. pressure (bar)	180	320	560	660
Sensitivity at U_S = 5 V (mV/bar)	28.57	15.38	9.52	6.67

Mechanical Data

Male thread	M10 x 1
Wrench size	27 mm
Installation torque	22 ± 2 Nm in aluminum 32.5 ± 2.5 Nm in steel
Weight w/o wire	35.2 g
Sealing	sealed cone

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V
Full scale output U_A	10 to 90 % U_S ratiometric
Current I_S	12 mA

Characteristic

Load capacity	10 nF
Output resistance	10 Ohm
Tolerance (FS)	+ 1 % (0 to 100°C) + 1.5 % (-40 to 0°C and 100 to 130°C)
Sensitivity	Please see Variations
Offset	500 mV at U_S = 5 V

Connectors and Wires

Connector	Bosch Compact
Mating connector	3-pole Compact D261.205.366-01
Pin 1	Gnd
Pin 2	Sig
Pin 3	U_S

Installation Notes

The PSS- can be connected directly to most control units. Please consider the TCI for the electrical connection of the sensor.

The sensor has a protection for overvoltage, reverse polarity and short-circuit.

Please do not fix the sensor directly to the engine block to avoid undesired strong vibrations.

Each mounting orientation is possible.

Please consider using the adapter F02U.002.711-01.

The sensor meets all EMV, EMC and ESD automotive standards.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Fluid PSS-140
Order number **0261.545.053**

Pressure Sensor Fluid PSS-260
Order number **0261.545.040**

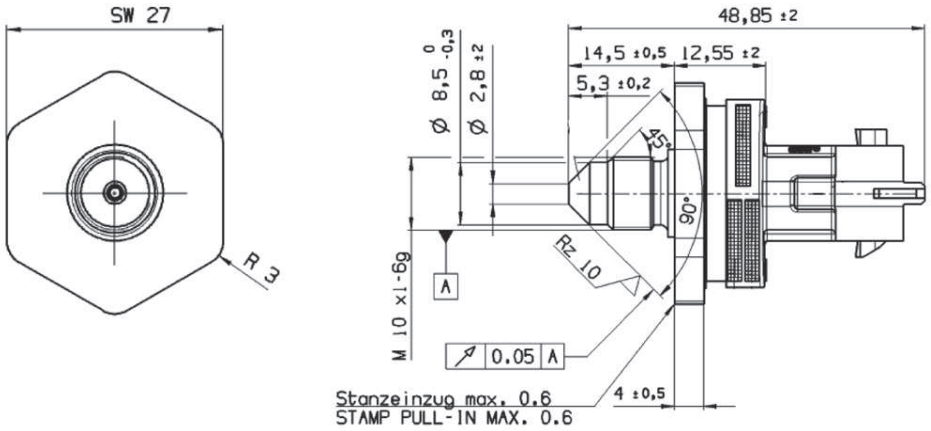
Pressure Sensor Fluid PSS-420
Order number **0261.545.136**

Pressure Sensor Fluid PSS-600
Order number **0261.B23.789-07**

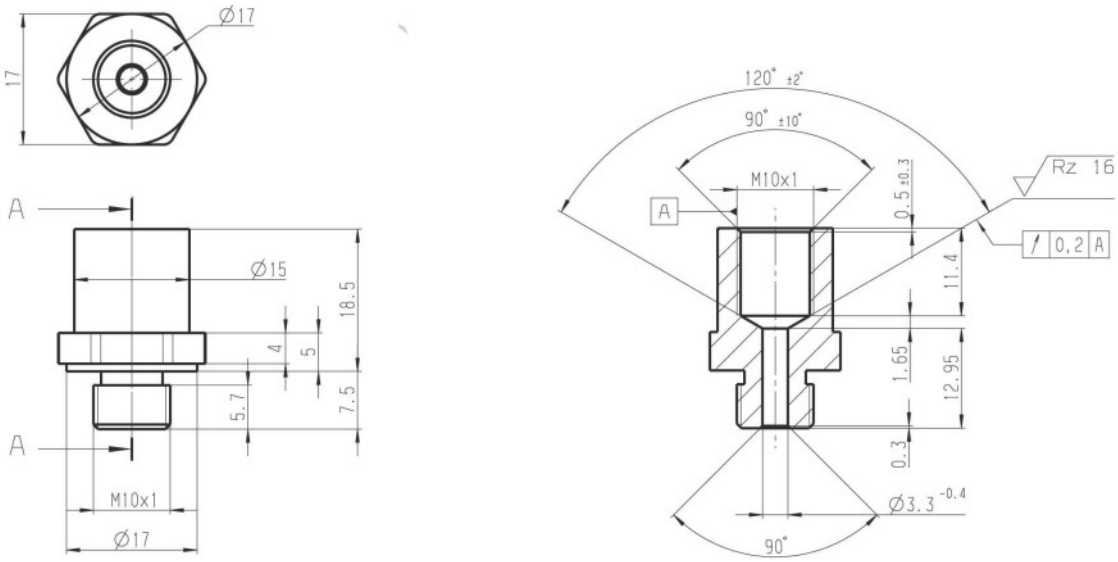
Accessories

Adapter
Order number **F02U.002.711-01**

Dimensions



Sensor



Adapter

Overview

Knock Sensor KS4-P



- Frequency: 3 to 25 kHz
- Weight: 48 g
- Height sensor head: 18 mm

Knock Sensor KS4-R



- Frequency: 3 to 25 kHz
- Weight: 82 g
- Height sensor head: 18 mm

Knock Sensor KS4-R2



- Frequency: 3 to 30 kHz
- Weight: 60 g
- Height sensor head: 14 mm

Knock Sensor KS4-P



Features

- Frequency: 3 to 25 kHz
- Weight: 48 g
- Height sensor head: 18 mm

This sensor is used for detecting structural born vibrations in spark ignition engines due to uncontrolled combustion. This sensor is suitable for operation in extreme conditions.
Due to the inertia of the seismic mass, the sensor moves in correlation to the engine block vibration; this motion results in a compressive force which is converted into a voltage signal via a piezoceramic sensor element. As a result, upper and lower voltage thresholds can be defined directly correlating to an acceleration magnitude.
The main benefits of this sensor are its robust mechanical design, compact housing and precise determination of structure-related noise. The small packaging is accomplished by integrating the connector directly to the sensor.

Application

Application	3 to 25 kHz
Operating temperature range	-40 to 150°C
Storage temperature range	-30 to 60°C
Max. vibration	≤ 800 m/s^2

Technical Specifications

Mechanical Data

Male thread (for cast)	M8x25
Male thread (for Al)	M8x30
Installation torque	20±5 Nm
Weight w/o wire	48 g
Protection	IP X9K

Electrical Data

Range of frequency	3 to 25 kHz
Sensitivity at 5 kHz	26 ± 8 mV/g
Max. sensitivity changing (life-time)	-17 %
Linearity between 5 to 15 kHz (from 5 kHz value)	-10 to 10 %
Linearity between 15 to 20 kHz (linear increasing with freq)	20 to 50 %
Main resonance frequency	30 kHz
Impedance	> 1 MOhm
Temperature dependence of sensitivity	0.04 mV/g°C
Capacity field	1,150 ± 200 pF

Connectors and Wires

Mating connector 2-pole	2-Pin RB-Kp.1 (F02U.B00.966-01) or 2-Pin Jetronic (D261.205.288-01)
Pin 1	Sig+
Pin 2	Sig-

Installation Notes

The KS4-P can be connected to all Bosch Motorsport ECUs featuring knock control

The sensor must rest directly on the brass compression sleeve during operation.

To ensure low-resonance coupling of the sensor to the measurement location, the contact surface must be clean and properly machined to provide a secure flush mounting.

Please route the sensor wire in a way that prevents resonance vibration.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

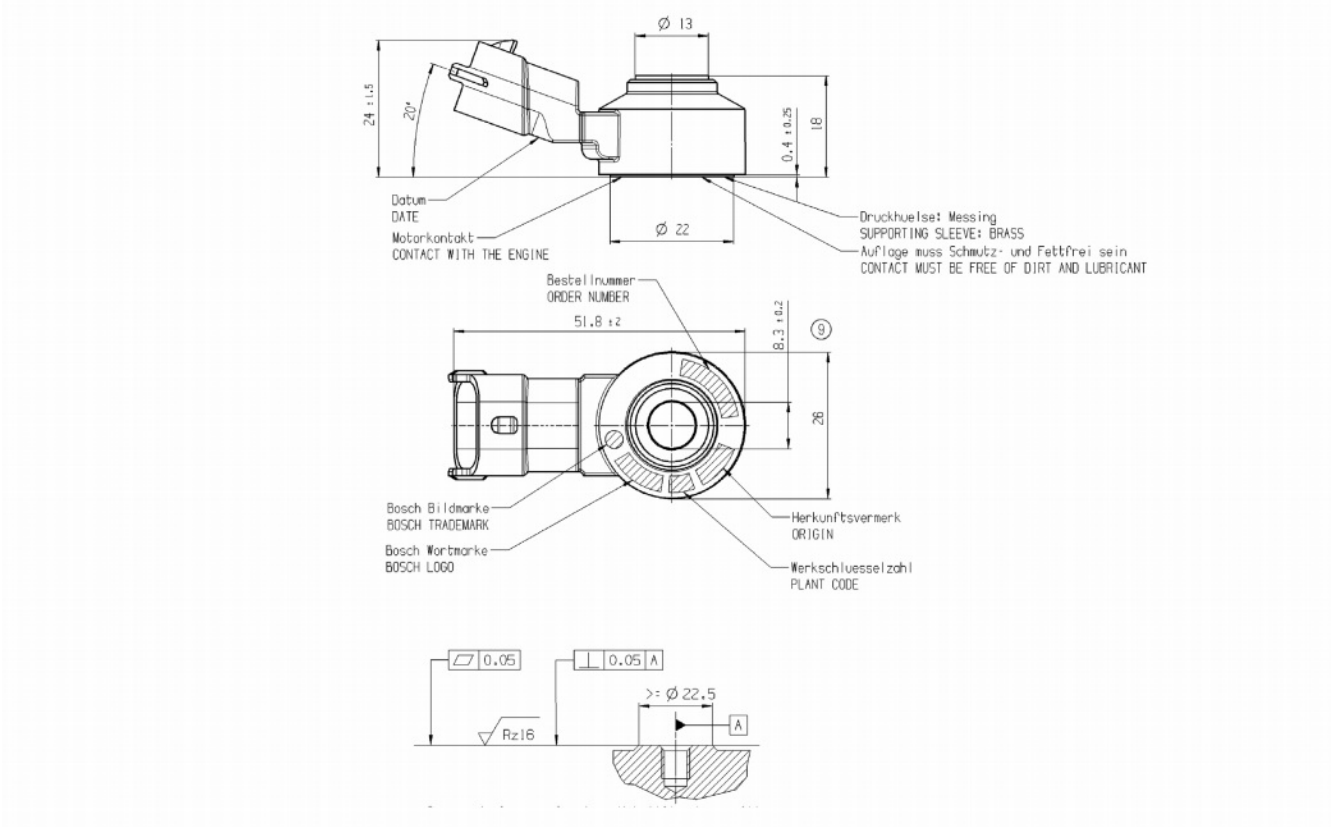
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Knock Sensor KS4-P
Mating Connector: 2-Pin RB-Kp.1
Order number **0261.231.173**

Knock Sensor KS4-P
Mating Connector: 2-Pin Jetronic
Order number **0261.231.188**

Dimensions


Ø 13
24 ±1.5
20°
0.4 ±0.25
18
Datum
DATE
Motorkontakt
CONTACT WITH THE ENGINE
Ø 22
Druckhuelse: Messing
SUPPORTING SLEEVE: BRASS
Auflage muss Schmutz- und Fettfrei sein
CONTACT MUST BE FREE OF DIRT AND LUBRICANT
Bestellnummer
ORDER NUMBER
51.8 ±2
8.3 ±0.2
9
26
Bosch Bildmarke
BOSCH TRADEMARK
Bosch Wortmarke
BOSCH LOGO
Herkunftsvermerk
ORIGIN
Werkschluesselzahl
PLANT CODE
0.05
0.05 A
>= Ø 22.5
A
Rz16

.

Knock Sensor KS4-R



Features

- Frequency: 3 to 25 kHz
- Weight: 82 g
- Height sensor head: 18 mm

This sensor is used for detecting structural born vibrations in spark ignition engines due to uncontrolled combustion. This sensor is suitable for operation in extreme conditions.
Due to the inertia of the seismic mass, the sensor moves in correlation to the engine block vibration; this motion results in a compressive force which is converted into a voltage signal via a piezoceramic sensor element. As a result, upper and lower voltage thresholds can be defined directly correlating to an acceleration magnitude.
The main benefits of this sensor are its robust mechanical design, compact housing and precise determination of structure-related noise. Connection to this sensor can be tailored to customer requirements through specified wire lengths and various connector options.

Application

Application	3 to 25 kHz
Operating temperature range	-40 to 130°C
Storage temperature range	-30 to 60°C
Max. vibration	≤ 800 m/s²

Technical Specifications

Mechanical Data

Male thread (for cast)	M8x25
Male thread (for Al)	M8x30
Installation torque	20 ± 5 Nm
Weight w/o wire	82 g
Protection	IP 54

Electrical Data

Range of frequency	3 to 25 kHz
Sensitivity at 5 kHz	28.8 mV/g
Max. sensitivity changing (life-time)	-17 %
Linearity between 5 to 15 kHz (from 5 kHz value)	-10 to 10 %
Linearity between 15 to 20 kHz (linear increasing with freq)	20 to 50 %
Main resonance frequency	> 30 kHz
Impedance	> 1 MOhm
Temperature dependence of sensitivity	0.04 mV/g°C
Capacity field	1,150 ± 200 pF

Connectors and Wires

Connector	A261.230.252
Mating connector 2-pole	2-Pin RB-Kp.1 (D261.205.337-01)
Pin 1	Sig +
Pin 2	Sig -
Sleeve	PUR
Wire size	0.5 mm²
Wire length L	530 mm

Various motorsport and automotive connectors on request.

Installation Notes

The KS4-R can be connected to all Bosch Motorsport ECUs featuring knock control

The sensor must rest directly on the brass compression sleeve during operation.

To ensure low-resonance coupling of the sensor to the measurement location, the contact surface must be clean and properly machined to provide a secure flush mounting.

Please route the sensor wire in a way that prevents resonance vibration.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

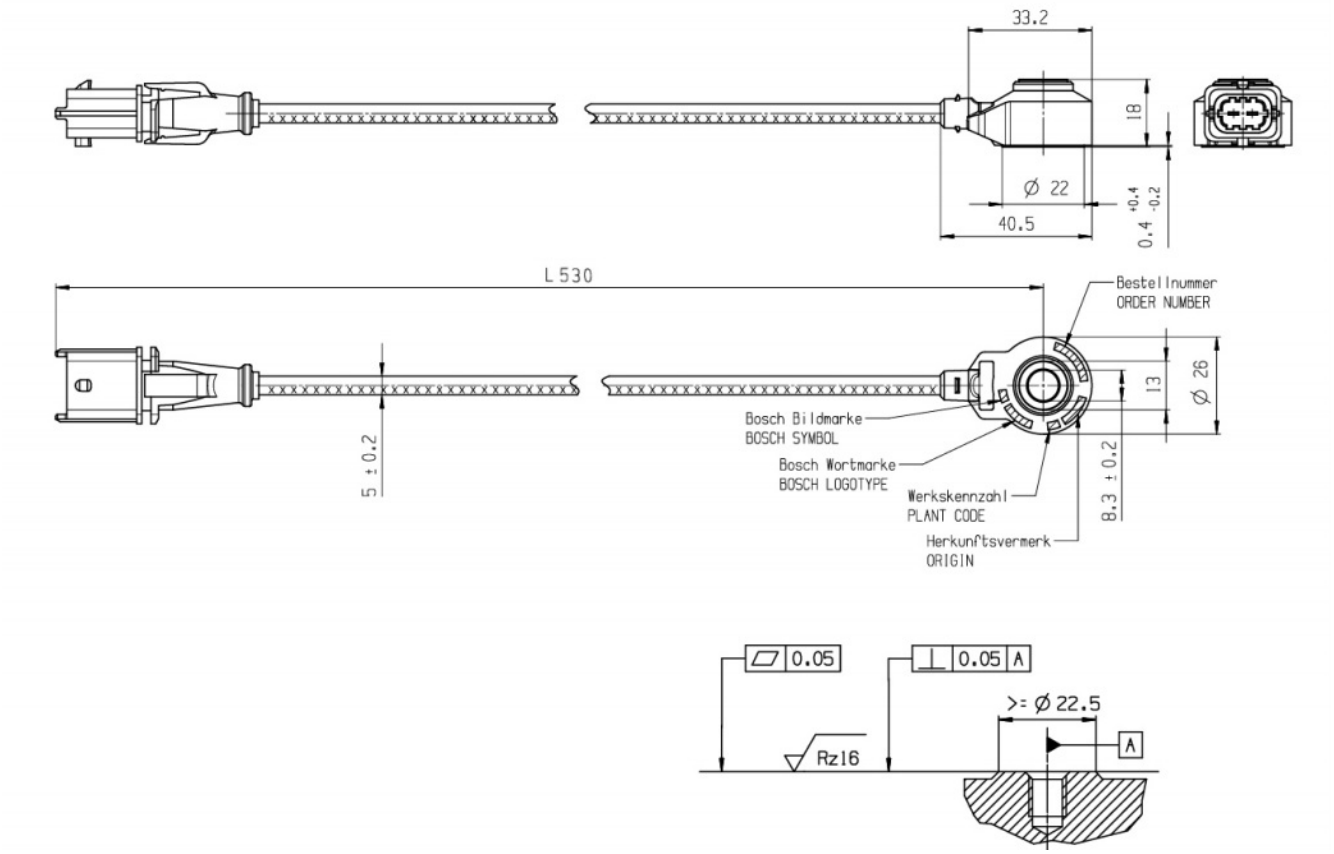
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Knock Sensor KS4-R
Order number **0261.231.218**

Dimensions



Knock Sensor KS4-R2



Features

- Frequency: 3 to 30 kHz
- Weight: 60 g
- Height sensor head: 14 mm

This sensor is used for detecting structural born vibrations in spark ignition engines due to uncontrolled combustion. This sensor is suitable for operation in extreme conditions.
Due to the inertia of the seismic mass, the sensor moves in correlation to the engine block vibration; this motion results in a compressive force which is converted into a voltage signal via a piezoceramic sensor element. As a result, upper and lower voltage thresholds can be defined directly correlating to an acceleration magnitude.
The main benefits of this sensor are its robust mechanical design, compact housing and precise determination of structure-related noise. This version is an optimized part for Motorsport applications based on a series application development. Compared to the previous version, the advantage of this new modification is that this product has an extended frequency and higher operating temperature rating.

Application

Application	3 to 30 kHz
Operating temperature range	-40 to 150°C
Storage temperature range	-30 to 60°C
Max. vibration	≤ 800 m/s² at 0 to 24 kHz ≤ 4,000 m/s² at 5 to 24 kHz (short-term)

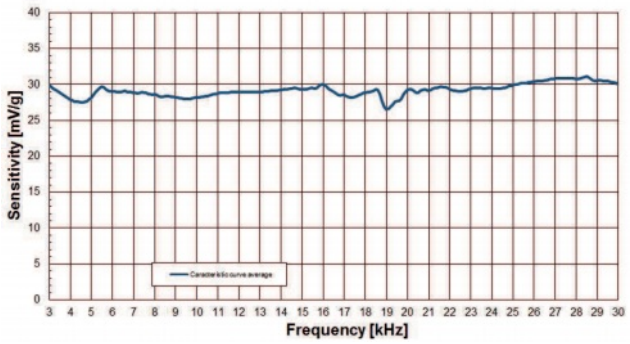
Technical Specifications

Mechanical Data

Fixing screw for cast iron	M8x25
Fixing screw for aluminum	M8x30
Installation torque	20 + 5 Nm
Weight w/o Connector	60 g
Protection	IP 54

Electrical Data

Range of frequency	3 to 30 kHz
Max. sensitivity changing (life-time)	-17 %
Linearity between 5 to 15 kHz (from 5 kHz value)	-10 to 10 %
Linearity between 15 to 20 kHz (linear increasing with freq)	20 to 50 %
Main resonance frequency	> 30 kHz



Ratio of frequency and sensitivity

Impedance	> 1 MOhm
Temperature dependence of sensitivity	0.04 mV/g°C
Capacity field	1,150 ± 200 pF

Connectors and Wires

Connector	ASX602-03PC-HE
Mating connector ASX002-03SC-HE	F02U.002.840-01
Pin 1	Sig
Pin 2	Gnd
Pin 3	Scr
Sleeve	Elastomer
Wire size	0.5 mm²
Wire length L	150 to 450 mm

Various motorsport and automotive connectors on request.

Installation Notes

The KS4-R2 can be connected to all Bosch Motorsport ECUs featuring knock control.

The sensor must rest directly on the brass compression sleeve during operation.

To ensure low-resonance coupling of the sensor to the measurement location, the contact surface must be clean and properly machined to provide a secure flush mounting.

Please route the sensor wire in a way that prevents resonance vibration.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

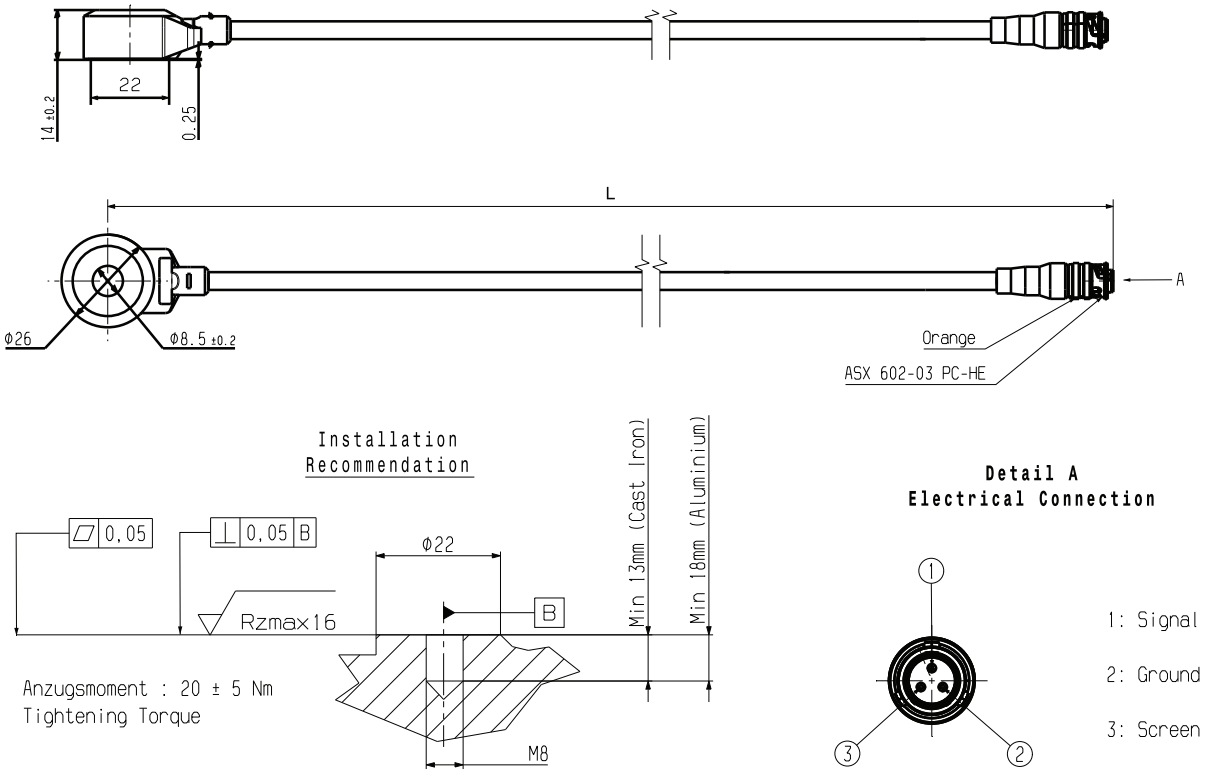
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Knock Sensor KS4-R2
Order number **F02U.V01.884-01**

Dimensions



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Overview

Lambda Sensor LSU 4.9



- Application: lambda 0.65 to ∞
- Exhaust gas temperature: 930°C (1,030 for a short time)
- Hexagon temperature: 600°C
- Thread: M18x1.5
- Weight w/o wire: 75 g

Lambda Sensor LSU ADV/ ADV pre Turbo



- Application: lambda 0.65 to ∞
- Exhaust gas temperature: 930°C (1,030 for a short time)
- Hexagon temperature: 820°C
- Thread: M18x1.5
- Weight w/o wire: 75 g

Lambda Sensor Mini-LSU 4.9



- Application: lambda 0.65 to ∞
- Exhaust gas temperature: 930°C (1,030 for a short time)
- Hexagon temperature: 700°C
- Thread: M16x1.5
- Weight w/o wire: 34 g

Lambda Sensor LSU 4.9



Features

- Application: lambda 0.65 to ∞
- Exhaust gas temperature: 930°C (1,030 for a short time)
- Hexagon temperature: 600°C
- Thread: M18x1.5
- Weight w/o wire: 75 g

This sensor is designed to measure the proportion of oxygen in exhaust gases of automotive engines (gasoline or Diesel).
The wide band lambda sensor LSU 4.9 is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of lambda 0.65 to air makes the LSU 4.9 capable of being used as a universal sensor for lambda 1 measurement as well as for other lambda ranges. The connector module contains a trimming resistor, which defines the characteristic of the sensor.
The main benefit of the LSU 4.9 is the robust design combined with the high Bosch production quality standard.
This lambda sensor operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and lambda control units like LT4. You'll find this unit and more on our homepage at Electronics/Sensor Interfaces.

Application

Application	lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel/E85
Exhaust gas pressure	≤ 2.5 bar (higher with decrease accuracy)
Exhaust gas temperature range (operating)	< 930°C
Exhaust gas temperature range (max.) for short time	< 1,030°C
Hexagon temperature	< 600°C
Wire and protective sleeve temperature	< 250°C
Connector temperature	< 140°C
Storage temperature range	-40 to 100°C
Max. vibration (stochastic peak level)	300 m/s^2

Technical Specifications

Variations

LSU 4.9 with automotive connector

Connector	1928.404.687 (Series production type, not available from Bosch Motorsport)
Mating connector	D261.205.356-01
Wire length L	95.0 cm

LSU 4.9 with motorsport connector

Connector	AS607-35PN
Mating connector	AS007-35SN
Wire length L	20.0 to 90.0 cm

Mechanical Data

Weight w/o wire	75 g
Thread	M18x1.5
Wrench size	22 mm
Tightening torque	40 to 60 Nm

Electrical Data

Power supply H+ nominal	7.5 V
System supply voltage	10.8 V to 16.5 V
Heater power steady state	7.5 W
Heater control frequency	≥ 100 Hz
Nominal resistance of Nernst cell	300 Ohm
Max current load for Nernst cell	250 µA

Characteristic

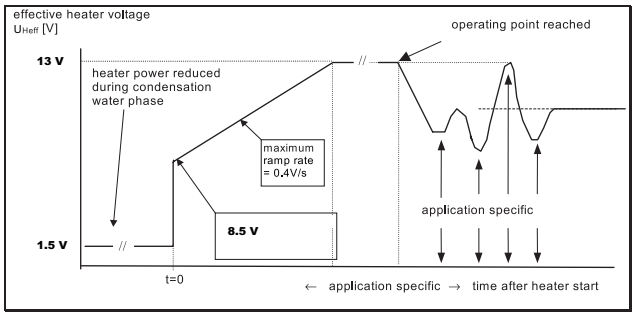
Signal output	I_P meas
Accuracy at lambda 0.8	0.80 ± 0.01
Accuracy at lambda 1	1.016 ± 0.007
Accuracy at lambda 1.7	1.70 ± 0.05

I_P [mA]	lambda	U_A [V], v=17	U_A [V], v=8
-2.000	0.650	-	0.510
-1.602	0.700	-	0.707
-1.243	0.750	0.192	0.884
-0.927	0.800	0.525	1.041
-0.800	0.822	0.658	1.104

-0.652	0.850	0.814	1.177
-0.405	0.900	1.074	1.299
-0.183	0.950	1.307	1.409
-0.106	0.970	1.388	1.448
-0.040	0.990	1.458	1.480
0	1.003	1.500	1.500
0.015	1.010	1.515	1.507
0.097	1.050	1.602	1.548
0.193	1.100	1.703	1.596
0.250	1.132	1.763	1.624
0.329	1.179	1.846	1.663
0.671	1.429	2.206	1.832
0.938	1.701	2.487	1.964
1.150	1.990	2.710	2.069
1.385	2.434	2.958	2.186
1.700	3.413	3.289	2.342
2.000	5.391	3.605	2.490
2.150	7.506	3.762	2.565
2.250	10.119	3.868	2.614

Please note: U_A is not an output signal of the lambda sensor, but the output of the evaluation circuit. Only I_P correlates with the oxygen content of the exhaust gas. Amplification factor v=17 is typically used for lean applications (lambda>1), amplification factor v=8 is typically used for rich applications (lambda<1).

Heater Strategy



Connectors and Wires

Connector	Please see variations
Mating connector	Please see variations
Sleeve	fiber glass / silicone coated
Pin 1	Pump current APE / IP
Pin 2	Virtual ground IPN / VM
Pin 3	Heater voltage H- / Uh-
Pin 4	Heater voltage H+ / Uh+
Pin 5	Trim resistor RT / IA
Pin 6	Nernst voltage UN / RE
Wire length	Please see variations

Various motorsport and automotive connectors are available on request.

Installation Notes

This lambda sensor operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and lambda control units like LT4. You'll find this unit and more on our homepage at Accessories/Expansion Modules.

The lambda sensor should be installed at point which permits the measurement of a representative exhaust-gas mixture, which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

As far as possible install the sensor vertically (wire upwards).

The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

The exhaust-gas passage opposite the sensor must be free of leaks in order to avoid the effects of leak-air.

Protect the sensor against condensation water.

The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

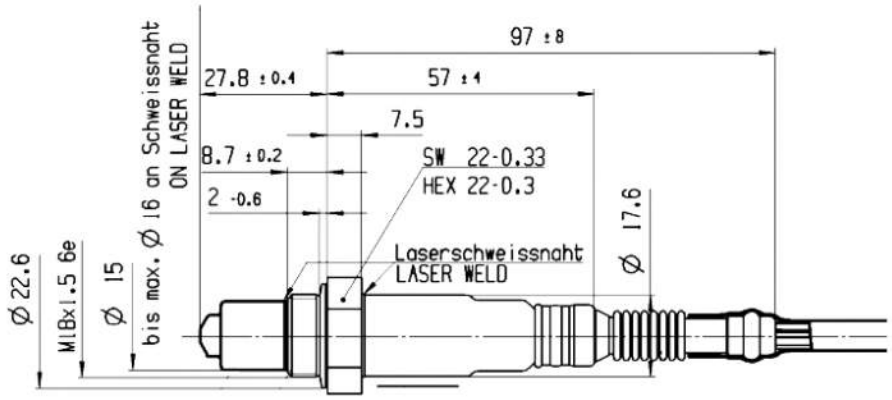
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

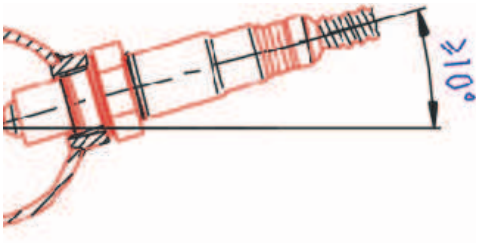
Lambda Sensor LSU 4.9
With automotive connector
Order number **0258.017.025**

Lambda Sensor LSU 4.9
With motorsport connector
Order number **B261.209.358-03**

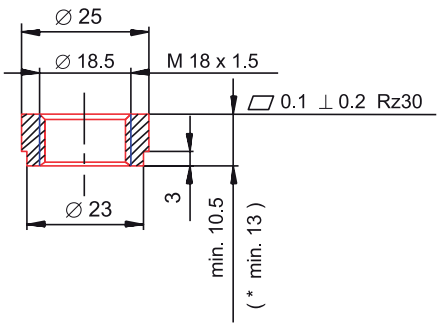
Dimensions



Mounting recommendation



Recommended design of the mating thread in the exhaust pipe:
THexagon > 600°C
or TGas > 930°C



Lambda Sensor LSU ADV/ADV pre Turbo



Features

- Application: lambda 0.65 to ∞
- Exhaust gas temperature: 930°C (1,030 for a short time)
- Hexagon temperature: 820°C
- Thread: M18x1.5
- Weight w/o wire: 75 g

This sensor is designed to measure the proportion of oxygen in exhaust gases of automotive engines (gasoline or Diesel). A version with a protection tube of Inconel for pre-turbo-(supercharger) mounting is available.
The wide band lambda sensor LSU ADV is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of lambda 0.65 to air makes the LSU ADV capable of being used as a universal sensor for lambda 1 measurement as well as for other lambda ranges.
The LSU ADV has no trimming resistor inside the connector what results in just 5 connector pins. Compared to LSU 4.9, the LSU ADV has a wider working temperature range.
LSU ADV operates only in combination with a special evaluation unit used in lambda control unit LT4 ADV. You'll find this unit and more on our homepage at Electronics/Sensor Interfaces.

Application

Application	lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel/E85
Exhaust gas pressure	≤ 2.5 bar (higher with decrease accuracy)
Exhaust gas temperature (operating)	≤ 930°C (≤ 980°C pre Turbo Version)
Max. exhaust gas temperature for short time	≤ 1,030°C
Hexagon temperature (operating)	≤ 650°C
Max. hexagon temperature for short time	≤ 700°C
Max. temperature at welding seam	≤ 820°C (pre Turbo Version)
Max. temperature difference between hexagon and welding seam	≤ 330°C
Wire and protective sleeve temperature	≤ 250°C
Connector temperature	≤ 140°C
Storage temperature range	-40 to 100°C
Max. vibration (stochastic peak level)	300 m/s^2

Technical Specifications

Mechanical Data

Weight w/o wire	75 g
Thread	M18x1.5
Wrench size	22 mm
Tightening torque	40 to 60 Nm

Electrical Data

Power supply H+ nominal	7.5 V
System supply voltage	10.8 V to 16.5 V
Heater power steady state	8.7 W
Heater control frequency	≥ 100 Hz
Nominal resistance of Nernst cell	300 Ohm
Max current load for Nernst cell	≤ 80 µA
Switch-on time	≤ 5 s

Characteristic

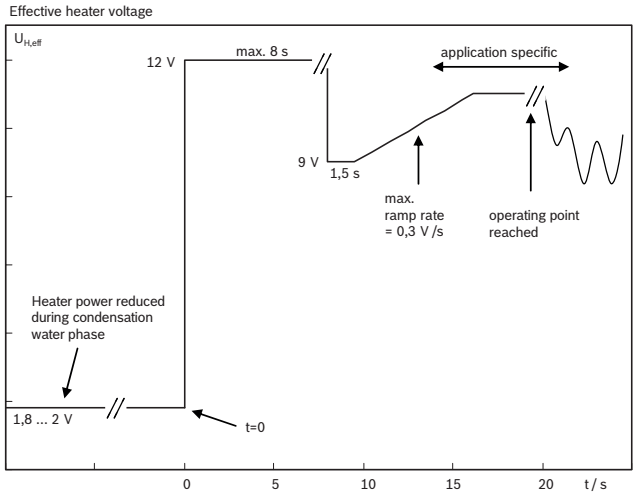
Signal output	I_P meas
Accuracy at lambda 0.8	-0.652 ± 0.032 mA
Accuracy at lambda 1	-0.018 ± 0.008 mA
Accuracy at lambda 1.7	0.515 ± 0.022 mA

I_P [mA]	lambda	U_A [V], v=17	U_A [V], v=8
-1,38000	0,650	0,048	0,817
-1.11000	0.700	0.332	0.950
-0.88000	0.750	0.574	1.064
-0.65000	0.800	0.816	1.178
-0.47500	0.850	1.000	1.265
-0.37000	0.880	1.111	1.317

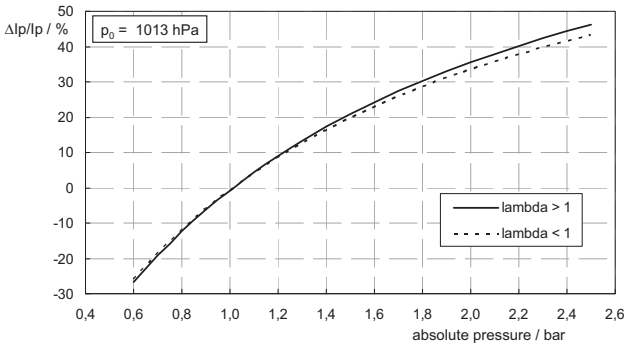
-0.30000	0.900	1.184	1.351
-0.16000	0.950	1.332	1.421
-0.07600	0.980	1.420	1.462
-0.04800	0.990	1.449	1.476
-0.02000	1.000	1.479	1.490
0.01167	1.030	1.512	1.506
0.03278	1.050	1.534	1.516
0.06444	1.080	1.568	1.532
0.08556	1.100	1.590	1.542
0.17000	1.180	1.679	1.584
0.23080	1.260	1.743	1.614
0.36000	1.430	1.879	1.678
0.40148	1.500	1.922	1.699
0.52000	1.700	2.047	1.758
0.54740	1.780	2.076	1.771
0.77000	2.430	2.310	1.881
1.40000	5.000	2.973	2.193

Please note: UA is not an output signal of the lambda sensor, but the output of the evaluation circuit. Only IP correlates with the oxygen content of the exhaust gas. Amplification factor v=17 is typically used for lean applications (lambda>1), amplification factor v=8 is typically used for rich applications (lambda<1).

Heater Strategy



Pressure Compensation



Connectors and Wires

LSU ADV with automotive connector

Connector	1 928 404 669 (Series production type, not available from Bosch Motorsport)
Mating connector	F02U.B00.725-01
Pin 1	IP/APE
Pin 2	VM/IPN
Pin 3	Uh-/H-
Pin 4	Uh+ / H+
Pin 5	nc
Pin 6	UN/RE
Wire length L	95.0 cm

LSU ADV pre Turbo with automotive connector

Connector	1254.488.136 (Series production type, not available from Bosch Motorsport)
Mating connector	F02U.B00.937-01
Pin 1	IP/APE
Pin 2	VM/IPN
Pin 3	Uh- / H-
Pin 4	Uh+ / H+
Pin 5	UN / RE

LSU ADV pre Turbo with motorsport connector

Connector	AS607-35PA
Mating connector	AS007-35SA
Pin 1	Uh+ / H
Pin 2	Uh- / H-
Pin 3	IP / APE
Pin 4	VM / IPN
Pin 5	UN / RE
Pin 6	nc
Please specify the required wire length with your order.	
Sleeve	fiber glass / silicone coated

Various motorsport and automotive connectors are available on request.

Installation Notes

This lambda sensor operates only in combination with a special evaluation unit used in lambda control unit LT4 ADV. You'll find this unit and more on our homepage at Accessories/Expansion Modules.

The lambda sensor should be installed at point which permits the measurement of a representative exhaust-gas mixture, which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

As far as possible install the sensor vertically (wire upwards).

The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

The exhaust-gas passage opposite the sensor must be free of leaks in order to avoid the effects of leak-air.

Protect the sensor against condensation water.

The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Lambda Sensor LSU ADV
Automotive connector, wire length 95 cm
Order number **0258.027.010**

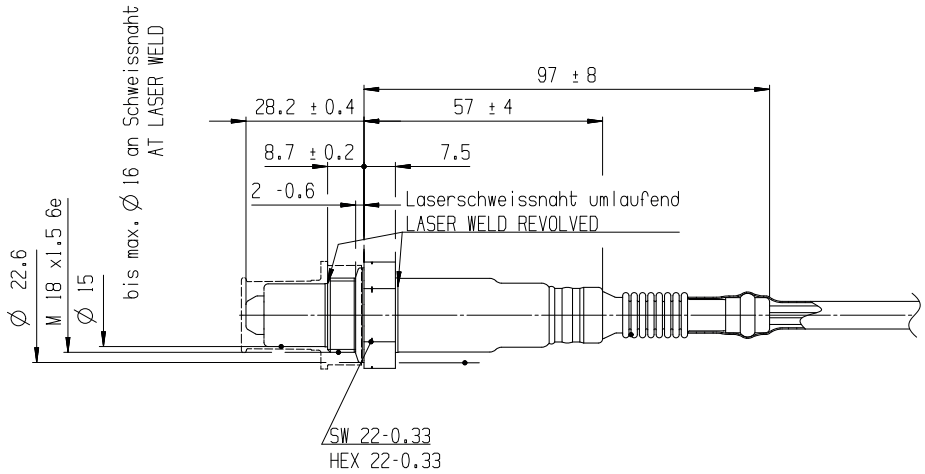
Lambda Sensor LSU ADV
Motorsport connector, wire length customer specific (max. 90 cm)
Order number **F02U.V01.861-01**

Lambda Sensor LSU ADV pre Turbo
Automotive connector, wire length 65 cm
Order number **0258.027.00F**

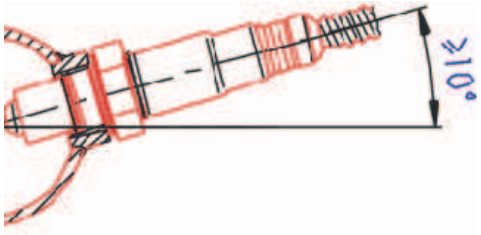
Lambda Sensor LSU ADV pre Turbo
Motorsport connector, wire length 33 cm
Order number **F02U.V02.908-02**

6

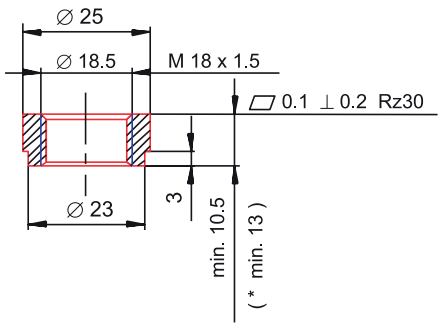
Dimensions



Mounting recommendation



Recommended design of the mating thread in the exhaust pipe
*: THexagon > 600°C or
TGas > 930°C



Lambda Sensor Mini-LSU 4.9



Features

- Application: lambda 0.65 to ∞
- Exhaust gas temperature: 930°C (1,030 for a short time)
- Hexagon temperature: 700°C
- Thread: M16x1.5
- Weight w/o wire: 34 g

This sensor is designed to measure the proportion of oxygen in exhaust gases of automotive engines (gasoline or Diesel).
The wide band lambda sensor Mini-LSU 4.9 is a planar ZrO_2 dual cell limiting current sensor with integrated heater. Its monotonic output signal in the range of lambda = 0.65 to air makes the LSU capable of being used as a universal sensor for lambda = 1 measurement as well as for lean and rich ranges.
The connector housing contains a trimming resistor, which defines the characteristic of the sensor. The main benefit of the Mini-LSU 4.9 is its very compact design in combination with the high Bosch production quality standard. The Mini-LSU is produced and tested in a handmade process.
The complete light weight housing is made of Inconel which makes it resistant against high temperatures. The sensor element is more than 50 % smaller than it is in the production lambda sensor. It is connected over silver coated steel cables to make it more reliable against vibrations.
This lambda sensor operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and lambda control units like LT4. You'll find this unit and more on our homepage at Electronics/Sensor Interfaces.

Application

Application	lambda 0.65 to ∞
Fuel compatibility	gasoline/Diesel/E85
Exhaust gas pressure	≤ 2.5 bar (higher with decrease accuracy)
Exhaust gas temperature range (operating)	< 930°C
Exhaust gas temperature range (max.) for short time	< 1,030°C
Hexagon temperature	≤ 700°C
Wire and protective sleeve temperature	< 250°C
Connector temperature	< 150°C
Storage temperature range	-40 to 100°C
Max. vibration (stochastic peak level)	300 m/s^2 (see Installation Notes)

Technical Specifications

Variations

Mini-LSU 4.9 with automotive connector	
Connector	1928.404.682 (Series production type, not available from Bosch Motorsport)
Mating connector	D261.205.356-01
Wire length L	950 mm
Mini-LSU 4.9 with motorsport connector	
Connector	AS607-35PN
Mating connector	AS007-35SN
Wire length L	200 to 1,400 mm

Mechanical Data

Weight w/o wire	34 g
Thread	M16x1.5
Wrench size	17 mm
Tightening torque	60 Nm

Electrical Data

Power supply H+ nominal	7.5 V
System supply voltage H+ (min)	10.8 V
Heater power steady state	7.5 W
Heater control frequency	100 Hz
Nominal resistance of Nernst cell	300 Ohm
Max. current load for Nernst cell	250 µA

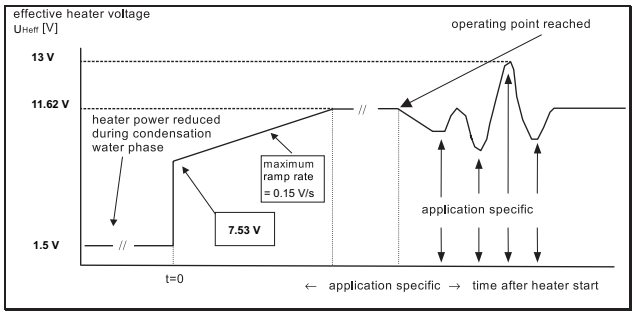
Characteristic

Signal output	I_P meas
Accuracy at lambda 0.8	0.80 ± 0.01
Accuracy at lambda 1	1.016 ± 0.007
Accuracy at lambda 1.7	1.70 ± 0.05

I_P [mA]	lambda	U_A [V], v=17	U_A [V], v=8
-2.000	0.650	-	0.510
-1.602	0.700	-	0.707
-1.243	0.750	0.192	0.884
-0.927	0.800	0.525	1.041
-0.800	0.822	0.658	1.104
-0.652	0.850	0.814	1.177
-0.405	0.900	1.074	1.299
-0.183	0.950	1.307	1.409
-0.106	0.970	1.388	1.448
-0.040	0.990	1.458	1.480
0	1.003	1.500	1.500
0.015	1.010	1.515	1.507
0.097	1.050	1.602	1.548
0.193	1.100	1.703	1.596
0.250	1.132	1.763	1.624
0.329	1.179	1.846	1.663
0.671	1.429	2.206	1.832
0.938	1.701	2.487	1.964
1.150	1.990	2.710	2.069
1.385	2.434	2.958	2.186
1.700	3.413	3.289	2.342
2.000	5.391	3.605	2.490
2.150	7.506	3.762	2.565
2.250	10.119	3.868	2.614

Please note: U_A is not an output signal of the lambda sensor, but the output of the evaluation circuit. Only I_P correlates with the oxygen content of the exhaust gas. Amplification factor v=17 is typically used for lean applications (lambda>1), amplification factor v=8 is typically used for rich applications (lambda<1).

Heater Strategy



Resistance/LSU Temperature

R (Ohm)	Temp (°C)
80	1030
150	888
200	840
250	806
300 [operating point]	780
350	761
400	744
450	729
550	703
650	686
800	665
1000	642
1200	628
2500	567

Connectors and Wires

Connector	Please see variations
Mating connector	Please see variations
Sleeve	fiber glass / silicone coated
Pin 1	Pump current APE / IP
Pin 2	Virtual ground IPN / VM
Pin 3	Heater voltage H- / Uh-
Pin 4	Heater voltage H+ / Uh+
Pin 5	Trim resistor RT / IA
Pin 6	Nernst voltage UN / RE
Wire length	Please see variations

Various motorsport and automotive connectors are available on request.

Installation Notes

This lambda sensor operates only in combination with a special LSU-IC, used in most Bosch Motorsport ECUs and lambda control units like LT4. You'll find this unit and more on our homepage at Accessories/Expansion Modules.

The lambda sensor should be installed at point which permits the measurement of a representative exhaust-gas mixture and which does not exceed the maximum permissible temperature.

Install at a point where the gas is as hot as possible.

Observe the maximum permissible temperature.

Sensors should be installed as close to vertical as possible (wire upwards).

The sensor is not to be fitted near to the exhaust pipe outlet, so that the influence of the outside air can be ruled out.

The exhaust system up stand and surrounding the sensor must be sealed in order to avoid the effects of leakage air.

Protect the sensor against condensation water. The sensor is not to be painted, nor is wax to be applied or any other forms of treatment. Use only the recommended grease for lubricating the thread.

Please find further application hints in the offer drawing at our homepage.

A higher maximum vibration profile is possible and should be determined by the customer's individual application.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

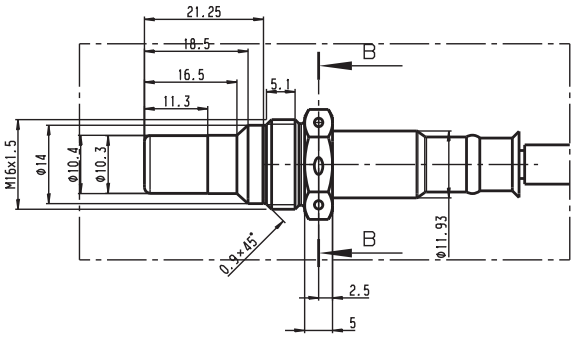
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

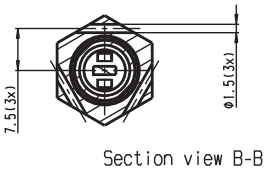
Ordering Information

Lambda Sensor Mini-LSU 4.9
With automotive connector
Order number **B258.490.103-30**

Lambda Sensor Mini-LSU 4.9
With motorsport connector
Order number **F02U.V02.227-02**

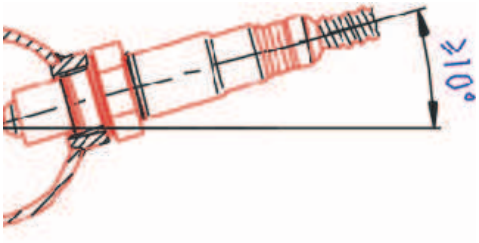
Dimensions

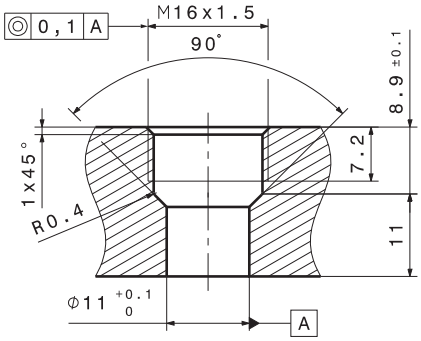




Section view B-B

Mounting recommendation





Overview

Pressure Sensor Combined PST 1/PST 3



- Pressure: 0.1 to 1.15 bar or 0.2 to 3 bar
- Temperature: -40 to 150°C or -40 to 140°C
- Power supply: 5 V
- Weight: 24 g

Pressure Sensor Combined PST 4



- Pressure: 0.4 to 4 bar
- Temperature: -40 to 130°C
- Power supply: 5 V
- Weight: 22 g

Pressure Sensor Combined PST-F 1



- Pressure: 0 to 10 bar
- Temperature: -40 to 150°C
- Power supply: 5 V
- Weight: 38 g

Pressure Sensor Combined PST-F 2 280 bar



- Pressure: 0 to 280 bar
- Temperature: -40 to 140°C
- Power supply: 5 V
- Weight: 36 g

Pressure Sensor Combined PST-F 2 350 bar



- Pressure: 0 to 350 bar
- Temperature: -40 to 140°C
- Power supply: 5 V
- Weight: 36 g

Pressure Sensor Combined PST 1/PST 3



Features

- Pressure: 0.1 to 1.15 bar or 0.2 to 3 bar
- Temperature: -40 to 150°C or -40 to 140°C
- Power supply: 5 V
- Weight: 24 g

This sensor is designed to measure absolute air pressure, especially the air box pressure of gasoline or Diesel engines plus temperature.
An integrated circuit combines a piezo-resistive sensor element and electronic systems for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratio metric signal. Two different pressure ranges are available (0.1 to 1.15 bar or 0.2 to 3 bar).

Application

Application 1	0.1 to 1.15 bar or 0.2 to 3 bar (a)
Application 2	-40 to 130°C
Reference	Absolute
Max. pressure	5 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	0 to 40°C
Max. vibration	According to ISO 16750-3

Technical Specifications

Variations

	PST 1 (0.1 to 1.15 bar)	**PST 3** (0.2 to 3 bar)
Tolerance (FS) at U_S = 5 V	± 0.016 bar	± 0.030 bar
Tolerance (FS)	± 1.52 %	± 1.07 %
Sensitivity	4,048 mV/bar	1,518 mV/bar
Offset	-4.76 mV	96.43 mV

Mechanical Data

Mounting	M6
Fitting	12.05 ± 0.8 mm
Weight w/o wire	24 g
Sealing	O-ring 7.59 x 2.62 mm

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max. power supply	16 V
Full scale output U_A at 5 V	0.4 to 4.65 V
Current I_S	9 mA

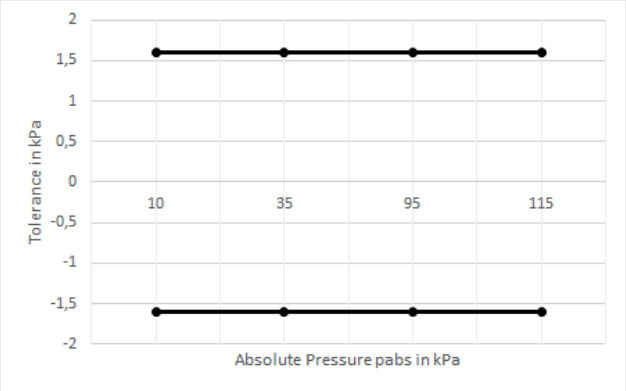
Characteristic 1

Response time T10/90	1 ms
Compensated range	10 to 85°C
Tolerance (FS) at U_S = 5 V	Please see variations
Tolerance (FS)	Please see variations
Sensitivity	Please see variations
Offset	Please see variations

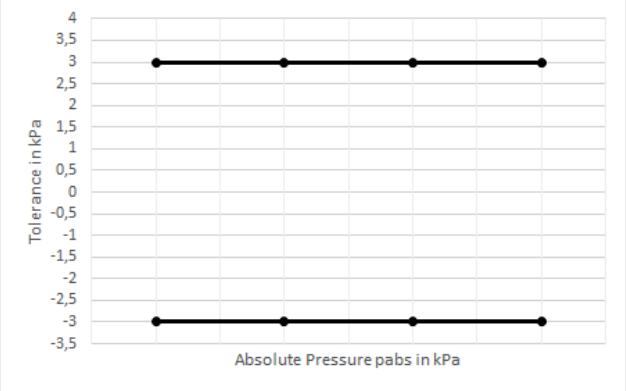
Characteristic 2

T [°C]	R [Ohm]
-40	45,303
-30	26,108
-20	15,458
-10	9,395
0	5,895
10	3,791
20	2,499
25	2,056
30	1,706
40	1,174
50	833.8
60	595.4
70	435.6
80	322.5
90	243.1
100	186.6
110	144.2
120	112.7
130	89.28

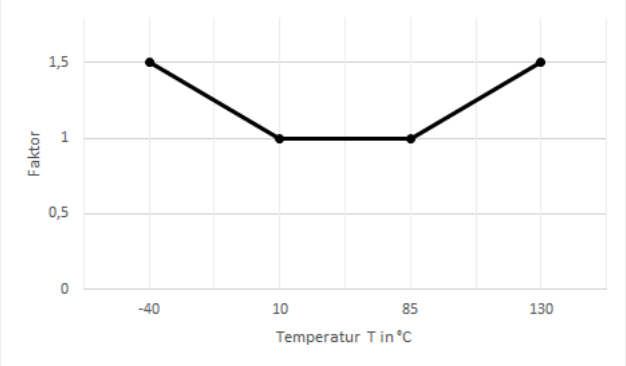
Tolerance 0.1 to 1.15 bar



Tolerance 0.2 to 3 bar



Expansion of Tolerance



Connectors and Wires

Connector	Bosch Compact
Mating connector	D261.205.360-01
Pin 1	Ground
Pin 2	Temperature Signal
Pin 3	Power Supply
Pin 4	Pressure Signal

Various motorsport and automotive connectors are available on request.

Installation Notes

The PST 1/PST 3 is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

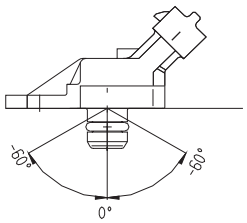
To avoid noise, an ECU-input circuit with a RC-low pass filter (tau = 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

To avoid damage caused by condensate the maximum mounting position from vertical is +-60°.



Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

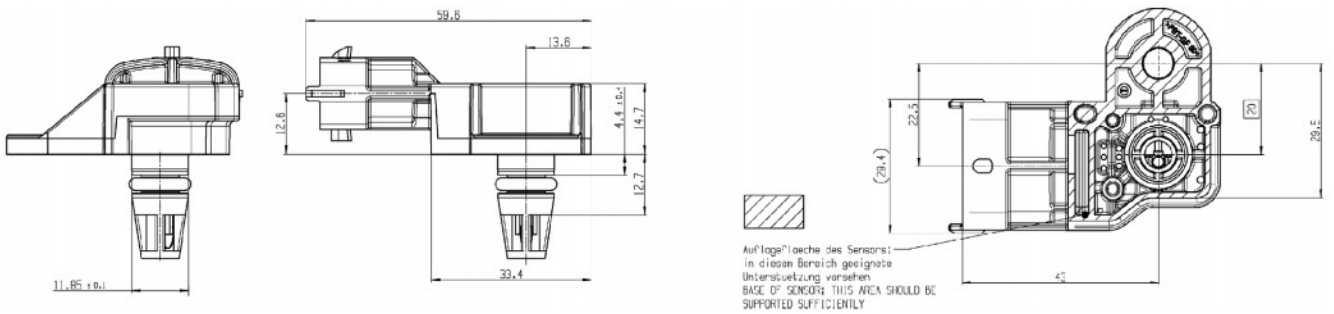
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Combined PST 1
0.1 to 1.15 bar
Order number **0261.230.333**

Pressure Sensor Combined PST 3
0.2 to 3 bar
Order number **0261.230.280**

Dimensions


59,6
13,6
12,6
4,4 ±0,4
14,7
12,7
11,85 ±0,1
33,4
22,5
(29,4)
29
29,5
42
Auflagefläche des Sensors ist
in diesem Bereich geeignete
Unterstützung vorsehen
BASE OF SENSOR: THIS AREA SHOULD BE
SUPPORTED SUFFICIENTLY

Pressure Sensor Combined PST 4



Features

- Pressure: 0.4 to 4 bar
- Temperature: -40 to 130°C
- Power supply: 5 V
- Weight: 22 g

This sensor is designed to measure absolute air pressure, especially the air box pressure of gasoline or Diesel engines plus temperature.
An integrated circuit combines a piezo-resistive sensor element and electronic systems for signal-amplification and temperature-compensation. The output of the sensor is an analog, ratio metric signal.

Application

Application 1	0.4 to 4 bar (a)
Application 2	-40 to 130°C
Reference	Absolute
Max. pressure	6 bar
Operating temp. range	-40 to 130°C
Media temp. range	-40 to 130°C
Storage temp. range	0 to 40°C
Max. vibration	According to ISO 16750-3

Technical Specifications

Mechanical Data

Mounting	M6 + Washer
Weight without wire	22 g
Fitting	12.05 ± 0.8 mm
Sealing	O-ring 7.59 x 2.62 mm

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V
Full scale output U_A	0.386 to 4.5 V
Current I_S	12 mA

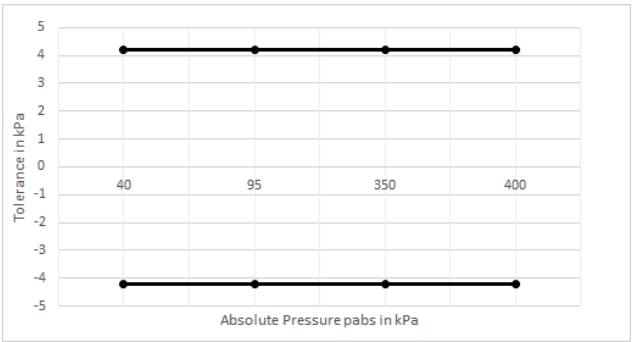
Characteristic 1

Response time T10/90	1 ms
Compensated range	10 to 85°C
Tolerance (FS) at U_S = 5 V	0.042 bar
Sensitivity	1,143 mV/bar
Offset	-71.43 mV

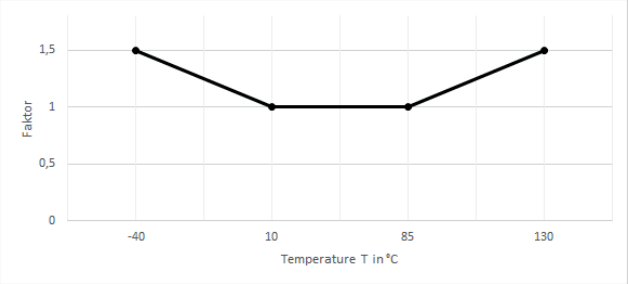
Characteristic 2

T [°C]	R [Ohm]
-40	45,303
-30	26,108
-20	15,458
-10	9,395
0	5,895
10	3,791
20	2,499
25	2,056
30	1,706
40	1,174
50	833.8
60	595.4
70	435.6
80	322.5
90	243.1
100	186.6
110	144.2
120	112.7
130	89.28

Tolerance



Expansion of Tolerance



Connectors and Wires

Connector	Bosch Compact
Mating connector	D261.205.360-01
Pin 1	Ground
Pin 2	Temperature Signal
Pin 3	Power Supply
Pin 4	Pressure Signal

Installation Notes

The PST 4 is designed for engines using ROZ95, ROZ98, M15, E22 and Diesel.

The sensor can be connected directly to most control units.

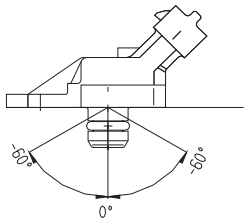
To avoid noise, an ECU-input circuit with a RC-low pass filter (tau = 2 ms) is recommended.

Use engine oil (5W40) as O-Ring grease (no silicone based grease).

Avoid miss-pinning (max. 5 minutes at I = 0.3 A).

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

To avoid damage caused by condensate the maximum mounting position from vertical is +-60°.



Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

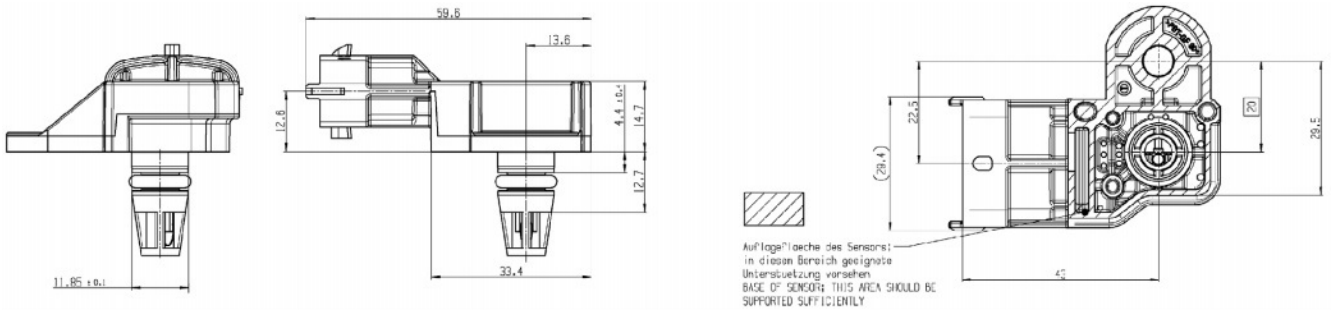
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Combined PST 4
Order number **0261.230.423**

Dimensions



Pressure Sensor Combined PST-F 1



Features

- Pressure: 0 to 10 bar
- Temperature: -40 to 150°C
- Power supply: 5 V
- Weight: 38 g

This sensor is designed to measure relative gasoline pressure and gasoline temperature in port injection systems.
The pressure measurement of the sensor is by means of a piezoresistive element which is acted on by a silicon diaphragm in contact with the fluid being measured. The reference (relative) pressure is provided via an opening in the sensor housing and acts on the active upper side of the silicon diaphragm.

Application

Application 1	0 to 10 bar (rel)
Application 2	-40 to 150°C
Reference	Relative
Max. pressure	20 bar max 15 min
Burst pressure (static)	40 bar
Operating temp. range	-40 to 150°C (160°C max 250 h)
Storage temp. range	-30 to 60°C
Fuel compatibility	Engine oils, most gasoline and Diesel fuels
Max. vibration	80 m/s^2 at 20 to 260 Hz 60 m/s^2 at 260 to 520 Hz
Vibration testing	according to DIN EN ISO 60068-2-6 (2008-10)
Amplitude of deflection	s=0,35 mm at 70 to 147 Hz
Amplitude of acceleration a	a=300 m/s^2 at 147 to 2,000Hz

Technical Specifications

Mechanical Data

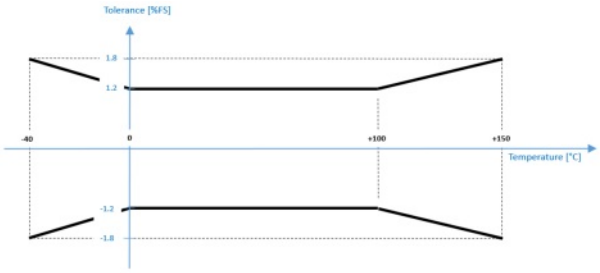
Male thread	M10x1
Weight without wire	38 g
Wrench size	27 mm
Installation torque	24 Nm
Sealing	Sealed cone

Electrical Data

Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V (18 V, 1 h max)
Full scale output U_A	0.5 to 4.5 V U_S ratiometric
Current I_S	12.5 mA

Characteristic 1

Response time Uout when Us is switched-on t10/90	2.0 ms
Jump response time to pressure changes Uout	0.8 ms
Compensated range	-40 to 150°C
Tolerance (FS) at U_S	+/-1.2 % at 0 to 100°C

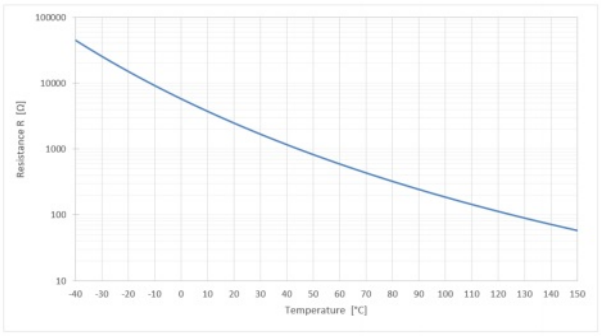


Sensitivity	400 mV/bar at U_S = 5 V
Offset	500 mV at U_S = 5 V

Characteristic 2

Response time t10/90	9 s (meas. in oil, 20 to 100°C)
T [°C]	R [Ohm]
-40	44,864
-30	25,524
-20	15,067
-10	9,195
0	5,784
10	3,740
20	2,480
30	1,683
40	1,167
50	824
60	594
70	434.9
80	323.4

90	244
100	186.6
110	144.5
120	113.3
130	89.9
140	71.9
150	58.1



Connectors and Wires

Connector	Bosch Trapezoid
Mating connector	F02U.B00.751-01
Pin 2	Pressure Signal
Pin 3	Power Supply
Pin 4	Ground
Pin 5	Temperature Signal

Installation Notes

The sensor can be connected directly to most control units.

For temperature measurement please use a pull-up resistor with an optimal value of 4.6 kOhm.

The sensor has a protection for overvoltage, reverse polarity and short-circuit.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

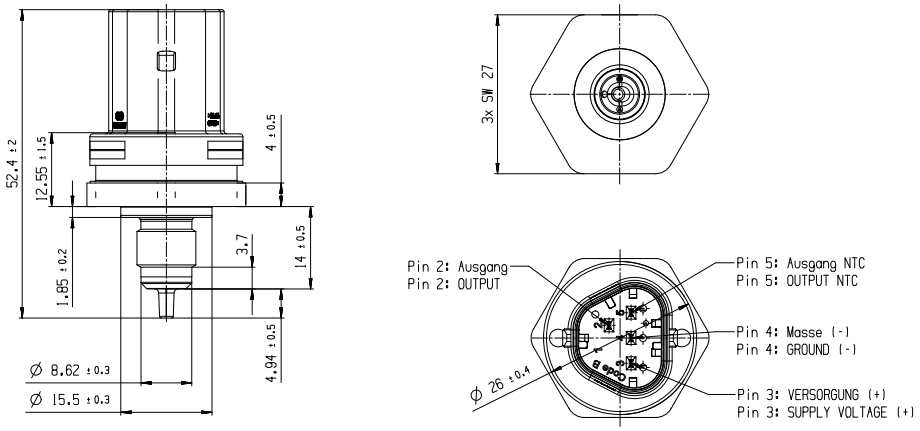
Safety Note

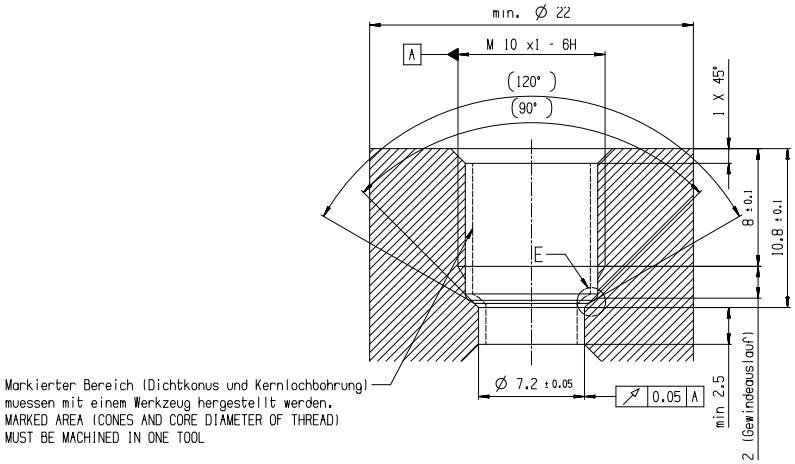
The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

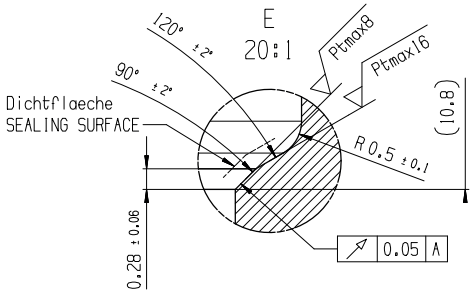
Ordering Information

Pressure Sensor Combined PST-F 1
Order number **0261.544.01F**

Dimensions




min. Ø 22
A
M 10 x1 - 6H
(120°)
(90°)
1 X 45°
8 ±0.1
10.8 ±0.1
E
Markierter Bereich (Dichtkonus und Kernlochbohrung)
muessen mit einem Werkzeug hergestellt werden.
MARKED AREA (CONES AND CORE DIAMETER OF THREAD)
MUST BE MACHINED IN ONE TOOL
Ø 7.2 ±0.05
0.05 A
min 2.5
2 (Gewindeauslauf)


E
20:1
120° ±2°
90° ±2°
Dichtflaeche
SEALING SURFACE
Ptmax8
Ptmax16
(10.8)
R 0.5 ±0.1
0.28 ±0.06
0.05 A

Pressure Sensor Combined PST-F 2 280 bar



Features

- Pressure: 0 to 280 bar
- Temperature: -40 to 140°C
- Power supply: 5 V
- Weight: 36 g

This sensor is designed to measure absolute gasoline pressure and gasoline temperature in direct injection systems.
The pressure measurement is based on the expansion of a steel diaphragm, where strain gauges are placed to a Wheatstone bridge. The measured signal is proportional to the pressure and is processed in an application specific integrated circuit.
The temperature measurement is conducted by an NTC thermistor. The main feature of this sensor is its compact design and the integration of two functions (temperature and pressure measurements) in a common housing.

Application

Application 1	0 to 280 bar
Reference	Absolute
Max. pressure	340 bar
Application 2	-40 to 140°C
Resistance at 25°C	10 kOhm
Operating temp. range	-40 to 140°C
Media temp. range	-40 to 140°C
Storage temp. range	-40 to 60°C
Biofuel compatibility	E26, E85
Max. vibration	210 m/s^2 RMS at 147 to 1,350 Hz 175 m/s^2 RMS at 1,350 to 2,000 Hz

Technical Specifications

Mechanical Data

Male thread	M10x1
Weight without wire	36 g
Wrench size	27 mm
Installation torque	37.5 ± 2.5 Nm
Sealing	Sealed cone

Electrical Data

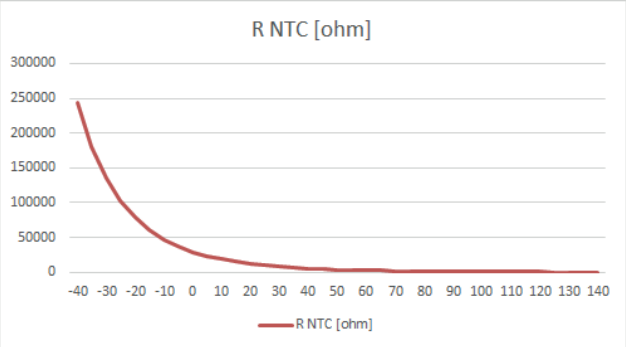
Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V (18 V for max. 1 h)
Full scale output U_A	0.5 to 4.5 V U_S ratiometric
Current I_S	12 mA

Characteristic 1

Response time T10/90	Pressure: 0.2 to 0.8 ms Temperature: 9 s (response time of temperature signal in oil dip bath 20 to 100°C)
Compensated range	-40 to 130°C
Tolerance (FS) at U_S	+/- 1 % at 0 to 100°C +/- 1.5 % at -40 to 0°C and 100 to 130°C
Sensitivity at U_S = 5 V	14.3 mV/bar
Offset	500 mV at U_S = 5 V

Characteristic 2

T [°C]	R [Ohm]
-40	243,241
-30	135,753
-20	78,716
-10	47,258
0	29,287
10	18,684
20	12,240
25	10,000
30	8,218
40	5,642
50	3,955
60	2,826
70	2,055
80	1,519
90	1,141
100	868.4
110	669.9
120	523.2
130	413.3
140	330.0



Connectors and Wires

Connector	Hirschmann
Mating connector	F02U.B00.596-01
Pin 1	Ground
Pin 2	Pressure Signal
Pin 3	Temperature Signal
Pin 4	Power Supply

Various motorsport and automotive connectors are available on request.

Installation Notes

The sensor can be connected directly to most control units.

For temperature measurement please use a pull-up resistor with an optimal value of 4.6 kOhm.

The sensor has a protection for overvoltage, reverse polarity and short-circuit.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

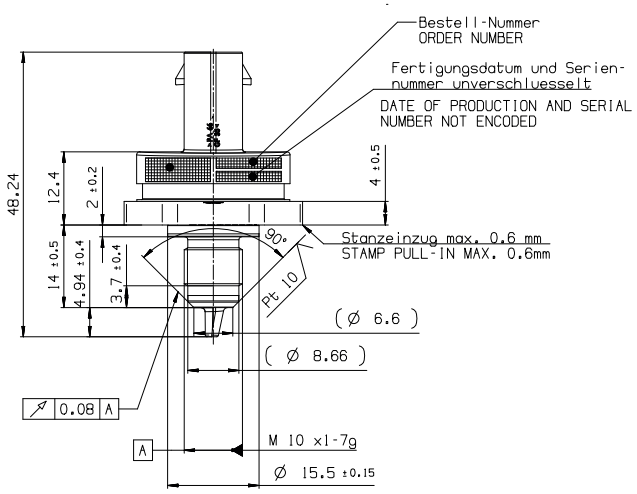
Legal Restrictions

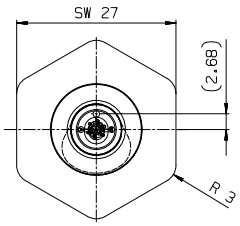
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Combined PST-F 2 280 bar
Order number **0261.545.115**

Dimensions





Pressure Sensor Combined PST-F 2 350 bar



Features

- Pressure: 0 to 350 bar
- Temperature: -40 to 140°C
- Power supply: 5 V
- Weight: 36 g

This sensor is designed to measure absolute gasoline pressure and gasoline temperature in direct injection systems
The pressure measurement is based on the expansion of a steel diaphragm, where strain gauges are placed to a Wheatstone bridge. The measured signal is proportional to the pressure and is processed in an application specific integrated circuit.
The temperature measurement is conducted by an NTC thermistor. The main feature of this sensor is its compact design and the integration of two functions (temperature and pressure measurements) in a common housing.

Application

Application 1	0 to 350 bar
Reference	Absolute
Max. pressure	390 bar
Application 2	-40 to 140°C
Resistance at 25°C	2 kOhm
Operating temp. range	-40 to 140°C
Media temp. range	-40 to 140°C
Storage temp. range	-40 to 60°C
Biofuel compatibility	E26, E85
Max. vibration	210 m/s^2 RMS at 147 to 1,350 Hz 175 m/s^2 RMS at 1,350 to 2,000 Hz

Technical Specifications

Mechanical Data

Male thread	M10x1
Weight without wire	36 g
Wrench size	27 mm
Installation torque	37.5 ± 2.5 Nm
Sealing	Sealed cone

Electrical Data

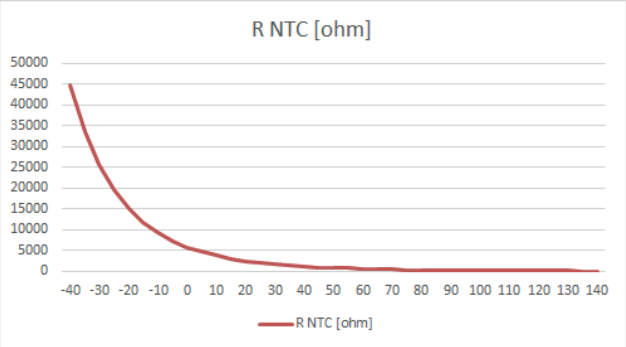
Power supply U_S	4.75 to 5.25 V
Max power supply U_S max	16 V (18 V for max. 1 h)
Full scale output U_A	0.5 to 4.5 V U_S ratiometric
Current I_S	12 mA

Characteristic 1

Response time T10/90	Pressure: 0.2 to 0.8 ms Temperature: 9 s (response time of temperature signal in oil dip bath 20 to 100°C)
Compensated range	-40 to 130°C
Tolerance (FS) at U_S	+/- 1 % at 0 to 100°C +/- 1.5 % at -40 to 0°C and 100 to 130°C
Sensitivity at U_S = 5 V	11.43 mV/bar
Offset	500 mV at U_S = 5 V

Characteristic 2

T [°C]	R [Ohm]
-40	44,864
-30	25,524
-20	15,067
-10	9,195
0	5,784
10	3,740
20	2,480
25	2,038
30	1,683
40	1,167
50	825
60	594
70	434,9
80	323,4
90	244
100	186,6
110	144,5
120	113,3
130	89,8
140	71,9



Connectors and Wires

Connector	Bosch Trapezoid
Mating connector	F02U.B00.751-01
Pin 1	-
Pin 2	Temperature Signal
Pin 3	Ground
Pin 4	Pressure Signal
Pin 5	Power Supply

Various motorsport and automotive connectors are available on request.

Installation Notes

The sensor can be connected directly to most control units.

For temperature measurement please use a pull-up resistor with an optimal value of 4.6 kOhm.

The sensor has a protection for overvoltage, reverse polarity and short-circuit.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

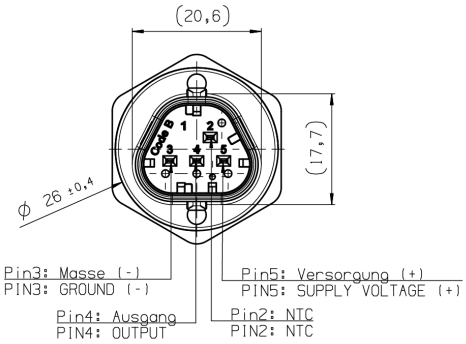
Legal Restrictions

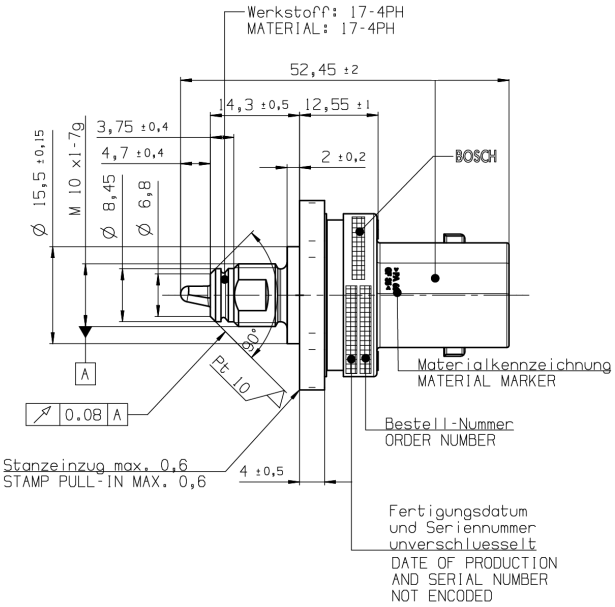
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Pressure Sensor Combined PST-F 2 350 bar
Order number **0261.B35.596-01**

Dimensions





Rotary Position Sensor RPS-F



6

Features

- Rotational movement measurement
- Hall effect technology
- Measurement range: 0 to 360° possible
- Analog output 0.2 to 4.8 V
- Dual output, fully redundant possible

This sensor is designed to measure rotational movement of throttle position.
The electrical circuit is designed with a magnetic rotary sensor using a Hall element and digital signal processing; sensor output is ratiometric. The angular position is provided by a two pole magnet integrated in the sensor shaft.
The main benefit of this sensor is its contactless Hall effect technology and its robust design for motorsport applications which includes fully redundant power and ground.

Application

Application	0 to 360° possible
Operating temperature range	0 to 150°C
Max. vibration	200 m/s^2 at 5 to 2,000 Hz

Technical Specifications

Mechanical Data

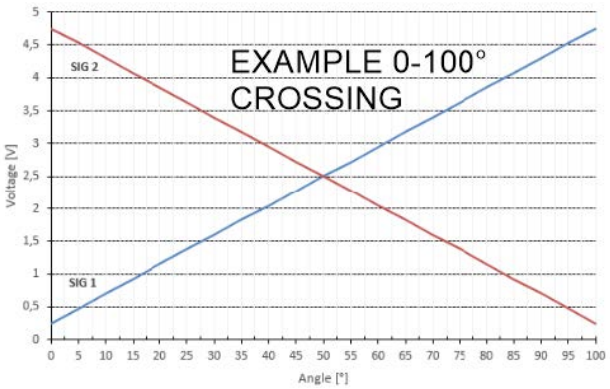
Weight w/o wire	< 36 g
Protection class	IP58
Mounting	2 x M4 screw
Lifetime	5 x 10^6 operations of ±65°
Housing	Aluminum

Electrical Data

Power supply U_S	5 ± 0.5 V regulated
Max. overvoltage	24 V
Half voltage tolerance	± 2°
Supply current	< 12.5 mA
Resolution	< 0.1°
Output voltage range	Ratiometric analog
Output load	> 10 kOhm

Characteristic

Max. rotation speed	600 RPM
Temp. coefficient	± 0.008° Rotation/°C 30°C nominal
Direction of rotation	Both
Redundancy	Yes



Flying lead and Wires

Red	U_S 1
Blue	Gnd 1
White	Sig 1
Orange	U_S 2
Green	Gnd 2
Yellow	Sig 2
Sleeve	DR-25
Wire size	AWG 26
Wire length L	100 cm

Installation Notes

The products of the RP series can be connected directly to most control units.

The sensor is designed with contactless Hall effect technology.

Any mounting orientation is possible.

Sensor is at mid point of electrical angle when shaft and wire exit are aligned as shown in the offer drawing.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Fulfilled Legal Standards/Legal Requirements

EMC Requirement	UNECE10

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

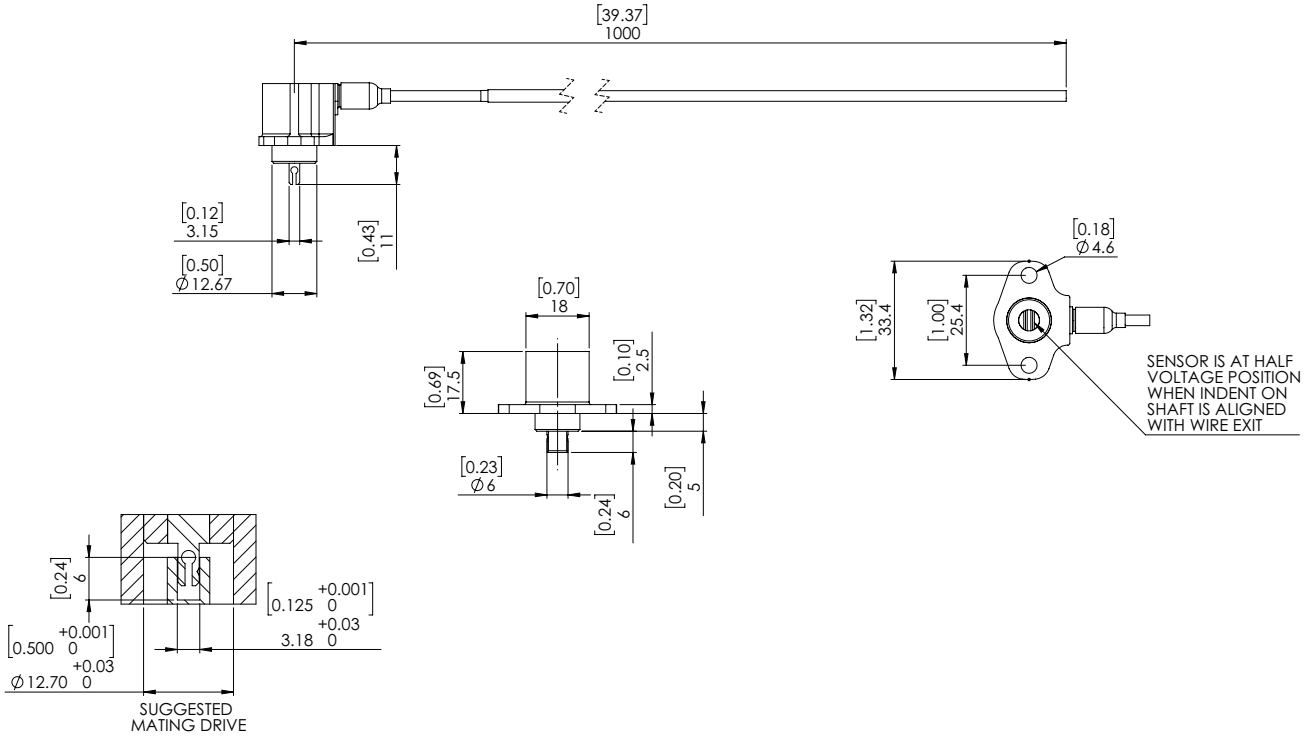
Rotary Position Sensor RPS-F
Single output, 360° range
Order number **F02U.V0U.400-02**

Rotary Position Sensor RPS-F
Dual output, 100° range, crossing signals (throttle)
Order number **F02U.V0U.401-02**

Rotary Position Sensor RPS-F
Dual output, 40° range, second signal 50 % of first (pedal)
Order number **F02U.V0U 402-02**

Rotary Position Sensor RPS-F
Dual output, 100° range, second signal 50 % of first (pedal)
Order number **F02U.V0U.403-02**

Dimensions



Overview

Speed Sensor Hall-Effect HA-D 90



- Max. frequency: ≤10 kHz
- Air gap: 0.4 to 1.0 mm
- Bore diameter: 11.8 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 12 g

Speed Sensor Hall-Effect HA-Di



- Max. frequency: ≤ 10 kHz
- Air gap: 0.4 to 1.0 mm
- Bore diameter: 12 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 12 g

Speed Sensor Hall-Effect HA-M



- Max. frequency: ≤ 4.2 kHz
- Air gap: 0.5 to 1.0 mm
- Bore diameter: 11.8 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 12 g

Speed Sensor Hall-Effect HA-N



- Max. frequency: ≤ 4.2 kHz
- Air gap: 0.4 to 1.5 mm
- Bore diameter: 10 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 8 g

Speed Sensor Hall-Effect Mini-HA-P



- Max. frequency: ≤ 10 kHz
- Air gap: 0.2 to 1.0 mm
- Bore diameter: 11.5 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 20 g

Speed Sensor Hall-Effect Mini-HA-P sealed



- Max. frequency: ≤ 10 kHz
- Air gap: 0.2 to 1.5 mm
- Bore diameter: 16 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 20 g

Speed Sensor Hall-Effect HA-D 90



Features

- Max. frequency: ≤10 kHz
- Air gap: 0.4 to 1.0 mm
- Bore diameter: 11.8 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 12 g

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft*, crankshaft or wheel speed), but it is not a “true power-on” sensor.
Due to the rotation of a ferromagnetic target wheel in front of the HA-D 90, the magnetic field is modulated at the place of the Hall probe.
The main feature and benefit of this sensor is a very good detection of the falling edge, due to a differential measuring method. This sensor is a combination of a high quality production part and robust design with a small housing.
*: see Installation Notes

Application

Application	Speed
Max. frequency	≤10 kHz
Target wheel air gap AG	0.4 to 1.0 mm
Temperature range	-40 to 150°C
Output circuit	Open collector for 1 kOhm
Output type	Active high
External magnetic fields	≤50 mT
Max. vibration	1,200 m/s² at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/o wire	12 g
Mounting	Screw 1 x M6
Bore diameter	11.8 mm
Installation depth L2	30 mm
Tightening torque	6 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	20 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 1.0 % (≤ 6 kHz) < 1.5 % (≤ 10 kHz)
Signal output	0.52 V to < U_S

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	ASL606-05PC-HE
Mating connector ASL006-05SC-HE	F02U.000.228-01
Pin 1	U_S
Pin 2	Gnd
Pin 3	Sig
Pin 4	Nc
Pin 5	Nc

Various motorsport and automotive connectors available on request.

Sleeve	DR-25
Wire size	AWG 24
Wire length L	15 to 100 cm

Please specify the required wire length with your order.

Installation Notes

The HA-D 90 is no true-power-on sensor. It needs the falling edge of two teeth for correct working. After a time of 0.68 s without rotation of the detected wheel it needs again the falling edge of two teeth.

The HA-D 90 can be connected directly to most control units and data logging systems

Please specify the angle between the mounting and the target wheel.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

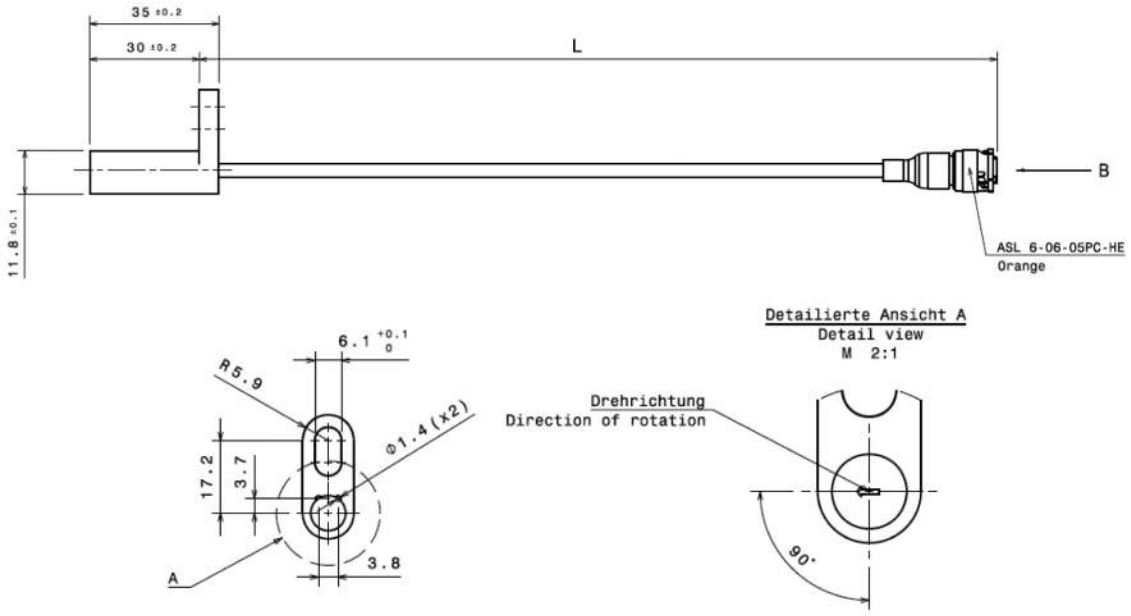
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

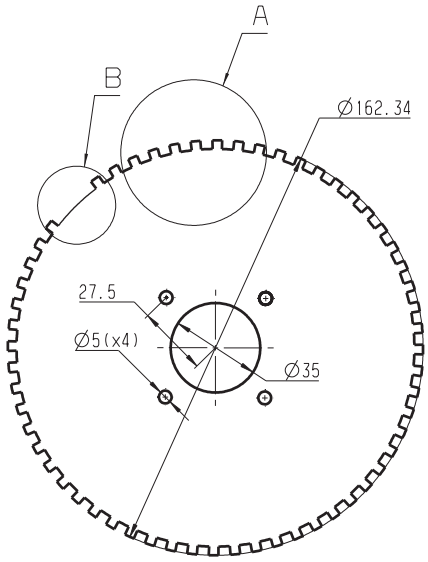
Ordering Information

Speed Sensor Hall-Effect HA-D 90
Order number **F02U.V00.334-01**

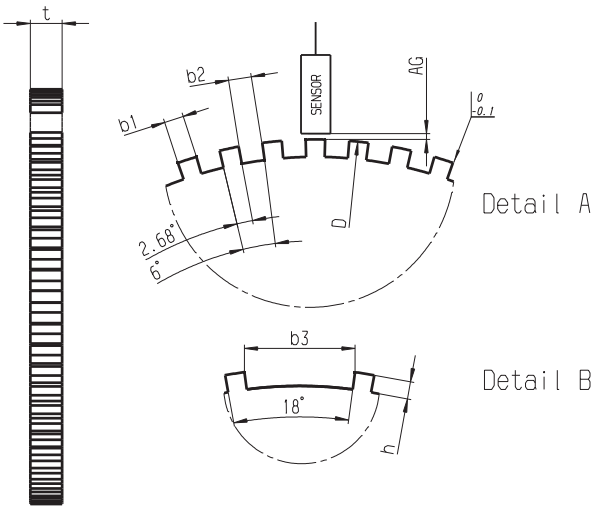
6

Dimensions





60-2 Teeth



Left view

Speed Sensor Hall-Effect HA-Di



Features

- Max. frequency: ≤ 10 kHz
- Air gap: 0.4 to 1.0 mm
- Bore diameter: 12 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 12 g

This sensor is designed for incremental measurement of rotational speed (e.g. crankshaft or wheel speed).
Due to the rotation of a ferromagnetic target wheel in front of the HA-Di, the magnetic field of the built-in magnet is modulated at the place of the sensors diff.
The main feature and benefit of this sensor is the detection of the rotational direction.

Application

Application	Speed
Max. frequency	≤ 10 kHz forward ≤ 6 kHz backward
Target wheel air gap AG	0.4 to 1.0 mm
Temperature range	-40 to 150°C
Output circuit	Open collector for 1 kOhm
External magnetic fields	≤ 100 mT
Max. vibration	1,200 m/s² at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

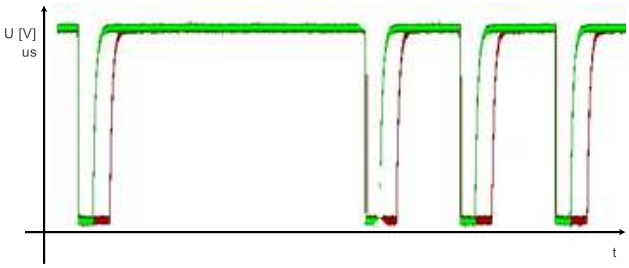
Weight w/o wire	12 g
Mounting	Screw 1 x M5
Bore diameter	12 + 0.2 mm
Installation depth L2	30 mm
Tightening torque	6 Nm

Electrical Data

Power supply	5 to 16 V (24 V for max. 5 min.)
Current IS	<20 mA
Power-on time	1 ms

Characteristic

Signal output width forward	37 to 53 µs (45)
Signal output width backward	75 to 105 µs (90)
Accuracy (tolerance)	±1.5° (for forward direction)
Signal output	0.52 V to < U_S



Signal output width (forward: green, backward: red)

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Alternative Target Wheel

Target wheel diameter	118 to 370 mm
Width of teeth b1	2.2 to 3.8 mm
Width of gap b2	≥4 mm
Depth of teeth h	≥4 mm
Target wheel width	≥5 mm
Relative magnetic permeability	µ (r) ≥1000

Connectors and Wires

Connector	ASL606-05PC-HE
Mating connector ASL006-05SC-HE	F02U.000.228-01
Pin 1	U_S
Pin 2	Gnd
Pin 3	Sig
Pin 4	Nc
Pin 5	Nc
Various motorsport and automotive connectors available on request.	
Sleeve	DR-25
Wire size	AWG 24

Wire length L	15 to 100 cm

Please specify the required wire length with your order.

Installation Notes

The HA-Di is no true-power-on sensor. It needs the falling edge of trigger wheel teeth for correct working. After a time of 0.68 s without rotation of the detected wheel it needs again the falling edge of two teeth.

Please specify the angle between the mounting and the target wheel.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

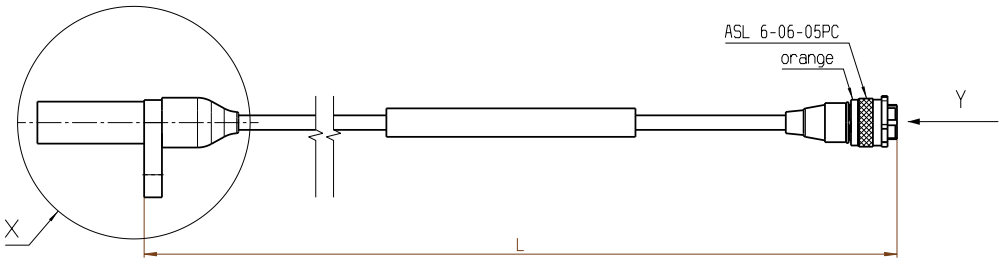
Speed Sensor Hall-Effect HA-Di 0
Order number **F02U.V01.802-02**

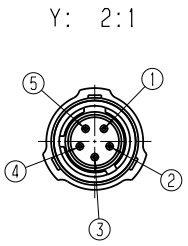
Speed Sensor Hall-Effect HA-Di 90
Order number **F02U.V01.803-02**

Speed Sensor Hall-Effect HA-Di 180
Order number **F02U.V01.804-02**

Speed Sensor Hall-Effect HA-Di 270
Order number **F02U.V01.805-02**

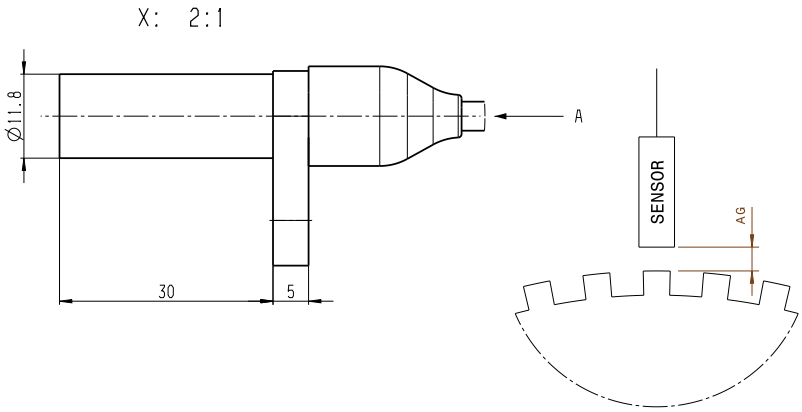
Dimensions

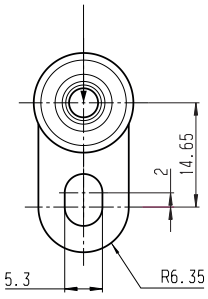




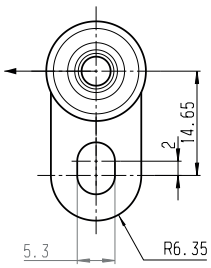
ASL 6-06-05PC

1: Supply
2: Ground
3: Signal
4: Not connected
5: Not connected

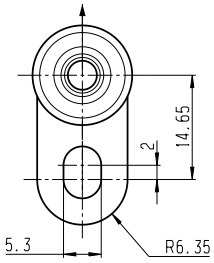




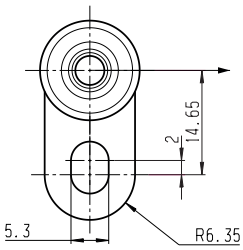
HA-DI 0



HA-DI 90

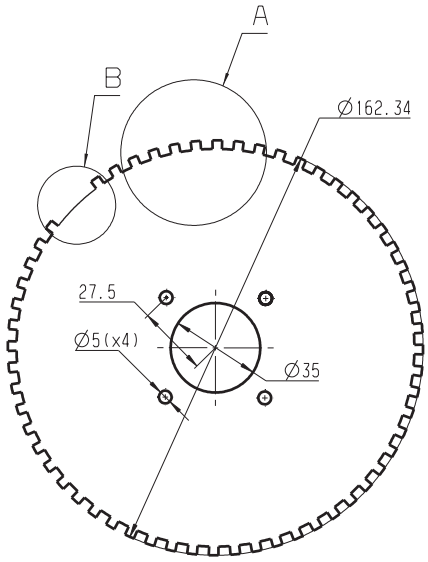


HA-DI 180

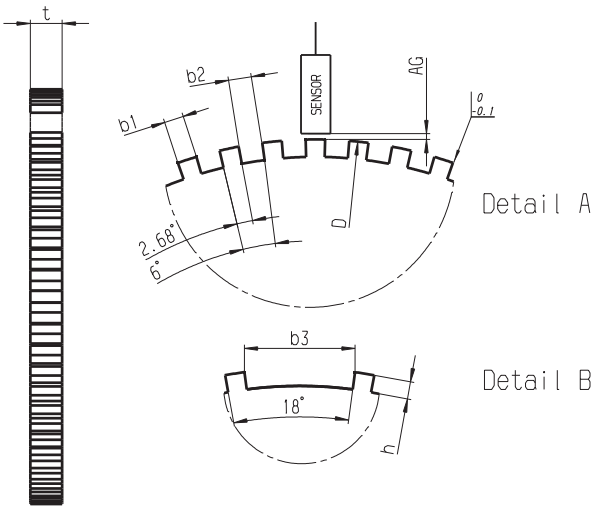


HA-DI 270

Direction of rotation of the target wheel, View A



60-2 Teeth



Left view

Speed Sensor Hall-Effect HA-M



Features

- Max. frequency: ≤ 4.2 kHz
- Air gap: 0.5 to 1.0 mm
- Bore diameter: 11.8 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 12 g

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheel speed).
Due to the rotation of a ferromagnetic target wheel in front of the HA-M, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal. We offer this sensor with two different types of output: Active high and Active low.
The main feature and benefit of this sensor is the combination of a high quality production part and robust design with metal housing and motorsport connectors.

Application

Application	Speed
Max. frequency	≤ 4.2 kHz
Target wheel air gap	0.5 to 1.5 mm
Temperature range	- 40 to 160°C
Output circuit	Open collector for 1 kOhm
Output type	Please see Ordering Information
External magnetic fields	< 1 mT
Max. vibration	1,200 m/s² at 10 Hz to 2 kHz

Technical Specifications

Variations

Active low with connector / active high with connector	
Connector	ASU603-03PN-HE
Mating connector ASU003-03SN-HE	F02U.000.199-01
Pin 1	U_S
Pin 2	Gnd
Pin 3	Sig
Active high, without connector	
Red	U_S
Black	Gnd
Green	Sig

Mechanical Data

Weight w/o wire	12 g
Mounting	1 x M6
Bore diameter	11.8 mm
Installation depth L2	30 mm
Tightening torque	6 Nm

Electrical Data

Power supply	5 to 18 V
Current I_S	5.6 to 18 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 4 % (≤ 4.2 kHz)
Signal output	0.52 V to < Us

Connectors and Wires

Various motorsport and automotive connectors available on request.

Pin layout	Please see Variations
Sleeve	DR-25
Wire size	AWG 24
Wire length L	10 to 100 cm

Please specify the required wire length with your order.

Installation Notes

The HA-M can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

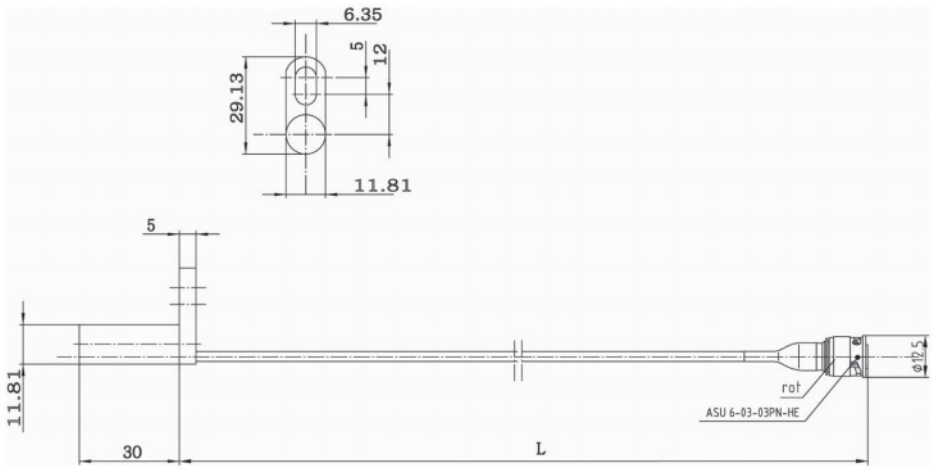
Ordering Information

Speed Sensor Hall Effect HA-M
Active low
Order number **B261.209.283-01**

Speed Sensor Hall Effect HA-M
Active high
Order number **B261.209.295-01**

Speed Sensor Hall Effect HA-M
Active high, without connector
Order number **F02U.V00.627-01**

Dimensions



Speed Sensor Hall-Effect HA-N



Features

- Max. frequency: ≤ 4.2 kHz
- Air gap: 0.4 to 1.5 mm
- Bore diameter: 10 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 8 g

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft or wheel speed). Due to the rotation of a ferromagnetic target wheel in front of the HA-N, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.
The HA-N combines a robust sensing element with a lightweight aluminum housing that is well suited for motorsport use. The sensor element used was specifically selected for its resistance to demagnetization at high temperatures and is programmed for an active low output. This sensor element is approved for NASCAR competition as a camshaft speed sensor.

Application

Application	Rotational speed
Max. frequency	≤ 4.2 kHz
Target wheel air gap AG	0.5 to 1.5 mm
Temperature range	-40 to 160°C
Output circuit	Open collector for 1 kOhm
Output type	Active low
External magnetic fields	< 1 mT
Max. vibration	1,200 m/s² at 10 Hz to 2 kHz

Technical Specifications

Mechanical Data

Weight w/ wire	13 g w/ 254 mm cable length and AS connector 28.5 g w/ 1,000 mm cable length flying lead
Bore diameter	10 mm
Installation depth L2	14 mm
Tightening torque	6 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	5.6 to 18 mA

Characteristic

Accuracy repeatability of the falling edge tooth	<4 % (≤ 4.2 kHz)
Signal output	0.52 V to V_S

Connectors and Wires

Sensor AS connector	
Connector	ASL606-05PA-HE
Mating connector	ASL006-05SA-HE
Pin 1	V_S
Pin 2	GND
Pin 3	Signal
Pin 4	Not used
Pin 5	Not used
Shrink sleeve	DR-25
Wire size	AWG 24
Wire length L	254 mm

Sensor Flying lead	
WHT/ORG	V_S
WHT/BLU	GND
WHT	Signal
Shrink sleeve	DR-25
Wire size	AWG 24
Wire length L	1,000 mm

Installation Notes

The HA-N can be directly connected to most control units and data logging systems.

If a trigger wheel with different dimensions is used (see Environment), the technical function must be tested.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

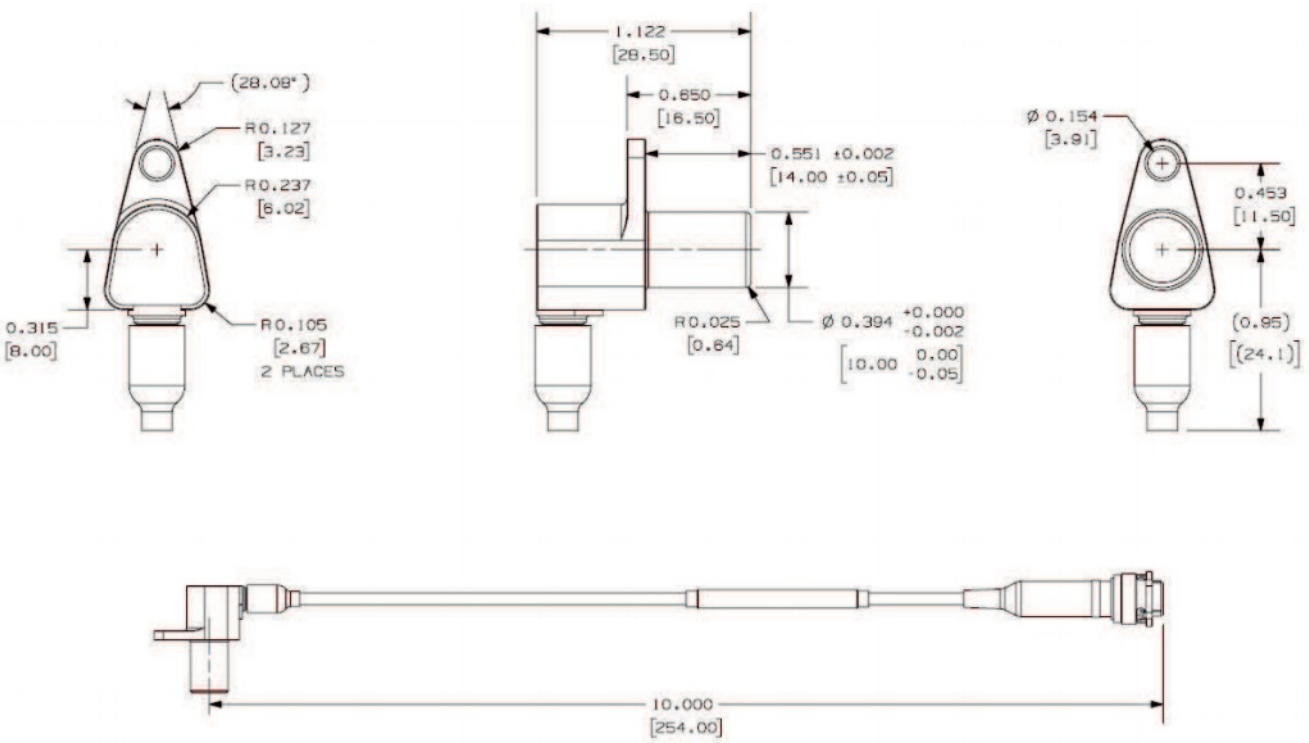
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Ordering Information

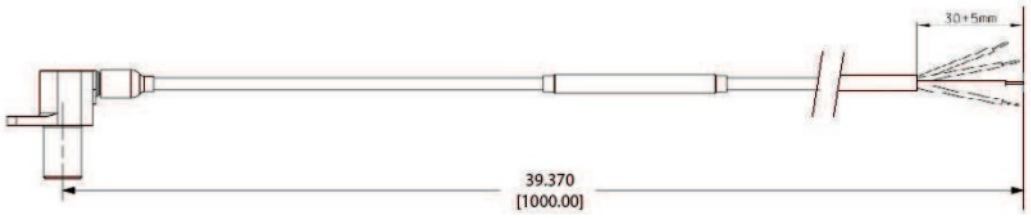
Speed Sensor Hall-Effect HA-N
Sensor AS connector
Order number **F02U.V0U.714-01**

Speed Sensor Hall-Effect HA-N
Sensor Flying lead
Order number **F02U.V0U.714-90**

Dimensions



Sensor AS connector



Sensor Flying lead

Speed Sensor Hall-Effect Mini-HA-P



Features

- Max. frequency: ≤ 10 kHz
- Air gap: 0.2 to 1.0 mm
- Bore diameter: 11.5 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 20 g

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft or wheel speed).
Due to the rotation of a ferromagnetic target wheel in front of the Mini-HA-P, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.
The main feature and benefit of this sensor is the combination of a high quality production part and robust design with a very small housing.

Application

Application	Speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.2 to 1.5 mm
Temperature range	-40 to 150°C
Output circuit	Open collector for 1 kOhm
Output type	Active low
External magnetic fields	≤ 0.3 mT
Max. vibration	1,200 m/s² at 10 Hz to 2 kHz

Technical Specifications

Variations

Connector	ASL606-05PC-HE	1234.482.092
Mating connector	ASL006-05SC-HE	F02U.B00.555-01
Pin 1	U_S	U_S
Pin 2	Gnd	Sig
Pin 3	Sig	Gnd
Pin 4	Nc	-
Pin 5	Nc	-

Mechanical Data

Weight w/o wire	19.2 g
Mounting	With screw 1 x M6
Bore diameter	11.5 mm
Installation depth L2	9 mm
Tightening torque	8 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	10 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 3 % (≤ 6 kHz) < 5 % (≤ 10 kHz)
Signal output	0.4 V to < U_S

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	Please see Variations
Various motorsport and automotive connectors available on request.	
Sleeve	HT wire ø 5.2 mm
Wire size	AWG 20
Wire length L	< 27 cm
Please specify the required wire length with your order.	

Installation Notes

The Mini-HA-P can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

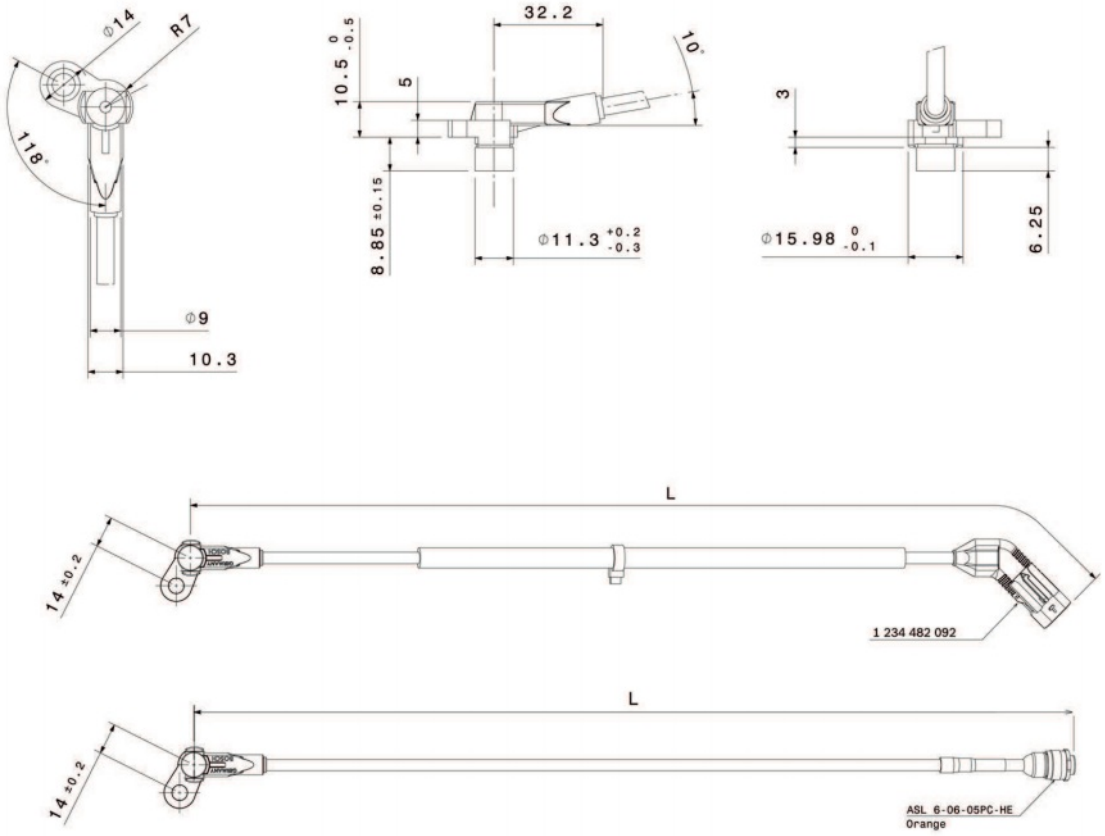
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

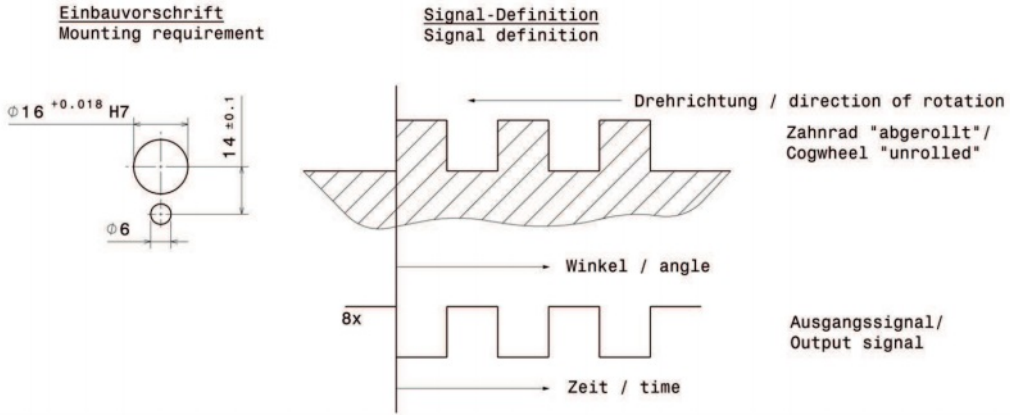
Ordering Information

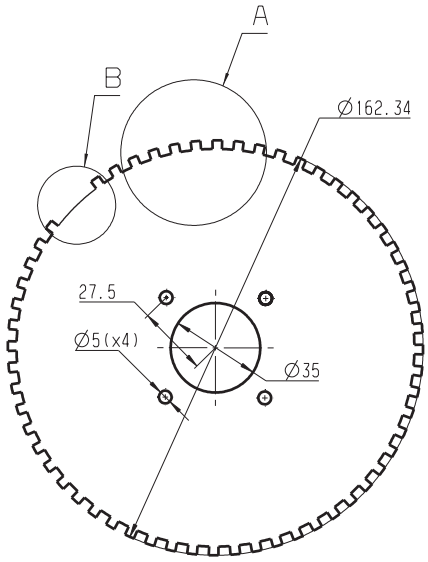
Speed Sensor Hall-Effect Mini-HA-P
Connector ASL606-05PC-HE
Order number **F02U.V00.564-03**

Speed Sensor Hall-Effect Mini-HA-P
Connector 1 234 482 092
Order number **F02U.V00.566-02**

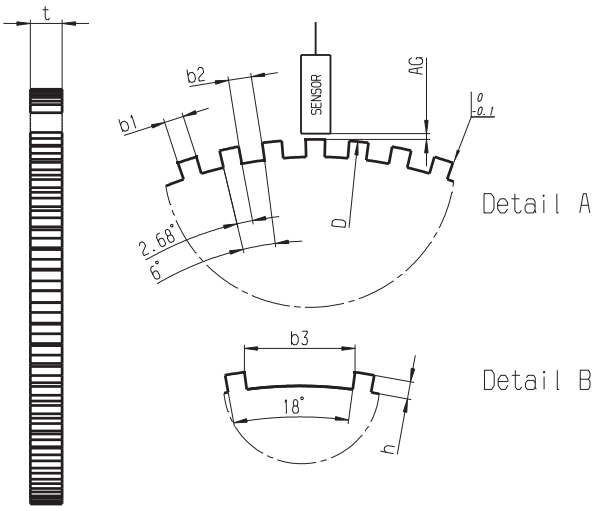
Dimensions


⌀14
R7
118°
⌀9
10.3
32.2
10°
10.5 0 -0.5
5
8.85 ±0.15
⌀11.3 +0.2 -0.3
3
⌀15.98 0 -0.1
6.25
L
14 ±0.2
1 234 482 092
L
14 ±0.2
ASL 6-06-05PC-HE
Orange


Einbauvorschrift
Mounting requirement
⌀16 +0.018 H7
14 ±0.1
⌀6
Signal-Definition
Signal definition
Drehrichtung / direction of rotation
Zahnrad "abgerollt"/
Cogwheel "unrolled"
Winkel / angle
8x
Ausgangssignal/
Output signal
Zeit / time



60-2 Teeth



Left view

Speed Sensor Hall-Effect Mini-HA-P sealed



6

Features

- Max. frequency: ≤ 10 kHz
- Air gap: 0.2 to 1.5 mm
- Bore diameter: 16 mm
- Max. vibration: 1,200 m/s² at 10 Hz to 2 kHz
- Weight w/o wire: 20 g

This sensor is designed for incremental measurement of rotational speed (e.g. camshaft, crankshaft and wheelspeed).
Due to the rotation of a ferromagnetic target wheel in front of the Mini-HA-P sealed, the magnetic field is modulated at the place of the Hall probe. A Hall-effect sensor element with integrated signal conditioning circuit detects this change and generates a digital output signal.
The main feature and benefit of this sensor is the combination of a high quality production part and a robust design with a very small housing.

Application

Application	Speed
Max. frequency	≤ 10 kHz
Target wheel air gap	0.2 to 1.5 mm
Temperature range	-40 to 150°C
Output circuit	Open collector for 1 kOhm
Output type	Active low
External magnetic fields	≤ 0.3 mT
Max. vibration	1,200 m/s² at 10 Hz to 2 kHz

Technical Specifications

Variations

Connector	ASL606-05PC-HE	Without connector
Mating connector	ASL006-05SC-HE F02U.000.228-01	-
Pin 1	U_S	U_S (red)
Pin 2	Gnd	Sig (green)
Pin 3	Sig	Gnd (black)
Pin 4	Nc	-
Pin 5	Nc	-
Wire length L	10 - 27 cm	27 cm

Mechanical Data

Weight w/o wire	19.2 g
Mounting	With screw 1 x M6
Bore diameter	16 mm
Installation depth L2	12 mm
Tightening torque	8 Nm

Electrical Data

Power supply	5 to 18 V
Current IS	10 mA

Characteristic

Accuracy repeatability of the falling edge of tooth	< 3 % (≤6 kHz) < 5 % (≤10 kHz)
Signal output	0.4 V to < U_S

Environment

Target wheel diameter D	162.34 mm
Thickness t	12.5 mm
Width of teeth b1	3.8 mm
Width of gap b2	4.7 mm
Width of sync. gap b3	20.79 mm
Depth of teeth h	3.4 mm
Number of teeth	60-2

Connectors and Wires

Connector	Please see Variations
Sleeve	HT wire ø 5.2 mm
Wire size	AWG 20
Wire length L	Please see Variations

Various motorsport and automotive connectors are available on request.

Please specify the required wire length with your order.

Installation Notes

The Mini-HA-P sealed can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated plug.

If a wheel with different dimensions is used (see Environment), the technical function has to be tested individually.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

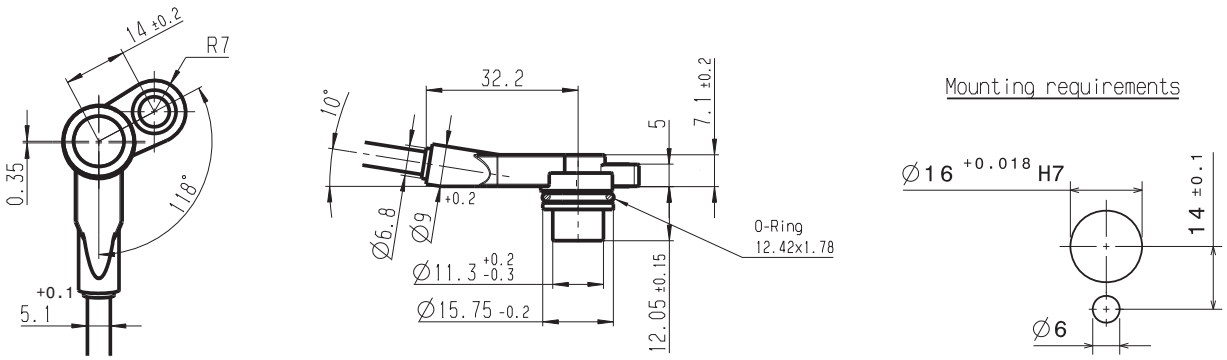
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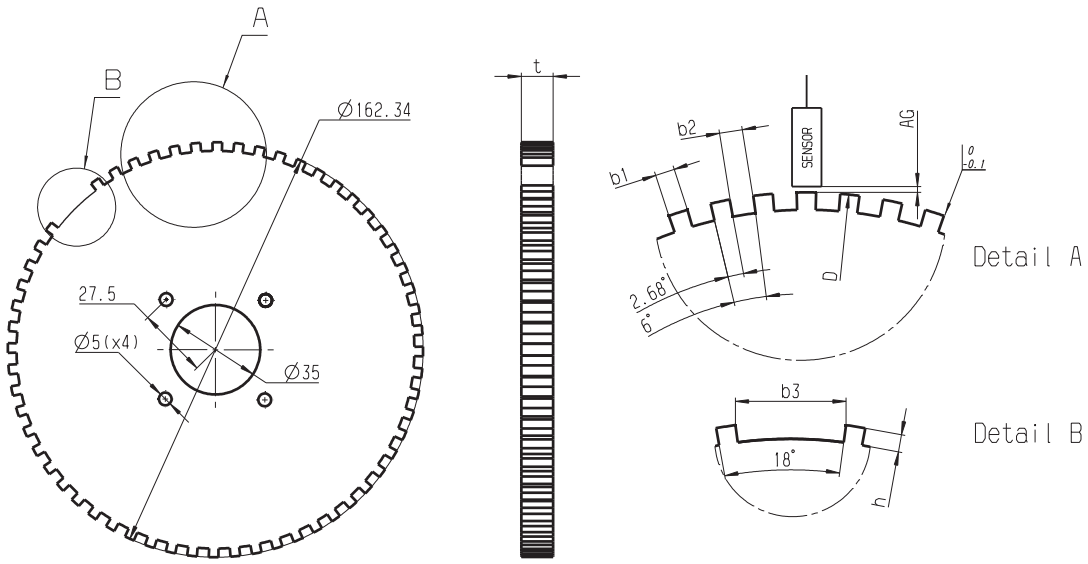
Ordering Information

Speed Sensor Hall-Effect Mini HA-P sealed
Connector ASL606-05PC-HE
Order number **F02U.V00.500-01**

Speed Sensor Hall-Effect Mini HA-P sealed
Without connector
Order number **F02U.V00.570-01**

Dimensions





60-2 Teeth

Left view

Steering Wheel Angle Sensor LWS



Features

- Steering Wheel Angle: ± 780°
- Angular Speed: 0 to 1,016°/s
- 500 kbaud CAN-output

This sensor is designed to measure rotational movement and angular speed, e.g. steering wheel angle and steering wheel speed.
In order to achieve this, the sensor is using the giant magneto resistive (GMR) effect. The detection of the absolute angle is realized by means of toothed measuring gears with different ratio including small magnets. Corresponding GMR elements that change their electrical resistance according to the magnetic field direction detects the angle position of the measuring gears.
The measured voltages are A/D converted and a microcontroller performs the angle calculations. The steering angle and the steering angle speed are provided on a CAN-interface.

Application

Steering wheel angle	± 780°
Angular speed	0 to 1,016°/s
Operating temperature range	-40 to 85°C

Technical Specifications

Mechanical Data

Weight	Approx. 34 g
Size	83 x 60 x 21.35 mm
Protection class	IP5K0

Electrical Data

Power supply	7 to 16 V
Max input current	< 150 mA
CAN speed	500 kbaud

CAN Message

CAN ID 01 0x2B0 LWS_Standard

Byte	Value / Bit			
	7/6/5/4/3	2	1	0
0	LWS_ANGLE			
1	LWS_ANGLE			
2	LWS_SPEED			
3	Reserved	TRIM	CAL	OK
4	Reserved			

CAN ID 02 0x7C0 LWS_Config

Byte	Value / Bit			
	7/6/5/4/3	2	1	0
0	Reserved	CCW		
1	Reserved			

Truth Table

TRIM	OK	CAL	ANGLE	SPEED	Sensor state
1	1	1	Value	Value	Sensor is calibrated and sensor information is valid.
1	1	0	7FFFh	Value	Sensor is not calibrated, speed information is valid.
1	0	0	7FFFh	FFh	Sensor is in failure mode, sensor information is not valid.
0	0	0	7FFFh	FFH	Sensor is in failure mode, sensor information is not valid.

Other combinations for TRIM, OK and CAL are not valid.

Signal Overview

OK	Failure status
1	Sensor information valid
0	Sensor information invalid, an internal sensor fault occurred

CAL	Calibration status
1	Sensor calibrated
0	Sensor not calibrated

TRIM	Trimming Status
1	Sensor trimmed
0	Sensor not trimmed, this is handled as a sensor failure (OK = 0)

CCW	Command code word
3h	Sets the signal LWS_Angle to 0°
5h	Resets the calibration status of the angle

Characteristics

Steering Wheel Angle	
Measuring range	± 780°
Absolute physical resolution	0.1°
Nonlinearity	± 2.5°
Hysteresis	0 to 5°
Angular Speed	
Measuring range	0 to 1,016°/s
Over range limit	± 2,500°/s
Absolute physical resolution	4°/s

Connectors and Wires

Connector	Bosch 7 pole
Mating connector	F02U.B00.656-01
Pin 1	Gnd
Pin 2	12 V
Pin 3	CAN High
Pin 4	CAN Low
Pin 5	Not connected
Pin 6	Not connected
Pin 7	Not connected

CAN Parameters

Byte order	LSB (Intel)
CAN speed	500 kbaud
CAN update rate	100 Hz / 10 ms

Installation Notes

The LWS can be connected directly to most control units and data logger systems via CAN bus.

Please avoid abrupt temperature changes.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing.

A zero adjustment is needed before using the sensor for the first time. To do so, reset the calibration with CCW = 5h. After resetting the calibration, a new calibration needs to be started with CCW = 3h. The sensor is now newly calibrated and can be used immediately.

Zero the sensor after every assembly.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

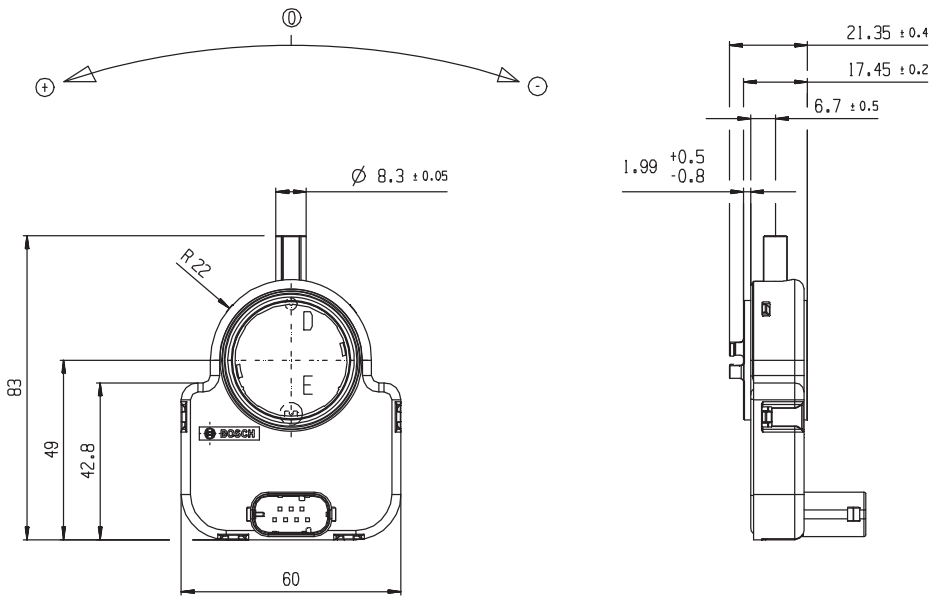
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Steering Wheel Angle Sensor LWS
Order number **F02U.V02.894-01**

Dimensions



Housing Size

Overview

Temperature Sensor NTC M5-HS



- Application: -55 to 300°C
- Accuracy at 25°C: ± 0.3°C
- Accuracy at 100°C: ± 1.3°C
- Male thread: M5
- Nominal resistance: 10 kOhm ± 1 % (at 25°C)

Temperature Sensor NTC M6-HS



- Application: -55 to 300°C
- Accuracy at 25°C: ± 0.3°C
- Accuracy at 100°C: ± 1.3°C
- Male thread: M6 x 1
- Nominal resistance: 10 kOhm ± 1 % (at 25°C)

Temperature Sensor NTC M8-HS



- Application: -55 to 300°C
- Accuracy at 25°C: ± 0.3°C
- Accuracy at 100°C: ± 1.3°C
- Male thread: M8 x 1
- Nominal resistance: 10 kOhm ± 1 % (at 25°C)

Temperature Sensor NTC M12



- Application: -40 to 130°C
- Accuracy at 25°C: ± 1.4°C
- Accuracy at 100°C: ± 3.4°C
- Male thread: M12 x 1.5
- Nominal resistance: 2.5 kOhm ± 5 % (at 20°C)

Temperature Sensor NTC M12-H



- Application: -40 to 130°C
- Accuracy at 25°C: ± 1.4°C
- Accuracy at 100°C: ± 0.8°C
- Male thread: M12 x 1.5
- Nominal resistance at 20°C: 2.5 kOhm ± 6 %

Temperature Sensor NTC M12-L



- Application: -40 to 130°C
- Accuracy at 25°C: ± 1.4°C
- Accuracy at 100°C: ± 3.4°C
- Male thread: M12 x 1.5
- Nominal resistance: 2.5 kOhm ± 5 % (at 20°C)

Temperature Sensor NTC M5-HS



Features

- Application: -55 to 300°C
- Accuracy at 25°C: ± 0.3°C
- Accuracy at 100°C: ± 1.3°C
- Male thread: M5
- Nominal resistance: 10 kOhm ± 1 % (at 25°C)

This sensor is designed to measure temperatures up to 300°C of oil, water, fuel or air. This signal is used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.
The NTC-sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. To improve a good protection against the ambient temperature, the housing is made of stainless steel and partly filled with an isolation-paste. The main benefit of the sensor is a very compact design and its very short response time.

Application

Application	-55 to 300°C
Storage temperature range	0 to 100°C
Bio fuel compatibility	-

Technical Specifications

Mechanical Data

Male thread	M5
Wrench size	8 mm
Installation torque	8 Nm
Weight w/o wire	6 g
Sealing	O-Ring 4 x 1 mm

Electrical Data

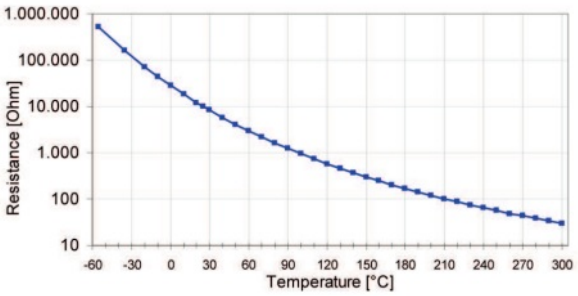
Characteristic	NTC
Nominal resistance at 25°C	10 kOhm ± 1 %

Characteristic

Accuracy at 25°C (homogeneous cond.)	± 0.3°C
Accuracy at 100°C (homogeneous cond.)	± 1.3°C
Response time tau 63 in still water	< 4 s

Characteristic Application

T [°C]	R [Ohm]
-55	519,910
-35	158,090
-20	71,668
-10	44,087
0	27,936
10	18,187
20	12,136
25	10,000
30	8,284
40	5,774
50	4,103
60	2,967
70	2,182
80	1,629
90	1,234
100	946.6
120	578.1
140	368.8
160	244.4
180	167.6
200	118.5
220	86.08
240	64.08
260	48.76
280	37.86
300	29.94



Connectors and Wires

Connector	ASL606-05PN-HE
Mating connector ASL006-05SN-HE	F02U.000.231-01
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-
Various motorsport and automotive connectors are available on request.	
Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

The NTC M5-HS can be connected directly to most control units using a pull-up resistance (typically 1 or 3 kOhm) .

Any mounting orientation is possible.

Please find further application hints in the offer drawing at our homepage.

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

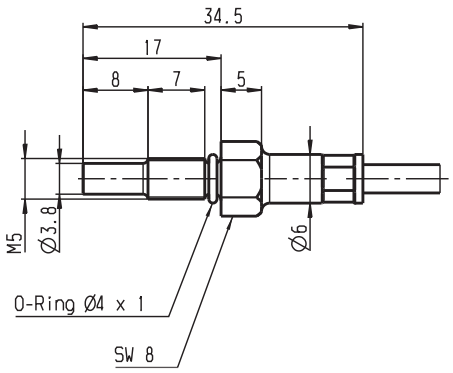
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Temperature Sensor NTC M5-HS
Order number **F02U.V00.510-01**

Dimensions



Temperature Sensor NTC M6-HS



Features

- Application: -55 to 300°C
- Accuracy at 25°C: ± 0.3°C
- Accuracy at 100°C: ± 1.3°C
- Male thread: M6 x 1
- Nominal resistance: 10 kOhm ± 1 % (at 25°C)

This sensor is designed to measure temperatures up to 300°C of oil, water, fuel or air. This signal is used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.
The NTC-sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. To improve a good protection against the ambient temperature, the housing is made of stainless steel and partly filled with an isolation-paste.
The main benefit of the sensor is a very compact design and its very short response time.

Application

Application	-55 to 300°C
Storage temperature range	0 to 100°C
Bio fuel compatibility	-

Technical Specifications

Mechanical Data

Male thread	M6x1
Wrench size	10 mm
Installation torque	8 Nm
Weight w/o wire	6.5 g
Sealing	O-Ring 4.47 x 1.78 mm

Electrical Data

Characteristic	NTC
Nominal resistance at 25°C	10 kOhm ± 1 %

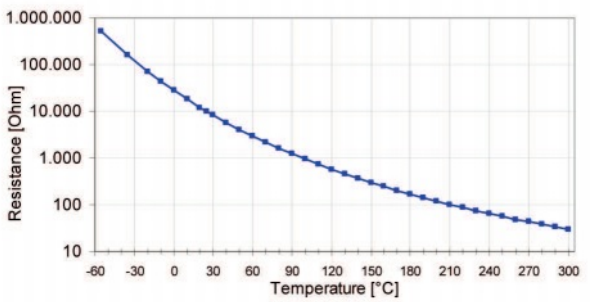
Characteristic

Accuracy at 25°C (homogeneous cond.)	± 0.3°C
Accuracy at 100°C (homogeneous cond.)	± 1.3°C
Response time tau 63 in still water	< 4 s

Characteristic Application

T [°C]	R [Ohm]
-55	519,910
-35	158,090
-20	71,668
-10	44,087
0	27,936
10	18,187
20	12,136
25	10,000
30	8,284
40	5,774
50	4,103
60	2,967
70	2,182
80	1,629
90	1,234
100	946.6
110	735.5
120	578.1
130	459.4
140	368.8
150	298.9
160	244.4
170	201.6
180	167.6
190	140.4
200	118.5
210	100.7
220	86.08
230	74.05
240	64.08
250	55.75
260	48.76
270	42.87

280	37.86
290	33.59
300	29.94



6

Connectors and Wires

Connector	ASL606-05PN-HE
Mating connector ASL006-05SN-HE	F02U.000.231-01
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

The NTC M6-HS can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kOhm).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging at our homepage.

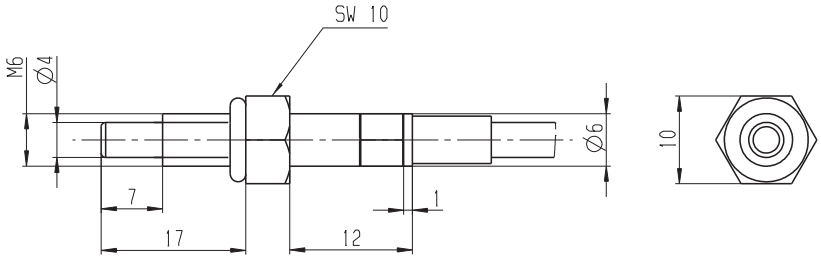
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Temperature Sensor NTC M6-HS
Order number **F02U.V00.486-01**

Dimensions



Temperature Sensor NTC M8-HS



Features

- Application: -55 to 300°C
- Accuracy at 25°C: ± 0.3°C
- Accuracy at 100°C: ± 1.3°C
- Male thread: M8 x 1
- Nominal resistance: 10 kOhm ± 1 % (at 25°C)

This sensor is designed to measure temperatures up to 300°C of oil, water, fuel or air. This signal is used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.
The NTC-sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises and the resistance decreases. To improve a good protection against the ambient temperature, the housing is made of stainless steel and partly filled with an isolation-paste.
The main benefit of the sensor is a very robust design and its very short response time.

Application

Application	-55 to 300°C
Storage temperature range	0 to 100°C
Bio fuel compatibility	-

Technical Specifications

Mechanical Data

Male thread	M8x1
Wrench size	12 mm
Installation torque	8 Nm
Weight w/o wire	8 g
Sealing	O-Ring 6.35 x 1.78 mm

Electrical Data

Characteristic	NTC
Nominal resistance at 25°C	10 kOhm ± 1 %

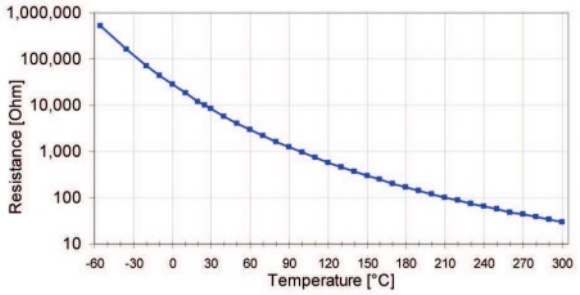
Characteristic

Accuracy at 25°C (homogeneous cond.)	± 0.3°C
Accuracy at 100°C (homogeneous cond.)	± 1.3°C
Response time tau 63 in still water	< 4 s

Characteristic Application

T [°C]	R [Ohm]
-55	519,910
-35	158,090
-20	71,668
-10	44,087
0	27,936
10	18,187
20	12,136
25	10,000
30	8,284
40	5,774
50	4,103
60	2,967
70	2,182
80	1,629
90	1,234
100	946.6
110	735.5
120	578.1
130	459.4
140	368.8
150	298.9
160	244.4
170	201.6
180	167.6
190	140.4
200	118.5
210	100.7
220	86.08
230	74.05
240	64.08
250	55.75
260	48.76
270	42.87

280	37.86
290	33.59
300	29.94



6

Connectors and Wires

Connector	ASL606-05PN-HE
Mating connector ASL006-05SN-HE	F02U.000.231-01
Pin 1	-
Pin 2	Sig-
Pin 3	Sig+
Pin 4	-
Pin 5	-

Various motorsport and automotive connectors are available on request.

Wire size	AWG 24
Wire length L	15 to 50 cm

Please specify the required wire length with your order.

Installation Notes

The NTC M8-HS can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kOhm).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

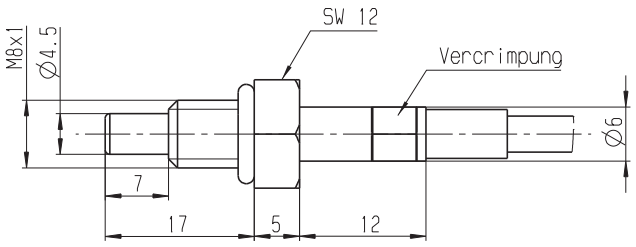
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Temperature Sensor NTC M8-HS
Order number **F02U.V00.509-01**

Dimensions



Temperature Sensor NTC M12



Features

- Application: -40 to 130°C
- Accuracy at 25°C: ± 1.4°C
- Accuracy at 100°C: ± 3.4°C
- Male thread: M12 x 1.5
- Nominal resistance: 2.5 kOhm ± 5 % (at 20°C)

This sensor is designed to measure fluid temperature e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.
The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises. The sensing element of the temperature sensor is made of semiconducting heavy metal oxide and oxidized mixed crystals, which are equipped with a protective housing.
The main benefit of the sensor is the combination of a high quality production part and a robust and compact design.

Application

Application	-40 to 130°C
Storage temp. range	0 to 100°C
Bio fuel compatibility	E85/M22
Max. vibration	600 m/s^2

Technical Specifications

Mechanical Data

Male thread	M12x1.5
Wrench size	19 mm
Installation torque	25 Nm
Weight w/o wire	29 g
Sealing	Not included

Electrical Data

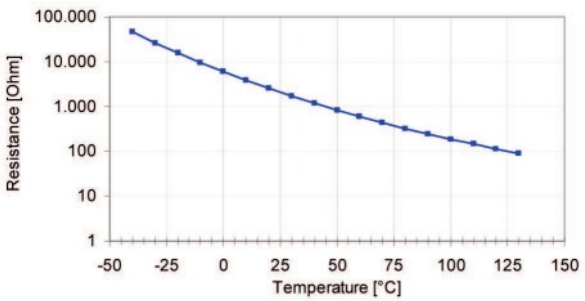
Characteristic	NTC
Nominal resistance at 20°C	2.5 kOhm ± 5 %

Characteristic

Accuracy at 25°C	± 1.4°C
Accuracy at 100°C	± 3.4°C
Response time tau 63 in still water	< 15 s

Characteristic Application

T [°C]	R [Ohm]
-40	45,313
-30	26,114
-20	15,462
-10	9,397
0	5,896
10	3,792
20	2,500
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89



Connectors and Wires

Connector	Bosch Jetronic
Mating connector 2-pole Jetronic	D261.205.288-01
Pin 1	SIG+
Pin 2	SIG-

Installation Notes

The NTC M12 can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kOhm).

Any mounting orientation is possible.

Please find further application hints in the offer drawing. www.bosch-motorsport.com

Free download of the sensor configuration file (*.sdf) for the Bosch Data Logging at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

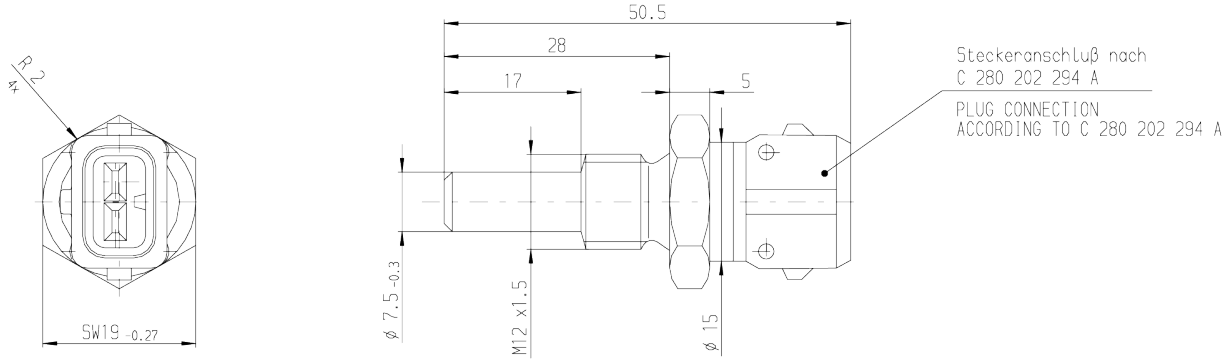
Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Temperature Sensor NTC M12
Order number **0280.130.026**

Dimensions



Temperature Sensor NTC M12-H



Features

- Application: -40 to 130°C
- Accuracy at 25°C: ± 1.4°C
- Accuracy at 100°C: ± 0.8°C
- Male thread: M12 x 1.5
- Nominal resistance at 20°C: 2.5 kOhm ± 6 %

This sensor is designed to measure fluid temperature e.g. oil, water or fuel. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.
The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises. The sensing element of the temperature sensor is made of semiconducting heavy metal oxide and oxidized mixed crystals, which are equipped with a protective housing.
The main benefit of the sensor is the combination of a high quality production part and a robust and compact design.

Application

Application	-40 to 150°C
Storage temperature range	-30 to 60°C
Bio fuel compatibility	E85/M22
Max. vibration	300 m/s^2

Technical Specifications

Mechanical Data

Male thread	M12x1.5
Wrench size	19 mm
Installation torque	18 Nm
Weight w/o wire	28.3 g
Sealing	Al-washer

Electrical Data

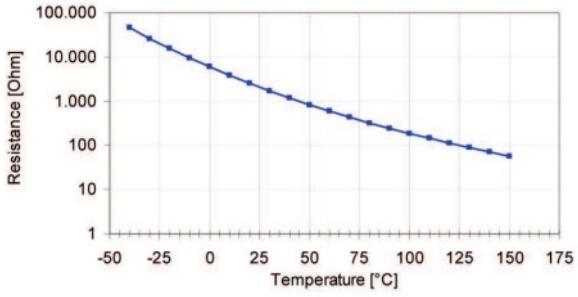
Characteristic	NTC
Nominal resistance at 20°C	2.5 kOhm ± 6 %

Characteristic

Accuracy at 25°C	± 1.4°C
Accuracy at 100°C	± 0.8°C
Response time tau 63 in still water	< 15 s

Characteristic Application

T [°C]	R [Ohm]
-40	45,313
-30	26,114
-20	15,462
-10	9,397
0	5,896
10	3,792
20	2,500
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89
140	71
150	57



Connectors and Wires

Connector	Bosch Compact
Mating connector 2-pole Compact	D261.205.337-01

Pin 1	SIG+
Pin 2	SIG-

Installation Notes

The NTC M12-H can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kOhm).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

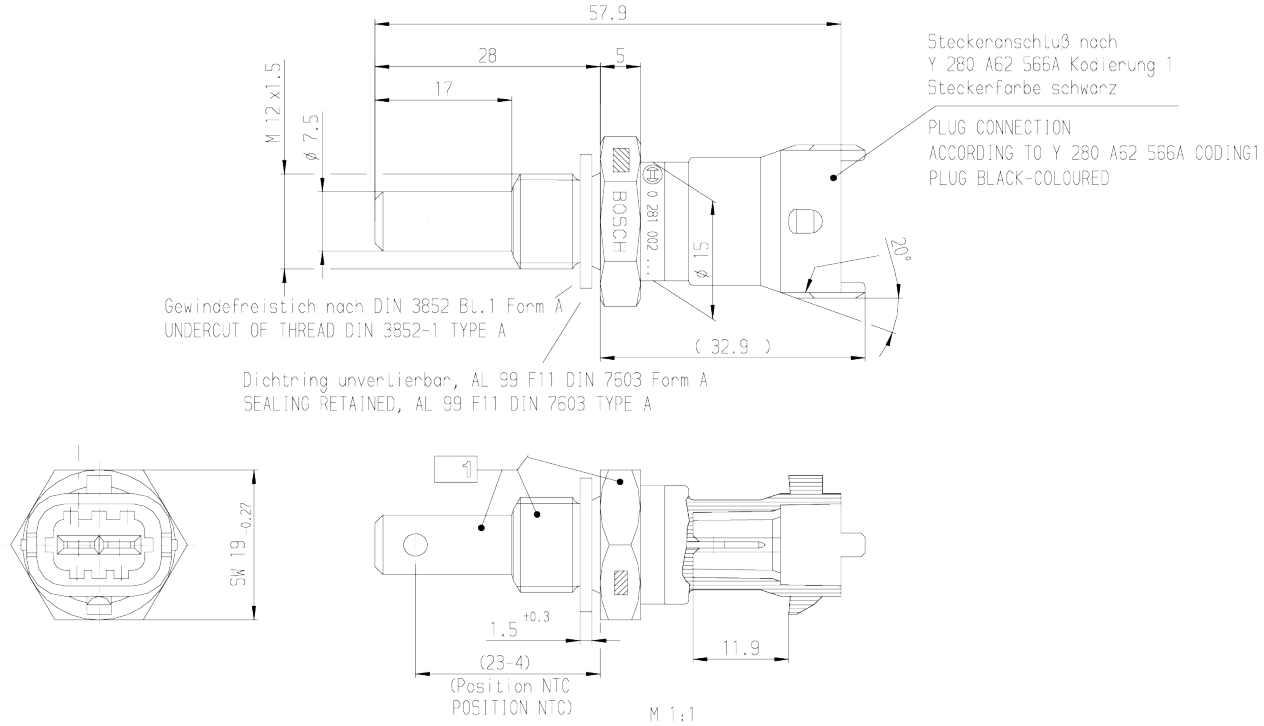
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Temperature Sensor NTC M12-H
Order number **0281.002.170**

6

Dimensions



Temperature Sensor NTC M12-L



Features

- Application: -40 to 130°C
- Accuracy at 25°C: ± 1.4°C
- Accuracy at 100°C: ± 3.4°C
- Male thread: M12 x 1.5
- Nominal resistance: 2.5 kOhm ± 5 % (at 20°C)

This sensor is designed to measure air temperature e.g. in the air box or ambient temperature. This signal may be used as a control value for engine control units or as a measurement value which is logged in a data acquisition system.
The NTC sensing element has a negative temperature coefficient. This means, that with increasing temperature the conductivity rises. The sensing element of the temperature sensor is made of semiconducting heavy metal oxide and oxidized mixed crystals, which are equipped with a protective housing.
The main benefit of the sensor is the combination of a high quality production part and a robust and compact design.

Application

Application	-40 to 140°C
Storage temp. range	-30 to 60°C
Bio fuel compatibility	E85/M22
Max. vibration	300 m/s^2 at 50 to 250 Hz

Technical Specifications

Mechanical Data

Male thread	M12x1.5
Wrench size	19 mm
Installation torque	15 Nm
Weight w/o wire	24.6 g
Sealing	Not included

Electrical Data

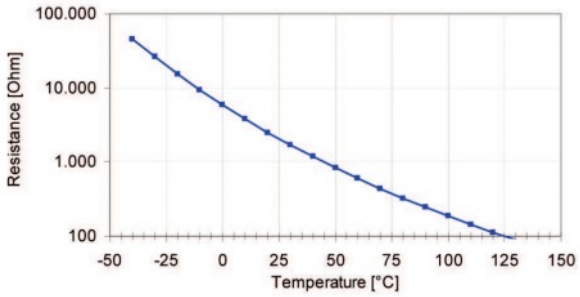
Characteristic	NTC
Nominal resistance at 20°C	2.5 kOhm ± 5%

Characteristic

Accuracy at 25°C	± 1.4°C
Accuracy at 100°C	± 3.4°C
Response time tau 63 in still water	< 10 s

Characteristic Application

T [°C]	R [Ohm]
-40	45,313
-30	26,114
-20	15,462
-10	9,397
0	5,896
10	3,792
20	2,500
30	1,707
40	1,175
50	834
60	596
70	436
80	323
90	243
100	187
110	144
120	113
130	89
140	71



Connectors and Wires

Connector	Bosch Compact
Mating connector 2-pole Jetronic	D261.205.288-01
Pin 1	SIG+
Pin 2	SIG-

Installation Notes

The NTC M12-L can be connected directly to most control units using a pull-up resistor (typically 1 or 3 kOhm).

Any mounting orientation is possible.

Please find further application hints in the offer drawing and free download of the sensor configuration file (*.sdf) for the Bosch Data Logging System at our homepage.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

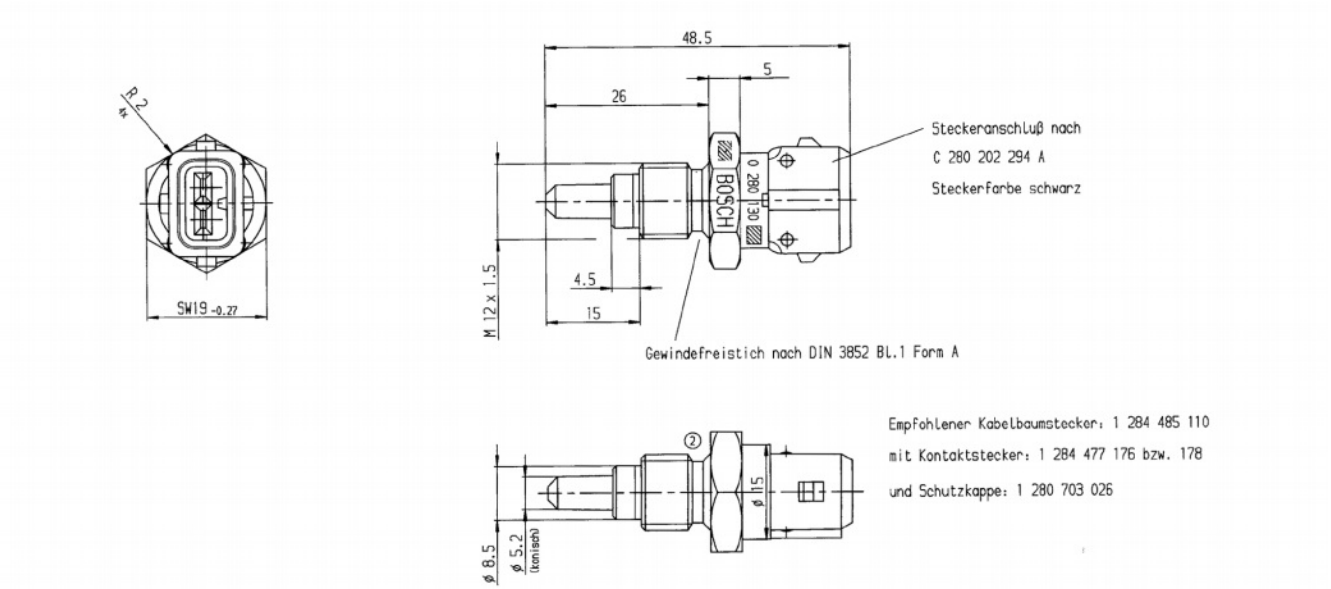
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Temperature Sensor NTC M12-L
Order number **0280.130.039**

6

Dimensions



Overview

Acceleration Sensor MM5.10



- Application 1: ±163°/s (roll rate/ yaw rate)
- Application 2: ±4.2 g (X, Y and Z acceleration)
- Weight w/o wire: 35 g
- Size: 80 x 56 x 21 mm
- Power supply: 7 to 18 V

Acceleration Sensor MM5.10-R



- Application 1: ±163°/s (roll rate/ yaw rate)
- Application 2: ±4.2 g (X, Y and Z acceleration)
- Weight w/o wire: 28 g
- Size: 34 x 34 x 16.5 mm
- Power supply: 7 to 18 V

Acceleration Sensor MM7.10



- Application 1: ±163°/s (roll / pitch / yaw rate)
- Application 2: ±4.2 g (X, Y and Z acceleration)
- Weight w/o wire: 35 g
- Size: 80 x 56 x 23.3 mm
- Power supply: 8 to 16 V

Acceleration Sensor MM5.10



Features

- Application 1: ±163°/s (roll rate/ yaw rate)
- Application 2: ±4.2 g (X, Y and Z acceleration)
- Weight w/o wire: 35 g
- Size: 80 x 56 x 21 mm
- Power supply: 7 to 18 V

The MM5.10 was designed to measure the physical effects of rotational and linear acceleration. In order to achieve this, the sensor includes MEMS measuring elements connected to an appropriate integrated circuit.
A rotational acceleration around the integrated sensing elements generates a Coriolis force which changes the internal capacity of the micro machined sensing parts. Furthermore, a pure surface micro machined element is used to measure the vehicle linear acceleration in all 3 axis. This combination of rotational and linear acceleration sensors enables a precise measurement of the vehicle dynamics.
The main feature and benefit of this sensor is the combination of 3 linear and 2 rotational accelerometers and its high speed 1 Mbaud CAN-signal output.

Application

Application I	±163°/s (roll rate/yaw rate)
Application II	±4.2 g (X, Y and Z acceleration)
Operating temperature range	-20 to 85°C

Technical Specifications

Mechanical Data

Weight w/o wire	35 g
Size	80 x 56 x 21 mm

Electrical Data

Power supply	7 to 18 V
Max input current	90 mA
CAN speed	1 Mbaud or 500 kbaud

CAN Message

CAN ID 01 0x174

Byte	Value
0	Yaw rate
1	
2	Reserved
3	
4	Acc Y-axis
5	
6	Reserved
7	Unused

CAN ID 02 0x178

Byte	Value
0	Roll rate
1	
2	Reserved
3	
4	Acc X-axis
5	
6	Reserved
7	Unused

CAN ID 03 0x17C

Byte	Value
0	Reserved
1	
2	Reserved
3	
4	Acc Z-axis
5	
6	Reserved
7	Unused

Characteristic

Characteristic Application I

Measuring range	± 160°/s
Over range limit	± 1,000°/s
Absolute physical resolution	0.1°/s
Cut-off frequency (-3 dB)	15 Hz; 30 Hz; 60 Hz

Characteristic Application II

Measuring range	±4.2 g
Over range limit	±10 g
Absolute physical resolution	0.01 g
Cut-off frequency (-3 dB)	15 Hz; 30 Hz; 60 Hz

Connectors and Wires

Connector (1)	AMP 114-18063-076
Mating connector (1)	F02U.B00.435-01
Pin 1	Gnd
Pin 2	CANL
Pin 3	CANH
Pin 4	UBat
Wire with open end (2)	
Red wire	UBat
Black wire	Gnd
White wire	CANH
Blue wire	CANL
Connector (3)	ASL606-05PC-HE
Mating connector (3)	ASL006-05SC-HE
Pin 1	UBat
Pin 2	Gnd
Pin 3	CANH
Pin 4	CANL
Pin 5	Not connected
Sleeve	DR-25
Wire size with open end (2)	4 x AWG24
Wire length L	15 to 100 cm

CAN Parameters

Byte order	LSB (Intel)
CAN speed	1 Mbaud or 500 kbaud
Bit mask	unsigned
Offset (all signals)	0x8000 hex
Quantization Yaw Rate	0.005 [°/s/digit]
Quantization Roll Rate	0.005 [°/s/digit]
Quantization Acc X-axis	0.0001274 [g/digit]
Quantization Acc Y-axis	0.0001274 [g/digit]
Quantization Acc Z-axis	0.0001274 [g/digit]

Installation Notes

Mounting position: Connector opposite to driving direction.

The MM5.10 can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated fixing holes.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage and calibration sheet.

Please deliver the calibration sheet with your order placement.

Please note:
CAN ID0 0x0170 (Rx) or 0x75 (Rx) is used for synchronization and configuration of the sensor (SYNC). Make sure that the CAN ID 0x170 (Rx) or 0x75 (Rx) is not used in your CAN network by any other device.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

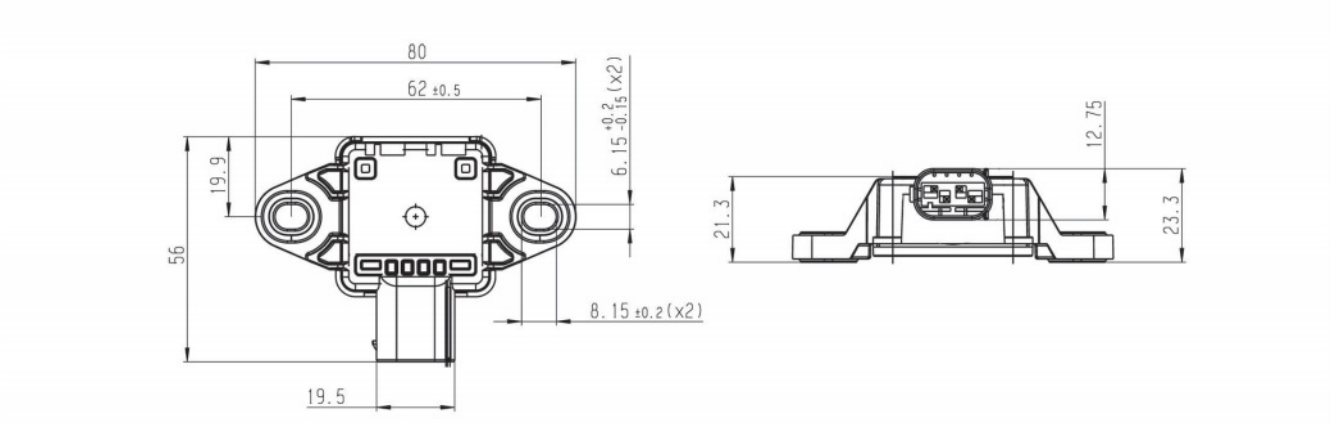
Ordering Information

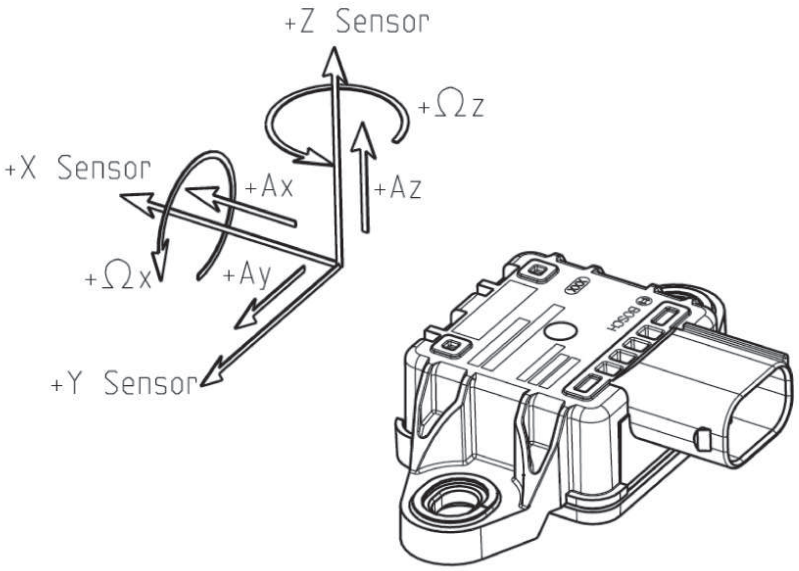
Acceleration Sensor MM5.10
Without wire (1)
Order number **F02U.V01.511-02**

Acceleration Sensor MM5.10
Wire with open end (2)
Order number **F02U.V01.511-92**

Acceleration Sensor MM5.10
Wire with motorsport connector (3)
Order number **F02U.V01.512-03**

Dimensions





Axis Scheme

Acceleration Sensor MM5.10-R



Features

- Application 1: ±163°/s (roll rate/ yaw rate)
- Application 2: ±4.2 g (X, Y and Z acceleration)
- Weight w/o wire: 28 g
- Size: 34 x 34 x 16.5 mm
- Power supply: 7 to 18 V

The MM5.10-R was designed to measure the physical effects of rotational and linear acceleration. In order to achieve this, the sensor includes MEMS measuring elements connected to an appropriate integrated circuit.
A rotational acceleration around the integrated sensing elements generates a Coriolis force which changes the internal capacity of the micro machined sensing parts. Furthermore, a pure surface micro machined element is used to measure the vehicle lineal acceleration in all 3 axes. This combination of rotational and linear acceleration sensors enables a precise measurement of the vehicle dynamics.
The main features and benefits of this sensor are the aluminum compact housing, the combination of 3 linear and 2 rotational accelerometers and its high speed 1 Mbaud CAN-signal output.

Application

Application I	±163°/s (roll rate/yaw rate)
Application II	±4.2 g (X, Y and Z acceleration)
Operating temperature range	-20 to 85°C

Technical Specifications

Mechanical Data

Weight w/o wire	28 g
Size	34 x 34 x 16.5 mm

Electrical Data

Power supply	7 to 18 V
Max input current	90 mA
CAN speed	1 Mbaud or 500 kbaud

CAN Message

CAN ID 01 0x174

Byte	Value
0	Yaw rate
1	
2	Reserved
3	
4	Acc Y-axis
5	
6	Reserved
7	Unused

CAN ID 02 0x178

Byte	Value
0	Roll rate
1	
2	Reserved
3	
4	Acc X-axis
5	
6	Reserved
7	Unused

CAN ID 03 0x17C

Byte	Value
0	Reserved
1	
2	Reserved
3	
4	Acc Z-axis
5	
6	Reserved
7	Unused

Characteristic

Characteristic Application I

Measuring range	± 160°/s
Over range limit	± 1,000°/s
Absolute physical resolution	0.1°/s
Cut-off frequency (-3 dB)	15 Hz; 30 Hz; 60 Hz

Characteristic Application II

Measuring range	±4.2 g
Over range limit	±10 g
Absolute physical resolution	0.01 g
Cut-off frequency (-3 dB)	15 Hz; 30 Hz; 60 Hz

6

Connectors and Wires

Connector	ASX002-05PA-HE
Mating connector	ASX602-05SA-HE
Pin 1	UBat
Pin 2	CANH
Pin 3	Not connected
Pin 4	CANL
Pin 5	Gnd
Sleeve	DR-25

CAN Parameters

Byte order	LSB (Intel)
CAN speed	1 Mbaud or 500 kbaud
Bit mask	unsigned
Offset (all signals)	0x8000 hex
Quantization Yaw Rate	0.005 [°/s/digit]
Quantization Roll Rate	0.005 [°/s/digit]
Quantization Acc X-axis	0.0001274 [g/digit]
Quantization Acc Y-axis	0.0001274 [g/digit]
Quantization Acc Z-axis	0.0001274 [g/digit]

Installation Notes

Mounting position: Connector opposite to driving direction.

The MM5.10-R can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated fixing holes.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage and calibration sheet.

Please deliver the calibration sheet with your order placement.

Please note:
CAN ID0 0x0170 (Rx) is used for synchronization and configuration of the sensor (SYNC). Make sure that the CAN ID 0x170 is not used in your can network by any other device.

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

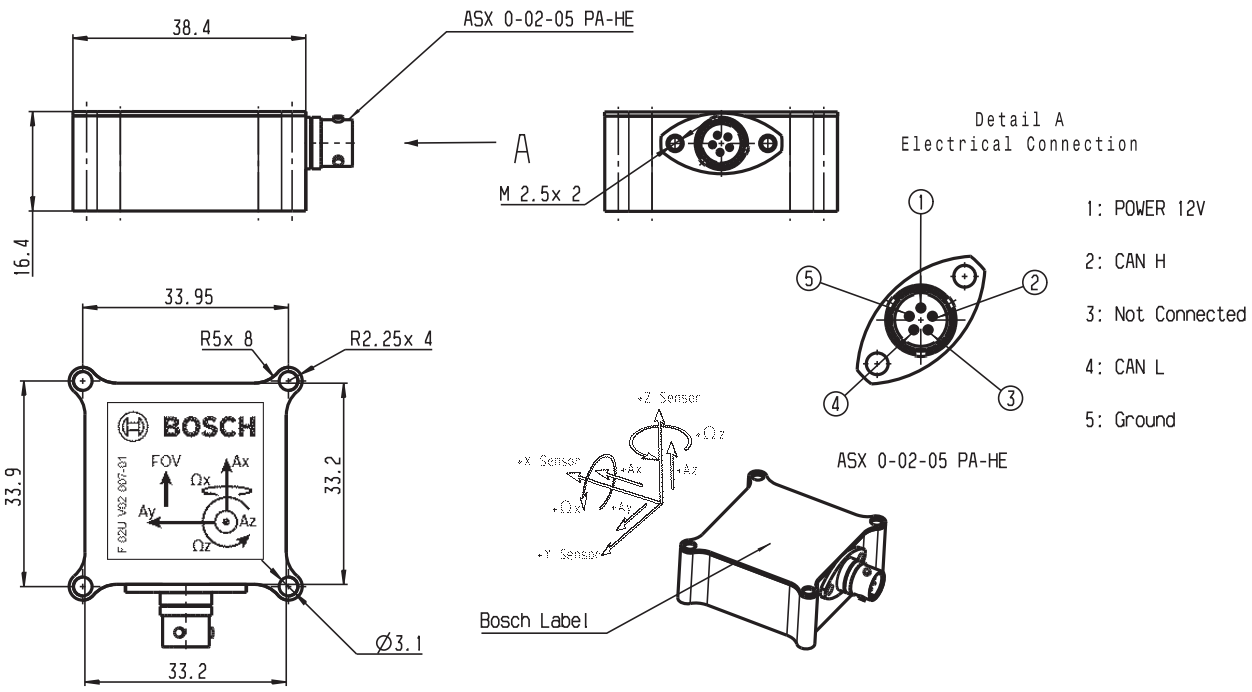
Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Acceleration Sensor MM5.10-R
Order number **F02U.V02.007-01**

Dimensions



Acceleration Sensor MM7.10



Features

- Application 1: ±163°/s (roll / pitch / yaw rate)
- Application 2: ±4.2 g (X, Y and Z acceleration)
- Weight w/o wire: 35 g
- Size: 80 x 56 x 23.3 mm
- Power supply: 8 to 16 V

The MM7.10 was designed to measure the physical effects of rotational and linear acceleration. In order to achieve this, the sensor includes MEMS measuring elements connected to an appropriate integrated circuit.
A rotational acceleration around the integrated sensing elements generates a Coriolis force, which changes the internal capacity of the micro machined sensing parts. Furthermore, a pure surface micro machined element is used to measure the vehicle linear acceleration in all 3 axis. This combination of rotational and linear acceleration sensors enables a precise measurement of the vehicle dynamics.
The main feature and benefit of this sensor is the combination of 3 linear and 3 rotational accelerometers and its high speed 1 Mbaud CAN-signal output.

Application

Application I	±163°/s (roll / pitch / yaw rate)
Application II	±4.2 g (X, Y and Z acceleration)
Operating temperature range	-20 to 85°C

Technical Specifications

Mechanical Data

Weight w/o wire	35 g
Size	80 x 56 x 23.3 mm

Electrical Data

Power supply	8 to 16 V
Max input current	100 mA at 7 V 50 mA at 14 V
CAN speed	1 Mbaud or 500 kbaud

CAN Message

CAN ID 01 0x174

Byte	Value
0	Yaw rate
1	
2	Reserved
3	
4	Acc Y-axis
5	
6	Reserved
7	Unused

CAN ID 02 0x178

Byte	Value
0	Roll rate
1	
2	Reserved
3	
4	Acc X-axis
5	
6	Reserved
7	Unused

CAN ID 03 0x17C

Byte	Value
0	Pitch rate
1	
2	Reserved
3	
4	Acc Z-axis
5	
6	Reserved
7	Unused

Characteristic

Characteristic Application I

Measuring range	± 163°/s
Over range limit	± 1,000°/s
Absolute physical resolution	0.1°/s
Cut-off frequency (-3 dB)	15 Hz; 30 Hz; 70 Hz

Characteristic Application II

Measuring range	±4.2 g
Over range limit	±20 g
Absolute physical resolution	0.01 g

Cut-off frequency (-3 dB)	15 Hz; 30 Hz; 70 Hz

Connectors and Wires

Connector (1)	**AMP 114-18063-076**
Mating connector (1)	F02U.B00.435-01
Pin 1	Gnd
Pin 2	CANL
Pin 3	CANH
Pin 4	UBat
Connector (2)	**ASL606-05PC-HE**
Mating connector (2)	ASL006-05SC-HE
Pin 1	UBat
Pin 2	Gnd
Pin 3	CANH
Pin 4	CANL
Pin 5	Not connected
Sleeve	DR-25
Wire with open end (3)	
Red wire	UBat
Black wire	Gnd
White wire	CANH
Blue wire	CANL
Wire size with open end (3)	4 x AWG24
Wire length L	15 to 100 cm

CAN Parameters

Byte order	LSB (Intel)
CAN speed	1 Mbaud or 500 kbaud
Bit mask	unsigned
Offset (all signals)	0x8000 hex
Quantization Roll Rate	0.005 [°/s/digit]
Quantization Pitch Rate	0.005 [°/s/digit]
Quantization Yaw Rate	0.005 [°/s/digit]
Quantization Acc X-axis	0.0001274 [g/digit]
Quantization Acc Y-axis	0.0001274 [g/digit]
Quantization Acc Z-axis	0.0001274 [g/digit]

Installation Notes

Mounting position: The MM7.10 must not be mounted with connector pointing upwards. Other than this Bosch has no restrictions for the mounting orientation. We recommend to align the sensor coordinate system to the vehicle coordinate system as this is the orientation that most systems will require and thus no mathematical transformation is needed.

The MM7.10 can be connected directly to most control units and data logging systems.

Please avoid abrupt temperature changes.

For mounting please use only the integrated fixing holes.

Please ensure that the environmental conditions do not exceed the sensor specifications.

Please find further application hints in the offer drawing at our homepage and calibration sheet.

Please deliver the calibration sheet with your order placement.

Please note:
CAN ID 04 0x7DC, RX1 0x7DF and RX2 0x7D4 are used for configuration of the sensor (SYNC). Make sure that the CAN ID 04 0x7DC, RX1 0x7DF and RX2 0x7D4 are not used in your CAN network by any other device.

CAN DBC file on request

Standards considered on request

Safety Note

The sensor is not intended to be used for safety related applications without appropriate measures for signal validation in the application system.

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

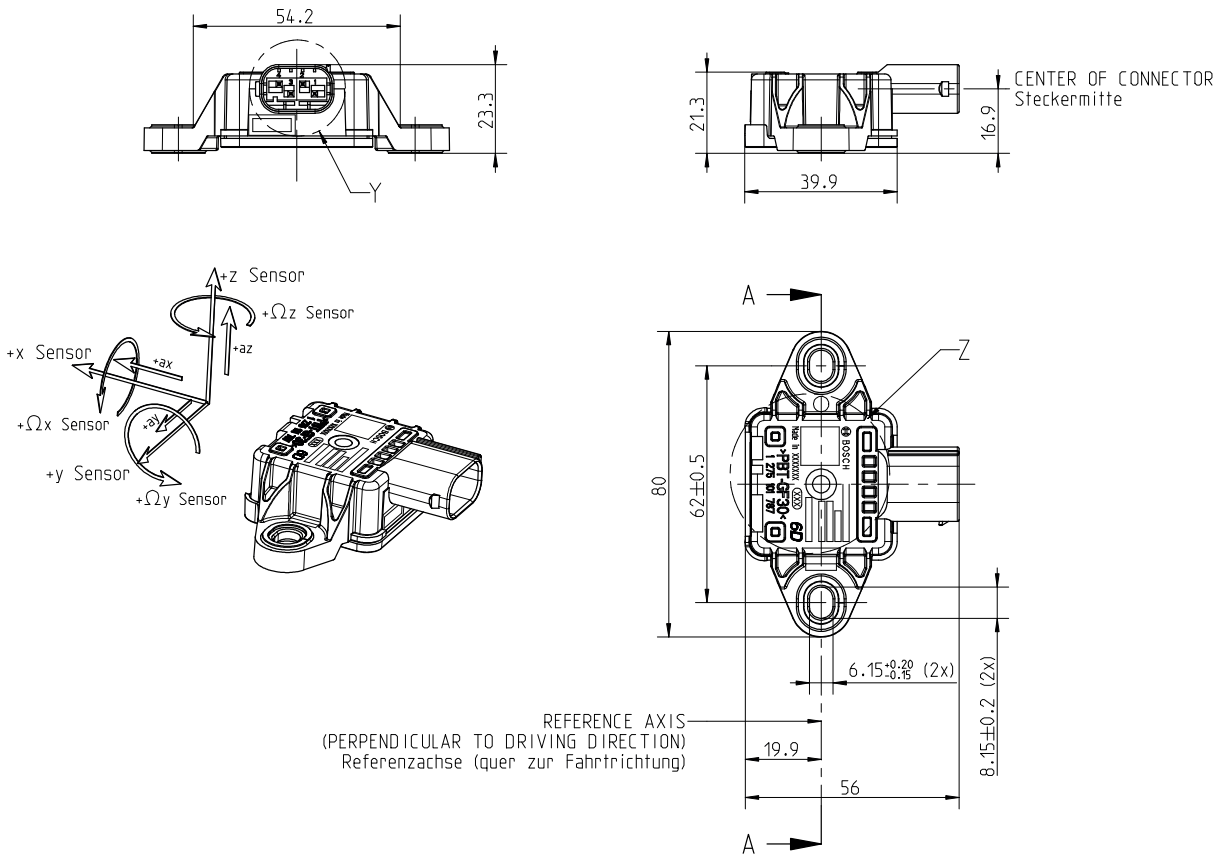
Ordering Information

Acceleration Sensor MM7.10
Without wire (1)
Order number **F02U.V03.092-01**

Acceleration Sensor MM7.10
Wire with motorsport connector (2)
Order number **F02U.V03.092-02**

Acceleration Sensor MM7.10
Wire with open end (3)
Order number **F02U.V03.092-90**

Dimensions


54.2
23.3
Y
21.3
16.9
CENTER OF CONNECTOR
Steckermitte
39.9
+z Sensor
+Ωz Sensor
+x Sensor
+ax
+az
+Ωx Sensor
+ay
+y Sensor
+Ωy Sensor
A
Z
80
62±0.5
6.15+0.20 -0.15 (2x)
8.15±0.2 (2x)
REFERENCE AXIS
(PERPENDICULAR TO DRIVING DIRECTION)
Referenzachse (quer zur Fahrtrichtung)
19.9
56
A

Brake 7

Antilock Braking Systems ABS 288

Electronic Brake System EBS 295

Overview

ABS M5 Kit



- Suitable for front-wheel, rear-wheel and four-wheel drive vehicles

ABS M5 Kit Clubsport



- Suitable for front-wheel, rear-wheel and four-wheel drive vehicles
- Generic wiring harness to fit all engine bay and front foot well locations for the hydraulic module
- Same ABS hardware as standard ABS M5 Kit

ABS M5 Kit Porsche Cup



- Plug & Play ABS M5 Kit for Porsche 997 Cup and 991 Cup Gen 1 and Gen 2
- Tested and developed on racetracks like Spa and Nordschleife
- Detailed installation instruction available at our website
- 1 Mbaud CAN

ABS M5 Kit



Features

- Suitable for front-wheel, rear-wheel and four-wheel drive vehicles

We developed ABS M5 for the operation in front-, rear- or 4-wheel drive vehicles. A vehicle specific wiring harness is included in the Kit.
The ABS M5 is specifically adapted for motorsport use. Individual car parameters like e.g. vehicle weight, vehicle track, wheel weights, wheel circumferences, wheel base or number of increments can be calibrated with software free of charge. Please contact your Bosch Motorsport dealer for further information.

Downloads about this (see Resources folder)

RaceABS Software Tool 3.5.3.1 (Resources/zip/9007199325354763.zip)

Technical Specifications

Variations

Option	Kit 1	Kit 2	Club-Sport
F02U.V05.2	89-01	90-01	91-01 92-01 93-01 94-01 95-01 96-01
Customized wiring loom	+	+	-
ABS-Off position optional on position 1	+	+	-
Selection of ABS maps via Bosch 12-position switch or via specified CAN signal	+	+	+*
Motorsport connectors for wheel speed sensors	-	+	-
Flexible CAN terminals	+	+	+**
Downforce depending slip regulation	+***	+***	-
Lateral acceleration slip regulation	+	+	-
Corner inside wheel slip reduction regulation	+	+	-

+*: fixed Kit Content
+**: Adjustable via Coding Plug
+***: Enabled with customer specific calibration

Mechanical Data

Hydraulic unit	
Serial housing, dust- and damp-proof	
Vibration damped circuit board	
38 pin connector	
2 hydraulic valves per wheel	
2 brake circuits (front and rear)	
2 hydraulic high pressures pumps	
2 hydraulic accumulators	5 cm^3/each
Standard fittings	2 x master cylinders M12 x 1 4 x brake cylinders M10 x 1
Size	122 x 110 x 122 mm
Operating temperature	-30 to 130°C
Max. shock	50 g less than 6 ms
Max. working speed	360 km/h = 100 m/s = 224 mph

Pressure Medium

DOT 4 brake fluid	
DOT 5.1 brake fluid	

Electrical Data

Supply voltage	10 to 16 V, max. 24 V for 5 min
Max. peak voltage	35 V for 200 ms
Power consumption Pump	230 W
Power consumption Relay	170 W
Power consumption Electronics	8 W

Inputs

4 active wheel speed DF11i, DF11S or DF11V
Brake pressure (front brake circuit / rear brake circuit)
Longitudinal acceleration, lateral acceleration, yaw rate (MM5.10 sensor)
11 adjustment settings (applicable for OEMs)
ABS function can be deactivated (Pos. 1 or Pos. 12)

Outputs

ABS warning light (MIL)

EBD warning light (MIL) if needed	
TTL wheel speed signal FL / FR / RL / RR	

Content of Kit and Weights

Hydraulic unit	1,910 g
2 pressure sensors	40 g/each
Yaw/acceleration sensor	60 g
12 position function switch	50 g
4 wheel speed sensors DF11 standard	50 g/each
ABS warning light (MIL)	50 g
Vehicle specific wiring harness with motorsport connectors	Depends on version
Clubsport wiring harness	1,540 g
Mounting and vibration-damping boards	80 g
Mounting board for hydraulic unit	212 g

Communication

ABS and Yaw rate sensor	CAN1
Diagnostics	MSA Box II

Installation Notes

Maintenance Interval (brake fluid change, bleeding): 220 h or a maximum of two years.
The load on the hydraulic unit in racing is much higher than in pure road operation, therefore we recommend a replacement of the unit after two years.

Legal Restrictions

The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

ABS M5 Kit 1
Order number **F02U.V05.289-01**

ABS M5 Kit 2
Order number **F02U.V05.290-01**

ABS M5 Kit Clubsport
DF11i, 500 kbaud
Order number **F02U.V05.291-01**

ABS M5 Kit Clubsport
DF11i, 1 Mbaud
Order number **F02U.V05.292-01**

ABS M5 Kit Clubsport
DF11S, 500 kbaud
Order number **F02U.V05.293-01**

ABS M5 Kit Clubsport
DF11S, 1 Mbaud
Order number **F02U.V05.294-01**

ABS M5 Kit Clubsport
DF11V, 500 kbaud
Order number **F02U.V05.295-01**

ABS M5 Kit Clubsport
DF11V, 1 Mbaud
Order number **F02U.V05.296-01**

Dimensions

ABS M5 Kit Variations

	ABS M5 Kit 1	ABS M5 Kit 2	ABS M5 Kit Clubsport	ABS M5 Kit Clubsport	ABS M5 Kit Clubsport
Tpye	Kit 1	Kit 2	1 Mbaud, DF11i	500 kbaud, DF11i	1 Mbaud, DF11S
Wiring harness	Specific	Specific	Generic	Generic	Generic
4 wheelspeed sensors DF11S	Included, with standard connectors	Included, with motorsport connectors	Not included	Not included	Included, with standard connectors
Wheel speed signal splitter	included*	Included*	included*	included*	included*
Fuses	Not included	Not included	Not included	Not included	Not included
Brake pipe fittings	Not included	Not included	Not included	Not included	Not included

	ABS M5 Kit Clubsport	ABS M5 Kit Clubsport	ABS M5 Kit Clubsport	ABS M5 Kit Porsche 991 Cup Gen 1	ABS M5 Kit Porsche 991 Cup Gen 2
Tpye	500 kbaud, DF11S	500 kbaud, DF11V	1 Mbaud, DF11V	Model year 2015	Model year 2017
Wiring harness	Generic	Generic	Generic	Specific	Specific
4 wheelspeed sensors DF11S	Included, with standard connectors	Not included	Not included	Included, Porsche specific DF11S	Included, Porsche specific DF11S
Wheel speed signal splitter TTL	included*	included*	included*	Included, DF11	Included, DF11
Fuses	Not included	Not included	Not included	Included	Included
Brake pipe fittings	Not included	Not included	Not included	Included	Included

*TTL splitter incl. in ABS Hardware, DF11 splitter optional

ABS M5 Kit Clubsport



Features

- Suitable for front-wheel, rear-wheel and four-wheel drive vehicles
- Generic wiring harness to fit all engine bay and front foot well locations for the hydraulic module
- Same ABS hardware as standard ABS M5 Kit

The ABS M5 Kit Clubsport is developed for the operation in front-, rear- or 4-wheel drive vehicles. A generic wiring harness is included in the kit. This enables us to provide the kit with a significantly reduced price in comparison to the standard ABS M5 Kit with individual loom.
The ABS M5 Kit Clubsport is specifically adapted for motorsport use. Individual car parameters like e.g. vehicle weight, vehicle track, wheel weights, wheel circumferences, wheel base or number of increments can be calibrated with software free of charge.
Please contact your Bosch Motorsport dealer for further information.

Technical Specifications

Mechanical Data

Hydraulic unit	
Serial housing, dust- and damp-proof	
Vibration damped circuit board	
38 pin connector	
2 hydraulic valves per wheel	
2 brake circuits (front and rear)	
2 hydraulic high pressures pumps	
2 hydraulic accumulators 5 cm^3/each	
Standard fittings	2 x master cylinders M12 x 1 4 x brake cylinders M10 x 1
Size	122 x 110 x 122 mm
Weight	1,910 g
Operating temperature	-30 to 130°C
Max. shock	50 g less than 6 ms
Max. working speed	360 km/h = 100 m/s = 224 mph

Pressure Medium

DOT 4 brake fluid	
DOT 5.1 brake fluid	

Electrical Data

Supply voltage	10 to 16 V max. 24 V for 5 min
Max. peak voltage	35 V for 200 ms
Power consumption Pump	230 W
Power consumption Relay	170 W
Power consumption Electronics	8 W

Inputs

4 active wheel speed DF11i, DF11S or DF11V
Brake pressure (front brake circuit / rear brake circuit)
Longitudinal acceleration, lateral acceleration, yaw rate (MM5.10 sensor)
11 adjustment settings
ABS function can be deactivated (Pos. 12)

Outputs

ABS warning light (MIL)
TTL wheel speed signal FL / FR / RL / RR

Content of Kit and Weights

Hydraulic unit	1,910 g
2 pressure sensors	40 g/each
Yaw/acceleration sensor	60 g
12 position function switch	50 g
4 wheel speed sensors DF11 standard	50 g/each
ABS warning light (MIL)	50 g
Standard wiring harness	1,540 g
Mounting and vibration-damping boards	80 g
Mounting board for hydraulic unit	212 g

Communication

ABS and Yaw rate sensor	CAN1
Diagnostics	MSA Box II

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

ABS M5 Kit Clubsport
DF11i, 500 kbaud
Order number **F02U.V05.291-01**

ABS M5 Kit Clubsport
DF11i, 1 Mbaud
Order number **F02U.V05.292-01**

ABS M5 Kit Clubsport
DF11S, 500 kbaud
Order number **F02U.V05.293-01**

ABS M5 Kit Clubsport
DF11S, 1 Mbaud
Order number **F02U.V05.294-01**

ABS M5 Kit Clubsport
DF11V, 500 kbaud
Order number **F02U.V05.295-01**

ABS M5 Kit Clubsport
DF11V, 1 Mbaud
Order number **F02U.V05.296-01**

ABS M5 Kit Porsche Cup



Features

- Plug & Play ABS M5 Kit for Porsche 997 Cup and 991 Cup Gen 1 and Gen 2
- Tested and developed on racetracks like Spa and Nordschleife
- Detailed installation instruction available at our website
- 1 Mbaud CAN

The ABS M5 Kit Porsche Cup is a derivative of the successful ABS M5 kit and specifically designed for Porsche 997 Cup and 991 Cup. A vehicle specific wiring harness is included in the kit. Individual car parameters like e.g. vehicle weight, vehicle track, wheel weights, wheel circumferences, wheel base or number of increments can be calibrated with software free of charge. Please contact your Bosch Motorsport dealer for further information.

Technical Specifications

Variations

	997 Cup (System DF11S)	991 Cup (System DF11i)
4 wheel speed sensors	Included, Porsche specific DF11S	Not included, series sensors fit
ABS warning light (MIL)	Included	Included (LED type)
Brake pipe fittings	Not included	Included
Fuses	Not included	Included
Holder for Hydraulic unit	Included, standard	Included, Porsche specific

Mechanical Data

Hydraulic unit

Vibration damped circuit board	
38 pin connector	
2 hydraulic valves per wheel	
2 brake circuits (front and rear)	
2 hydraulic accumulators 5 cm^3/each	
Standard fittings	2 x master cylinders M12 x 1 4 x brake cylinders M10 x 1
Size	122 x 110 x 122 mm
Weight	1,910 g
Operating temperature	-30 to 130°C
Max. shock	50 g less than 6 ms
Max. working speed	360 km/h = 100 m/s = 224 mph

Pressure Medium

DOT 4 brake fluid	
DOT 5.1 brake fluid	

Electrical Data

Supply voltage	10 to 16 V, max. 24 V for 5 min
Max. peak voltage	35 V for 200 ms
Power consumption pump	230 W
Power consumption relay	170 W
Power consumption electronics	8 W

Inputs

4 active wheel speed DF11	
2 brake pressure (front brake circuit, rear brake circuit)	
Longitudinal acceleration	
Lateral acceleration	
12 position function switch:	• 11 maps preconfigured • 1 switch position for ABS function OFF

Outputs

ABS warning light (MIL)	
CAN channels: see manual	

Optional Accessories

Data logger C 70	F02U.V02.302-02
Display DDU 9	F02U.V02.300-03

Content of Kit

Hydraulic unit

Holder for Hydraulic unit	See Variations
4 Wheel speed sensors	See Variations
2 pressure sensors	
MM5.10 acceleration sensor	
Vibrations damping board for acceleration sensor	
12 position function switch	
ABS warning light (MIL)	See Variations
Specific wiring harness	

Brake pipe fittings	See Variations
Fuses	See Variations
Fuse mounting bracket	

Required Content

Brake pipes not included, available at Bosch Motorsport dealer

Communication

CAN via Com Interface MSA-Box II

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

ABS M5 Kit Porsche 997 Cup
Order number **F02U.V05.289-20**

ABS M5 Kit Porsche 991 Cup Gen 1
2015 Model Year
Order number **F02U.V05.289-18**

ABS M5 Kit Porsche 991 Cup Gen 2
2017 Model Year
Order number **F02U.V05.289-19**

Electronic Brake System EBS



Features

- Suitable for one axle use

We developed EBS for the operation in electric or hybrid vehicles on one axle. A vehicle specific wiring harness can be purchased (vehicle specific definition is needed).
The EBS is specifically adapted for motorsport use. Individual car parameters like e.g. brake pads friction can be calibrated with software free of charge. Please contact your Bosch Motorsport dealer for further information.

Technical Specifications

Mechanical Data

Hydraulic unit	
Serial housing, dust- and damp-proof	
Vibration damped circuit board	
38 pin connector	
6 hydraulic valves for inlet/outlet	
1 separation backup valve	
1 electric pump motor	
1 hydraulic accumulator	160 bar/90 cm^3
Standard fittings	M12 x 1
Size	176 x 144 x 157 mm
Operating temperature	-30 to 130°C
Max. shock	50 g less than 6 ms
Max. working pressure	130 bar; max. recommended locking pressure 120 bar
Max. pressure gradient	up to 2,000 bar/s

Pressure Medium

DOT 4 brake fluid	
DOT 5.1 brake fluid	

Electrical Data

Supply voltage	10 to 16 V max. 24 V for 5 min
Max. peak voltage	35 V for 200 ms
Max. peak at start	<165 A
Current consumption Pump	<40 A
Current consumption Relay	<16.5 A
Power consumption Electronics	<1.5 A

Inputs

1 x PWM Target (Pressure or Torque)
1 x PWM input calliper pressure
1 x CAN1; 500 k or 1 Mb selectable
1 x CAN1 DC (Daisy Chain)
EBS function switch 6 positions via CAN1

Outputs

EBS warning light (MIL) via CAN1
EBS diagnostic via CAN1

Required Additionals

Mounting Board for Hydraulic Unit	
Pressure Sensors Fluid PSS-260	2 required
Com Interface MSA Box II	Required for communication and programming, not mandatory if available

Spare Parts

Mounting Rubber Elements Kit	5 sets (10 units Ø 18 mm; 5 units Ø 23 mm)

Component Weights

Hydraulic Unit	3,630 g
Mounting Board for Hydraulic Unit	300 g
2 Pressure Sensors Fluid PSS-260	40 g/each
Vehicle specific wiring harness with motorsport connectors	Depends on version

Pin Configuration

1	**UB_MR**
...	
13	**GND_MR**
14	CAN1M
15	CAN1M-DC
...	
25	**UB_VR**
26	CAN1P
27	CAN1P-DC
28	WAU_IN

...	
31	PWM Gnd
...	
33	PWM 5 V
...	
36	P_Target_PWM
37	P Caliper PWM in
38	**GND_ECU**

Communication

EBS	CAN1
Diagnostics	Com Interface MSA-Box II

Installation Notes

Maintenance Interval (brake fluid change, bleeding): 220 h or a maximum of two years.
The load on the hydraulic unit in racing is much higher than in pure road operation, therefore we recommend a replacement of the unit after one year.

Legal Restrictions

The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Electronic Brake System EBS
Order number **F02U.V02.900-01**

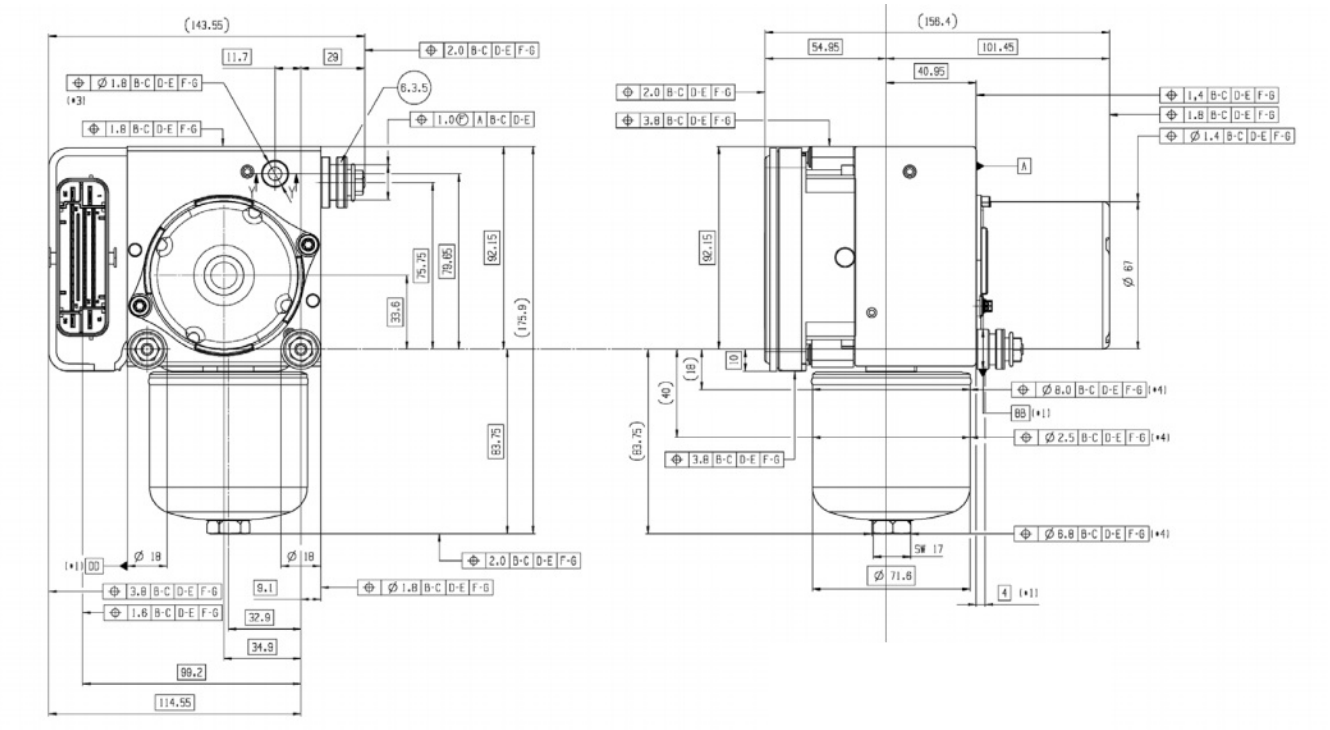
Com Interface MSA-Box II
Not mandatory if available
Order number **F02U.V00.327-03**

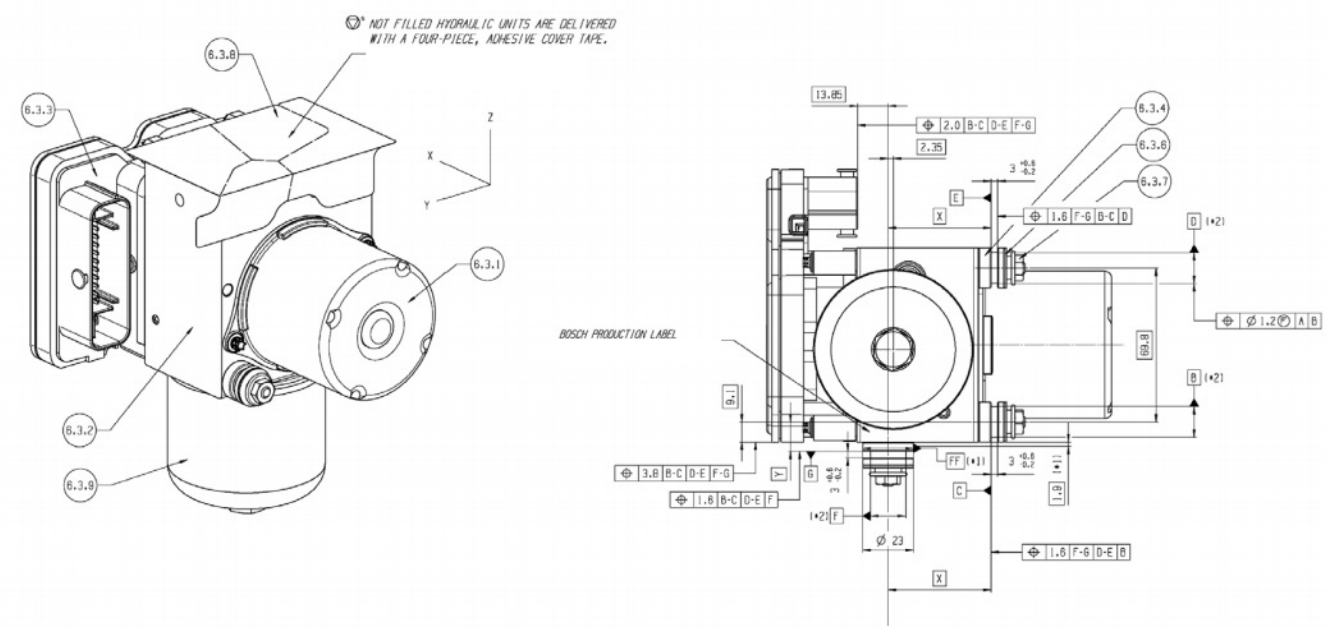
Mounting Board for Hydraulic Unit
Order number **0265.Y5H.505-01**

Pressure Sensor Fluid PSS-260
Order number **0261.545.040**

Mounting Rubber Elements Kit
Spare Part
Order number **F02U.V03.318-01**

Dimensions




NOT FILLED HYDRAULIC UNITS ARE DELIVERED WITH A FOUR-PIECE, ADHESIVE COVER TAPE.
6.3.8
6.3.3
6.3.1
6.3.2
6.3.9
Z
X
Y
BOSCH PRODUCTION LABEL
13.85
2.35
6.3.4
6.3.8
6.3.7
69.8
9.1
Ø 23

Software 8

Analysis 300

API 302

Customer Code Area 303

Licenses 304

PBXSuite 305

RaceABS 306

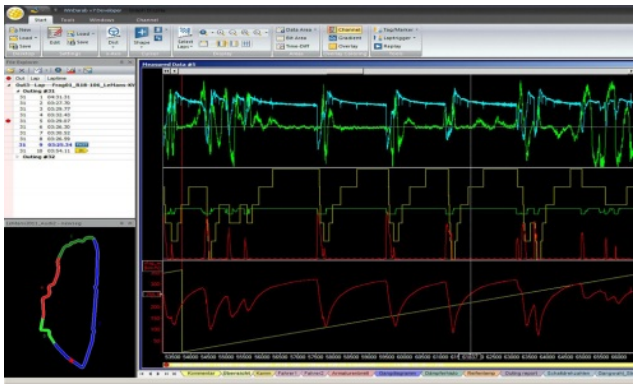
RaceConnect 307

Scrutineering 308

Simulation 309

System Configuration 312

Analysis Tool WinDarab V7



8

Features

- State of the art user interface, versatile diagrams
- Numerous analysis functions
- Customizable mathematical channels and filters
- Software based license without dongle
- License Troubleshooting

WinDarab V7 is an evaluation tool for monitoring and analyzing of logged data and is specially designed for motorsport use. Monitor vehicle data using online telemetry and compare logged data by reading out your data logger. WinDarab V7 features a state of the art user interface and reads out both engine and chassis data.
The follower of WinDarab V6 offers simplified and ergonomic handling as well as new features and a revised license system to work without a dongle.
Choose between the *Free* and the *Expert* version depending on your purpose.
The enormous bandwidth of features makes WinDarab V7 a perfect evaluation tool for motorsport engineers.

Application

Diagrams
Oscilloscope
X-/Y-plot to create scatterbands
Histogram
3D-diagram
Analysis
Overlay of different laps
Time or distance based analysis
Absolute and relative values
One-touch channel statistics (min./max., avg., etc.)
Regression lines, user defined lines
Lap reports and lap based comparisons
Replay offline data in realtime
Advanced Analysis
User defined math channels
User defined conditions to filter data
FFT analysis
Racetracks
Racetrack creation based on v/acc or GPS data
Racetrack segmentation
Telemetry
Replay online data in realtime
Gauges for realtime visualization
User Interface
Flexible display setup and arrangement
Storable display setup and arrangement
Lap browser
Data Transmission
Direct data input without intermediate hardware
Protection/encryption of logged data files
ASCII import and export
License System
Dongle-free working in all WinDarab V7 variations
Activation/update via internet
Annual maintenance for up-to-date versions

Environment

PC
IBM PC Pentium/AMD Athlon compatible, min. 1.6 GHz
Min. 1 GB RAM
Min. 1 GB free HD space
VGA / WGA monitor (min. 1,024 x 768)
Recommended Operation System Windows 10

Technical Specifications

Variations

	Free	Expert
Max. open files	4	unlimited
Max. measuring data windows	2	unlimited
Max. areas in measuring data windows	4	unlimited
Histogram	+	+
x/y-plot	+	+
Distribution	+	+
min/max-tables	+	+
Fourier-transformation	+	+

Outing report	+	+
Lap analysis	-	+
Flowcharts	-	+
Instrument panel	+	+
User defined physical units	+	+
Racetrack generation via speed/lateral G or GPS	+	+
ASCII export	+	+
Available operators for math channels.	*+, -, *, /, ^, sqr (x), sqrt (x)*	All
Extras settings/comments	-	+
Desktop load/save	+	+
Telemetry	+	+
Programming interface (API)	-	Opt.

Installation Notes

Yearly maintenance is recommended, no components to replace.

Legal Restrictions

The sale of this Software Tool in Mexico is prohibited.
Due to embargo restrictions, sale of this Software Tool in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

WinDarab Free Version
Order number **free download at our homepage**

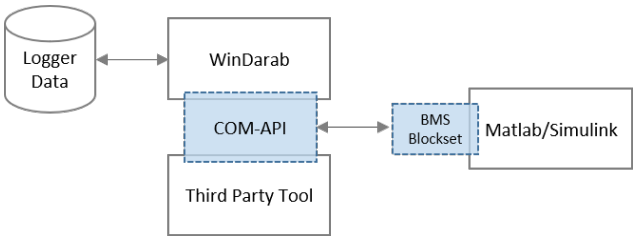
WinDarab Expert
Order number **F02U.V01.308-01**

Software Options

Software licence COM-API for WinDarab Expert
Order number **F02U.V01.682-01**

Yearly maintenance
Order number **F02U.V01.345-01**

COM-API for WinDarab Expert



8

Features

▶ Gives external tools access to WinDarab functionalities

Using COM-API allows some control over WinDarab:

- Attaching to or creating new instances of WinDarab Application
- Data Domain (opened files and overlays)
- Cursor position – View range
- Marked/Tagged range

Users can also compile their application as a WinDarab Plugin. This allows custom buttons and menus on the WinDarab Ribbon. Apart from plugins, applications using COM-API are *out of process communication*.

COM-API can create new measurement files

- A 3rd party application/plugin can use the UserDataFile class to create new measurement files with application generated channel data.
- Files created with the new API are written in WinDarab file format v2 which is supported since WinDarab v7.6.
- A brief example how to write a file can be found in the BMS2ApiSamples.Net project, see the source in CreateUserDataFile.cs.

The application of COM-API requires the Expert-version of WinDarab, it doesn't work with the Free-version.

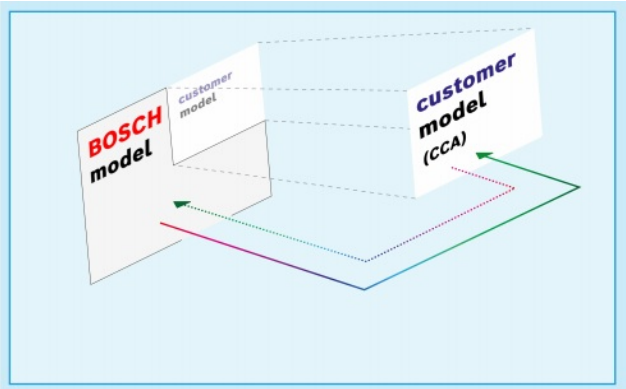
Legal Restrictions

The sale of this Software Tool in Mexico is prohibited.
Due to embargo restrictions, sale of this Software Tool in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

COM-API for WinDarab Expert
Yearly License
Order number **F02U.V01.682-01**

CCA Development Environment



Features

- Calculation directly in Bosch main device possible
- Communication binding via Software free cuts
- Unlimited bandwidth interfaces
- One Box Design (compact solution, no extra weight)

We provide the option to run software code on our ECUs that has been developed by the customer. This code is run in the customer code area (CCA) and is protected against access of anyone else. Within ECUs and VCUs, this feature can be run in parallel to all further functionality.
We deliver it with a full environment for Matlab/Simulink, a compiled Bosch model as library and a package of Matlab/Simulink interfaces to all I/Os.

Technical Specifications

General Functions

Support for generating executables that include algorithm, device-driver and real-time operating system

Multitasking scheduling using time synchronous (and asynchronous) tasks, task pre-emption and temporary task overruns

Environment for Matlab/Simulink

Full I/O access with Bosch-Motorsport device drivers

Full read access to all Bosch signals

Development Environment with reduced Bosch “unit_blockset”

Real time calibration

Calibration and measurement interface XCP via Ethernet

SW-Download via Bosch Motorsport calibration tool RaceCon

Software option for all ECUs and VCUs

Free maintenance for the first 12 month, afterwards with costs.

System Requirements

MathWorks Requirements

- MATLAB R2018b
- Simulink R2018b
- MATLAB Coder
- Embedded Coder
- Simulink Coder
- Stateflow
- Compiler for Mathworks
- Microsoft Visual C++ 2017

Operating System

- Windows 10
- Microsoft Visual C++ 2005 Redistributable (x64)
- Microsoft Visual C++ 2008 Redistributable (x86)
- Microsoft Visual C++ 2008 Redistributable (x64)
- Microsoft .NET Framework 2.0, 3.5.1, 4.8
- Microsoft Excel 2016(32bit) or Office365(64bit)

DocGen

- basic-miktex-21.2-x64.exe from https://miktex.org/download

Additional (not included)

Multi CCA for VCU

Enables the use of an extra core to utilize more computing power in the device for running a second customer model

Legal Restrictions

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Ordering Information

CCA Development Environment
Order number **F02U.V02.370-01**

Multi CCA Development Environment for VCU
Order number **F02U.V03.223-01**

Software Options

CCA Hardware Upgrade per device
Order number **F02U.V02.137-01**

Multi CCA Hardware Upgrade VCU per device
Order number **F02U.V03.222-01**

License Manager



Bosch Motorsport License Manager is an easy tool to manage your locally installed licenses.

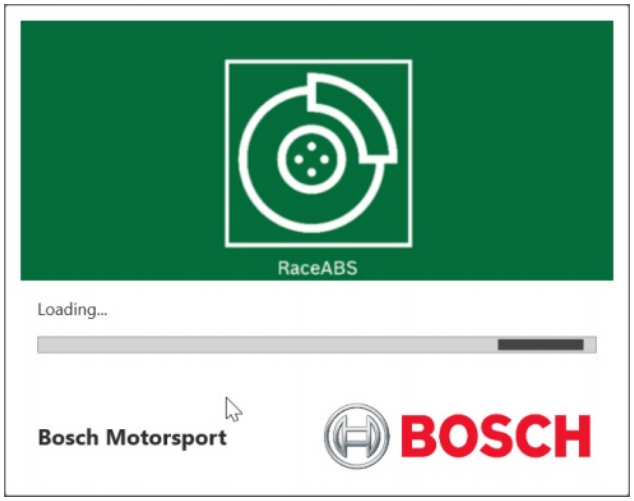
- This update license feature in the tool helps you to apply a new license using the license number or with a license file which is typically used for offline purposes.
- The force update feature in the tool helps verify if there are any new updates available and guides you to install the update.
- Manage license feature guides you to Raceconnect page where license self management is done.
- Help feature in the tool guides you to Bosch Motorsport Licenses page to troubleshoot and download related tools.

PBXSuite



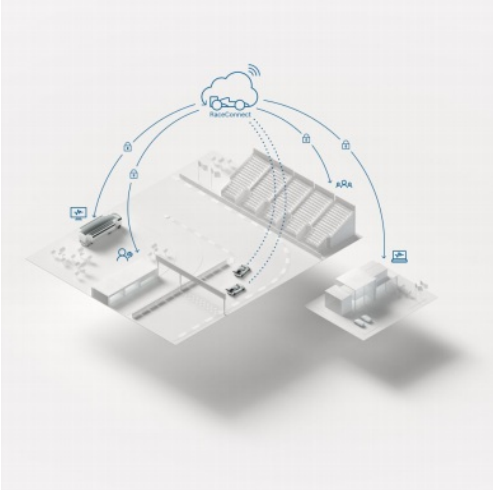
PBXSuite is the Bosch Motorsport programming and diagnostic software tool for powerboxes.

RaceABS Software Tool



RaceABS is the Bosch Motorsport programming and diagnostic software tool for ABS and EBS systems.

RaceConnect



Features

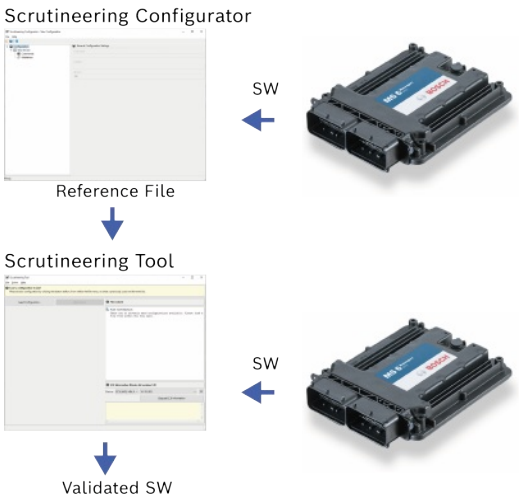
- LTE-based online telemetry system for continuous transfer of vehicle data to scalable, location-independent receivers. Secured data transfer and handling between the racecar and the cloud portal.
- Modular systems architecture and multi-disciplinary engineering expertise yields flexible and fast service enhancement and development according to customer needs.
- The ready-to-use solution requires no further infrastructure at the track.
- Realization of any combination of unidirectional communication routes between transmitter, cloud and receiver, for example, multiple transmitters to one receiver or one transmitter to multiple receivers.
- Full customer control and diagnostics due to accessing racecar data and modem connection status through the cloud interface.

RaceConnect combines years of expertise in component and system development with connectivity and cloud competence. The ready-to-use package for vehicle data transmission, storage and post-processing includes hardware, connectivity solutions, software services and system integration expertise.

Ordering Information

RaceConnect
Please contact us for further information.
Order number **on request**

Scrutineering Configurator and Tool



Features

- Verification of the ECU software content
- State of the art Hash algorithm SHA-256

The Scrutineering Configurator and Tool is a software package developed for teams and OEMs to validate the software content of Bosch Motorsport ECUs.
The Scrutineering Configurator creates the reference file required to check the software status of a control unit. All you need is a template file and the Bosch control unit prepared with the correct software. The template file can be configured and is provided by Bosch, please contact Bosch.
The Scrutineering Tool checks the content of a control unit against the reference file.

Scrutineering Tool standalone
If you do not need the configurator and only want to work with the scrutineering tool (e.g. marshal or team), you can order the tool separately. You will need a license number to activate the tool, which we provide free of charge.

Technical Specifications

PC Environment

IBM PC Pentium/AMD Athlon compatible, min. 1.6 GHz
Min. 2 GB RAM
Min. 1 GB free hard disc space
VGA/WGA monitor (min. 1,024 x 768)
Recommended Operation System Windows 10

Installation Notes

Software license valid for the duration of one year from activation. If the license is not renewed after that, further use is not possible.
Initial minimum purchase quantity is 3 licenses, after one year there is no minimum purchase quantity anymore.

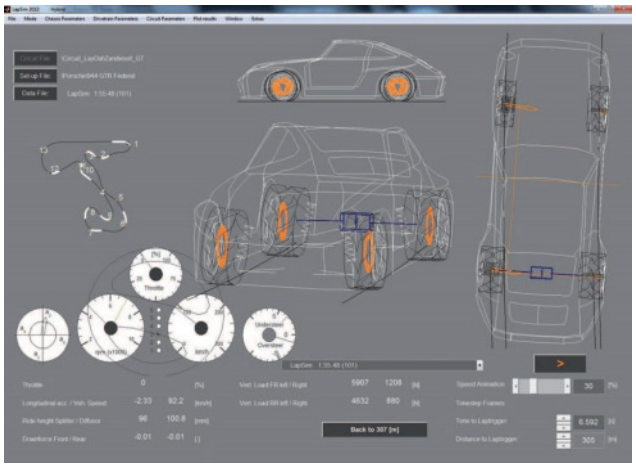
Legal Restrictions

The sale of this Software Tool in Mexico is prohibited.
Due to embargo restrictions, sale of this Software Tool in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Scrutineering Configurator and Tool Please contact us for Software Download. Order number **F02U.V03.072-01**
Scrutineering Tool standalone Please contact us for Software Download (free of charge). Order number **F02U.V03.071-01**

Simulation Tool LapSim



Features

- Professional Simulation Tool
- Free / Chassis / Engine Versions available
- Find the Operation Manual here.
- Find the Installation Manual here.

LapSim Chassis
is both an analysis tool as well as a vehicle simulation program. By further processing the on-car recorded data, using parts of the simulation models, a much more profound analysis of the vehicle behavior can be gained. Due to the direct link with the simulation model, vehicle parameters can be validated like aerodynamics, tire behavior, engine power, as well as driver performance. The visualization of the vehicle behavior creates a much easier and better understanding of the influence of several vehicle parameters on the performance independent of the technical background of the user.

LapSim Engine
supplies an easy to use engine simulation package capable of generating a torque/power and a corresponding ignition curves out of the main parameters of an engine. The model is able to simulate any 4-stroke spark ignition (SI) race engine currently seen on the market, with or without air restrictor(s). To summarize, the engine software is aiming for 95 % accuracy but 5 % the effort of complex engine software packages. The engine software avoids a vast number of variables in order to define every engine detail, in order to improve usability as well as computational performance. The engine package is integrated in the lap simulation.

Application

Data Analysis

Post processing of the on-car recorded data with simulation models. Calculating vehicle handling state, aerodynamics, differential function, etc.

Determination of tire parameters out of on-car recorded data. Possibility to analyze tire performance over the laps.

Direct comparison between several outings and/or simulation model.

3D Animation of vehicle behavior for a better and more thorough understanding.

By comparing recorded data with simulation data a validation possibility of vehicle parameters and vehicle functioning is made.

LapSim software adds all vehicle parameters to WinDarab Files and creates automatic database.

Chassis Simulation model

Practical Pacejka like tire model. Tire parameters can easily be determined out of on-car recorded data. No tire data required.

Full vehicle model including limited slip (or visco-) differential

3D aero maps

Ride height dependent suspension kinematics

Calculation time 3-4 times faster than real car

(PVI - 3 GHz)

Automatic set-up optimization

Engine Simulation model

Engine model generates torque/power curve as well as ignition angle

Normally aspirated engines, with or without restrictor

2,3,4 and 5 valve cylinder heads

2-zone burn model in order to cope with all possible compression ratios and chamber geometries

Ignition point is determined by adjustable maximum pressure in cylinder

Fully adjustable camshaft profile

Engine model generates pressure curve over 720° crankshaft, which is integrated to calculate engine torque/power

10 seconds calculation time for 0 to 10,000 rpm range

Legal Restrictions

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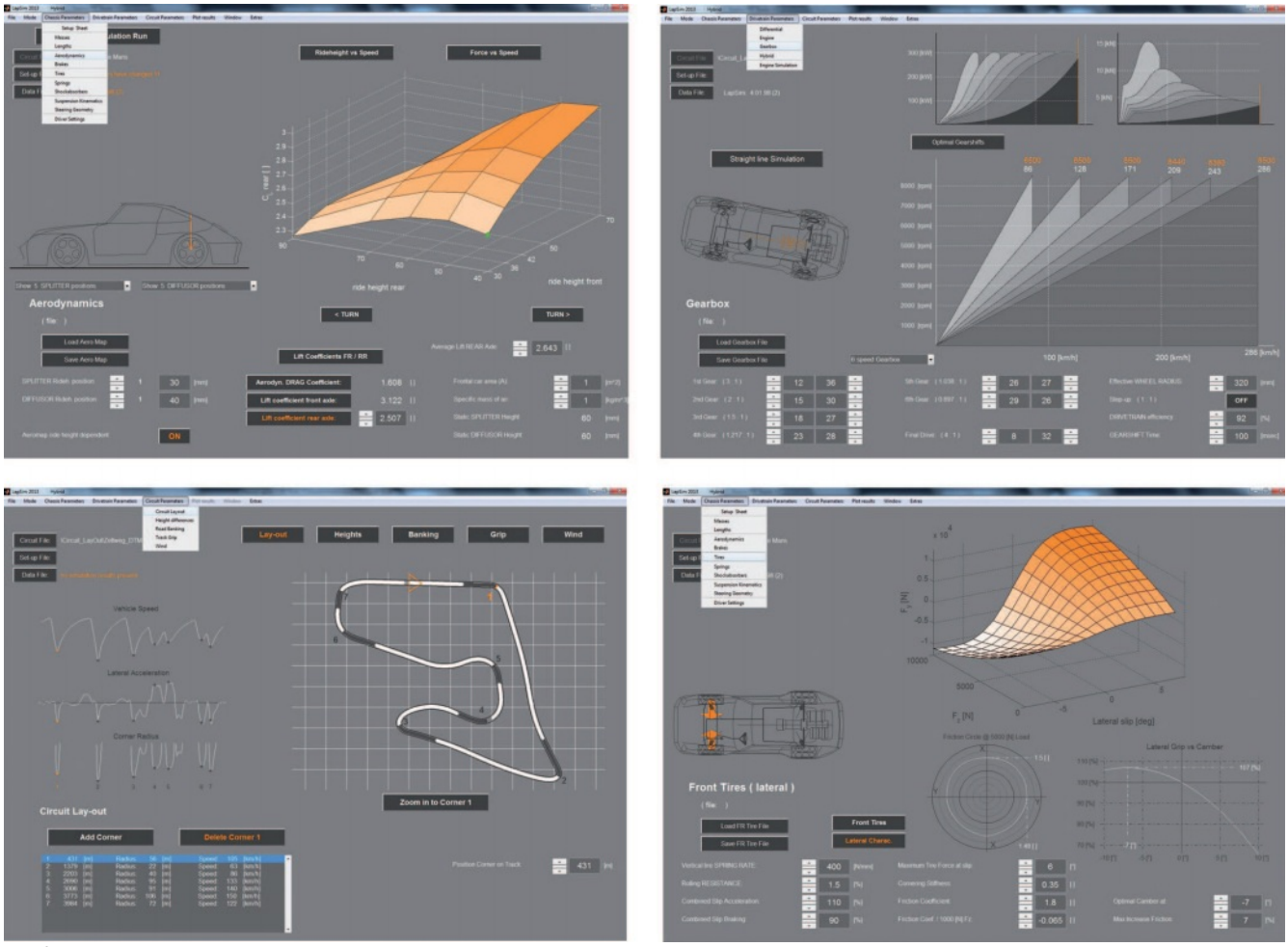
Ordering Information

LapSim Chassis Free Version
Order number **free download at our homepage**

LapSim Chassis License
Order number **B261.206.432-01**

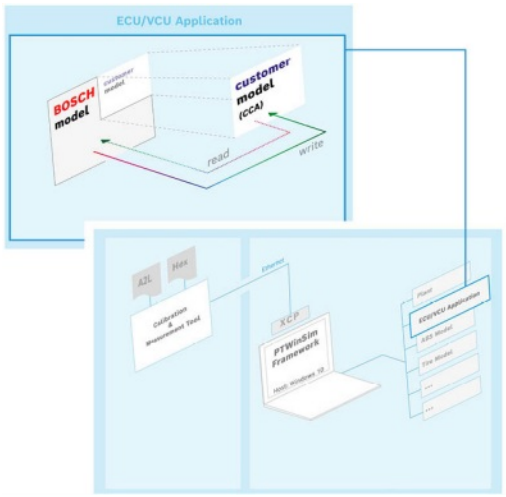
LapSim Chassis and Engine License
Order number **F01T.A20.057-01**

Dimensions



A few Screenshots

Simulation Packages



Features

- Simulate Bosch model and Customer model together in the same simulation environment
- Develop Bosch Motorsport control systems (ECU/VCU) in a simulation environment with other plant models (e.g. tire, ABS)
- Enables use of Bosch models (via *PTWinSim*) in other simulation environments like rFpro
- Execute your control system faster than real-time on a Windows 10 PC
- Perform real-time analysis on telemetry streams or other data sources

These simulation packages allow customers that use Bosch Motorsport control systems to simulate the functionality without using the hardware. These packages enable the user to run Bosch Motorsport and customer code area functions within the PTWinSim® environment.
PTWinSim® provides a framework and supporting functionality enabling several applications to execute in a coherent time frame on a variety of hosts. Applications ranging from Engine Control Unit code to vehicle system models with complex control algorithms are simply adapted for the simulation environment. Furthermore, with WinDarab COM API, Bosch Motorsport customers can use WinDarab datasets as stimuli and logging for their simulated control system.
Device Simulation Runtime provides the runtime licenses to run a Bosch Motorsport simulation package within PTWinSim®. This requires an individual and project specific simulation software, which needs to be ordered separately.
CCA Simulation Package also provides the option for users of CCA to generate their own simulation software. Device Simulation Runtime is included.

Technical Specifications

Recommended Operation System Windows 10, min. Update Version 1803

Required and not included Software

MathWorks Requirements	CCA S.P.*	Device S.P.*
MATLAB R2018b	x	
Simulink	x	
Real-Time Workshop	x	
Real-Time Workshop Embedded Coder	x	
Fixed-Point Toolbox	x	
Simulink Fixed-Point	x	
Stateflow	x	
Stateflow Coder	x	
Vehicle Network Toolbox	x	
Min. PTWinSim 4.09	x	x
Compiler		
Microsoft Visual Studio, Version 2017	x	x
Application tool		
RaceCon 2.7 or later	x	x

*S.P.: Simulation Package

Legal Restrictions

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Due to embargo restrictions, sale of this Software Tool in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

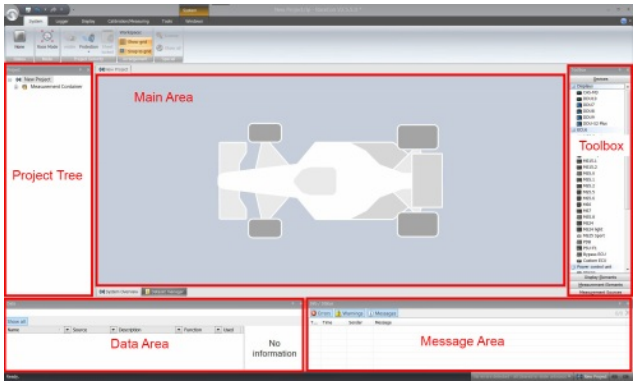
CCA Simulation Package
CCA Simulation development target to build and execute customer code.
Including 1 Device Simulation Runtime license and 1 year maintenance.
Order number **F02U.V02.893-01**

Device Simulation Runtime
Device Simulation Runtime license to execute simulation on a PC and 1 year maintenance
Order number **F02U.V02.891-01**

CCA Simulation Package Annual Maintenance
Order number **F02U.V02.892-01**

Device Simulation Runtime Annual Maintenance
Order number **F02U.V02.890-01**

System Configuration Tool RaceCon



Features

▶ An all integrated software tool for configuration and calibration

RaceCon is an all integrated software tool for configuration and calibration of Bosch Motorsport hardware products, such as ECUs, displays, loggers. The communication is based on Bosch Motorsport MSA-Box interface.

Application

- Calibration of ECU maps and curves
- ECU data file up- and download
- Parameter file up- and download
- Diagnostic functionality for Bosch Motorsport ECUs
- Data file / Work base management
- Integrated flash functionality
- Integrated Bosch sensor database
- Configuration of Bosch Motorsport displays, data loggers, CAN modules, ...
- Communication via K-Line/CAN/Ethernet (KWP/CCP/XCP)
- CAN communication log functionality (baud rate changeable)
- Quick data access over Race Mode
- Intuitive design, easy to use

Technical Specifications

PC

- IBM PC Pentium/AMD Athlon compatible, min. 1.6 GHz
- Min. 2 GB RAM
- Min. 1 GB free hard disc space
- VGA/WGA monitor (min. 1,024 x 768)
- Recommended Operating System: Windows 10

Optional Accessories

MSA-Box II	F02U.V00.327-03

Legal Restrictions

The sale of this Software Tool in Mexico is prohibited.
Due to embargo restrictions, sale of this Software Tool in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

System Configuration Tool RaceCon
Order number **free download**

More 9

Breakout Boxes 314

Communication Interface 320

Connector Opening Tool 321

Connectors 322

Vibration Profiles 323

Wiring Harnesses 328

Overview

Breakout Box BOB 66-pole



- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

Breakout Box BOB MS 6 / MS 6 EVO



- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

Breakout Box BOB MS 7



- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

Breakout Box BOB PBX 90



- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

Breakout Box BOB PBX 190



- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- No more lost jumpers due to patented 90° rotatable connectors

Breakout Box BOB 66-pole



Features

- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

The Breakout Box BOB enables the operator to perform measurements and modify connections during operation. The jumpers allow to individually open or close each single connection without removing the jumper. Jacks provide access to all signals for measurement purposes. The box is essential for development and test environments in the lab and vehicle.

Technical Specifications

Mechanical Data

Size	225 x 130 x 35 mm
Weight	1,100 g
4 mm standard jacks for measuring leads	66

Connectors and Wires

F02U.V02.295-01 code blue	
Connector on housing	AS018-35PB
Connector on wire	AS618-35SB
F02U.V02.296-01 code orange	
Connector on housing	AS018-35PC
Connector on wire	AS618-35SC
F02U.V02.297-01 code red	
Connector on housing	AS018-35PN
Connector on wire	AS618-35SN
F02U.V02.298-01 code yellow	
Connector on housing	AS018-35PA
Connector on wire	AS618-35SA
F02U.V02.299-01 code violet (universal)	
Connector on housing	AS018-35PU
Connector on wire	AS618-35SU
Wire length L (all)	Ca. 50 cm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Breakout Box BOB 66-pole
Connector code: blue
Order number **F02U.V02.295-01**

Breakout Box BOB 66-pole
Connector code: orange
Order number **F02U.V02.296-01**

Breakout Box BOB 66-pole
Connector code: red
Order number **F02U.V02.297-01**

Breakout Box BOB 66-pole
Connector code: yellow
Order number **F02U.V02.298-01**

Breakout Box BOB 66-pole
Connector code: violet (universal use)
Order number **F02U.V02.299-01**

Breakout Box BOB MS 6 / MS 6 EVO



Features

- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

The Breakout Box BOB enables the operator to perform measurements and modify connections during operation. The jumpers allow to individually open or close each single connection without removing the jumper. Jacks provide access to all signals for measurement purposes. The box is essential for development and test environments in the lab and vehicle. We developed one version for use with Engine Control Units MS 6 and a second version for use with Engine Control Units MS 6 EVO. They differ in their internal structure and cannot be interchanged.

Technical Specifications

Mechanical Data

Size	355 x 270 x 50 mm
Weight	4,100 g
4 mm standard jacks for measuring leads	176
Ethernet connectors	4
Ethernet wire	2 x inclusive
USB connectors	2
USB jumper	inclusive

Connectors and Wires

Wire length L	2 x 60 cm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Breakout Box BOB MS 7



Features

- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

The Breakout Box BOB enables the operator to perform measurements and modify connections during operation. The jumpers allow to individually open or close each single connection without removing the jumper. Jacks provide access to all signals for measurement purposes. The box is essential for development and test environments in the lab and vehicle. This version was especially developed for use with the LIFE connector of Engine Control Units MS 7 and Vehicle Control Unit VCU.

Technical Specifications

Mechanical Data

Size	226 x 130 x 40 mm
Weight	1,180 g w/o accessories
4 mm standard jacks for measuring leads	36
Ethernet connectors	10
Ethernet wire	5 x inclusive
USB connectors	2
USB jumper	1 inclusive

Connectors and Wires

Wire length L	55 cm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Breakout Box BOB MS 7
Connector code: red
Order number **F02U.V02.293-01**

Breakout Box BOB PBX 90



Features

- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- Standard configurations and fully customized versions available
- No more lost jumpers due to patented 90° rotatable connectors

The Breakout Box BOB enables the operator to perform measurements and modify connections during operation. The jumpers allow to individually open or close each single connection without removing the jumper. Jacks provide access to all signals for measurement purposes. The box is essential for development and test environments in the lab and vehicle. This version was especially developed for use with PowerBox PBX 90.

Technical Specifications

Mechanical Data

Size	255 x 220 x 45 mm
Weight	2,400 g
4 mm standard jacks for measuring leads	68
Ethernet connectors	4
Ethernet wire	2 x inclusive

Connectors and Wires

Wire length L	2 x 60 cm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Breakout Box BOB PBX 90
Order number **F02U.V02.292-01**

Breakout Box BOB PBX 190



Features

- Compact, lightweight housing in low-profile design with high-density packaging
- Robust 4 mm standard jacks for measuring leads
- Signal integrity of high-speed data links ensured by product-specific version
- No more lost jumpers due to patented 90° rotatable connectors

The Breakout Box BOB enables the operator to perform measurements and modify connections during operation. The jumpers allow to individually open or close each single connection without removing the jumper. Jacks provide access to all signals for measurement purposes. The box is essential for development and test environments in the lab and vehicle. This version was especially developed for use with PowerBox PBX 190.

Technical Specifications

Mechanical Data

Size	355 x 265 x 50 mm
Weight	5,800 g
4 mm standard jacks for measuring leads	112
Ethernet connectors	8
Ethernet wire	4 x inclusive

Connectors and Wires

Wire length L	2 x 4 x 55 cm

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Breakout Box BOB PBX 190
Order number **F02U.V02.523-01**

Com Interface MSA-Box II



Features

- Communication interface for PC-supported calibration on K-line, CAN or Ethernet interface

The MSA-Box II is the low cost unit for PC-supported calibration and configuration on Ethernet, K-Line or CAN interface of an ECU.
The MSA-Box II is coupled to the PC via the USB interface. This ensures a powerful and universal link to all common PCs. The coupling to the ECU is effected via Ethernet, K-Line or CAN-interface of the diagnosis interface.

Technical Specifications

Mechanical Data

Size	84 x 38 x 25 mm
Temperature range	0 to 70°C
Compact design	
Fully suitable for motor vehicle use	
All inputs and outputs to the PC with galvanic separation	

Electrical Data

Input voltage (vehicle side)	8 to 32 V
Power supply through the connection to the ECU from board mains with galvanic separation	
Power consumption (powered by USB)	Typ. 0.5 W
USB	USB 2.0, high speed (480 MBit/sec)
Ethernet	100 MBit/sec
K-Line	300 Bd up to 320 kBd
CAN	10 kBit/s up to 1 MBit/s
Recommended Operation System	Windows 10

Connectors and Wires

Connector AS612-35PN	F02U.000.441-01
Mating connector AS012-35SN	F02U.000.258-01
Pin 1	Terminal 30 (permanent pos)
Pin 2	Terminal 15 (switch pos)
Pin 3	GND
Pin 4	CAN_High
Pin 10	K-Line
Pin 8	RxD+
Pin 9	RxD-
Pin 11	TxD+
Pin 12	TxD-
Pin 16	CAN_Low
Pin 22	SCR
Diagnosis wire length	2 m
USB wire length	0.5 m

Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Com Interface MSA-Box II
Not mandatory if available
Order number **F02U.V00.327-03**

Connector Opening Tool for AS series



Features

- Quick and easy opening of ECU connectors

The Connector Opening Tool helps you to open connectors of ECUs like MS 7.4.

Technical Specifications

Mechanical Data

Material	Stainless steel

Legal Restrictions

Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Ordering Information

Opening tool for shellsize 16
Order number **F02U.V01.393-01**

Opening tool for shellsize 18
Order number **F02U.V01.394-01**

Connectors



Features

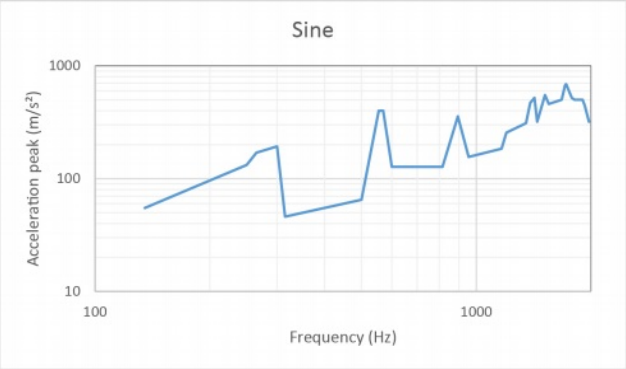
- Bosch Jetronic and Compact connectors inclusive contacts and sealings
- Autosport connectors from Deutsch, Tyco, etc.
- Connectors with 3 to 128 pins

Convenient to the Wiring Harnesses, we have a wide range of connectors on offer.
From single pin and Bosch series connectors above TE-connectors to Deutsch-motorsport connectors, you can choose from a big variation.
You can get from us different Deutsch-motorsport connectors of the series AS, ASL, ASU, ASX and ASDD. According to the series, these are 3 to 128-pin connectors.
At Bosch connectors you can choose from connectors of the Jetronic or Compact series. Furthermore you receive convenient contacts and sealings to our Bosch-connectors.
If you are interested, give us a call!

Legal Restrictions

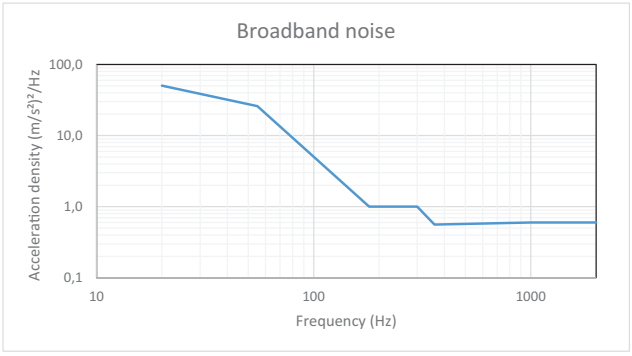
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Vibration Profile 1



Broadband noise: 8h/direction

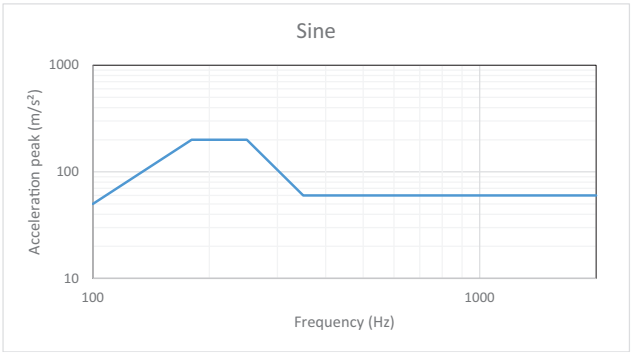
Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
20	50.4
55	26.0
180	1.0
300	1.0
360	0.56
1,000	0.6
2,000	0.6
Effective value a_{Eff}	55.4 m/s^2



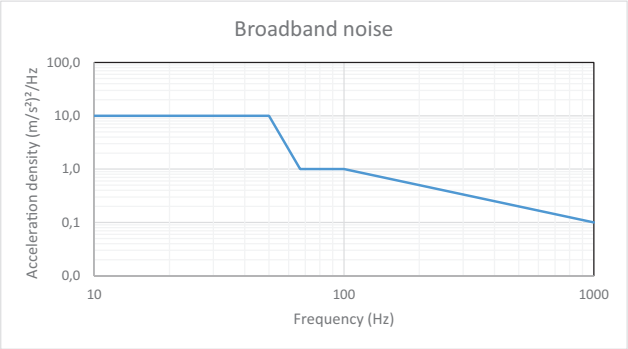
Sine: 8h/direction

Alteration rate of frequency: 2.4 oct./min

Frequency (Hz)	Acceleration peak (m/s2)
100	50
180	200
250	200
350	60
2,000	60



Vibration Profile 2



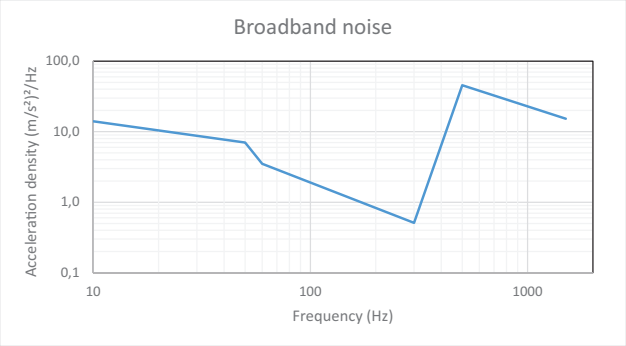
Broadband noise: 8h/direction

Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
10	10.0
50	10.0
66.7	1.0
100	1.0
1,000	0.1
Effective value a_{Eff}	26.9 m/s^2

Vibration Profile 3

Broadband noise

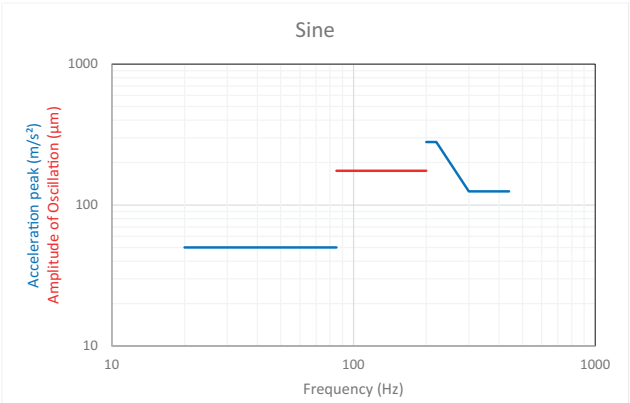
Frequency (Hz)	Acceleration density $(m/s^2)^2/Hz$
10	14.0
50	7.0
60	3.5
300	0.5
500	45.6
1,500	15.3
Effective value a_{Eff}	168 m/s^2



Sine

Alteration rate of frequency: 1 oct./min

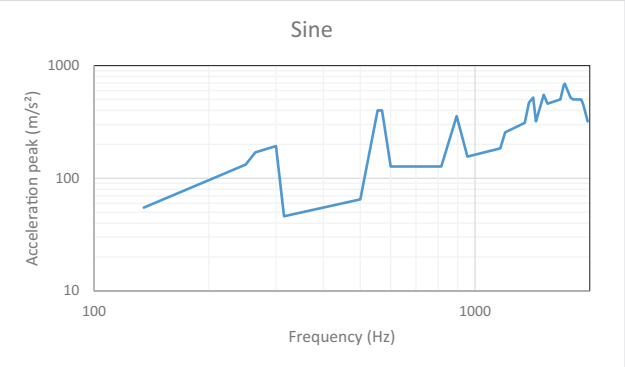
Frequency (Hz)	Amplitude of acceleration (m/s^2)	Amplitude of oscillation lane (µm)
20	50	
85	50	
85		175
200		175
200	280	
220	280	
300	125	
440	125	



Vibration Profile 4

Sine 80h/direction

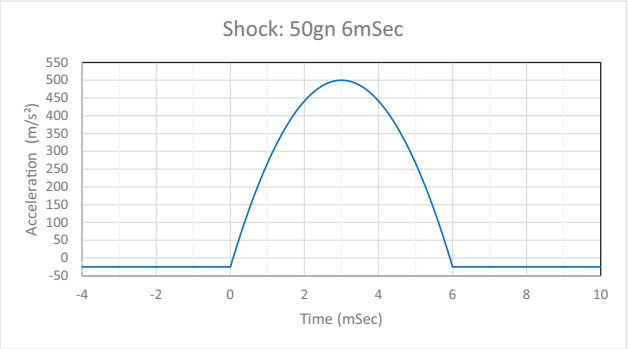
Frequency (Hz)	Acceleration peak (m/s^2)
135	55
250	132
265	170
300	193
315	46
500	65
555	400
570	400
600	127
815	127
895	356
955	156
1,165	184
1,200	256
1,350	310
1,385	470
1,420	520
1,445	320
1,515	550
1,550	460
1,675	500
1,710	670
1,720	690
1,780	520
1,810	500
1,900	500
1,925	448
1,975	320



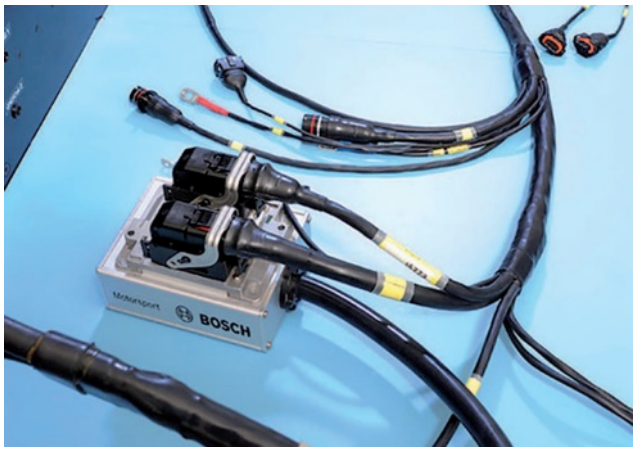
Vibration Profile Shock

Shock: 10 shocks (pos. and neg.) / direction
50gn 6mSec ISO 16750-3

Time (mSec)	Acceleration Density $(m/s^2)^2/Hz$
-4	-25
0	-25
3	500
6	-25
10	-25



Customized Wiring Harnesses



Features

- One-stop-shop for consulting, manufacturing, development and service
- Manufacture of individual pieces and small batches
- Use of the highest quality materials
- Full test coverage based on the latest testing equipment for all products
- The complete package, from a single pin to a complete wiring harness

Our expertise

Bosch Motorsport specialists have decades of experience in design and manufacture of customized wiring solutions for race cars and prototypes.
Increasing complexity in race cars necessitates a high degree of understanding in the electrical architecture of the project. We provide to you the extensive system know-how and the expertise of our specialists.
As a system supplier, we are familiar with the full spectrum of electronic requirements of the components in a racecar – from high current and high voltage applications to high-speed data networks.

Our offer

Whether it is complete vehicle wiring, test equipment or a simple adapter – we design, plan, construct and test according to your individual requirements and requests.
If you want to build your wiring yourself, we also offer consulting and development support independently from our manufacturing services.
Give us a call!

Legal Restrictions

The sale of this product in Mexico is prohibited.
Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

Appendix 10

General Information 330

General Information

ESD, Handling and Transport
Please be mindful of the specifications concerning ESD. Never grab into the connectors. Please follow the regulations when transporting devices (e.g. ESD packaging materials).

Service
To ensure full functionality every time, Bosch Motorsport recommends annual functional testing of all equipment.

Battery
Some of the devices use Lithium-Ion batteries. Please use extra caution to be certain that the correct removal procedure is followed. Abide by the maintenance cycle schedule to ensure correct operation. Bosch Motorsport recommends maintenance once a year.

Installation
The correct installation extends reliability and durability. Please follow the specifications regarding temperature, humidity, vibration and liquid compatibility.

Icons

µLC Test System 118

A

ABS M5 Kit 289
ABS M5 Kit Clubsport 291
ABS M5 Kit Porsche Cup 293
Acceleration Sensor MM5.10 278
Acceleration Sensor MM5.10-R 281
Acceleration Sensor MM7.10 283
Analysis Tool WinDarab V7 300

B

Breakout Box BOB 66-pole 315
Breakout Box BOB MS 6 / MS 6 EVO 316
Breakout Box BOB MS 7 317
Breakout Box BOB PBX 190 319
Breakout Box BOB PBX 90 318

C

CAN Keypad CK-M12 72
CCA Development Environment 303
Collision Avoidance System CAS-M light 77
Collision Avoidance System CAS-M 3 EVO 80
Com Interface MSA-Box II 320
COM-API for WinDarab Expert 302
Connector Opening Tool for AS series 321
Connectors 322
Customized Wiring Harnesses 328

D

Data Logger and Sensor Interface C 80 ..... 90, 106
Data Logger C 70 86
Diesel System Components 128
Display DDU 10 63
Display DDU 11 67

E

Electronic Brake System EBS 295
Electronic Throttle Body 188
Engine Control Unit MS 25 Sport 49
Engine Control Unit MS 6 CUP EVO 13
Engine Control Unit MS 6.1 EVO 18
Engine Control Unit MS 6.2 EVO 23
Engine Control Unit MS 6.3 EVO 28
Engine Control Unit MS 6.4 EVO 34
Engine Control Unit MS 6.4P EVO 39
Engine Control Unit MS 7.8 45
Expansion Board CAN-FD 120
Expansion Board Current Loop Interface 121
Expansion Board Digital Multichannel Pot. 122
Expansion Board Digital Outputs 124
Expansion Board FlexIO 125

F

FPR Adaptor light 135
Fuel Pressure Regulator Mini 2 130
Fuel Pressure Regulator Mini 5 132
Fuel Pressure Regulator Mini A 133
Fuel Pump FP 165-E 137
Fuel Pump FP 200-7 139
Fuel Pump FP 200-E 141

G

General Information 330

H

HP Fuel Pump HDP 5 143
HP Injection Valve HDEV 5.2 183

I

Ignition Coil C90i-E10 148
Ignition Coil C90i-E8 146
Ignition Coil C90i-pro 150
Ignition Coil C90i-pro evo 152
Ignition Coil C90i-WG 154
Ignition Coil P50/P50-M 156
Ignition Coil P65 159
Ignition Coil P65-T 161
Ignition Coil P65-TWG 164
Ignition Coil P65-WG 166
Ignition Coil P65-WS 168
Ignition Coil PS-T 170
Ignition Module IM 3.2 173
Ignition Module IM 4 175
Injection Valve EV 14 178

K

Knock Sensor KS4-P 213
Knock Sensor KS4-R 215
Knock Sensor KS4-R2 217

L

Lambda Sensor LSU ADV/ADV pre Turbo 223
Lambda Sensor LSU 4.9 220
Lambda Sensor Mini-LSU 4.9 226
Lambdatronic LT4 110
Lambdatronic LT4 ADV 112
License Manager 304

P

PBXSuite 305
PowerBox PBX 190 101
PowerBox PBX 90 97
Pressure Sensor Air PS-AA 197
Pressure Sensor Air PSA-N 201
Pressure Sensor Air PS-AS 199
Pressure Sensor Combined PST 1/PST 3 230
Pressure Sensor Combined PST 4 233
Pressure Sensor Combined PST-F 1 235
Pressure Sensor Combined PST-F 2 280 bar 238
Pressure Sensor Combined PST-F 2 350 bar 240
Pressure Sensor Fluid PSC-260 204
Pressure Sensor Fluid PSS-10 206
Pressure Sensor Fluid PSS-140/260/420/600 210
Pressure Sensor Fluid PSS-250R 208

R

RaceABS Software Tool 306
RaceConnect 307
Rotary Position Sensor RPS-F 242

S

Scrutineering Configurator and Tool..... 308
Simulation Packages..... 311
Simulation Tool LapSim..... 309
Speed Sensor Hall-Effect HA-D 90 245
Speed Sensor Hall-Effect HA-Di 248
Speed Sensor Hall-Effect HA-M..... 252
Speed Sensor Hall-Effect HA-N 254
Speed Sensor Hall-Effect Mini-HA-P..... 256
Speed Sensor Hall-Effect Mini-HA-P sealed..... 260
Steering Wheel Angle Sensor LWS..... 262
System Configuration Tool RaceCon..... 312

T

Temperature Sensor NTC M12-H..... 273
Temperature Sensor NTC M12-L 275
Temperature Sensor NTC M12..... 271
Temperature Sensor NTC M5-HS 265
Temperature Sensor NTC M6-HS 267
Temperature Sensor NTC M8-HS 269

U

USB Data Components 94

V

Vehicle Control Unit MS 50.4..... 52
Vehicle Control Unit MS 50.4P incl. CCA 56
Vibration Profile 1..... 323
Vibration Profile 2..... 324
Vibration Profile 3..... 325
Vibration Profile 4..... 326
Vibration Profile Shock 327

W

Wheel Speed Signal Splitter..... 115
Wiper Direct Actuator WDA..... 191

Bosch Engineering GmbH
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