JUMO DELOS S02

Pressure transmitter with display

Single Pair Ethernet

Operating manual

JUMO

40505612T90Z001K000

V2.00/EN/30052944/2024-01-22

Further information and downloads

qr-405056-en.jumo.info

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1 About this documentation

1.1 Validity

This manual is valid for all devices with an SPE interface (Single Pair Ethernet).

1.2 Purpose

This documentation is part of the device and includes all information to ensure that it is used safely and as intended across all phases of the product lifecycle.

If you do not follow the documentation and safety information, this may result in risk to life and damage to property due to improper use.

- Read and follow the documentation and the safety information and warnings.
- Store the document in its entirety, in an easily accessible location, and so that it can be read in full at all times.
- Contact the manufacturer if you have any questions about the device and documentation.

1.3 Target group

This documentation is intended to be used by personnel for plant mechanical systems for sanitary, heating and air-conditioning technology, electrical engineering or mechanical and plant engineering.

1.4 Abbreviations

abs	Absolute pressure
CE	Conformité Européenne (European Conformity)
CIP	Cleaning in Place (Process for cleaning process plants without major disassembly)
DHCP	Dynamic Host Configuration Protocol (communication protocol for automatic assignment of the network configuration)
DMC	Data Matrix Code
DN	Diamètre Nominal (nominal diameter)
DNS	Domain Name System
EHEDG	European Hygienic Engineering and Design Group (association of equipment suppliers for food production, companies involved in food processing, research institutes, and public health organizations as a foundation)
EMC	Electromagnetic compatibility
FCC	Federal Communications Commission (issues FCC certification for electronic products sold or manufactured in the United States)
FDA	Food and Drug Administration (US-amerikanische Arzneimittelbehörde; zuständig für Zulassung, Kontrolle und Überwachung unter anderem von Medizinprodukten in den Vereinigten Staaten)
LVS	Limit Value Switch
IP	Internet Protocol
MQTT	Message Queuing Telemetry Transport (network protocol for exchanging data between Internet of Things (IoT) devices and other applications)
MSP	Measuring span (difference between measuring range end and measuring range start)
NFC	Near Field Communication
NPT	National Pipe Thread (thread standard used in the USA for self-sealing compression fittings)
PDU	Protocol Data Unit (core component of the Modbus telegram; consisting of function code and data)
PELV	Protective Extra Low Voltage

PoDL	Power over Data Line (power is supplied in parallel to data transmission via the single-pair Ethernet connection)
rel	Relative pressure
SCCP	Serial Communication Classification Protocol (automatic negotiation of the PoDL class)
SPE	Single Pair Ethernet
SPS	Programmable Logic Controller
TCP	Transmission Control Protocol (standard for network conversation)
UKCA	UK Conformity Assessed
UNF	Unified Fine Thread Standard (American imperial standard fine thread)
URL	Uniform Resource Locator (denotes an address that specifies a file on a server)

1.5 Definition of terms

Use in the documentation	Definition
Device, product	Pressure transmitter
Medium, measurement medium	Gases, vapors, liquids
Product lifecycle	Overall consideration of Product identification, acceptance of the goods, storage, mounting, connection, operation, troubleshooting, maintenance to disposal

1.6 Trademark information

All trademarks and trade and company names used are the property of their rightful owners or authors.

1.7 Symbols

WARNING!

The signal word "WARNING" indicates an imminent danger.

Non-observance can lead to death or serious injury.

▶ The instructions in the warning notice must be observed and followed!

NOTE!

This symbol refers to important information about the device or its handling.

REFERENCE!

This symbol refers to **further information** in other sections, chapters, or other manuals.

2 Safety

2.1 Intended use

The device is intended for measuring relative and absolute pressures of gases, steam, and liquids. The device's pressure range needs to be taken into account here.

In order to ensure the device's perfect condition, only media may be used to which the materials in contact with the media are sufficiently resistant.

The operator is responsible for compliance with the specifications indicated in the technical data (e.g. operating and ambient temperature).

The device may only be used in a technically perfect condition, in accordance with its intended use, in a safety-conscious and hazard-conscious manner and in compliance with the operating manual.

The following in particular are considered to be improper

- Any structural, technical or electrical modifications to the device.
- Use of the device outside the areas described in this operating manual.
- Use of the device deviating from the technical data.

The manufacturer is not liable for any damage resulting from improper use.

The operating manual is part of the device. The device is only intended for use according to this operating manual.

2.2 Qualification of personnel

The personnel deployed must meet the following requirements in all phases of the product lifecycle:

- Members of personnel have at least completed training in the field of plant mechanical systems for sanitary, heating, and air-conditioning technology or have completed a degree in electrical engineering or mechanical and plant engineering.
- Members of personnel are familiar with this documentation and the safety information and warnings it contains.

2.3 Hot media

Hot media may result in the device surfaces becoming hot and presenting a risk of injury.

- Allow the device and plant to cool down.
- Wear suitable protective equipment.
- If required, install contact protection.

2.4 Hazardous materials

Using hazardous materials as a medium may result in abrasive and corrosive damage to components of the product that come into contact with the medium. The medium may leak and present a fire hazard and a risk to health.

Carry out a risk assessment taking into consideration the safety data sheet for the relevant hazardous substance for mounting, operation, maintenance, cleaning, and disposal:

- Comparison and systematic checking of the durability of the components of the product that come into contact with the medium and the admissible environmental influences.
- Assessment of the risk to people and the environment.
- Assessment of the fire hazard due to the product materials, the admissible environmental influences, and the voltage supply.

2.5 Mechanical load

Mechanical load on the device and process connections can lead to leaks.

- Do not place the device and the process connections under mechanical strain.
- Systematically check that the process connections are leak-tight.

2.6 Declarations of conformity

Radio Equipment Directive (RED)

JUMO GmbH & Co. KG hereby states that the device complies with the Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available on the manufacturer‘s website.

Federal Communications Commission (FCC)

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions.

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

Caution: Any Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

Radio equipment regulations S.I. 2017 No. 1206

The manufacturer hereby declares that the device corresponds to the radio equipment regulations S.I. 2017 No. 1206. The full text of the UK declaration of conformity can be found on the manufacturer’s website.

2.7 Transport and storage damage

The device can be damaged if it is insufficiently protected during transport and/or improperly stored.

- Transport the device protected from moisture and dirt in shockproof packaging.
- Protect all electrical and mechanical connections from damage.
- Observe the admissible storage temperature of the device.
- Store the device in a dry and dust-free environment.

3 Description

3.1 Structure

1 Display
2 M12 connector
3 Pressure compensation element (only with "relative pressure" version)
4 Housing for electronic components
5 Process connection

3.2 Function

The process pressure has an effect on the piezoresistive sensor element via the metallic pressure measurement membrane. Deformation of the membrane and the sensor element occurs due to the application of force; this results in a change in resistance. In addition, there is the mechanical tension that comes about as the result of the deformation in the sensor element's piezoresistive material. This results in a change in the electrical conductivity. In turn, this change in conductivity results in a change in resistance.

This change in resistance in the sensor element is converted into a corresponding output signal and output as a measured value.

The pressure measuring cell is open to the atmosphere via the pressure compensation element in the "relative pressure" version. The ambient pressure in the pressure measuring cell can therefore be acquired and compensated.

The pressure measuring cell is encapsulated in the "absolute pressure" version. The process pressure is measured compared to the vacuum.

3.3 Nameplate

JUMO	Manufacturer and address
DELOS S02	Device designation
Typ	Device version
TN	Part no.
	Measuring range
	Voltage supply
	Output
F-Nr.	Fabrication number The production date (year/week) can be taken from the serial number. These are the characters 12, 13, 14, 15.
CE	CE identification marking
	DMC code
UK CA	UKCA identification marking
FC	FCC identification marking
	Disposal
	Observe device documentation!

3 Description

3.4 Approvals

	EHEDG	
	Test facility	Research Center Weihenstephan for Brewing and Food Quality
	Certificate/certification number	EL Class 1/certification number, see EHEDG certificate
	Inspection basis	EHEDG design specifications (Doc. 8 – Hygienic Design Principles)
	Valid for	Process connection 613 Clamp DN 25, DN 32, DN 40 with Tri-Clamp seal Combifit International B.V. Process connection 616 Clamp DN 50 with Tri-Clamp seal Combifit International B.V. Process connection 550 Aseptic DN 20 DIN 11864-1 Form A Process connection 551 Aseptic DN 25 DIN 11864-1 Form A Process connection 552 Aseptic DN 32 DIN 11864-1 Form A Process connection 553 Aseptic DN 40 DIN 11864-1 Form A Process connection 554 Aseptic DN 50 DIN 11864-1 Form A Process connection 684 VARIVENT® type B DN 15/10 with EPDM O-ring Process connection 685 VARIVENT® type F DN 32/25 with EPDM O-ring Process connection 686 VARIVENT® type N DN 50/40 with EPDM O-ring Process connection 710 Aseptic DN 25 DIN 11864-3-A Process connection 711 Aseptic DN/OD 33.7 DIN 11864-3-A Process connection 997 JUMO PEKA with FKM O-ring

3.5 Scope of delivery

Device in the ordered version
Quick start guide

4.1 Electrical safety

Requirements	DIN EN 61010-1:2020 The device must be equipped with an electrical circuit that meets the requirements for "Limited-energy circuits".

4.2 Electrical data

Voltage supply	DC 18 to 30 V, PELV
Current consumption	≤ 100 mA
Power consumption	≤ 1.8 W
Overvoltage category	II
Pollution degree	2
Protection rating	DIN EN 61140, Class III (protective low voltage)
PoDL class	Class 11, IEEE 802.3cg
PoDL classification	SCCP or Forced Mode
Electrical connection	
Connection element	M12 plug connection
M12 plug connector	IEC 63171-5
Version	2-pole, shielded
Protection type	IP67
Connecting cable	IEC 61156-13, IEC 61156-14
Version	2-core, shielded
Bandwidth	≥ 20 MHz
Line length	≤ 500 m (≥ AWG 22 at ≥ DC 24 V supply voltage into the cable)
DC loop resistance	< 59 Ω
Temperature resistance	≥ 80 °C

4 Technical data

4.3 Inputs

4.3.1 Measuring range and accuracy

Relative pressure

Nominal measuring range bar	Linearity[a] % MSP	Accuracy at 20 °C[d] % MSP	 -20 to +75 °C[e] % MSP	Long-term stability[b] % MSP per year	Overload capability[c] bar	Burst pressure bar
0 to 0.4	0.15	0.40	1.00	≤ 0.15	10	20
0 to 1	0.15	0.30	1.00	≤ 0.15	10	20
0 to 4	0.10	0.25	0.75	≤ 0.10	25	50
0 to 10	0.10	0.25	0.75	≤ 0.10	50	60
0 to 25	0.10	0.25	0.75	≤ 0.10	120	200
0 to 60	0.10	0.25	0.75	≤ 0.10	300	400
0 to 100	0.10	0.25	0.75	≤ 0.10	300	400
-0.1 to +0.1	0.20	0.50	1.00	≤ 0.20	6	10
-0.4 to +0.4	0.15	0.40	1.00	≤ 0.20	10	20
-1 to +1	0.15	0.30	1.00	≤ 0.15	10	20
-1 to +3	0.10	0.25	0.75	≤ 0.10	25	50
-1 to +9	0.10	0.25	0.75	≤ 0.10	50	60
-1 to +24	0.10	0.25	0.75	≤ 0.10	120	200

[a] Linearity according to limit point setting

[b] Reference conditions DIN EN 61298-1

[c] All pressure transmitters are vacuum proof.

[d] Includes: linearity, hysteresis, repeatability, deviation of measuring range start value and measuring range end value

[e] Includes: linearity, hysteresis, repeatability, deviation of measuring range start value and measuring range end value, thermal effect on measuring range start and measuring span

Absolute pressure

Nominal measuring range bar	Linearity[a] % MSP	Accuracy at 20 °C[d] % MSP	 -20 to +75 °C[e] % MSP	Long-term stability[b] % MSP per year	Overload capability[c] bar	Burst pressure bar
0 to 0.4	0.15	0.40	1.00	≤ 0.15	10	20
0 to 1	0.15	0.30	1.00	≤ 0.15	10	20
0 to 4	0.10	0.25	0.75	≤ 0.10	25	50
0 to 10	0.10	0.25	0.75	≤ 0.10	50	60
0 to 25	0.10	0.25	0.75	≤ 0.10	120	200
0 to 60	0.10	0.25	0.75	≤ 0.10	200	300

[a] Linearity according to limit point setting

[b] Reference conditions DIN EN 61298-1

[c] All pressure transmitters are vacuum proof.

[d] Includes: linearity, hysteresis, repeatability, deviation of measuring range start value and measuring range end value

[e] Includes: linearity, hysteresis, repeatability, deviation of measuring range start value and measuring range end value, thermal effect on measuring range start and measuring span

4.4 Interfaces

4.4.1 Bluetooth

Function	Transfer of configuration data and device information, display of process values
Communication	Via mobile end device with the JUMO smartCONNECT app
Authentication	Via NFC
Connection status (configurable)	Active Inactive Restricted (via NFC)
Range	10 m (open space)
Radio frequency Bluetooth radio module NFC tag	 2.4 GHz 13.56 MHz
Max. transmission power Bluetooth radio module NFC tag	 0 dBm –
JUMO smartCONNECT app System requirements iOS device Android device	 iPhone 7 or later with iOS 13 Android 8.0 or later

4.4.2 SPE

Function	Transfer of process data, configuration data, and device information, voltage supply via PoDL
Communication	Via end device and JUMO Cloud, Modbus master
SPE standard	10BASE-T1L
Transmission protocol	Modbus TCP, integrated JUMO Cloud gateway
Data transfer rate	10 Mbit/s

4.5 Display

Type	LCD
Size	Display 22.5 mm x 26.0 mm, font size 7.5 mm
Brightness	10 levels (configurable)
Alignment	Display can be rotated by 180° via software Housing can be rotated by ±165°
Color	White
Structure	3-color device status display 4-digit process value display Text line Toolbar
Measuring unit	bar, mbar, hPa, kPa, MPa, psi, %

4 Technical data

4.6 Environmental influences

Admissible medium temperature	-25 to +100 °C (135 °C maximum 1 hour per day; no function here)
Admissible ambient temperature	-25 to +75 °C
Admissible storage temperature	-40 to +85 °C
Climatic conditions	DIN EN 60721-3-3
Climate class	3K6
Storage	Relative humidity ≤ 90 %, without condensation
Operation	Relative humidity ≤ 100 %, including condensation on device outer shell
Protection type	DIN EN 60529 IP65
Electromagnetic compatibility (EMC)	DIN EN 61326-2-3:2021
Interference emission	Class B[a]
Interference immunity	Industrial requirements
Vibration resistance	DIN EN 60068-2-6, DIN EN 60068-2-27
Vibration resistance	20 g at 10 Hz to 2000 Hz
Shock resistance	50 g for 11 ms 100 g for 1 ms
Site altitude	≤ 2000 m above sea level

[a] The product is suitable for industrial use as well as for households and small businesses.

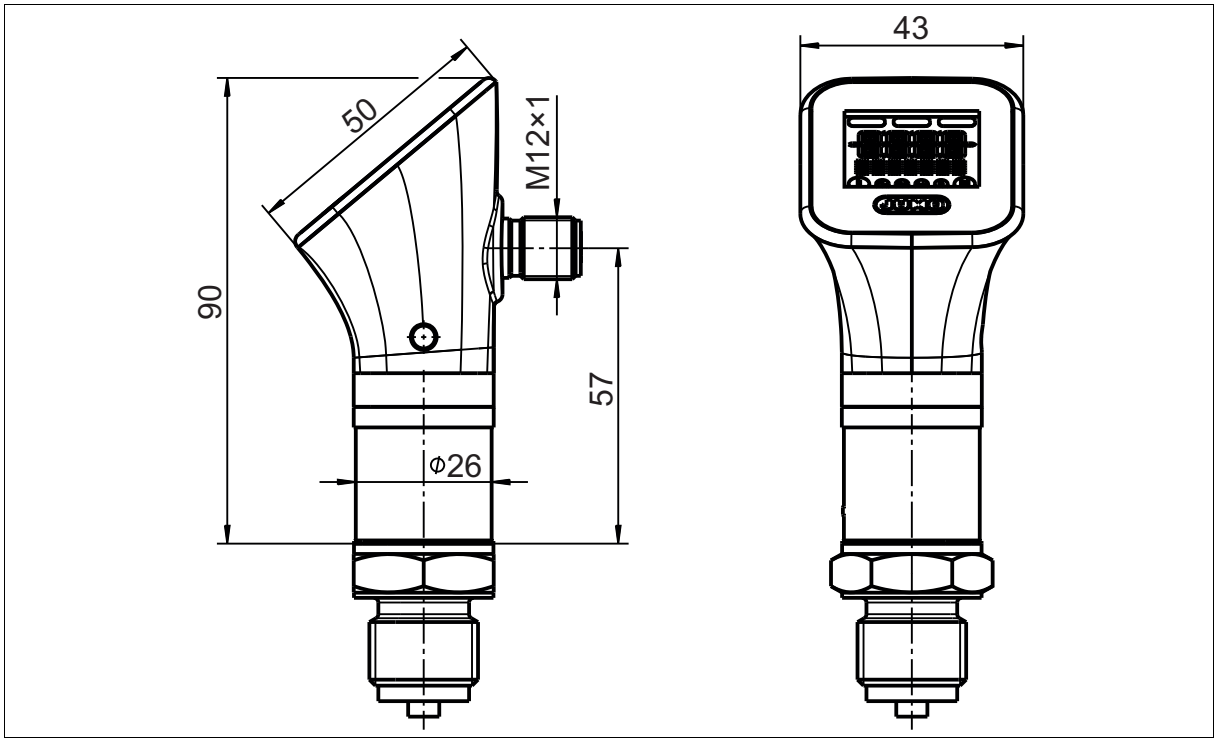
4.7 Mechanical features

Reference conditions	DIN 16086 and DIN EN 60770
Material	
Sensor	Silicon sensor with stainless steel pressure measurement
Housing	304, PBT-GF30
Threaded sleeve M12 x 1	304
Housing seal	EPDM
Display	PMMA
Process connection	316 L
Membrane	316 L
Welding ring	316 L
O-ring, sealing ring	FPM, others available as an optional extra (e.g. EPDM, VMQ)
Calibration position	Device upright, process connection at the bottom
Installation position	Any[a]
Sensor	
Pressure transfer medium	Synthetic oil (silicone oil) or FDA-compliant oil
Admissible load changes	> 10 million
Operation	
On-site	Via Bluetooth and app
Via interface	Depending on the version

[a] If the mounting position is different from the calibration position, a zero offset may occur. Complete zero point adjustment.

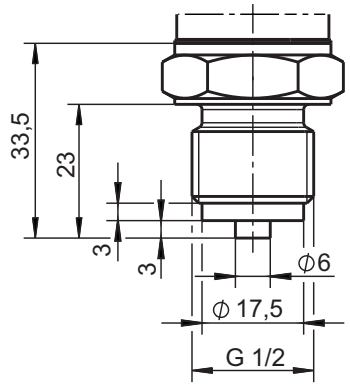
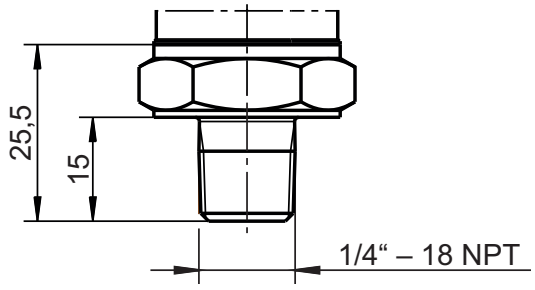
4.8 Dimensions

4.8.1 Device

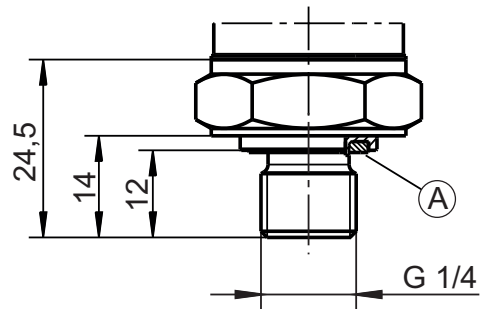
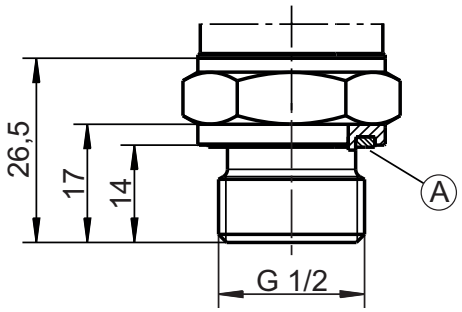
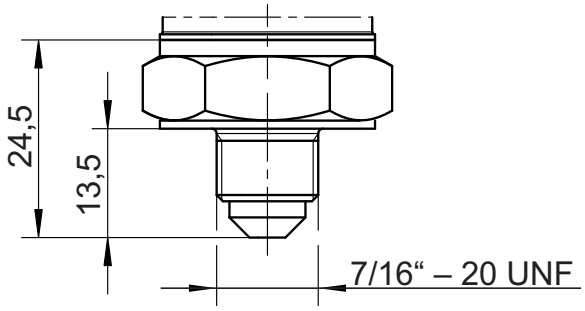


4.8.2 Process connections

Process connections, not front-flush

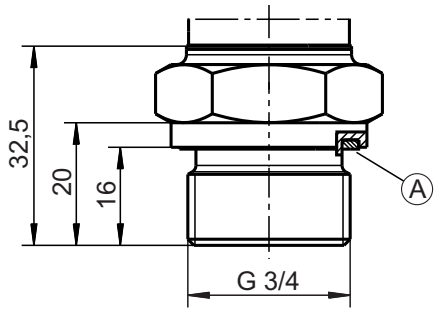
G 1/2 **DIN EN 837** (Order code 504) • Wrench size SW27 • Tightening torque: 30 Nm	
1/4“ – 18 NPT **DIN EN 837** (Order code 511) • Wrench size SW27 • Tightening torque: 20 Nm	

4 Technical data

G 1/4 **DIN EN 3852-11** (Order code 521) (A) Sealing ring G 1/4 • Wrench size SW27 • Tightening torque: 20 Nm	
G 1/2 **DIN EN 3852-11** (Order code 523) (A) Sealing ring G 1/2 • Wrench size SW27 • Tightening torque: 30 Nm	
7/16“ – 20 UNF (Order code 562) • Wrench size SW27 • Tightening torque: 20 Nm	

Process connections, front-flush

Operating conditions of the process connections with regard to pressure and temperature according to DIN standard. The temperature range depends on the sealing material and the pressure range.

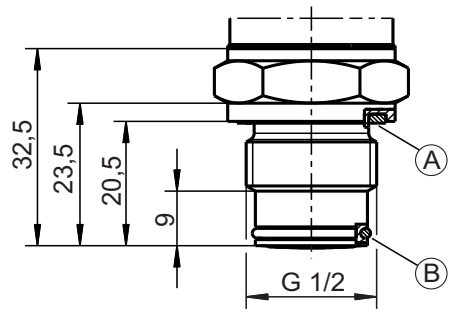
G 3/4 front-flush **DIN EN ISO 228-1** (Order code 571) (A) Sealing ring G 3/4 • Wrench size SW32 • Tightening torque: 25 Nm **Operating condition:** p_{max} = 25 bar → -10 °C < T < +150 °C p_{max} = 40 bar → -10 °C < T < +100 °C	

G 1/2 front-flush with double seal
(Order code 574)

(A) Sealing ring G 1/2
(B) O-ring 15.1 × 1.78

- Wrench size SW27
- Tightening torque: 25 Nm

Operating condition:
p_{max} = 25 bar → -10 °C < T < +150 °C
p_{max} = 40 bar → -10 °C < T < +100 °C

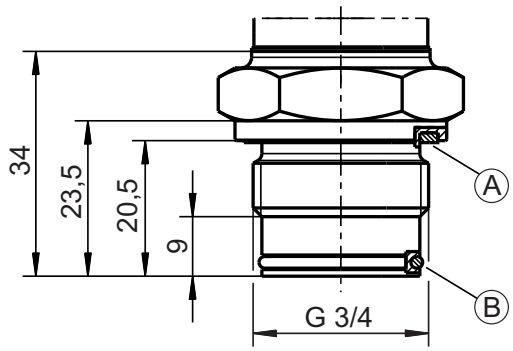


G 3/4 front-flush with double seal
(Order code 575)

(A) Sealing ring G 3/4
(B) O-ring 26.7 × 1.78

- Wrench size SW32
- Tightening torque: 25 Nm

Operating condition:
p_{max} = 25 bar → -10 °C < T < +150 °C
p_{max} = 40 bar → -10 °C < T < +100 °C

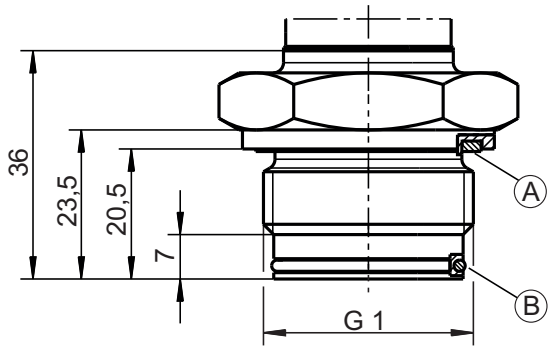


G 1 front-flush with double seal
(Order code 576)

(A) Sealing ring G 1
(B) O-ring 26.7 × 1.78

- Wrench size SW41
- Tightening torque: 25 Nm

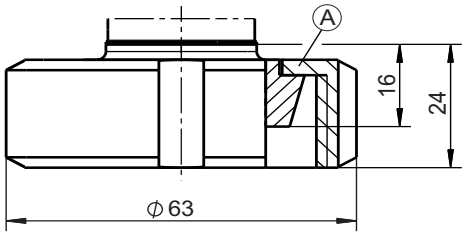
Operating condition:
p_{max} = 40 bar → -10 °C < T < +100 °C



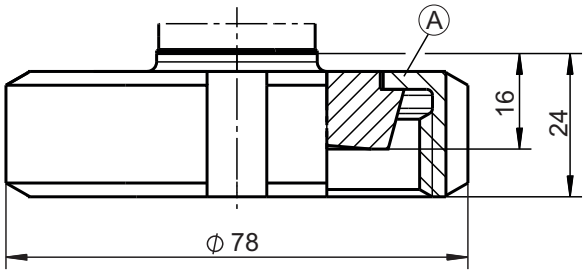
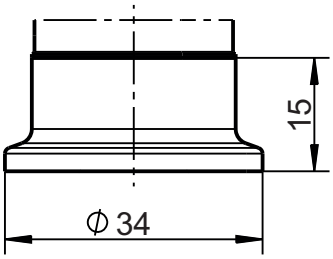
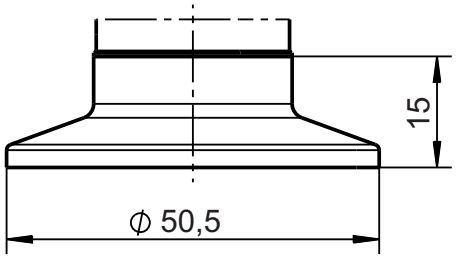
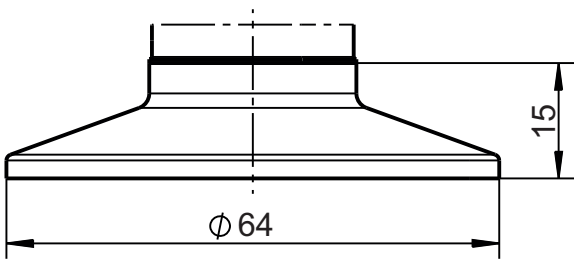
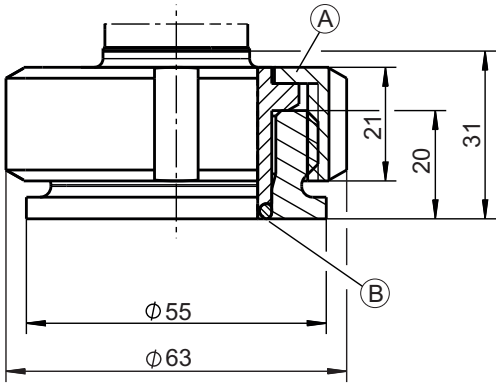
Taper socket with union nut DN 25
DIN 11851
(Order code 604)

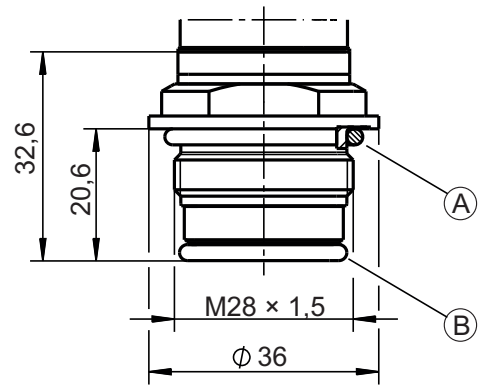
(A) Grooved union nut DN 25

Operating condition:
p_{max} = 40 bar → -10 °C < T < +140 °C



4 Technical data

Taper socket with union nut DN 40 **DIN 11851** (Order code 606) (A) Grooved union nut DN 40 **Operating condition:** p_{max} = 40 bar → -10 °C < T < +140 °C	
Clamping socket (clamp) DN 10, DN 15, DN 20 **DIN 32676** (Order code 612) **Operating condition:** p_{max} = 25 bar → -10 °C < T < +140 °C	
Clamping socket (clamp) DN 25, DN 32, DN 40 **DIN 32676** (Order code 613) **Operating condition:** p_{max} = 25 bar → -10 °C < T < +140 °C	
Clamping socket (clamp) **DN 50 DIN 32676** **2“ ISO 2852** (Order code 616) **Operating condition:** p_{max} = 16 bar → -10 °C < T < +140 °C	
Tank connection with grooved union nut DN 25 Round thread 52 × 1/6 ("dairy thread") (Order code 652) (A) Grooved union nut DN 25 (B) O-ring 29.82 × 2.62 **Operating condition:** p_{max} = 25 bar → T < +150 °C p_{max} = 40 bar → T < +100 °C	

JUMO PEKA[a] Hygienic process connection (Order code 997) (A) O-ring 26 × 2.5 (B) O-ring 21 × 2.5 (not included in the scope of delivery) • Wrench size SW27 • Tightening torque: 20 Nm	

[a] Refer to data sheet 409711 for detailed information on this process connection system.

5 Installation

NOTE!

Ensure the compatibility of the device and measurement medium before installation.

5.1 Preparing for installation

5.1.1 Installation site

- ✓ The device is protected from UV radiation.
- ✓ The device is protected from the weather when used outside.
- ✓ The admissible environmental influences must be observed ⇨ "Environmental influences ", Page 16.

5.1.2 Admissible process pressure

The process pressure admissible for the device is specified on the nameplate. It is valid at a reference temperature of 20 °C.

5.1.3 Installation position

The device can be installed in any position.

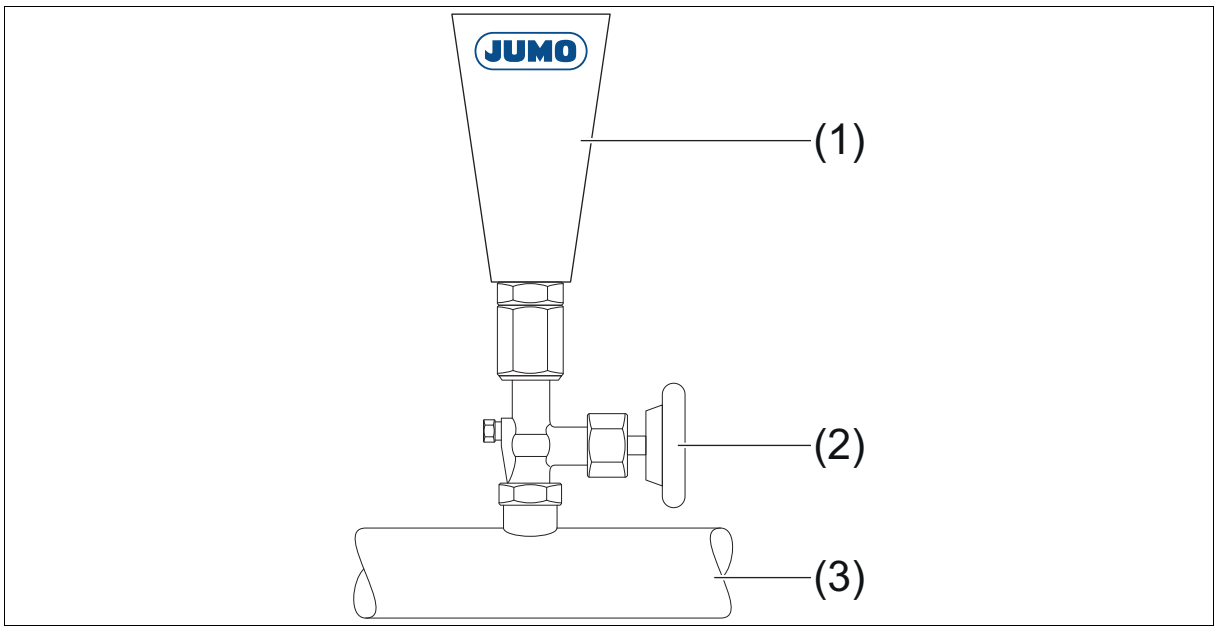
Upright installation of the device (as shown) is recommended.

In order to ensure readability of the display in all installation positions, the display orientation can be rotated by 180° using the app or software. In addition, you can rotate the housing on the sensor by ±165° .

5.1.4 Measurement set-up

Gases

Mount the device above the measuring point for pressure measurement in gases. Any condensate can therefore flow into the pipe.

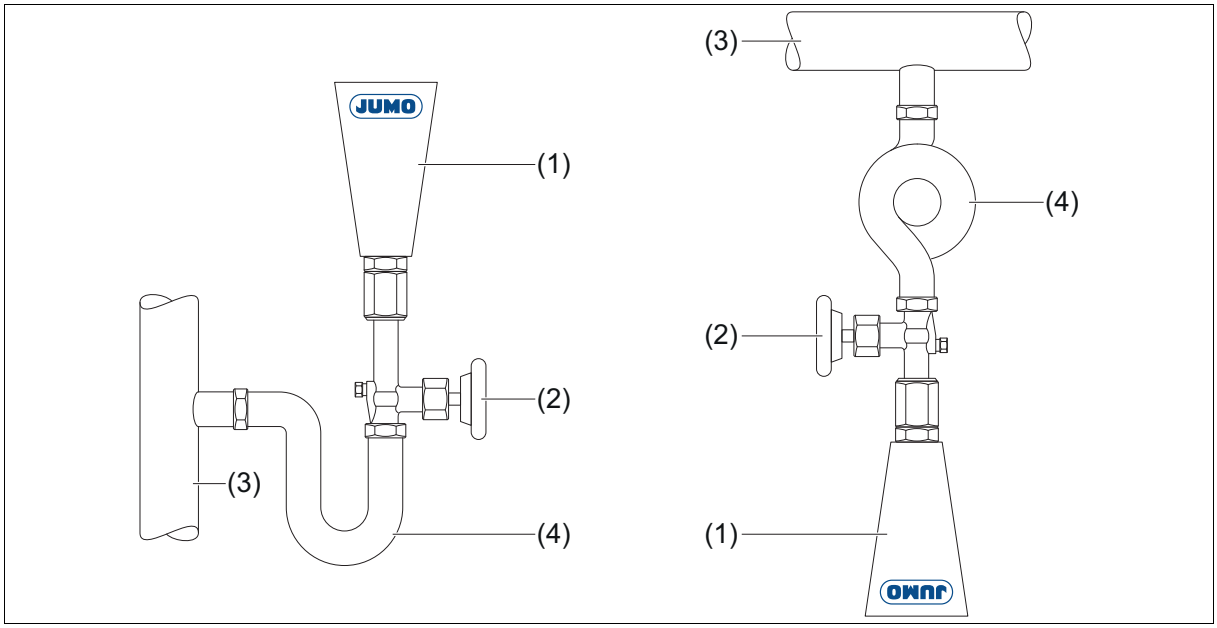


1 Device
2 Shut-off valve
3 Pipe

Steam

Use a siphon for pressure measurement in steam. The device is protected against excessive temperatures thanks to the condensate in the pipe bend.

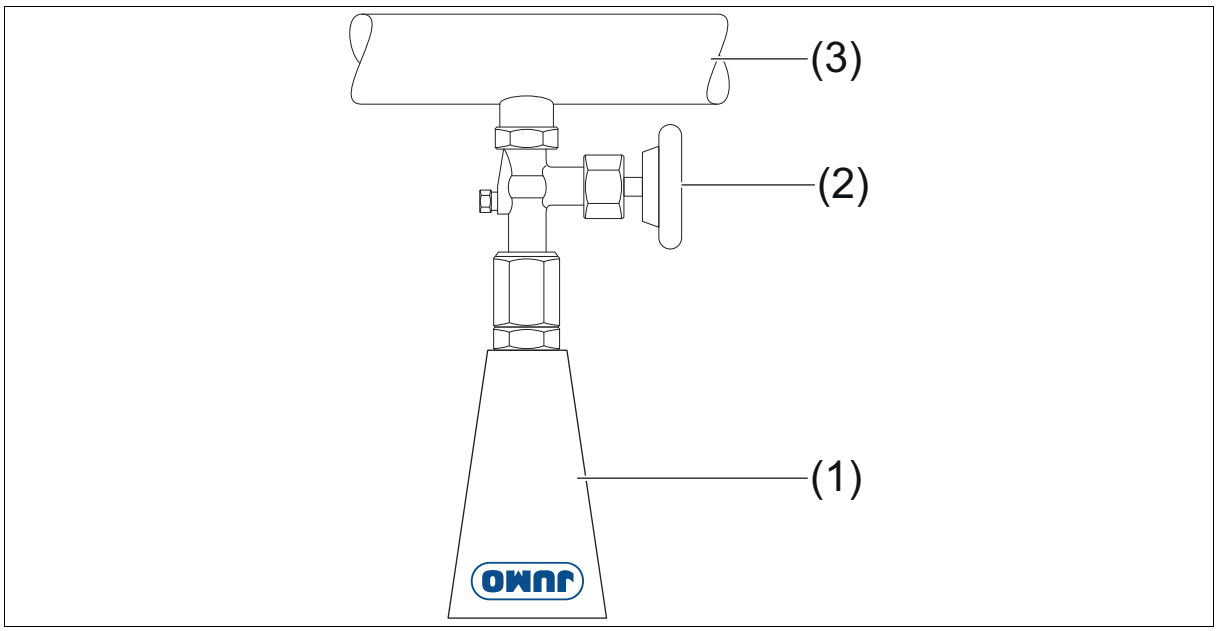
The device can be mounted above or below the measuring point. Installation below is recommended.



1 Device
2 Shut-off valve
3 Pipe
4 Siphon

Liquids

The device can be mounted above or below the measuring point. Installation below is recommended.



1 Device
2 Shut-off valve
3 Pipe

5.2 Important information for usage according to EHEDG

The device in combination with one of the following process connections is suitable for use in food production due to its EHEDG approval:

- Clamp connections DN 25, DN 32, DN 40, DN 50, DN 100 or 1“, 1 1/2“, 2 1/2“, 4“ with Tri-Clamp seal Combifit International B.V.
- JUMO PEKA with FKM O-ring
- VARINLINE® housing with process connection type N or type G with EPDM O-ring
- VARIVENT® process connections type B, type F, and type N with EPDM O-ring
- Aseptic screw connections DN 25 to DN 50, DIN 11864-1 and DIN 11864-3

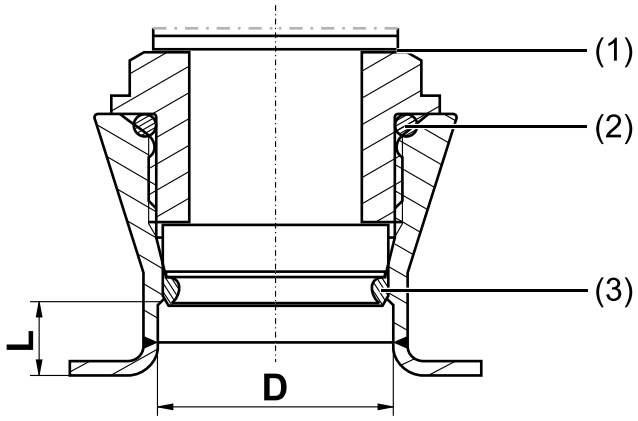
The device is suitable for CIP (Cleaning in Place) when installed accordingly.

Observe temperature and material resistance.

Observe EHEDG-compliant integration into the respective systems:

Prefer installation without cavity.
Ensure self-draining installation of the connection spigots.
Use only EHEDG approved process connections according to the current EHEDG position paper.
When used on tanks, the installation must be flush with the front. Cleaning by direct illumination must be ensured. It must be possible to detect cavity.
Install leakage opening in a clearly visible position. In the case of vertical lines, install pointing downwards.

The following drawing shows an installation example.
Observe dimensions to avoid cavity: **L < D**.



(1) Leakage opening
(2) Rear seal
(3) Front-flush seal

5.3 Installing the device

NOTE!

The pressure measurement membrane is located in the process connection and is very sensitive. Irreparable damage may occur due to sharp or hard objects.

Requirements:

✓ The plant has been de-pressurized.
✓ The plant pipeline is emptied and flushed.

Procedure:

1. Screw the device into the pipes.
2. If present: Ensure correct position of the seals.
3. Observe tightening torque ⇨ "Process connections ", Page 17.
4. Check for seal tightness.

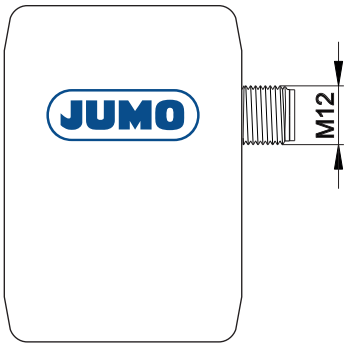
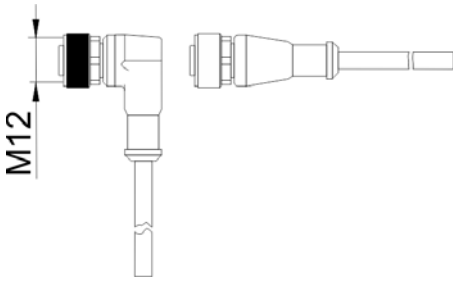
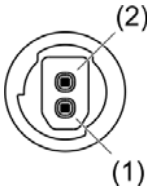
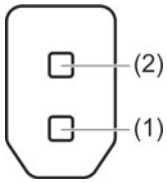
Result:

The device is now installed in the pipe.

6 Electrical connection

6.1 Terminal assignment

6.1.1 Terminal assignment, M12 connector, SPE

	Device	M12 connecting cable
		
Terminal assignment and color coding RxTx+/PoDL+ RxTx-/PoDL-	 (1) (2)	 (1) – WH (white) (2) – BU (blue)
Connection type	Plug connector M12 according to IEC 63171-5	Plug connector M12 with screw locking

6.2 Connecting the device

Aids:

🛠 M12 connecting cable for SPE

Requirements:

✓ The connections for the voltage supply and signal processing have been prepared.

✓ A heat-resistant cable is used (≥ 80 °C).

✓ Do not lay the cable near power cables, high-voltage cables or high-frequency cables or maintain a minimum gap of 30 cm from them.

Procedure:

1. Insert the connecting cable into the M12 connector.
2. Tighten the knurled screw by hand on the connecting cable (corresponds to a maximum tightening torque of approx. 0.4 Nm).
3. The device or the process connection must be grounded in the case of ungrounded pipes (e.g. plastic pipes).

   Grounding is provided via a separate grounding cable or via a hose clamp, for example.
4. Connect the connecting cable to the device that is processing the signals and to the voltage supply.
5. Lay the connecting cable so that it is protected from mechanical load.

Result:

The device is ready for use.

7.1 Zero point adjustment

An automatic pressure zero point adjustment can be performed. A zero offset depending on position can therefore be corrected, for example.

The current measured value is adopted as a negative offset if the zero point adjustment is performed.

Procedure:

The zero point adjustment can be performed via Modbus TCP or the app.

Modbus TCP:

1. De-pressurize device when installed.
2. If the device displays a measured value which is significantly different from 0, perform zero point calibration. To do so, write the Modbus register 0x0E42 with the ActionValue 0xCEF6D261 ⇨ "Actions ", Page 44.

A correction value is now saved in the "Offset" parameter. The device shows a measured value of close to 0.

8 Operation

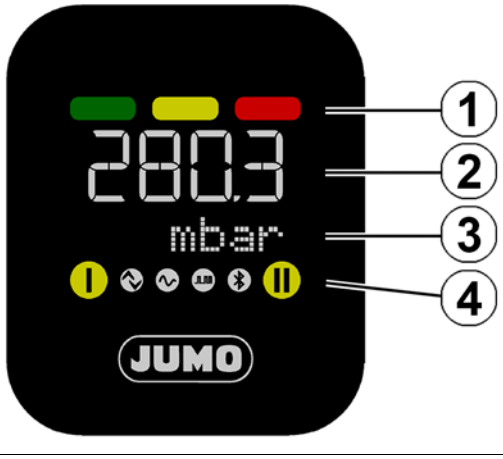
8.1 Device info display

As soon as the device is supplied with voltage, a device info display appears on the display. The device info display includes information on the software version.

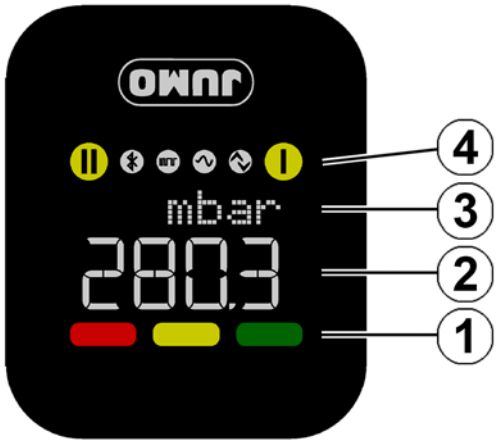
The display is shown depending on the configured display orientation.

After 3 seconds, the device info display switches to the basic status.

8.2 Basic status



Orientation: 0°



Orientation: 180°

1 Device status display
2 Process value display
3 Text line
4 Toolbar

8.2.1 Device status display

Symbol	Designation
	Green continuously lit: Failure-free standard operation Green flashing: "Maintenance required" error category
	Yellow continuously lit: "Outside the specification" error category
	Red continuously lit: "Failure" error category Red flashing: "Functional check" error category

8.2.2 Process value display

4 digits plus prefix sign can be displayed.

The larger the process value, the fewer decimal places are displayed.

If the value falls below -9999 or exceeds +9999, "-----" is displayed instead of the measured value.

In the event of a malfunction, a replacement value is displayed instead of the process value (⇨ "Process value error ", Page 46).

8.2.3 Text line

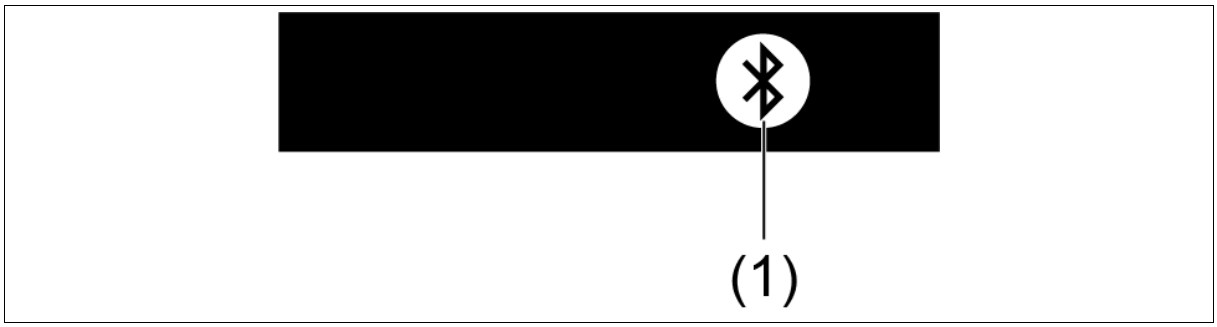
Unit

If there is an error, the unit configured for the display is shown in the text line.

Error message

Error messages and warnings are specified as running text in the text line.

8.2.4 Toolbar



1 Bluetooth connection status

Bluetooth connection status

Symbol	Description
–	Icon off: The Bluetooth wireless module is in the "inactive" or "restricted" operating mode. The device cannot be found during a scan for new devices.
	Flashing icon: Connection can be established Icon continuously lit: Connection active

8.3 Error messages

Error messages and warnings are specified as running text in the text line – alternately with the unit configured for the display. The illuminated fields for the device status display indicate the error category.

For further information ⇨ "Error messages ", Page 46

9 Interfaces

9.1 Bluetooth

The device can be operated and configured via the JUMO smartCONNECT app. The connection is established via Bluetooth. Authentication takes place via NFC.

9.1.1 App download

The "JUMO smartCONNECT" app is available as a free download for Android smartphones (via Google Play) and Apple smartphones (via App Store).

Android smartphones

The app is automatically displayed in the Play Store when the Android smartphone is placed on the device's display so that the NFC antennas are on top of each other.

Alternatively, the QR code below leads directly to the Google Play Store.

Apple smartphones

The app must be installed manually for Apple smartphones. The QR code below leads directly to the Apple App Store.

9.1.2 Authentication

In order to operate the device via Bluetooth, authentication is required beforehand. Authentication takes place via an NFC tag that is installed under the device's display.

The following requirements must be met for authentication to take place:

- ✓ The device is switched on.
- ✓ The Bluetooth wireless module is in the "Active" or "Restricted" operating mode.
- ✓ NFC is activated on the smartphone.
- ✓ The app is installed.
- ✓ No other smartphone is connected to the device.

Android smartphones

The smartphone must be placed on the device's display so that the NFC antennas are on top of each other. Authentication then takes place automatically.

Apple smartphones

Click "Add new device" in the open app. The smartphone must then be placed on the device's display so that the NFC antennas are on top of each other.

NOTE!

If authentication is not successful, the NFC antennas of the smartphone and device may be too far apart. The position of the smartphone must be corrected.

The smartphone settings show where the NFC antenna is located.

9.1.3 Connection

If the smartphone has been successfully authenticated, there is a Bluetooth connection between the device and the smartphone.

The device stores the authentication key. If the smartphone is within Bluetooth range, a new connection can be established without NFC – as long as no other smartphone is connected.

The device stores a maximum of 8 authentication keys. If another smartphone is authenticated, the smartphone that has not been connected to the device for the longest time will be deleted from the memory.

If this smartphone is to be connected to the device again, authentication via NFC tag is required again.

9.1.4 Bluetooth settings

Active

By default, Bluetooth is configured as permanently "active".

Restricted

Alternatively, Bluetooth can be configured as "restricted".

In that case, Bluetooth is activated as soon as a smartphone with the NFC antenna switched on is placed on the device's display. If no smartphone connects to the device within 10 seconds, Bluetooth is switched off again.

If the existing Bluetooth connection is lost, a new connection can be established within one minute. After the time has elapsed, Bluetooth turns off again.

Inactive

The Bluetooth connection can also be configured as permanently "inactive". This setting is not available in the app.

Bluetooth can be deactivated via Modbus TCP.

9.1.5 JUMO smartCONNECT app

Start screen

- The current connection status is displayed.
- Under "Demo", the app can be tested even if no suitable device is available.
- Under "Known devices", all devices are displayed for which authentication via NFC tag was successfully performed.
- The x symbol can be used to delete the authentication key on the smartphone.

Establish a connection

The connection between the smartphone and device is established by clicking on the corresponding device name under "Known devices" or "Nearby".

Once the connection to a device is established, the device name must be clicked again. Then the display opens in the app.

Display

After successful connection, information about the device is displayed, such as the name or serial number.

Some process values are also shown.

At the bottom of the screen you will find the following icons:

Configuration menu

Device is removed from the "Known devices" list and the authentication key on the smartphone is deleted

Connection between smartphone and device is terminated

9.2 JUMO Cloud

The device can be connected to the JUMO Cloud or any instance of the audako Cloud. Values can be read out and the device configured via the cloud. However, not all parameters are available.

The prerequisite for connecting to the cloud is configuring the device appropriately. This can be performed on the app or via Modbus TCP.

The gateway required to connect to the cloud is integrated into the device. The device is connected to the network via an SPE switch and the data packets are forwarded accordingly.

The MQTT protocol is used.

9.2.1 Data exchange

Data is transferred from the device to the cloud through the cloud gateway.

The data is buffered before transmission. This allows network failures to be bridged without immediately losing data.

The device sends its data to the cloud ("Historical data") via the buffer at the configured interval.

If the live mode is activated, the data is also sent directly – without buffering – to the device ("live data"). The interval for live mode can be configured.

NOTE!

All process values are always transmitted to the cloud in JUMO base units. This happens regardless of what is configured as the unit for the display or for Modbus TCP.

The relevant JUMO base units are:

bar	Pressure

9.2.2 Startup

In order for the cloud gateway to work, the following things must be set up in the cloud and then transferred to the device.

1. The device must be assigned to a tenant.
2. A data source must be created. This automatically generates the access data – consisting of device ID and password.
3. A data connection must be set up.
4. A signal must be created in the cloud for each value to be sent from the device to the cloud.

   The following information is relevant:

   a) Signal type (analog or binary)
   b) Average value / last value
   c) Interval
   d) Address

The Smart Device Wizard in the cloud simplifies startup.

9.2.3 Further information

A detailed description of the JUMO Cloud can be found in the help center.

9.3 Modbus TCP

The device can be accessed via Modbus TCP using a tool or directly via PLC.

NOTE!

The device only saves the configuration once the relevant action has been performed ⇨ "Actions ", Page 44.

Some configuration parameters require the device to be restarted in order to become effective ⇨ "Transfer of configuration ", Page 44.

NOTE!

This EEPROM has only a limited number of write cycles. Therefore do not send the save action cyclically.

9.3.1 Transmission

All data types are transmitted in big-endian format according to Modbus standard.

9.3.2 Modbus address tables

⇨ "Modbus address tables ", Page 41

10 Configuration

The device has several interfaces and thus several operating options. The configuration parameters are mostly identical. Since the menu structure differs depending on the interface, the configuration parameters are listed sorted by function.

10.1 Display on the device

Parameter	Value	Default setting	Description
Signal selection	None Pressure (physical measurand) Pressure (in % based on the measuring range)	Pressure (physical measurand)	–
Brightness	0 to 10	5	Backlight brightness **0:** Display is switched off
Language	German English French Spanish	German	–
Pressure unit	mbar bar hPa kPa MPa psi	bar	Unit of the physical measurand Pressure in percent is created as an independent measuring channel
Display orientation	0 degrees 180 degrees	0 degrees	–

10.2 Interfaces

10.2.1 Bluetooth

Parameter	Value	Default setting	Description
Bluetooth mode	Inactive Restricted Active	Active	**Inactive:** Bluetooth permanently switched off **Restricted:** Bluetooth is temporarily activated by NFC tag **Active:** Bluetooth permanently switched on

10.2.2 Single Pair Ethernet

Network settings

Parameter	Value	Default setting	Description
Method	Manual Automatic (DHCP)	Automatic (DHCP)	**Manual:** IP address is permanently set in the device **Automatic (DHCP):** IP address is assigned automatically by DHCP server
IP address	–	0.0.0.0	Only if "Method" = "Manual"
Subnet mask	–	255.255.0.0	Only if "Method" = "Manual"
Standard gateway	–	0.0.0.0	Only if "Method" = "Manual"
DNS server IP automatic	Yes No	Yes	Only if "Method" = "Automatic (DHCP)"
DNS server	–	0.0.0.0	Only if "Method" = "Manual" and "DNS server IP automatic" = "No"

Connection to the JUMO cloud

Parameter	Value	Default setting	Description
Connection to the cloud	Active Inactive	Inactive	–
Cloud server	JUMO Cloud Individual	JUMO Cloud	**JUMO Cloud:** The JUMO Cloud is used. **Individual:** The cloud server is determined by an individual URL.
Server URL (device)	–	–	Only if "Cloud Server" = "individual"
Server URL (config)	–	–	Only if "Cloud Server" = "individual"
Device ID	–	–	Access data to the cloud (generated by the cloud)
Password	–	–	Access data to the cloud (generated by the cloud)
Permanenter live mode	Active Inactive	Active	If live mode is activated, live data is also transmitted to the cloud in addition to the historical values (for interval, see "Cycle time for live data").
Cycle time for live data	1000 ms to 25000 ms	1000 ms	Time for how often the live data is sent from the device to the cloud. Only if "Permanent Live Mode" = "active"

Modbus TCP

Parameter	Value	Default setting	Description
Port	1 to 1024	502	TCP port of the device
Pressure unit	mbar bar hPa kPa MPa psi	bar	The unit of the Modbus transmission can be configured independently of the display unit. Pressure in percent is created as a separate Modbus register.
Interface activated	Active Inactive	Active	Cannot be set via Modbus TCP.

10 Configuration

10.3 Pressure measurand

Parameter	Value	Default setting	Description
Offset	-999 bar to +999 bar	0 bar	Offset correction to eliminate detected deviation. Measuring range monitoring occurs before the offset is added to the measured value.
Filter time constant	0 s to 99.99 s	0 s	The process value can be attenuated by a 2nd order filter. The larger the filter time constant, the slower the change in measured value at the output.
Simulation default value	-1.1 bar to +110 bar	0 bar	As an aid to device startup, the process value can be simulated.
Simulation activation	Inactive Statistical value	Inactive	Simulation is always switched off after a restart.

10.4 Functions

10.4.1 Limit value monitoring function

Parameter	Value	Default setting	Description
Switching function	Deactivated SinglePointMode Windows Mode TwoPointMode	Deactivated	**Deactivated:** Limit value switch inactive **SinglePointMode:** Hysteresis mode ("Switching point SP1" and "Hysteresis") **Windows Mode:** Window mode ("Switching point SP1", "Release point SP2" and "Hysteresis") **TwoPointMode:** Two-point mode ("Switching point SP1" and "Release point SP2")
Inversion	HighActive LowActive	HighActive	The limit value logic can be inverted. **HighActive:** An active limit value switch corresponds to the High signal (logic level 1). **LowActive:** An active limit value switch corresponds to the Low signal (logic level 0).
Switching point SP1	-1 bar to +100 bar	0 bar	–
Switching point SP2	-1 bar to +100 bar	0 bar	Only for "Switching function" = "WindowMode" and "TwoPointMode"
Hysteresis	0 bar to 100 bar	0 bar	Only for "Switching function" = "SinglePointMode" and "WindowMode"
Switch-on delay	0 s to 100 s	0 s	State is not given to the limit value switch output until after the time has elapsed.
Switch-off delay	0 s to 100 s	0 s	State is not given to the limit value switch output until after the time has elapsed.
Response at error	Low High Frozen	Low	Behavior of the limit value switch output signal when there is a process value error. **Low:** Low signal (logic level 0) **High:** High signal (logic level 1) **Frozen:** Last valid value

Two limit value switches are available for each measurand. All limit value switches can be configured independently of each other.

Different switching modes are selectable, all of which can be inverted. In addition, the limit value switches have a switching delay.

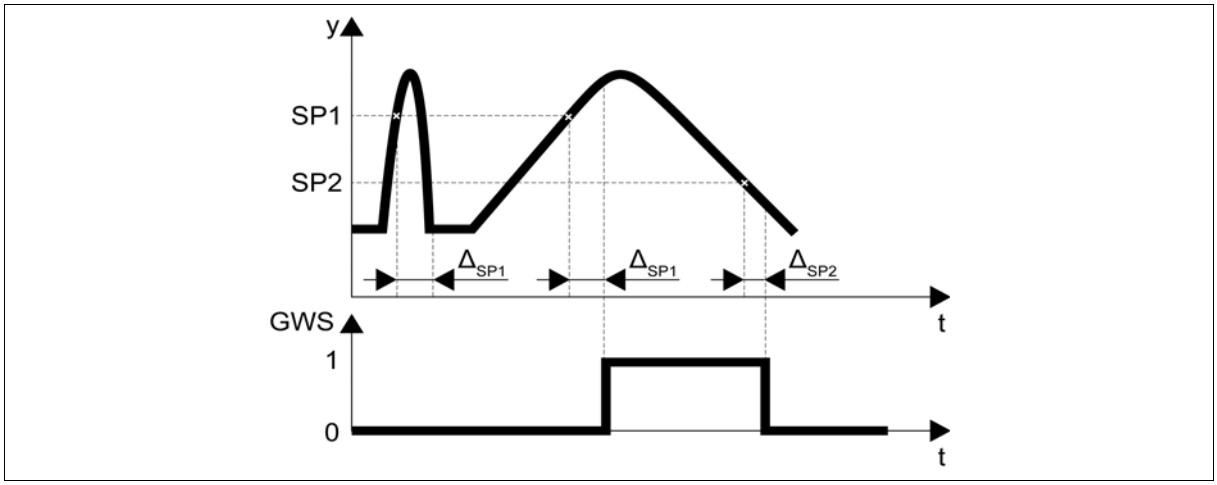
Switching delay

A switching delay for switching on and / or switching off can be configured.

If the switching condition is fulfilled, the set timer for the switch-on delay (Δ_{SP1}) starts to elapse. The state is only output after the time has elapsed. If the switching condition is no longer fulfilled before the time has elapsed, the timer is restarted.

The switch-off delay (Δ_{SP2}) works analogously.

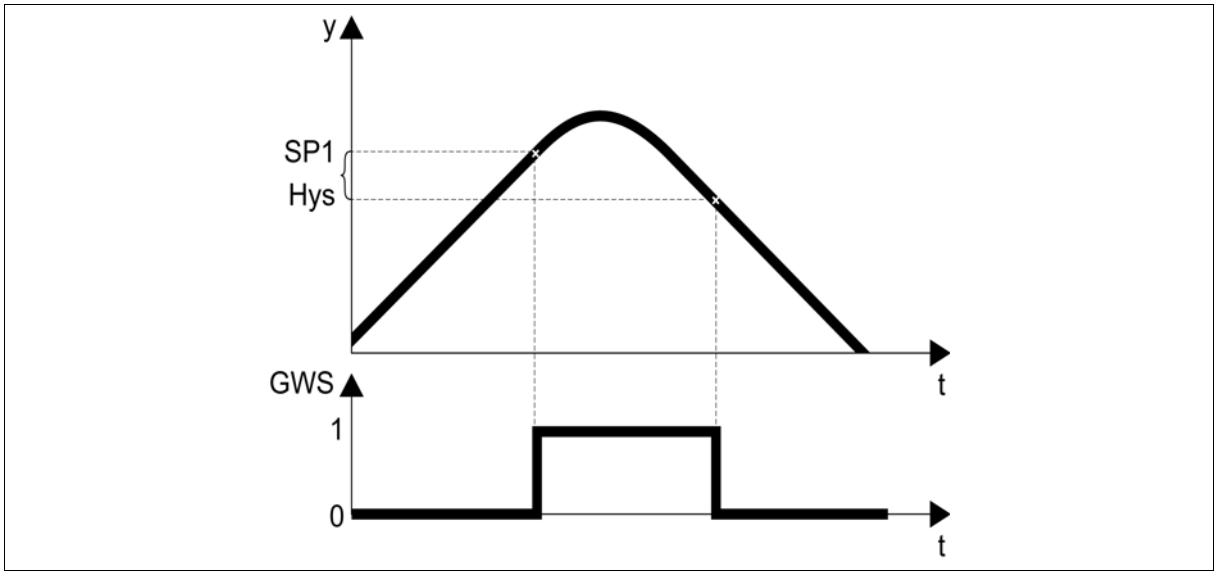
The delay times prevent the output from being switched by measured value peaks or by measured value dips.



(Δ_{SP1}) Switch-on delay
(Δ_{SP2}) Switch-off delay
(LVS) Limit value switch output signal
(SP1) Switching point
(SP2) Release point
(t) Time
(y) Measured value

Hysteresis mode

If the process value exceeds the switching point SP1, the output of the limit value switch becomes active. If the switching point SP1 reduced by the amount of the hysteresis is undershot again, the output of the limit value switch becomes inactive again.

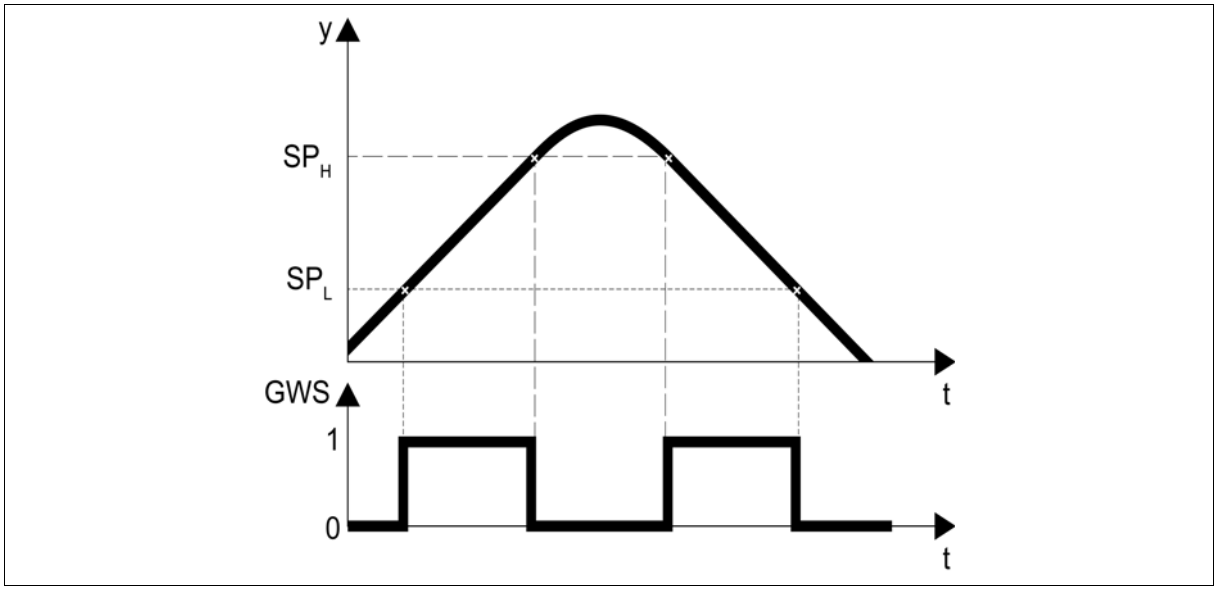


(LVS) Limit value switch output signal
(Hys) Hysteresis
(SP1) Switching point
(t) Time
(y) Measured value

Window mode

Window mode checks whether the process value is within a certain range. SP_L is defined as the smaller value of switching points SP1 and SP2. SP_H is defined as the larger value of switching point SP1 and SP2.

The hysteresis of the switching points is adjustable.

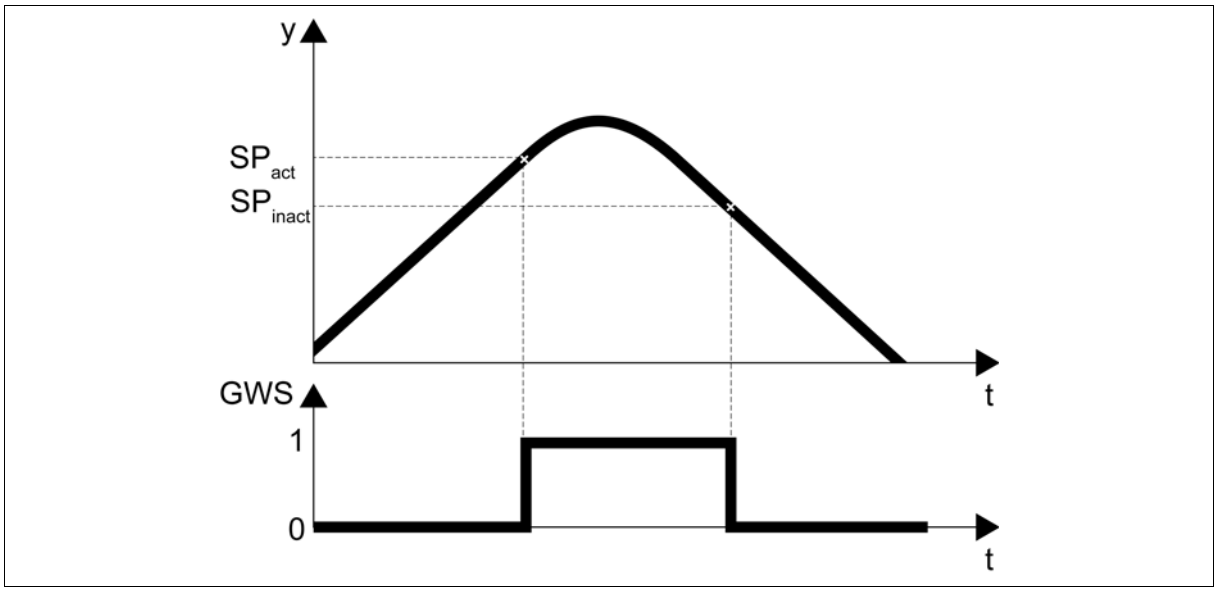


(LVS) Limit value switch output signal
(SP_H) High switching point
(SP_L) Low switching point
(t) Time
(y) Measured value

Two-point mode

In two-point mode, two switching points are defined. If the process value exceeds the SP_{act} switching point, the limit value switch output becomes active. If the process value falls below the SP_{inact} switching point, the output becomes inactive.

SP_{act} is defined as the larger value of switching points SP1 and SP2, SP_{inact} is correspondingly the smaller of the two values.



(LVS)	Limit value switch output signal	(t)	Time
(SP_{act})	Active switching point	(y)	Measured value
(SP_{inact})	Inactive switching point		

11.1 Transmission

All data types are transmitted in big-endian format according to Modbus standard.

11.2 Version and fabrication number

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
21	0x0015	string	19	r/-	Software version number	–
70	0x0046	string	11	r/-	Hardware version number	–
110	0x006E	string	10	r/-	Fabrication number	–

[a] r/-: Read access

11.3 Configuration

Display

The following settings of the units concern the display on the device. For the Modbus interface the units can be set separately ⇨ "Modbus TCP ", Page 42.

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
1000	0x03E8	selection	1	r/w	Language	0: German 1: English 2: French 3: Spanish
1001	0x03E9	selection	1	r/w	Pressure unit	0: mbar 1: psi 2: bar 3: hPa 4: kPa 5: MPa
1002	0x03EA	string	10	r/w	Device name	–
1012	0x03EB	string	18	r/w	DNS name	Name to access the device in the Ethernet network – instead of the IP address
1100	0x044C	selector	6	r/w	Process value	⇨ "Analog selector ", Page 45
1106	0x0452	selection	1	r/w	Display orientation	0: 0° 1: 180°
1107	0x0453	integer	2	r/w	Display brightness	0 to 10

[a] r/w: Read and write access

11 Modbus address tables

Analog input

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
1200	0x04B0	float	2	r/w	Offset	-999 to +999
1202	0x04B2	float	2	r/w	Filter time constant	0 s to 100 s

[a] r/w: Read and write access

Modbus TCP

The following settings of the units concern the Modbus interface. For the display on the device, the units can be set separately ⇨ "Display ", Page 41.

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
1600	0x0640	integer	2	r/w	Port gateway	1 to 1024
1602	0x0642	selection	1	r/w	Pressure unit	0: mbar 1: psi 2: bar 3: hPa 4: kPa 5: MPa

[a] r/w: Read and write access

Network settings

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
1700	0x06A5	selection	1	r/w	Method	0: Manual 1: Automatic
1701	0x06A6	string	8	r/w	IP address	–
1709	0x06AD	string	8	r/w	Subnet mask	–
1717	0x06B5	string	8	r/w	Standard gateway	–
1725	0x06BD	boolean	1	r/w	Assign DNS server IP automatically	–
1726	0x06BE	string	8	r/w	DNS server	–

[a] r/w: Read and write access

Bluetooth

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
2100	0x0834	selection	1	r/w	Bluetooth mode	0: Inactive 1: Restricted 2: Active

[a] r/w: Read and write access

Limit value function

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
2350	0x092E	float	2	r/w	LVS 1: Switching point SP1	-1 bar to +100 bar
2352	0x0930	float	2	r/w	LVS 1: Switching point SP2	-1 bar to +100 bar
2354	0x0932	selection	1	r/w	LVS 1: Inversion	0: HighActive 1: LowActive
2355	0x0933	selection	1	r/w	LVS 1: Switching function	0: Deactivated 1: Hysteresis mode 2: Window mode 3: Two-point mode
2356	0x0934	float	2	r/w	LVS 1: Hysteresis	0 bar to 100 bar
2358	0x0936	selection	1	r/w	LVS 1: Error behavior	0: Inactive 1: Active 2: Frozen
2359	0x0937	float	2	r/w	LVS 1: Switch-on delay	0 s to 100 s
2361	0x0939	float	2	r/w	LVS 1: Switch-off delay	0 s to 100 s

[a] r/w: Read and write access

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
2375	0x0947	float	2	r/w	LVS 2: Switching point SP1	-1 bar to +100 bar
2377	0x0949	float	2	r/w	LVS 2: Switching point SP2	-1 bar to +100 bar
2379	0x094B	selection	1	r/w	LVS 2: Inversion	0: HighActive 1: LowActive
2380	0x094C	selection	1	r/w	LVS 2: Switching function	0: Deactivated 1: Hysteresis mode 2: Window mode 3: Two-point mode
2381	0x094D	float	2	r/w	LVS 2: Hysteresis	0 bar to 100 bar
2383	0x094F	selection	1	r/w	LVS 2: Error behavior	0: Inactive 1: Active 2: Frozen
2384	0x0950	float	2	r/w	LVS 2: Switch-on delay	0 s to 100 s
2386	0x0952	float	2	r/w	LVS 2: Switch-off delay	0 s to 100 s

[a] r/w: Read and write access

11 Modbus address tables

11.4 Actions

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
3000	0x0BB8	action	2	r/w	Save configuration	Save (0xC7E7BC2E) Discard (0xF0864181) Default setting (0x34BFE138)
3627	0x0E2B	action	2	r/w	Teach function	Teach SP1 (0x57FBE8) Teach SP2 (0x35800A1)
3650	0x0E42	action	2	r/w	Zero point adjustment	Set zero point (0xCEF6D261)

[a] r/w: Read and write access

The status of a triggered action can be checked. For this purpose, the Modbus register of the corresponding action can be read back.

Read-back value	Meaning
0x00000000	The action was performed successfully.
0xFFFFFFFF	An error has occurred when performing the action.
The previously written value	The action has not been performed.

11.5 Process values

Measured values

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
6000	0x1770	float	2	r/-	Pressure	–
6002	0x1772	float	2	r/-	Pressure in percent	–

[a] r/-: Read access

Transfer of configuration

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	Hex					
6450	0x1932	boolean	1	r/-	Device restart required due to a configuration change	–

[a] r/-: Read access

Limit value monitoring function

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	**Hex**					
3625	0x0E29	unsigned short integer	1	r/w	Measuring channel for which teach process is to be executed	1: Measuring channel 1 (limit value switch 1) 2: Measuring channel 1 (limit value switch 2)
3626	0x0E2A	unsigned short integer	1	r/-	Result of the teach process	0: Inactive 1: SP1 successful 2: SP2 successful 7: Error
6900	0x1AF4	boolean	1	r/-	Limit value switch 1 output	–
6901	0x1AF5	boolean	1	r/-	Limit value switch 2 output	–

[a] r/-: Read access; r/w: Read and write access

11.6 Error

Modbus PDU address		Data type	Number of Modbus registers	Access[a]	Data	Encoding
Dec	**Hex**					
6400	0x1900	boolean	1	r/-	General error	–
6401	0x1901	boolean	1	r/-	Pressure faulty	–
6402	0x1902	boolean	1	r/-	Configuration faulty	–
6403	0x1903	boolean	1	r/-	Calibration faulty	–
6404	0x1904	boolean	1	r/-	Device not calibrated	–
6405	0x1905	boolean	1	r/-	Simulation active	–
6407	0x1907	boolean	1	r/-	Device operating conditions	–

[a] r/-: Read access

11.7 Analog selector

The three-part hash values must be transmitted together in a Modbus message.

Selector	Hash value	
	Hex	**Dec**
No signal	0x0 – 0x0 – 0x0	0 – 0 – 0
Pressure input	0x4E27A4CC – 0xFFC2981 – 0x8C1C81C3	1311220940 – 268183937 – 2350678467
Pressure input in percent	0xE595E143 – 0xF2461B10 – 0x745595D5	3851804995 – 4064680720 – 1951765973

12 Troubleshooting

12.1 Process value error

Process value errors are displayed instead of the process value. In part, process value errors are supplemented with error messages in the text line.

Error message	Cause	Remedy
----	The input value is invalid. The sensor is defective or communication to the sensor is impaired.	Contact the manufacturer.
	There is an internal device error.	Contact the manufacturer.
<<<<	The measuring range was undershot.	Operate the device within the device specifications. If necessary, contact the manufacturer.
>>>>	The measuring range was exceeded.	Operate the device within the device specifications. If necessary, contact the manufacturer.

12.2 Error messages

Error messages and warnings are specified as running text in the text line – alternately with the unit configured for the display. The only error shown is always the one with the highest priority.

The illuminated fields for the device status display indicate the error category based on the NAMUR recommendation NE 107.

red continuously lit **Failure (F)**

Error message	Cause	Remedy
Configuration faulty	The checksum of the configuration data is faulty.	Transfer the configuration data to the device again.
Calibration data faulty	The checksum of the calibration data is faulty.	Contact the manufacturer.
Device not calibrated	There is no calibration data.	Contact the manufacturer.
Pressure faulty	The measuring range has been fallen below or exceeded or the pressure sensor has failed.	Operate the device within the device specifications. If necessary, contact the manufacturer.

red flashing **Functional check (C)**

Error message	Cause	Remedy
Simulation active	Simulation mode is active.	Deactivate simulation mode or restart the device.

green flashing **Maintenance required**

Error message	Cause	Remedy
Restart the device	The device must be restarted due to a configuration change.	Restart the device.

yellow continuously lit **Outside the specification (S)**

Error message	Cause	Remedy
Device operating conditions	The device is operated outside the device specifications.	Operate the device within the device specifications.

13 Maintenance and cleaning

13.1 Maintenance

The device is maintenance-free.

13.2 Cleaning

13.2.1 Cleaning device housing

Clean the device from the outside with a cloth moistened with water or with a mild cleaning agent. Do not use any aggressive or flammable cleaning agents.

13.2.2 Clean measurement membrane

NOTE!

The pressure measurement membrane is located in the process connection and is very sensitive. Irreparable damage may occur due to sharp or hard objects.

Requirements:

✓ The device is disassembled.

✓ A cleaning station for rinsing all parts in contact with the medium is prepared.

Procedure:

1. If present: Remove seals on the process connection.
2. Carefully flush pressure measurement membrane with water. If necessary, use a mild cleaning agent.
3. Check the seals for damage and replace if necessary.

Result:

The pressure measurement membrane has been cleaned. The device can now be installed, disposed of, or returned.

14.1 Dismounting

WARNING!

Risk of injury resulting from pressurized systems!

Opening the pressurized system could result in people becoming injured by components that are slung away or by the escaping medium.

▶ Before starting with the mounting, make sure that the system is depressurized.

Requirements:

✓ The plant has been de-pressurized.

✓ The plant pipeline is emptied and flushed.

✓ The device has cooled down.

Procedure:

1. Loosen the knurled screw on the connecting cable by hand.
2. Pull the connecting cable out of the M12 connector.
3. Unscrew the device.
4. Carefully remove the device from the plant and put in a clean and dry place.

Result:

The device is disassembled and can be used elsewhere.

14.2 Returns

Requirements:

✓ The device housing is cleaned.

✓ The pressure measurement membrane has been cleaned.

Procedure:

1. The supplementary sheet for product returns must first be completed correctly and signed. Then enclose it with the shipping documents and attach it to the packaging, ideally on the outside.
2. Use the original packaging or a suitably secure container for sending the device.

14.3 Disposal

Requirements:

✓ The device housing is cleaned.

✓ The pressure measurement membrane has been cleaned.

- Do not dispose of the device or replaced parts in the trash after use.
- Delete programs and data stored on the device.
- Remove batteries, if any, if this can be done without damaging the device.
- Dispose of the device and the packaging material in a responsible and environmentally friendly manner.
- Observe the country-specific laws and regulations for waste treatment and disposal.

In accordance with Directive 2012/19/EU on Waste from Electrical and Electronic Equipment, manufacturers are obliged to offer the option of returning waste equipment. Request the return from the manufacturer.

15 Open-source software

The device software and/or device components were developed using open-source software.

Insofar as the respectively applicable license terms justify a claim on the provision of source code or other information, JUMO GmbH & Co. KG will provide the source code and the license texts on a conventional data carrier at the cost incurred for the provision of the data carrier.

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