



perfect in sensors.

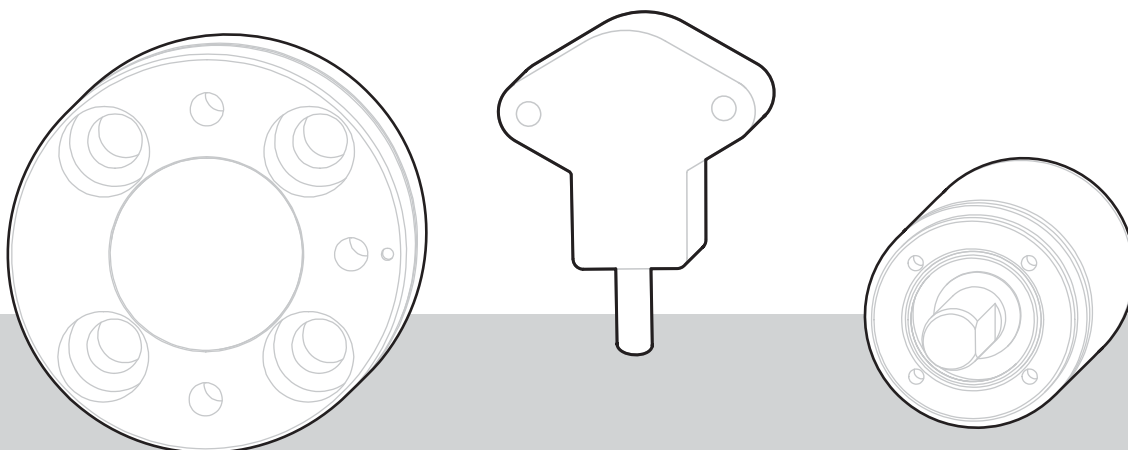
posirot[®]

PRDS-CANOPR, PRDS-J1939R

Magnetic Angle Sensors
Dual channel redundant single turn

Installation and operation manual

EN



Please read carefully before installation and operation!

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1 Safety instructions

1.1 Signal words and symbols



WARNING, Risk of Injury:

Indicates a potentially hazardous situation, which, if not avoided, can result in serious injury or property damage.

▲ DANGER

WARNING, Risk of Personal Injury or Death:

Indicates a situation that can result in serious personal injury or death if not properly avoided.

▲ WARNING

WARNING, Risk of Personal Injury or Death:

Indicates a situation that can result in moderate personal injury or death if not properly avoided.

▲ CAUTION

WARNING, Risk of Personal Injury:

Indicates a situation that can result in minor personal injury if not properly avoided.

NOTICE

WARNING, Risk of Property Damage:

Indicates a situation that can result in minor to major property damage if not properly avoided.

Product liability

- Disregarding the following instructions may result in malfunction, damage to property and personal injury and releases the manufacturer from product liability.

Safety regulations

- National safety regulations must be observed!

1.2 General safety instructions

▲ WARNING

Danger of injury to the operator or damage to the property

- Connection to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by qualified personnel.
- Any alteration, reconstruction or extension of the sensor is not allowed!
- The sensor must be operated only within values specified in the datasheet.
- The danger of personal injury and danger of property damage due to a malfunction of the sensor in machines or systems must be excluded by additional safety measures.
- In safety-relevant applications, additional facilities must be provided for maintaining safety and preventing damage.
- Check whether the protection class of the sensor is suitable for the application.

1.3 Intended use

The angle sensor is intended for angular position measurement. For determining measuring range, environmental compatibility and connection data of the sensor, please note the data sheet. Use the sensor as intended by operating within its specified technical data and ambient conditions.

The installation and operating instructions supplied with the unit must be respected. All maintenance and service work must be carried out. The data sheet of the respective sensor is part of this instruction manual. If not yet available, it may be requested by stating the respective model number.

The sensor must not be improperly mounted, operated or serviced. In addition, operation of the sensor in faulty condition is prohibited.

The sensors listed in the installation and operating instructions must not be operated in potentially explosive environments. Sensors intended for this environment (posirot® EX) are described in their respective manuals.

2 Transport and storage

Observe storage and transport temperatures according to the temperatures specified in the data sheet.

Max. rel. humidity 60%, dew condensation must be prevented at all times.

The device must be secured against slipping and tipping during transport.

Shipment damage

Check sensor immediately for shipment damage. In case of any damage or equipment not operating appropriately, please contact your supplier.

Shipment content

- Sensor
- Installation and operation manual

3 Installation and initial operation

Description of the PRDS sensors

The angle sensors PRDS of the posirot® product family perform non-contact or shaft-based angle measurement. A position magnet rotates in front of the sensing area of the sensor head.

The sensor detects the angular position of the position magnet and outputs an absolute digital position value (CANopen, SAE J1939).

3.1 Mechanical installation

- Mount the sensor without mechanical strain.
- For sensors with shaft use flexible coupling or torque arms to avoid misalignment errors (see page 12 “Couplings”).

Mechanical information for the PRDS27 sensor:

- Mount the sensor on a flat surface.
- Do not deform the sensor housing!

Placement and alignment of the position magnet



For non-contact sensor models air gap and alignment of sensor and position magnet has to be observed. The linearity will degrade in case of misalignment.

Adjacent magnetic fields or ferromagnetic materials can influence the measurement results of the PRDS sensors of the posirot® product family. Therefore, the angle sensors and position magnets should be mounted solely with nonmagnetic / non magnetisable screws and washers.

The angle sensors PRDS1, PRDS2, PRDS3, PRDS5, PRDS6 and PRDS7 are equipped with an integrated magnetic shield which minimizes the sensitivity against external magnetic fields.

An optional shield plate is available for the angle sensors PRDS27 and PRDS29. It can reduce the effect of residual magnetizing in case the sensor has to be mounted on a ferromagnetic material.

It is however not possible to exclude the effect of lateral external magnetic fields.

3.2 Electrical connection

NOTICE**Damage or destruction of the sensor due to excessive operating voltage or mounting error**

- The applied operating voltage must not exceed the value specified in the data sheet.
- Operate the sensor only within the limits specified in the data sheet.
- Connection to the power supply only by qualified personnel and in accordance with the applicable safety regulations for electrical equipment.
- Do not connect or disconnect the sensor under voltage!

Corrosion in the sensor due to moisture penetration

- Use the sensor only according to protection class.
- The mating connector should have the same protection class as the sensor, otherwise the lower protection class of the mating connector is valid.
- Avoid crossing the dew point.
- Cable outputs must be installed in such a way that no moisture can get into the cable.
- The protection class of sensors with connector output is valid only if the electrical plug is connected!

Damage of the sensor cable due to mechanical stress

- Do not twist the M12 connector inserts.
- It is important that the knurled nuts on the connectors are tightened to the correct torque for each different size of the connector:
 - M12-ASM connectors / couplings: 1.0 Nm
 - connectors / couplings of other manufacturers: according to manufacturer instruction.
- Use a torque wrench.
- Do not strain the connection cable.
- A separate strain relief is recommended.



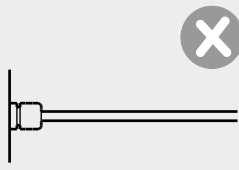

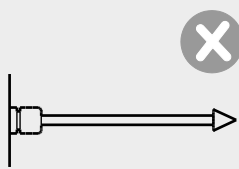
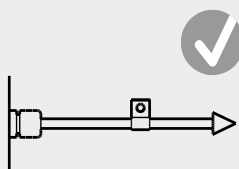
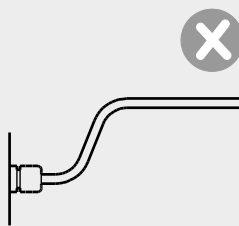
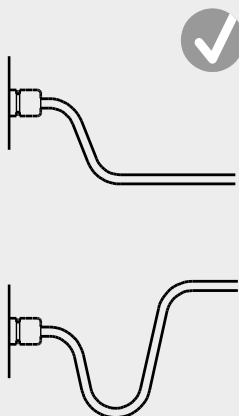
Connector Pin assignment

According to the definitions of the output types contained in the appendix. Observe different color code for pre-assembled accessory cables. See catalog information for accessories.

Supply voltage

See specification in the data sheet of the sensor. The maximum operating voltage must not be exceeded.

Installation of the sensor supply cable

	incorrect	correct
Admissible bending radius of the cable must be observed: R ~ 5 x D R ~ 10 x D (underwater cable)		
Length compensation for the cable must be observed		
A separate cord grip for cable strain relief is recommended		
Observe cable routing in case of splashing water, water condensation and humidity		

Electromagnetic Compatibility (EMC)

Electromagnetic compatibility of posirot® magnetic angle sensors is influenced by the sensor wiring.

NOTICE

Possible malfunction of the sensor when used in systems with highly interference-prone components such as frequency inverters

Recommended wiring:

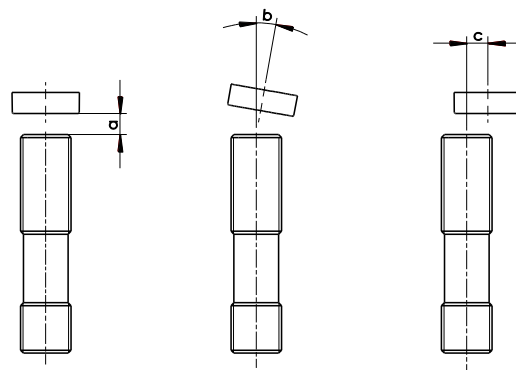
- Use single shielded sensor cable with twisted pair conductors for power supply and signal output.
- Connect the cable shield to ground on one side of the control cabinet. Connect the shield connection over a large area using cable clamps before or at the cable entry into the control cabinet. When preassembled cables are delivered, the screen is not connected to the housing on the sensor side.
- Do not install sensor cables close to power conductors such as motor or contactor control cables (use separate cable ducts for signal and power cables).
- Install the cables in metal cable ducts which are connected to ground.

3.3 Operating temperature

posirot® PRDS27	-40 ... +85°C
posirot® PRDS29	-40 ... +85°C
posirot® PRDS1	-40 ... +85°C
posirot® PRDS2	-40 ... +85°C
posirot® PRDS3	-40 ... +85°C
posirot® PRDS5	-40 ... +85°C
posirot® PRDS6	-40 ... +85°C
posirot® PRDS7	-40 ... +85°C

Measuring error by misalignment of the position magnet

Sensor	Position magnet	Air gap [mm] (a)	Parallelism m [°] (b)	Error by axial misalignment [°] (c)					
				0.2 mm	0.5 mm	1 mm	2 mm	3 mm	4 mm
PRDS1	PRMAG20	0 ... 6.5	0 ... 5	0.15	0.4	0.8	2.2	5.0	–
	PRMAG21	0 ... 4	0 ... 5	0.2	0.4	1	3.8	10	–
	PRMAG22	0 ... 9.5	0 ... 5	0.1	0.4	1	2.2	4.5	8
PRDS2	PRMAG2-Z-VA	0 ... 9	0 ... 5	0.1	0.2	0.6	1.5	4.5	8.5
	PRMAG20	0 ... 6	0 ... 5	0.15	0.4	0.8	2.2	5	–
	PRMAG21	0 ... 3.5	0 ... 5	0.2	0.4	1	3.8	10	–
	PRMAG22	0 ... 9	0 ... 5	0.1	0.4	1	2.2	4.5	8.0
PRDS5	PRMAG2-Z-(VA)	0 ... 8.5	0 ... 5	0.1	0.2	0.6	1.5	4.5	8.5
PRDS6	PRMAG5-Z-(VA)	0 ... 7.5	0 ... 5	0.1	0.2	0.6	1.5	4.5	8.5
PRDS7	PRMAG6-Z-(VA)	0 ... 7.5	0 ... 5	0.1	0.2	0.6	1.5	4.5	8.5
	PRMAG7-Z-VA	0 ... 7.5	0 ... 5	0.1	0.2	0.6	1.5	4.5	8.5
	PRMAG20	0 ... 5.5	0 ... 5	0.15	0.4	0.8	2.2	5	–
	PRMAG21	0 ... 3	0 ... 5	0.2	0.4	1	3.8	10	–
	PRMAG22	0 ... 8.5	0 ... 5	0.1	0.4	1	2.2	4.5	8
PRDS27 PRDS29	PRMAG20	0 ... 7.5	0 ... 5	0.1	0.3	0.7	2	4.6	–
	PRMAG21	0 ... 2.5	0 ... 5	0.15	0.3	0.9	3.6	9.6	–
	PRMAG22	0 ... 10.5	0 ... 5	0	0	0.7	1.5	3.8	7
	PRMAG-M10	0 ... 3.5	0 ... 5	0.1	0.1	0.5	2	7	–

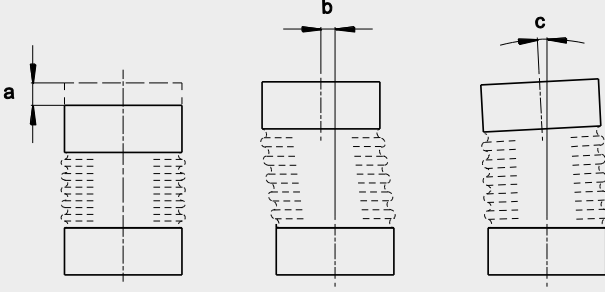
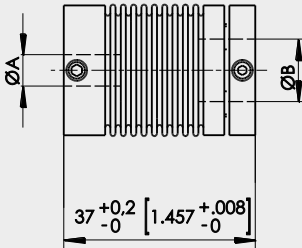


Torque for fixing screws

The specified torques and mounting methods are general recommendations and can differ according to application and operating conditions.

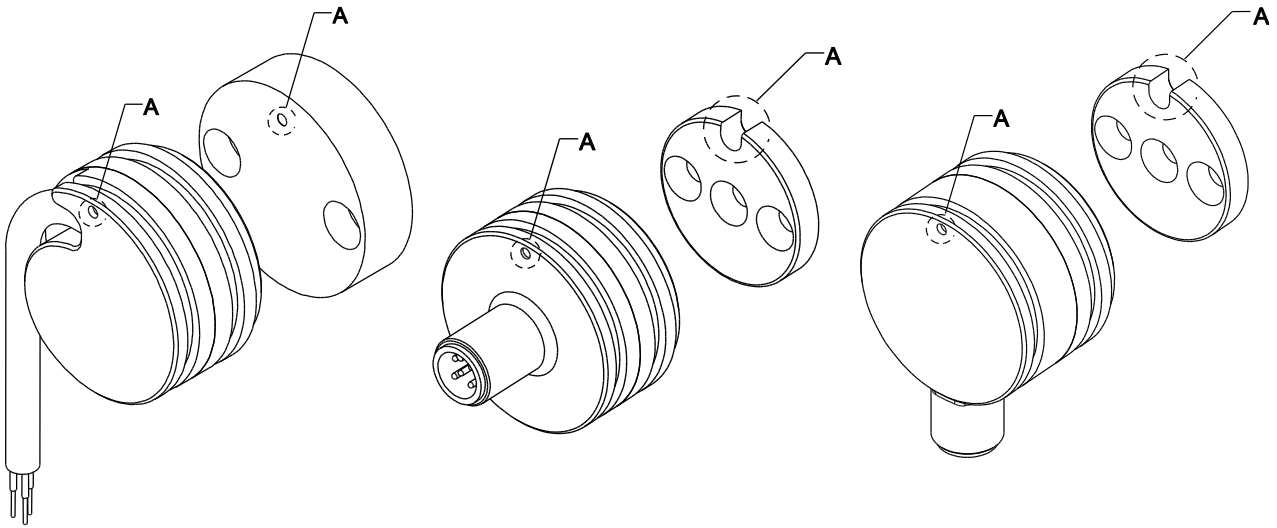
Model	Mounting method	Material	Torque [Nm]
PRDS1	M12x1	-	2.5
PRDS2, PRDS3	M2,5 screws for mounting brackets	-	0.8
PRDS3	M3 screws for mounting flange	-	1.2
PRDS27, PRDS29	M4	-	1
PRDS5	M8	steel	<10
PRDS6	M6	steel	<6
PRDS7	M6	steel	<6

Couplings

Model MK4	Rated torque	2 Nm
	Total length (inserted)	37 mm
		
Axial misalignment (a)		< 0.7 mm
Lateral misalignment (b)		< 0.25 mm
Angular misalignment (c)		< 2°
		
Dimensions in mm [inch]		
Order code	A	B
MK4-37-6-6	Ø6H7 [.236 +.0005]	Ø6H7 [.236 +.0005]
MK4-37-6-10	Ø6H7 [.236 +.0005]	Ø10H7 [.394 +.0006]
MK4-37-6-12	Ø6H7 [.236 +.0005]	Ø12H7 [.472 +.0007]

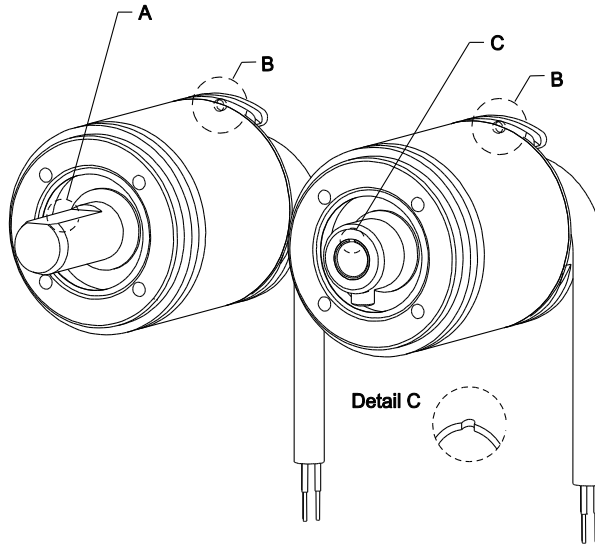
Reference position

PRDS2 with cable output PRDS2 with connector M12 axial PRDS2 with connector M12 radial



A – Marking

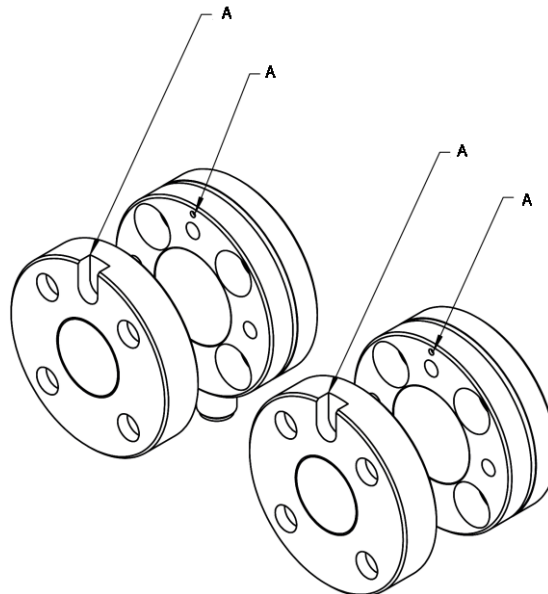
PRDS3 with shaft and hollow shaft



- A – Flat area
- B – Marking
- C – Marking (back side)

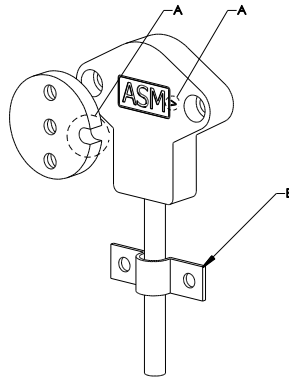
Allowable shaft load:
100 N axial, 100 N radial

PRDS5 with connector M12 axial, radial



- A – Marking

PRDS27/PRDS29
Mounting with strain relief



- A – Marking
- B – Strain relief

4 Maintenance and disposal

4.1 Maintenance and repair

NOTICE

Opening all the posirot® sensors will cause damage and void the warranty

- Do not open the sensor.
- We strongly advise against repair attempts. Any repairs not carried out by ASM will invalidate the warranty. Damaged sensors must be shut down immediately, please contact ASM.

Maintenance interval

Proper maintenance comprises the visual examination of parts (e.g. integrity of housing, connectors and cables). Maintenance intervals depend on the specific application and should be defined by the user in dependence of operating conditions.

Check sensor regularly for possible damage. The following maintenance steps are recommended:

Inspection of ...	Measures
Integrity of housing	Remove sensor from service and send it to ASM for repair
Integrity of cables, connectors	Damaged parts: remove sensor from service and replace damaged parts resp. send sensor to ASM for repair
Mounting elements	Loose mounting parts: mounting elements must be tightened with recommended torque. Provide screw locks if necessary
Visual check of shaft sealing	Damaged shaft sealing: Remove sensor from service and send it to ASM for repair

Calibration

The recommended calibration interval is 1 year.


Test protocol and traceable calibration certificate (ISO9001 / ISO10012) is available on request.

4.2 Disposal

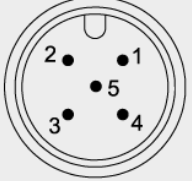
Disposal according to applicable government regulations.

5 Output specification

Digital output

CANOPR CANopen 	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B
	Communication profile	CANopen CiA 301 V 4.02, Slave
	Device profile	Encoder CiA 406 V 3.2
	Configuration services	Layer Setting Service (LSS), CiA Draft Standard 305 (transmission rate, node id)
	Error Control	Node Guarding, Heartbeat, Emergency Message
	Node ID	Default: 127 and 126; programmable via LSS or SDO
	PDO	3 TxPDO, 0 RxPDO, static mapping
	PDO Modes	Event-/Time triggered, Remote-request, Sync cyclic/acyclic
	SDO	1 server, 0 Client
	CAM	8 cams
	Certified	Yes
	Transmission rates	50 kBaud to 1 MBaud, default: 125 kBaud; programmable via LSS or SDO
	Bus connection	M12 connector, 5 pin
	Integrated bus terminating resistor	adjustable by the customer
Bus, galvanic isolated	No	

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	40 mA typical at 24 V DC 80 mA typical at 12 V DC, 120 mA max.
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	$\pm 50 \times 10^{-6}/^{\circ}\text{C}$ f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMC	DIN EN 61326-1:2013

Signal wiring	Output signals	Connector pin no.	Cable color
Connector M12, 5 pin  View to the sensor connector	Shield	1	brown
	Excitation +	2	white
	GND	3	blue
	CAN-H	4	black
	CAN-L	5	grey

CANopen – Set up (MCANOP)



Download


- A detailed specification of this interface can be downloaded from the ASM website:

www.asm-sensor.com/en/downloads.html > **Configuration files**



Risk of injury by unexpected machine movement

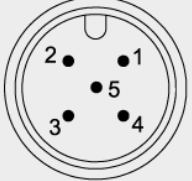
- Change parameters only when machine is in a safe condition!
- Changing parameters may cause unexpected machine movement.
- Changing parameters may influence dependent parameters e.g. changing the resolution may have influence on position of CAM switches.
- Precautions have to be taken to avoid damage to human and machine parts!

CANJ1939R CAN SAE J1939 	CAN Specification	ISO 11898, Basic and Full CAN 2.0 B
	Transceiver	24V-compliant, not isolated
	Communication profile	SAE J1939
	Baud Rate	250 kbit/s
	Internal termination resistor	Adjustable by the customer
	Address	Default 247d and 246d, configurable

NAME Fields	Arbitrary address capable	1	Yes
	Industry group	0	Global
	Vehicle system	7Fh (127d)	Non specific
	Vehicle system instance	0	
	Function	FFh (255d)	Non specific
	Function instance	0	
	ECU instance	0	
	Manufacturer	145h (325d)	Manufacturer ID
	Identity number	0nnn	Serial number 21 bit

Parameter Group Numbers (PGN)	Configuration data	PGN EF00h	Proprietary-A (PDU1 peer-to-peer)
	Process data	PGN FFnnh	Proprietary-B (PDU2 broadcast); nn Group Extension (PS) configurable

Specifications	Excitation voltage	8 ... 36 V DC
	Excitation current	40 mA typical at 24 V DC 80 mA typical at 12 V DC 120 mA max.
	Measuring rate	1 kHz (asynchronous)
	Stability (temperature)	$\pm 50 \times 10^{-6} / ^\circ\text{C}$ f.s. (typical)
	Repeatability	1 LSB
	Operating temperature	See specification of the respective sensor
	Protection	Reverse polarity, short circuit
	Dielectric strength	1 kV (V AC, 50 Hz, 1 min.)
	EMV	DIN EN 61326-1:2013

Signal wiring	Output signals	Connector pin no.	Cable color
Connector M12, 5 pin  View to the sensor connector	Shield	1	brown
	Excitation +	2	white
	GND	3	blue
	CAN-H	4	black
	CAN-L	5	grey

SAE J1939 – Set up (MCANJ1939)



Download

- A detailed specification of this interface can be downloaded from the ASM website:

www.asm-sensor.com/en/downloads.html > Configuration files

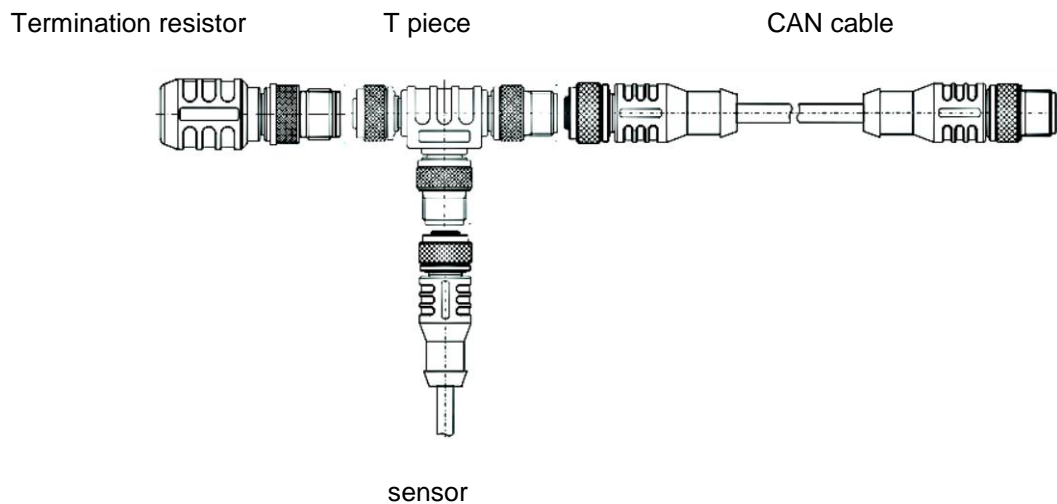


Risk of injury due to unexpected machine movement

- Change parameters only when machine is in a safe condition!
- Changing parameters may cause unexpected machine movement.
- Changing parameters may influence dependent parameters e.g. changing the resolution may have influence on position of CAM switches.
- Precautions have to be taken to avoid damage to human and machine parts!

CAN-Bus wiring

Connect the device by a T-connector to the CAN trunk line. Total length of stubs should be minimized. Do not use single stub lines longer than 0.5 m. Connect terminating resistors 120 Ohm at both ends of the trunk line.



Reliability Parameters

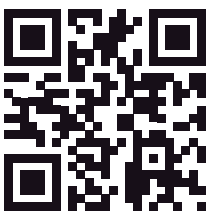
Models	PRDS-CANR 2 channels	
Interfaces	MCANOPR	CAN interface (CANopen) redundant
	MCANJ1939R	CAN interface (SAE J1939) redundant
Reliability Parameters	Device type	B
	Life period electronics MTTF _D	250 years
	Probability of failure electronics PFH (λ_{DU})	450 Fit
	Working life	20 years
	Service and calibration interval	annually
Reference conditions	Supply voltage UB	UB _{ref} = 24 V
	Reference temperature ϑ	ϑ_{ref} = 60°C
	Maximum rotational speed	720 rpm
Standards	Failure rate of electronic components (Siemens)	SN29500







perfect in sensors.



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