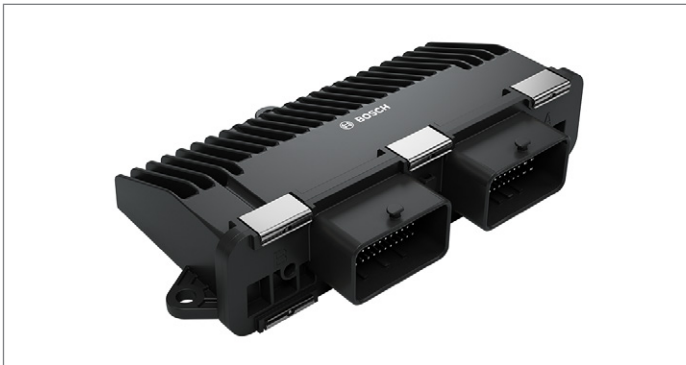


BODAS Ultra Sonic System USS controller



- ▶ Robust and compact controller for ultrasonic systems

Features

- ▶ Evaluation of signals of ultrasonic sensors for distance detection and collision avoidance
- ▶ Component of BODAS system for mobile applications
- ▶ Possible connection of up to 12 sensors
- ▶ Capability for 12 V and 24 V
- ▶ Data transfer via CAN interface
- ▶ Configuration via UDS or BODAS-service 4.x

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Ordering code

The BODAS Ultra Sonic System controller (USS) is available with two different software variants:

| Designation | Order number |
|-------------------|--------------|
| BODAS USS ENTRY | F037.000.145 |
| BODAS USS PREMIUM | F037.000.125 |

Both variants use identical hardware

Optional accessories

BODAS-service software

The windows-based BODAS-service PC software (data sheet 95086) is used for configuration and setting of sensors and filters of functions etc. via a PC.

BODAS Ultra Sonic System sensor

The available USS sensor perfectly suited for use with the BODAS USS controller and returns the distance values for evaluation by the BODAS USS controller. The sensor is available with two connector orientations: radial and axial. Further information can be found in data sheet RE95245.

Description

The BODAS Ultra Sonic System controller serves for evaluation and processing of signals from connected ultrasonic sensors. The controller also provides the voltage supply for the sensors mentioned above.

The controller is equipped with a CAN interface. The individual connected sensors detect objects in the field of view and the ECU forwards their distance information via this CAN interface. The user can freely choose to take any measures based on the distance data (switching of lights, acoustic signal, display indicator etc.)

Communication with a service tool is also conducted via this CAN interface. The BODAS USS controller is supported by default by the Rexroth tool BODAS-service 4.x.

This software enables configuration of individual sensors as well as setting of filters and various threshold values.

The BODAS USS controller was developed specifically for use in mobile working machines and satisfy corresponding safety requirements regarding ambient temperatures, water and dust ingress, shock and vibration as well as electromagnetic compatibility (EMC). It can be used for indoor applications as well as outdoor applications in harsh surroundings.

Technical data

| Type | BODAS USS controller |
|--|--|
| Nominal voltage | |
| Nominal on-board voltage | 12 V or 24 V |
| Supply voltage, permissible range | 9.2 V to 32 V |
| Current consumption | |
| with 12 sensors | 260 mA |
| maximum (peak) | <1980 mA |
| Fuse | |
| internal | none |
| External in supply path | max. 15 A |
| Resolution | |
| Distance measurement | 10 mm |
| Object detection | 20 mm |
| Interfaces | |
| CAN speed 250 or 500 kBaud | 1 |
| Permissible operating temperature | -40 °C to +85 °C |
| Storage temperature, housing | -40 °C to +85 °C |
| Type of protection | IP6K9K |
| Weight | 381 g |
| Dimensions | |
| without mating connector (L x W x H) | 190.7 mm x 118.3 mm x 40 mm |
| Mating connector | 2x 48-pin Molex |
| CE Mark | Compliance with EMC Directive 2014/30/EU. The harmonized standards EN 13766-1:2018, EN 12895:2015 and EN ISO 14982:2009 have been applied. Compliance with RoHS2 directive 2011/65/EU on the restriction of the use of certain hazardous substances. |

Qualification testing

| | |
|--|--|
| Temperature testing | High-temperature storage and low-temperature storage according to ISO1670-4:2010 |
| Salt spray test | ISO 16750-4: 2010 : Test 5.5.1 |
| Chemical resistance test | according to ISO 16750-5:2010 |
| Protection class tests | according to ISO 20653 IP6K9K |
| Mechanical tests | Vibration according to ISO 16750-3:2012, test VII and IEC 60068-2-64 Mechanical shock according to ISO 16750-3:2012 and IEC 60068-2-27 |
| Susceptibility EMC tests | according to ISO 13766-1,2:2018 Interference immunity according to IEC 61000-6-2:2005 |
| Emission EMC test | UN ECE R10 Rev. 6, broadband/narrowband interference emission CISPR 25:2016 radiated and conducted emissions Interference emissions according to EN IEC 61000-6-4:2007 |
| Electrostatic discharge (ESD) tests | according to ISO 10605:2008 |
| Transient tests | ISO 7637-2:2011 test pulse 1,2a,2b,3a,3b ISO 7637-3:2016 test pulse a,b |
| General electrical tests | Electrical stress according to ISO 16750-2:2012 |

Overview of the functions

The BODAS USS controller is available with two different software variants. Both variants use identical hardware

1. BODAS USS ENTRY
2. BODAS USS PREMIUM

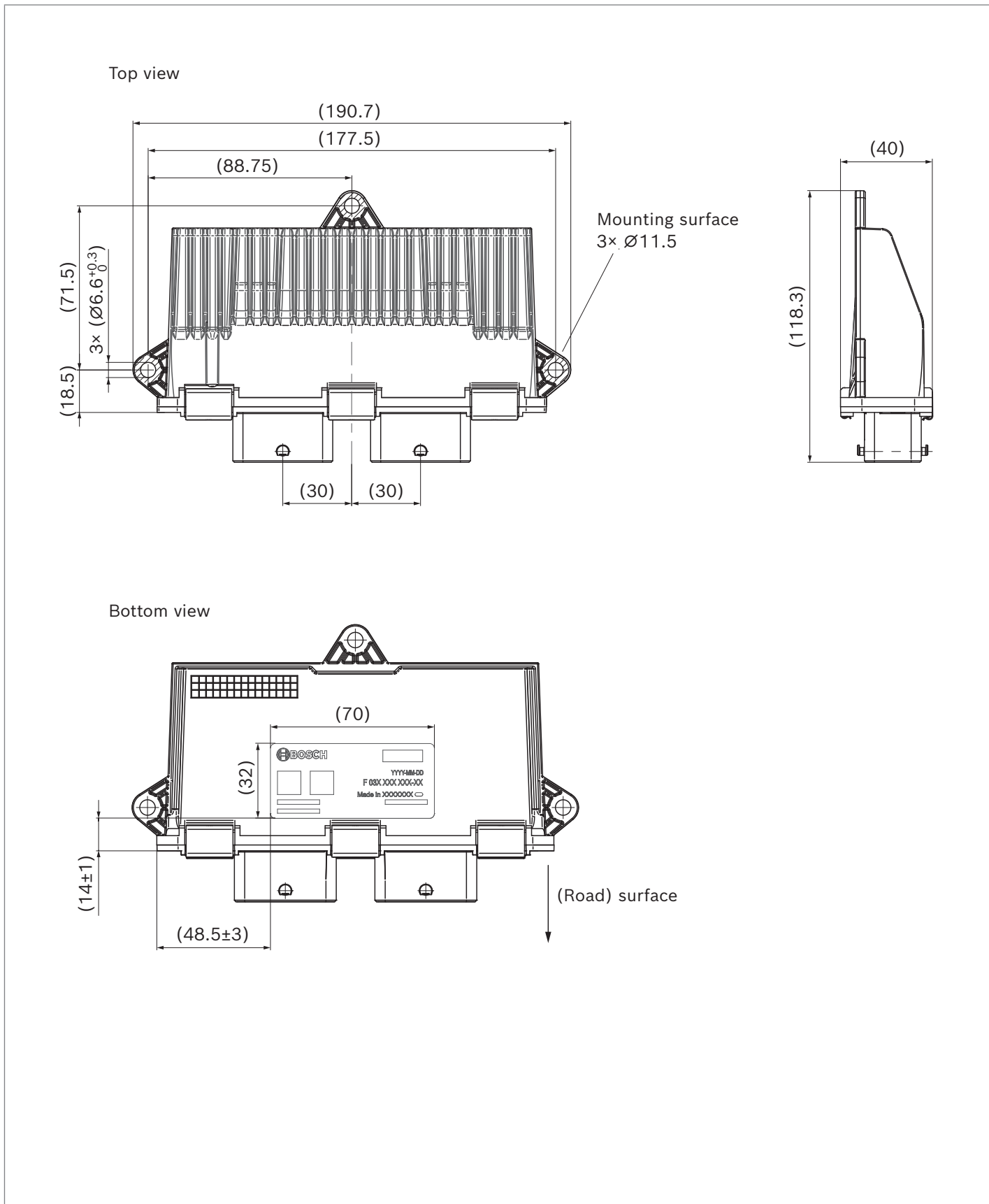
The following functions are available with both variants:

- ▶ For each connected sensor, several distance values to the next objects in the respective field of view are returned.
- ▶ Adjustable Baud rate of CAN interface
- ▶ Automatic detection of dirt or blocking at sensors (ice, dirt)
- ▶ Automatic detection in the field of view of the sensor (d<15cm)
- ▶ Various adjustable filters for distance and sensitivity.
- ▶ Ignoring of specific areas in the field of view of the sensor (e.g. attachments or protruding vehicle parts)
- ▶ Variable adjustable CAN-ID

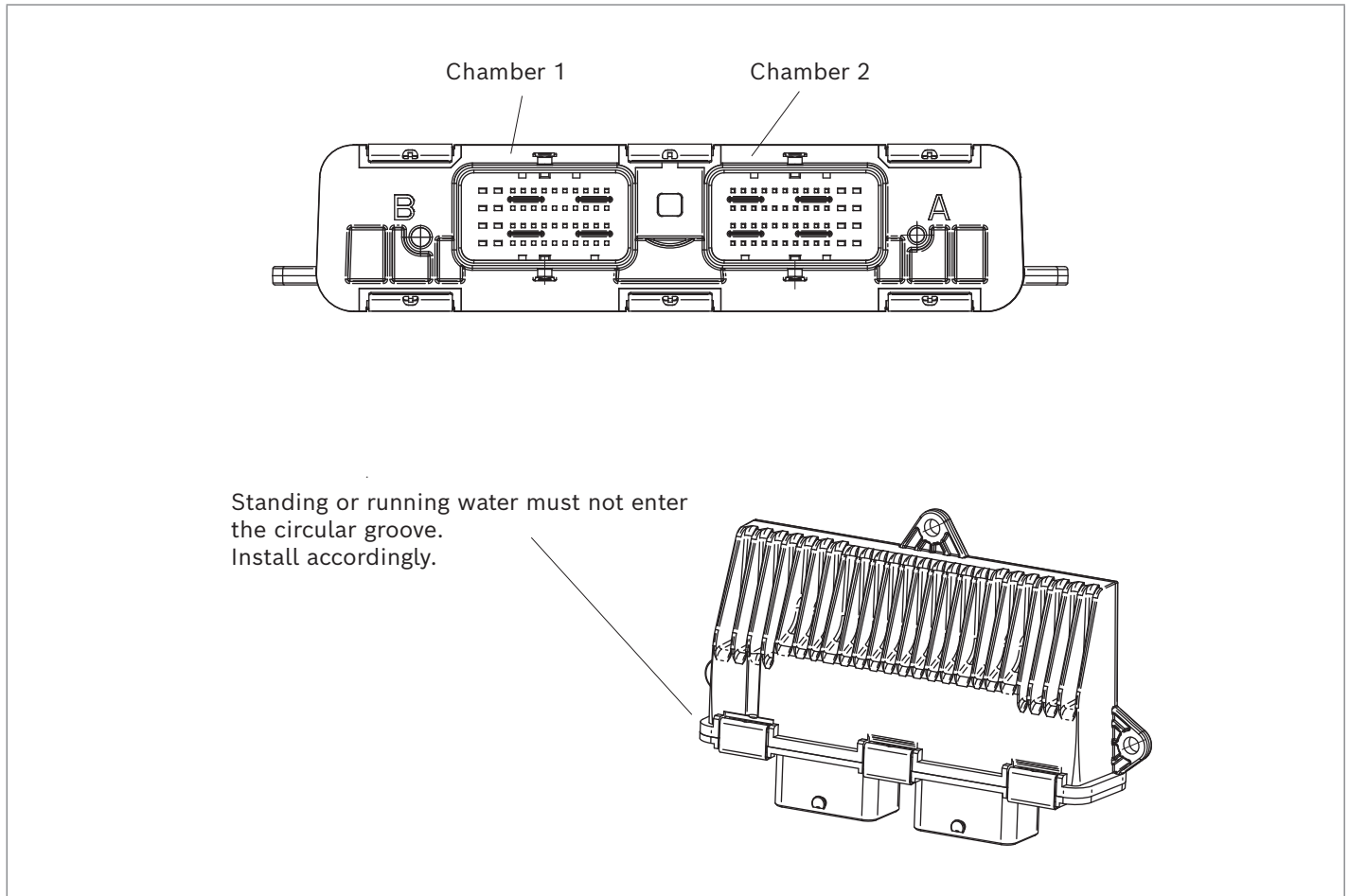
In addition to these functions, the PREMIUM variant offers the option of **"Object Localization" (OLO)**

This function enables localization of objects in the field of view of the sensors of the system. For this, multiple signals from different sensors are combined, evaluated and processed. This is enabled by the cross-echo between two neighboring sensors. This enables display of the precise position of detected objects in a 2D map. The detected objects are automatically assigned IDs. Output of the controller on the CAN bus then includes one x and one y coordinate for each object.

Dimensions



Installation position



Mounting:

- ▶ The controller must be attached at three specific positions (mounting surface).
- ▶ The recommended tightening torque for mounting of the device at a steel sheet with M6 screws is 6 +/- 1.5 Nm.
- ▶ Responsibility for tightening (tightening torque), fatigue resistance, protection against loosening and arrangement of the screw connection lies with the customer.
- ▶ The controller must be installed as illustrated in the drawing with the connector facing the (road) surface.
- ▶ The wiring harness is not included in the scope of delivery and must be ordered separately.
- ▶ Both wiring harnesses must be securely mounted. Mounting: Distance to connector max. 200 mm.
- ▶ Water must not enter via the device via the wiring harness.

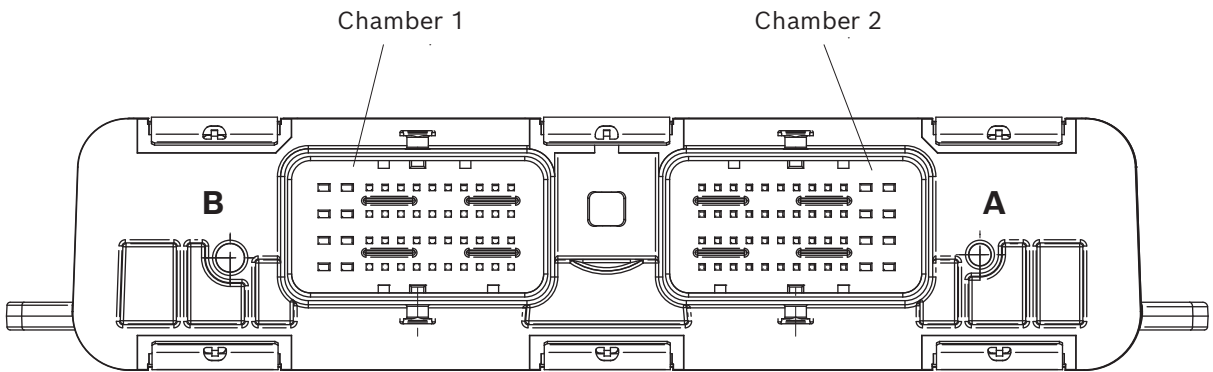
Mating connector

The device features two separate chambers with 48 pins each.

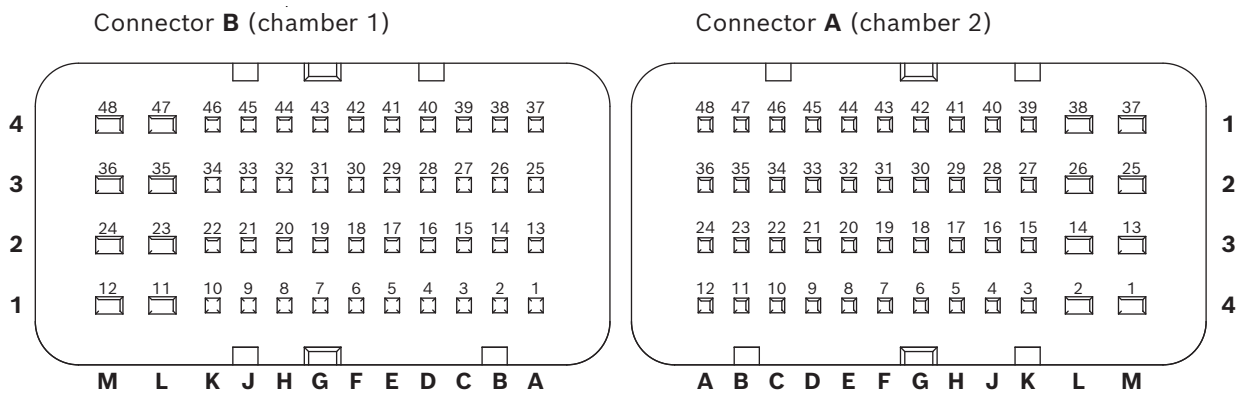
The following mating connectors are compatible:

| | | |
|-----------|-------------------|------------------|
| Chamber 1 | Wire outlet right | Molex 0643203311 |
| Chamber 2 | Wire outlet left | Molex 0643201318 |

View of connector strip



Pin assignment



Chamber 1

| Pin# (serial) | Pin# | Description |
|---------------|------|-------------|
| 1 | A1 | not used |
| 2 | B1 | not used |
| 3 | C1 | not used |
| 4 | D1 | not used |
| 5 | E1 | not used |
| 6 | F1 | not used |
| 7 | G1 | not used |
| 8 | H1 | not used |
| 9 | J1 | not used |
| 10 | K1 | not used |
| 11 | L1 | not used |
| 12 | M1 | ECU GND |
| 13 | A2 | not used |
| 14 | B2 | not used |
| 15 | C2 | not used |
| 16 | D2 | not used |
| 17 | E2 | not used |
| 18 | F2 | not used |
| 19 | G2 | not used |
| 20 | H2 | not used |
| 21 | J2 | not used |
| 22 | K2 | not used |
| 23 | L2 | not used |
| 24 | M2 | not used |
| 25 | A3 | not used |
| 26 | B3 | not used |
| 27 | C3 | not used |
| 28 | D3 | not used |
| 29 | E3 | not used |
| 30 | F3 | not used |
| 31 | G3 | not used |
| 32 | H3 | not used |
| 33 | J3 | not used |
| 34 | K3 | not used |
| 35 | L3 | not used |
| 36 | M3 | not used |
| 37 | A4 | not used |
| 38 | B4 | not used |
| 39 | C4 | not used |
| 40 | D4 | not used |
| 41 | E4 | CAN HIGH |
| 42 | F4 | CAN LOW |
| 43 | G4 | not used |
| 44 | H4 | not used |
| 45 | J4 | not used |
| 46 | K4 | not used |
| 47 | L4 | not used |
| 48 | M4 | ECU POWER |

Chamber 2

| Pin# (serial) | Pin# | Description |
|---------------|------|-----------------|
| 1 | M4 | not used |
| 2 | L4 | not used |
| 3 | K4 | not used |
| 4 | J4 | Sensor 12 GND |
| 5 | H4 | Sensor 12 Data |
| 6 | G4 | Sensor 12 Power |
| 7 | F4 | Sensor 8 GND |
| 8 | E4 | Sensor 8 Data |
| 9 | D4 | Sensor 8 Power |
| 10 | C4 | Sensor 4 GND |
| 11 | B4 | Sensor 4 Data |
| 12 | A4 | Sensor 4 Power |
| 13 | M3 | not used |
| 14 | L3 | not used |
| 15 | K3 | not used |
| 16 | J3 | Sensor 11 GND |
| 17 | H3 | Sensor 11 Data |
| 18 | G3 | Sensor 11 Power |
| 19 | F3 | Sensor 7 GND |
| 20 | E3 | Sensor 7 Data |
| 21 | D3 | Sensor 7 Power |
| 22 | C3 | Sensor 3 GND |
| 23 | B3 | Sensor 3 Data |
| 24 | A3 | Sensor 3 Power |
| 25 | M2 | not used |
| 26 | L2 | not used |
| 27 | K2 | not used |
| 28 | J2 | Sensor 10 GND |
| 29 | H2 | Sensor 10 Data |
| 30 | G2 | Sensor 10 Power |
| 31 | F2 | Sensor 6 GND |
| 32 | E2 | Sensor 6 Data |
| 33 | D2 | Sensor 5 Power |
| 34 | C2 | Sensor 2 GND |
| 35 | B2 | Sensor 2 Data |
| 36 | A2 | Sensor 2 Power |
| 37 | M1 | not used |
| 38 | L1 | not used |
| 39 | K1 | not used |
| 40 | J1 | Sensor 9 GND |
| 41 | H1 | Sensor 9 Data |
| 42 | G1 | Sensor 9 Power |
| 43 | F1 | Sensor 5 GND |
| 44 | E1 | Sensor 5 Data |
| 45 | D1 | Sensor 5 Power |
| 46 | C1 | Sensor 1 GND |
| 47 | B1 | Sensor 1 Data |
| 48 | A1 | Sensor 1 Power |

Safety instructions

General instructions

- ▶ Reliable operation cannot be guaranteed if samples or prototypes are used in series production machines.
- ▶ The possible circuits for the system do not imply any technical liability for Bosch Rexroth.
- ▶ Incorrect connections could cause unexpected signals at the outputs of the controller.
- ▶ Incorrect parameterization of the controller may create potential hazards while the machine is in operation. It is the responsibility of the machine manufacturer to identify hazards of this type in a hazard analysis and to bring them to the attention of the end user. Rexroth is not liable for any hazards of this kind.
- ▶ The component firmware/software must be installed and removed by Bosch Rexroth or the responsible authorized partner in order to ensure that the warranty does not expire.
- ▶ It is not permissible to open the controller or to modify or repair the controller. Modification or repairs to the wiring could result in dangerous malfunctions. Repairs to the controller may only be performed by Bosch Rexroth or by an authorized partner.
- ▶ Make sure that the controller's configuration does not lead to safety-critical malfunctions of the complete system in the event of failure or malfunction. This type of system behavior may lead to danger to life and/or cause much damage to property.
- ▶ Do not use defective components or components which are configured incorrectly. Failed or incorrectly operating components must be repaired immediately.
- ▶ Do not install the controller near parts which generate considerable heat (e.g. exhaust).
- ▶ Radio equipment and mobile telephones must not be used in the driver's cab without a suitable antenna or near the control electronics.
- ▶ A sufficiently large distance to radio transmission systems must be maintained.
- ▶ All connectors must be unplugged from the electronics during electrical welding and painting operations.
- ▶ Cables/wires must be sealed individually to prevent water from entering the device.
- ▶ The controller must not be electrostatically charged, e.g. during a painting operation.
- ▶ The controller will heat up beyond normal ambient temperature during operation. To avoid danger caused by high temperatures, it should be protected against contact.

- ▶ Install the controller in such a way that the electrical connector is not facing upwards. This ensures that any condensation water that may form can flow out.
- ▶ Standing and permanently running water is not permissible near the area of the circular groove.
- ▶ The controller must be fastened with metal screws in order to establish a good thermal connection between the housing and the cooling surface (heat sink).

Information on transport and storage

- ▶ If it is dropped, the controller must not be used any longer as invisible damage could have a negative impact on reliability.
- ▶ After a storage time of more than 5 years, the controller must be examined by the manufacturer.

Notes on wiring and circuitry

- ▶ Connections to systems with a different electrical ground or power source require galvanic isolation.
- ▶ For CAN connections, twisted-pair cables must be used.
- ▶ The product may only be wired when it is de-energized.
- ▶ Lines to the electronics must not be routed close to other power-conducting lines in the machine or vehicle.
- ▶ The wiring harness must be mechanically fastened in the area in which the controller is installed (distance < 150 mm). The wiring harness should be fixated so that in-phase excitation with the controller occurs (e.g. at the controller bolting point).
- ▶ If possible, lines should be routed in the vehicle interior. If the lines are routed outside the vehicle, make sure that they are securely mounted.
- ▶ Lines must not be kinked or twisted, must not rub against edges and must not be routed through sharp-edged ducts without protection.
- ▶ Lines are to be routed with sufficient distance from hot or moving vehicle parts.
- ▶ The controller is designed for the use in mobile working machines provided no limitations / restrictions are made to certain application areas in this data sheet.
- ▶ Operation of the controller must generally occur within the operating ranges specified and released in this data sheet. This applies in particular to voltage, current, temperature, vibration, shock and other described environmental influences.
- ▶ Its use outside of these specified and approved boundary conditions may result in danger to life and/or cause damage to components which could result in sequential damage to the mobile working machine.

Improper use

- ▶ Any use of the controller other than that described in chapter "Intended use" is considered to be improper.
- ▶ Use in explosive areas is not permissible.
- ▶ Damage resulting from its improper use and/or from an unauthorized intervention which is not specified in this data sheet voids all warranty and liability claims against the manufacturer.

Use in safety-related functions

- ▶ The system described in this data sheet is a comfort system and only offers assistance functions.
- ▶ The customer is responsible for performing a risk analysis of the mobile working machine and determining the possible safety-related functions.
- ▶ The system must not be used as safety system.
- ▶ The machine operator is fully responsible at all times and must always separately validate the response received from the system.

Disposal

- ▶ The controller and its packaging must be disposed of according to the national environmental regulations of the country in which the controller is used.

Further information

- ▶ Further information about the controller can be found at www.boschrexroth.com/mobile-electronics.

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