SJB 200 W-EX Handbook

Junction box for SMARTPAT sensors

Category
II 2 G
EPL Gb

KROHNE

IMPRINT

1.1 Intended use

CAUTION!
Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

INFORMATION!
This device is a Group 1, Class A device as specified within CISPR11:2009. It is intended for use in industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

INFORMATION!
The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The intended use of the junction box SJB 200 W-Ex is to connect SMARTPAT sensors with the process control system. The SJB 200 W-Ex is suitable for installation in zone 1.

1.2 Safety instructions from the manufacturer

1.2.1 Copyright and data protection

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1.2.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.2.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.2.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

1.2.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

DANGER!
This warning refers to the immediate danger when working with electricity.

DANGER!
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

DANGER!
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.

WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.

CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator's plant.

INFORMATION!
These instructions contain important information for the handling of the device.

LEGAL NOTICE!
This note contains information on statutory directives and standards.

- HANDLING
  This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➲ RESULT
This symbol refers to all important consequences of the previous actions.

1.3 Safety instructions for the operator

WARNING!
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

1.4 EU conformity

The manufacturer declares with the EU declaration of conformity, in which the applied standards are also specified, on his own responsibility conformity with the protection goals of the ATEX directive for use in hazardous areas with gas.

The EU declaration of conformity is based on the EU type examination certificate:

KIWA 16ATEX0047 X

You can download the EU Type Examination Certificate from the manufacturer's website.

1.5 Approval according to the IECEx scheme

Conformity with IEC standards was tested in accordance with the IECEx certification scheme for Explosive Atmospheres acc. to IEC 60079-0:2011 and IEC 60079-11:2011. The number of the IECEx certificate is:

IECEx KIWA 16.0015X

You can download the IECEx certificate from the manufacturer's website or from the official IECEx website www.iecex.com.

1.6 Approval according to North-America standards

Examination of the device by QPS attests the junction box SJB 200 W-Ex in compliance with the CSA and ANSI/ISA standards as applicable. The product is eligible to bear the QPS mark shown with adjacent indicators 'C' and 'US' for Canada and US. The number of the QPS certificate is:

QPS LR1322-8

You can download the QPS certificate from the manufacturer's website. The associated Control Drawing number is APPR GD 800124-01.

2.1 Scope of delivery

INFORMATION!
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

Figure 2-1: Standard scope of delivery

① Ordered device
② Documentation

Optional accessories

- Connecting cable with M12 connector for HART® handheld (Length: 120 cm / 47.2 inch) Order code: XGAS080014

INFORMATION!
For further information contact your local sales office.

2.2 Device description

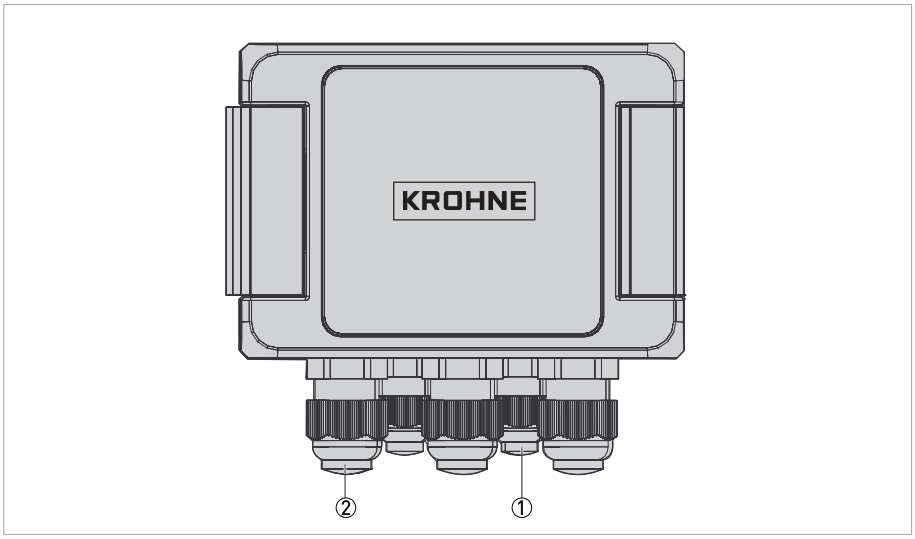


Figure 2-2: Overview device

① Cable feedthroughs M12 x 1.5
② Cable feedthroughs M16 x 1.5

2.3 Nameplate

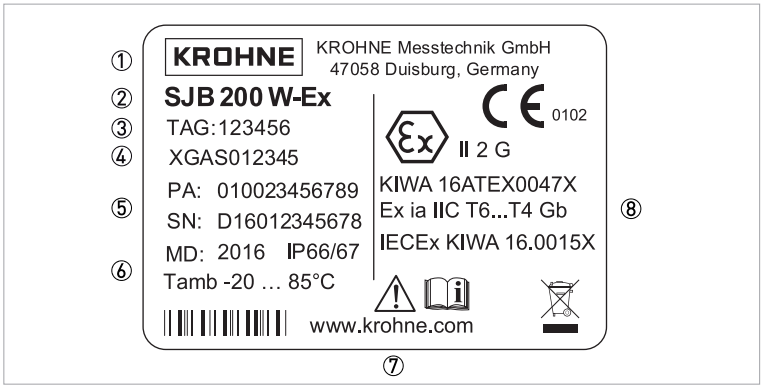


Figure 2-3: Example of a nameplate (ATEX) on the junction box

① Manufacturer
② Device name
③ TAG number
④ Order code
⑤ Production number / Serial number
⑥ Manufacturing date / Protection category / Ambient temperature
⑦ Barcode (serial number) / Website / Observe the operation and installation instruction
⑧ Ex relevant data

Figure 2-4: Example of a nameplate (QPS) on the junction box

① Manufacturer
② Device name
③ TAG number
④ Order code
⑤ Production number / Serial number
⑥ Manufacturing date / Protection category / Ambient temperature
⑦ Barcode (serial number) / Website / Observe the operation and installation instruction
⑧ Ex relevant data

2.4 Approval for zone classified locations

In type of protection "Intrinsic Safety" the device meets the requirements of IEC 60079-11. The explosion protection is ensured by limitation of the current and voltage so that no ignitable energy can occur. The Equipment Protection Levels (EPL) Gb allows the use within Zone 1 or Zone 2 classified locations.

The marking of the junction box in accordance with the requirements of the ATEX directive is as follows:


II 2 G Ex ia IIC T6...T4 Gb

The marking of the junction box in accordance with the requirements of the IECEx scheme is as follows:

Ex ia IIC T6...T4 Gb

Components of the Ex marking and their definition	
II	Group II classified equipment
2	Equipment category 2
G	Gas explosion protection
Ex ia	Equipment protection by intrinsic safety, level of protection ia
IIC	Gas group IIC approved, suitable for gas groups IIA, IIB, IIC
T6...T4	Temperature class range, suitable for T1...T6
Gb	EPL Gb approved, suitable in Zone 1 or Zone 2

The marking of the junction box in accordance with the Canadian and US requirements for Zone classified locations is as follows:

Ex ia IIC / Class I, Zone 1 AEx ia IIC T4...T6

Components of the Ex marking and their definition	
Class I	Gas explosion protection
Ex ia	Equipment protection by intrinsic safety, level of protection ia
Zone 1 AEx	Zone 1 approved according to US standards
IIC	Gas group IIC approved, suitable for gas groups IIA, IIB, IIC
T4...T6	Temperature class range, suitable for T1...T6

2.5 Approval for division classified locations

In type of protection "Intrinsic Safety" the device meets the requirements of Canadian and US standards for the Division concept according to NEC 500. The explosion protection is ensured by limitation of the current and voltage so that no ignitable energy can occur.
The marking of the junction box in accordance with the requirements of the applicable National Electrical Code (NEC 500) and the Canadian Electrical Code (CEC) is as follows:

IS Class I, Division 1, Groups A to D

Components of the Ex marking and their definition	
IS	Intrinsically safe equipment
Class I	Explosion protection for gas
Division 1	Division 1 approved, suitable for Division 1, Division 2
Groups A to D	Approved for gas groups A, B, C, D

2.6 Electrical data

Connect the device only to intrinsically-safe certified equipment. Observe the following maximum values for the junction box when connecting:

- U_i = 30 V
- I_i = 120 mA
- P_i = 1.0 W
- L_i = 0 mH
- C_i = 2.7 nF

CAUTION!
Capacity and inductance of the connecting cable have to be considered.

2.7 Electrostatic charge

In order to avoid ignition hazards due to electrostatic charge, the junction box may not be used in areas with:

- processes that generate strong charges,
- mechanical friction and cutting processes,
- spraying of electrons (e.g. in the vicinity of electrostatic painting systems)

WARNING!
Electrostatic charging of the housing surface by friction must be avoided. The junction box must not be dry cleaned.

2.8 Temperature classes

The permissible temperature range of the device for use in temperature class T1...T6 is:

Temperature class	Permissible ambient temperature in [°C]	Permissible ambient temperature in [°F]
T5 / T6	-20...+65°C	-4...+149°F
T1...T4	-20...+85°C ①	-4...+185°F ①

① Rated continuous operating temperature of connecting cable min. 85°C / 185°F

The minimum permissible storage temperature for a short time (24 h) is -40°C / -40°F.

The maximum permissible temperatures are valid under the following conditions:

- The device is operated in its intended position.
- The device is not exposed to heat radiation (e.g. direct sunlight, adjoining hot parts).
- Insulation does not obstruct the ventilation of the device.

3.1 General notes on installation

DANGER!
All work on the electrical connections may only be carried out with the power disconnected.

DANGER!
Observe the national regulations for electrical installations!

WARNING!
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

INFORMATION!
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

3.2 Storage and transport

CAUTION!
Do not make any mechanical modifications to the device (drilled, bent or scratched). This can result in the loss of proper functionality, as well as the rights under the device warranty.
The device must be suitable for the temperature, pressure and environmental conditions which are specified (including chemical resistance).

3.3 Wall mounting (optional)

When mounting to a wall the junction box with optional mounting bracket shall be secured and mounted to a supporting surface by 4 mounting screws size 5 x 40 mm and 4 plastic walls anchors (e.g. by fisher anchor type UX7/40R) or equivalent mounting parts.

INFORMATION!
The screws must be fixed with a torque of 1 Nm.

3.4 Electrical connection M12 (optional)

CAUTION!
Moisture on the connector must be avoided! Moisture may cause a short-circuit and a malfunction of the measuring loop!
If moisture has entered the connector, dry it with air (e.g. hot air gun).

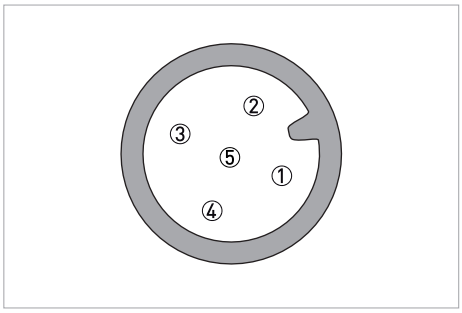


Figure 3-1: M12 connector

① Not connected
② 15...35 VDC (+)
③ 15...35 VDC (-)
④ Not connected
⑤ Not connected

4.1 Safety instructions

DANGER!
All work on the electrical connections may only be carried out with the power disconnected. For more information about the voltage data refer to Technical data on page 23

DANGER!
Observe the national regulations for electrical installations!

WARNING!
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Open the housing

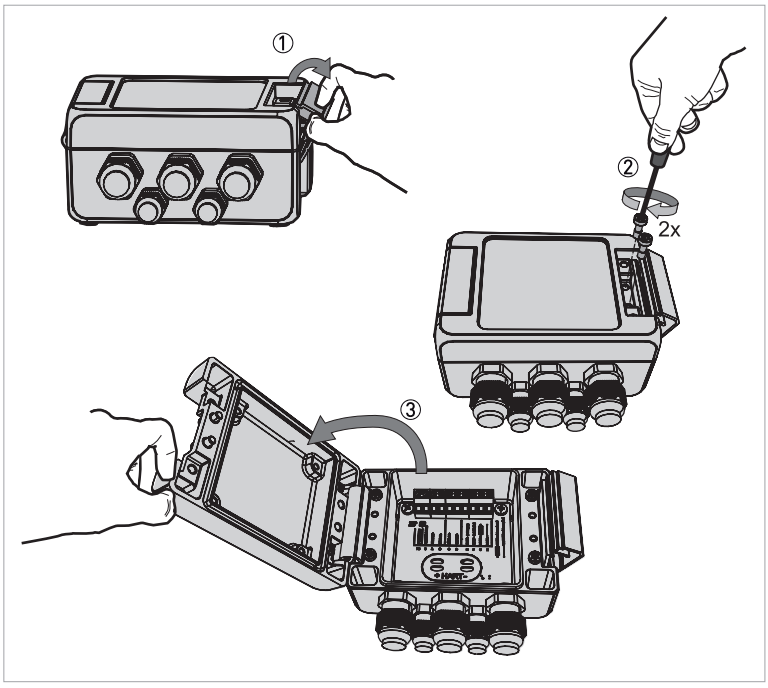


Figure 4-1: Open the housing

① Pull the hinge lock to the side.
② Loose the 2 torx screws (TX20) with a torx screwdriver
③ Lift the housing cover up.
➲ Now you can start with the cable connections.

After completion of work, close the housing cover. To achieve a proper sealing of the device please tighten the screws with a torque of 1.5 Nm.

4.3 Connection assignment

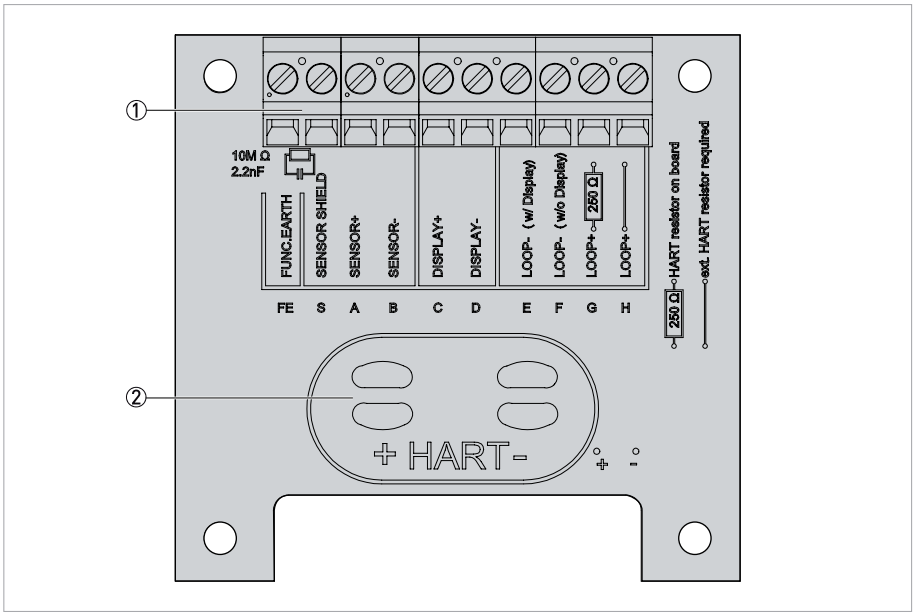


Figure 4-2: Overview circuit board

① Connection terminal

② Connection terminals for HART®handheld

4.3.1 Connecting the cable

DANGER!
All work on the electrical connections may only be carried out with the power disconnected.

Sensor cable VP 2-S

Black	Sensor+
White	Sensor-
Shield	S

4.4 Connection diagram

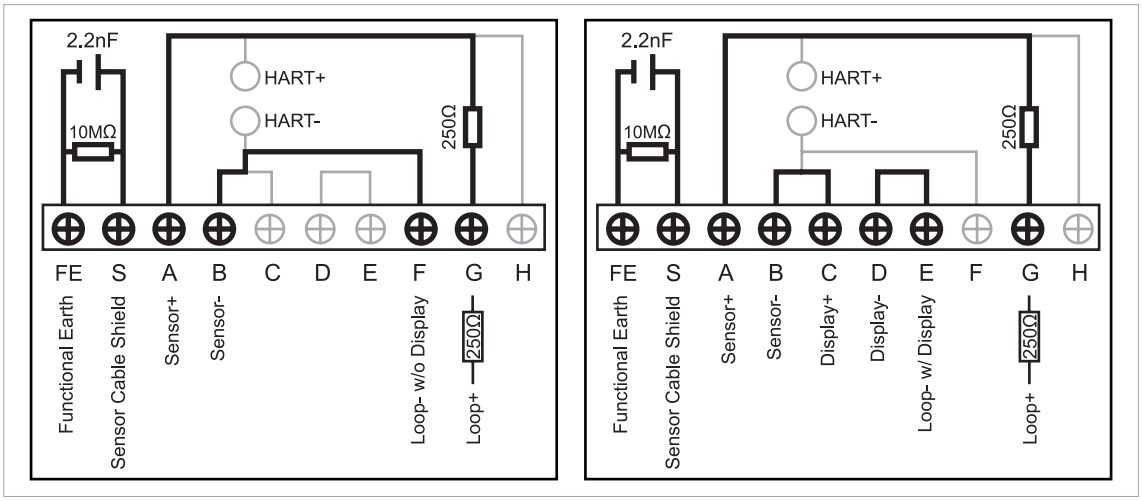


Figure 4-3: SJB 200 W-Ex with SMARTPAT sensor, integrated HART® resistor and without display (left side). SJB 200 W-Ex with SMARTPAT sensor, integrated HART® resistor and display (right side).

SJB 200 W-Ex with SMARTPAT sensor, integrated HART® resistor and without display.		SJB 200 W-Ex with SMARTPAT sensor, integrated HART® resistor and display.	
FE	Ground (housing)	FE	Ground (housing)
S	Sensor cable shield	S	Sensor cable shield
A	Sensor+	A	Sensor+
B	Sensor-	B	Sensor-
F	Loop-	C	Display+
G	Loop+ 250Ω	D	Display-
		E	Loop- with Display
		G	Loop+ 250Ω

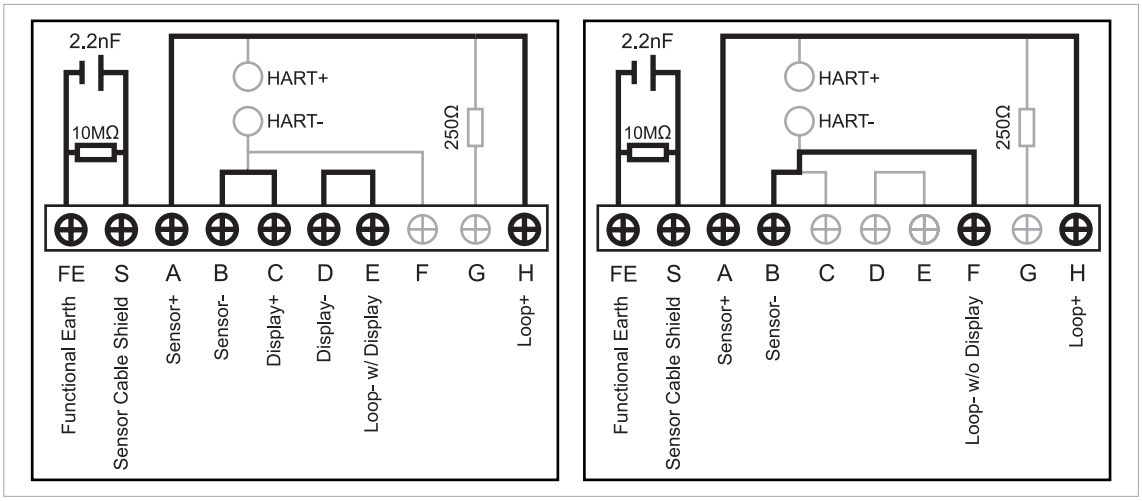


Figure 4-4: SJB 200 W-Ex with SMARTPAT sensor, display and without integrated HART® resistor (left side).
SJB 200 W-Ex with SMARTPAT sensor, without display and integrated HART® resistor (right side)

SJB 200 W-Ex with SMARTPAT sensor, display and without integrated HART® resistor.		SJB 200 W-Ex with SMARTPAT sensor, without display and integrated HART® resistor.	
FE	Ground (housing)	FE	Ground (housing)
S	Sensor cable shield	S	Sensor cable shield
A	Sensor+	A	Sensor+
B	Sensor-	B	Sensor-
C	Display+	F	Loop-
D	Display-	H	Loop+
E	Loop- with Display		
H	Loop+		

4.4.1 Usage of HART® communication

Only the following devices can be connected to the SJB 200 W-Ex

- HART® handheld
- USB interface cables

Passive behaviour according to the power supply has to be considered.

4.4.2 Grounding and equipotential bonding

DANGER!
The housing must be connected to the equipotential bonding of the hazardous area. Please use the ground connection facility (terminal FE) inside the housing.

The sensor cable shield must be connected to the connection facility (terminal S).

Consider the information mentioned in the supplementary instruction of the SMARTPAT sensor.

5.1 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!
For more precise information, please contact your local sales office.

5.2 Returning the device to the manufacturer

5.2.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

WARNING!
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

WARNING!
If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*

5.2.2 Form (for copying) to accompany a returned device

CAUTION!
To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:
Department:		Name:
Tel. no.:		Fax no. and/or Email address:
Manufacturer's order no. or serial no.:		
The device has been operated with the following medium:		
This medium is:		radioactive
		water-hazardous
		toxic
		caustic
		flammable
		We checked that all cavities in the device are free from such substances.
		We have flushed out and neutralized all cavities in the device.
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.		
Date:		Signature:
Stamp:		

5.3 Disposal

LEGAL NOTICE!
Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**.
The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

6.1 Technical data

INFORMATION!

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).*

SJB 200 W Ex

Design

Housing	Die-cast aluminium AlSi 12
Cable gland	2 x M16 x 1.5 + 2 x M12 x 1.5 / PA V0 (UL 94)
Connector	M12 (optional)

Operating conditions

Ingress protection	IP 66/67
Weight	Approx. 640 g / 1.41 lb
Operating and storage temperature range	-20...+85°C / -4...+185°F -40...+85°C / -40...+185°F (short term storage)

Installation conditions

Start-up	Directives, recommendation and engineering standards for the application shall be considered. The intrinsic safety shall be provided by interconnection to intrinsically safe equipment.
	To prevent risk of flammable hazard in case of malfunctions and or transients in the equipotential bonding system, use equipment providing galvanic separation.

Materials

Cable feedthrough	Polyamid 6
Housing	Die-cast aluminium, painted
M12 connector (optional)	Contactors: CuZn and Au Body: PA

Input and output

Internal connection	Terminals for: • Current loop 4...20 mA, HART® handheld • SMARTPAT Sensor, cable shield • Display (optional)
External connection	M12 connector for HART® handheld (optional)
Electrical data	Only for connections to certified intrinsically safe circuits with the maximum values: • Ui = 30 V • Ii = 120 mA • Pi = 1 W • Ci = 2.7 nF • Li = negligible
Isolation	500 VAC to earth

Approvals

CE	
This device fulfils the statutory requirements of the EC directive. The manufacturer certifies successful testing of the product by applying the CE mark.	
For full information of the EU directives and standards and the approved certifications, please refer to the EU declaration or the website of the manufacturer	
Hazardous areas	
ATEX	In accordance with ATEX Directive, suitable for Zone 1 and Zone 2
IECEx	Certificate of Conformity for Ex equipment in accordance with the IECEx system. Suitable for Zone 1 and Zone 2
QPS	Certificate and cQPSus Approval Mark in accordance with the US and Canadian requirements for Zone classified locations (Zone 1 and Zone 2) and for Division classified locations (Division 1 and Division 2).

6.2 Dimensions

Ex version

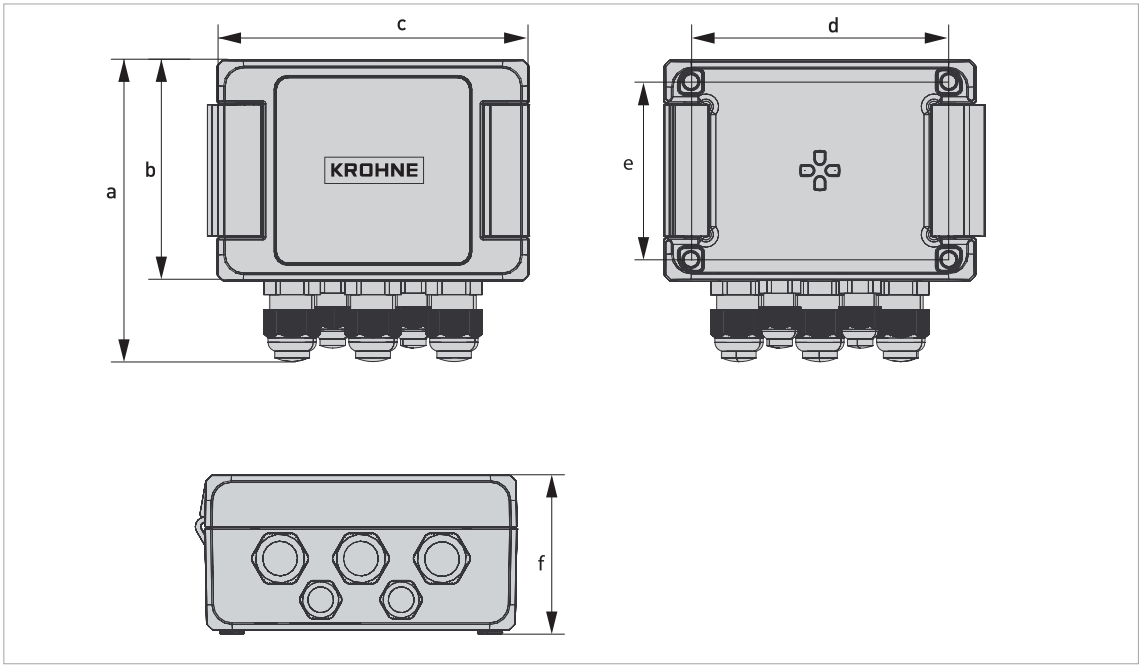
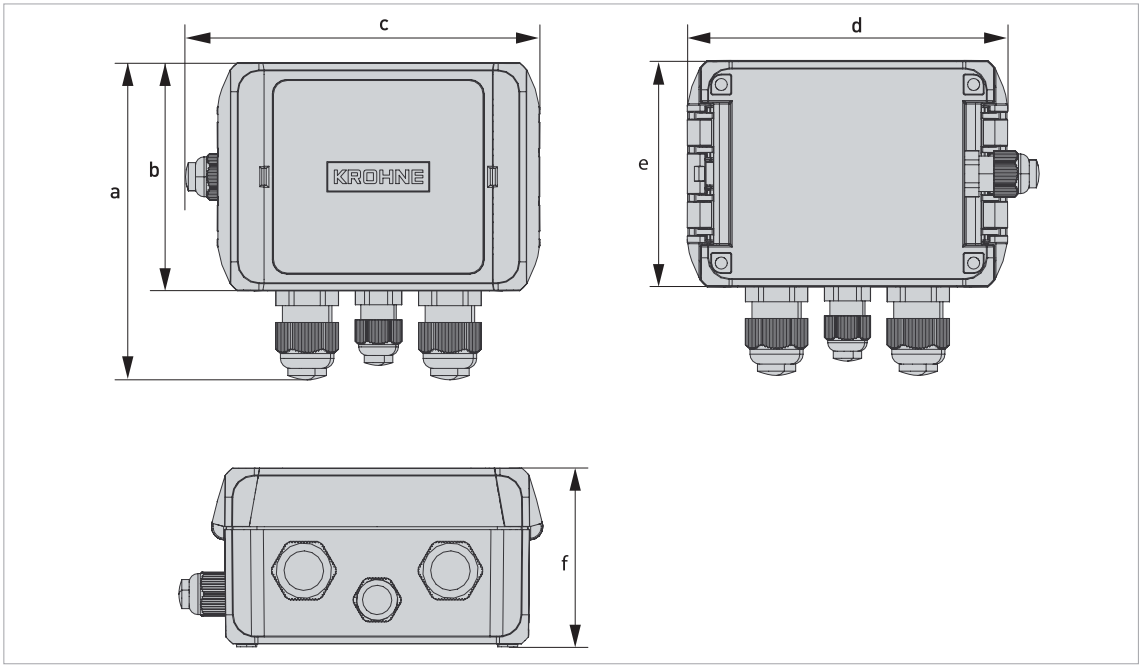


Figure 6-1: SJB 200 W-Ex dimensions

Die-cast aluminium housing

	Dimensions [mm]	Dimensions [inch]
a	117.2	4.61
b	86	3.39
c	121	4.76
d	100	3.94
e	69	2.72
f	61.7	2.43

Non Ex version



Poly carbonate (PC) housing (only for non Ex version)

	Dimensions [mm]	Dimensions [inch]
a	111	4.37
b	80	3.15
c	124	4.88
d	89	3.50
e	63	2.48
f	61	2.40

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