JUMO flowTRANS US W02

Ultrasonic flow meter for liquids

Bluetooth® digiLine Modbus

Brief Instructions

JUMO

40605106T97Z001K000

V4.00/EN/00778422/2024-11-12

Further information and downloads

qr-406051-en.jumo.info

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1 About this documentation

1.1 Other applicable device documentation

This document is supplemented by the documents listed below:

Product group	Document type
406051	Operating manual JUMO digiLine

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 trained in electrical, mechanical, and plant engineering across all phases of the product lifecycle.

1.4 Definition of terms

Use in the documentation	Definition
Device, inline device, product	Ultrasonic flowmeter
Medium, measurement medium, fluid	Liquid
Transducer	Ultrasonic converter, transducer, sensor
Volume flow, flow	Totalized flow rate per time span
Product lifecycle	Overall consideration of Product identification, acceptance of the goods, storage, mounting, connection, operation, troubleshooting, maintenance to disposal

1.5 Trademark information

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

1.6 Symbols

NOTE!

This symbol is used in tables and indicates that further information is provided after the table.

REFERENCE!

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

2.1 Intended use

The ultrasonic flowmeter measures the flow, temperature and (optionally) the pressure of conductive and non-conductive liquid media.

It is mounted in pipes made from plastic or metal.

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

2.2 Qualification of personnel

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

- Trained electrical, mechanical, and plant engineering personnel.
- Members of personnel are familiar with this documentation and the safety information and warnings it contains.

2.3 Hot surfaces

Hot device surfaces pose a risk of injury. Hot device surfaces can be caused by the use of hot media in applications.

- If required, install contact protection.
- Take into account the alignment of the housing for electronic components, ⇨page 21.

When working on the device:

- Allow the device and plant to cool down.
- Wear suitable protective equipment.

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 loads

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

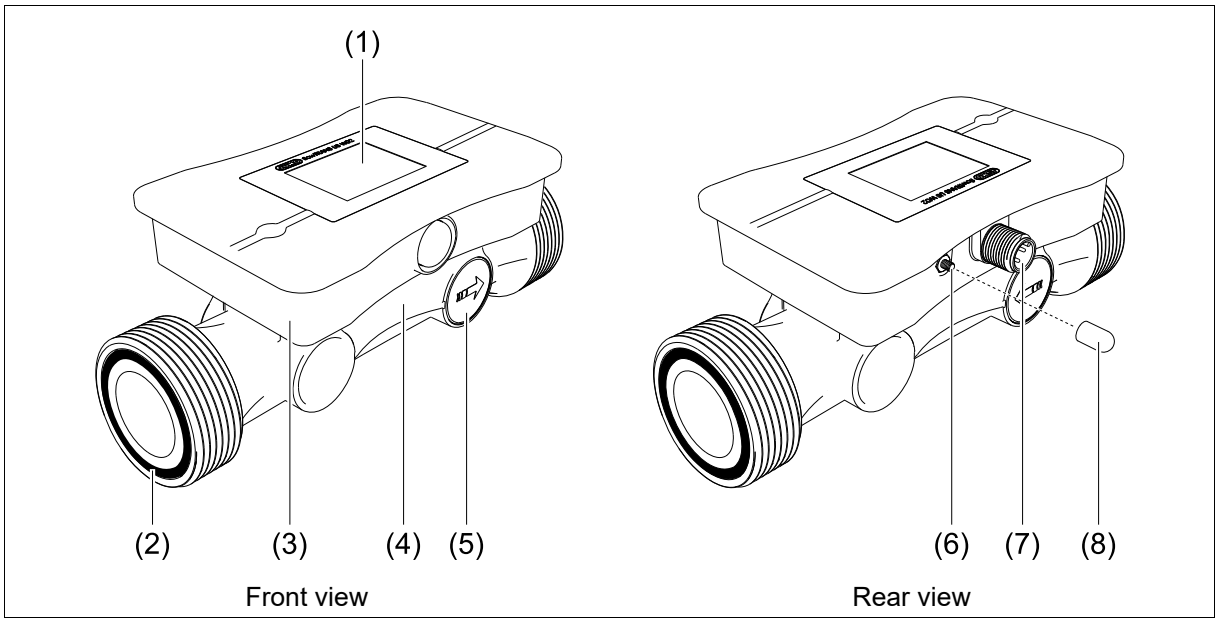
- Do not place the device and the process connections under mechanical strain.
- Systematically check that the process connections are leak-tight.

2.6 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.

3.1 Structure



1	Display	5	Transducer (ultrasonic converter)
2	O-ring (seal for the process connection)	6	Grounding terminal
3	Housing for electronic components	7	M12 plug connector
4	Measuring pipe	8	Protective cap for grounding terminal

3.2 Function

The transducers are on opposite sides of the measuring section and act as transmitters and receivers, i.e. they convert the electrical energy into sound waves and the sound waves into electrical energy.

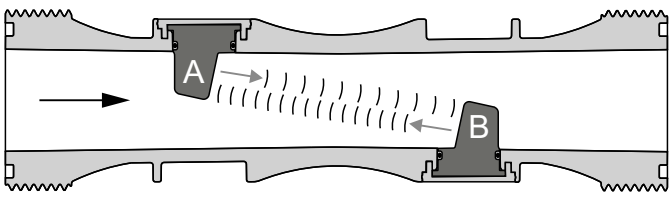
The electronic components supply power to the device, convert the raw signals into standard signals for communicating with other systems (PLC, recorder, indicating device, etc.), and provide interfaces for displaying measured values.

Function principle

The ultrasonic flowmeter works according to the runtime method.

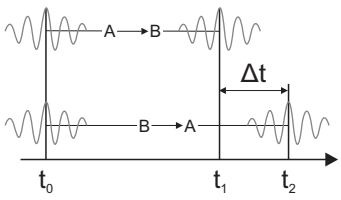
This method measures the runtimes t_1 and t_2 required by the sound to travel from transducer A to transducer B and vice versa.

⟶ = Flow direction



Measuring section (sectional view)

The runtime differential Δt is directly proportional to the flow velocity of the medium.

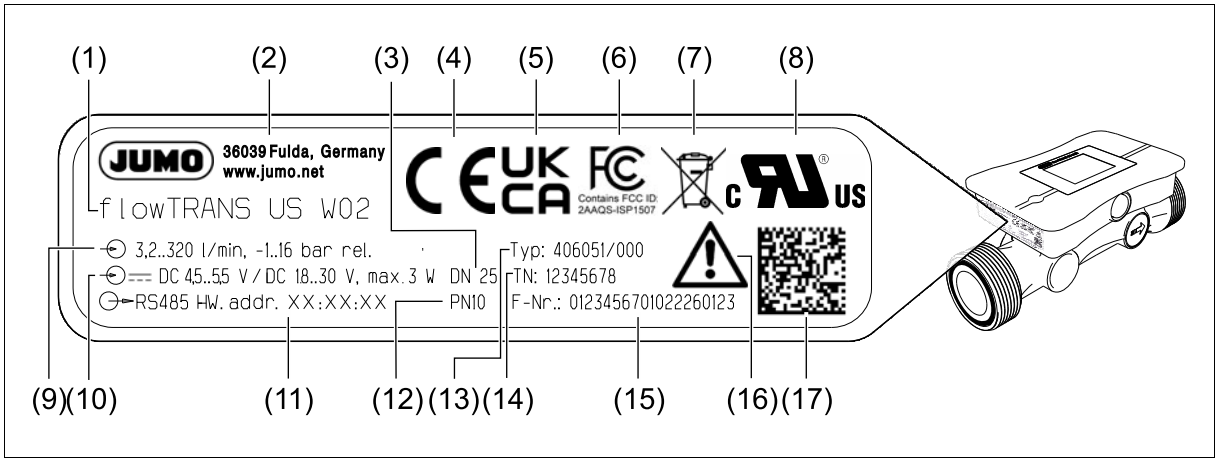


$\Delta t = t_2 - t_1$

3 Description

3.3 Nameplate

Example:



1	Device designation	10	Voltage supply (DC)
2	Manufacturer and address	11	JUMO digiLine hardware address
3	Nominal width	12	Nominal pressure level
4	CE identification marking	13	Order code
5	UKCA identification marking	14	Part no.
6	FCC identification marking	15	Fabrication number
7	Disposal	16	Observe device documentation!
8	UL identification marking	17	Data Matrix code
9	Measuring range		

3.4 Approval marks and certificates

Certificates for approved device versions are available for download 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 Directive (RED)

JUMO GmbH & Co. KG hereby declares that the JUMO flowTRANS US W02 device complies with the Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following web address: qr-406051-en.jumo.info.

Radio equipment regulations 2017

JUMO GmbH & Co. KG hereby states that the flowTRANS W02 device complies with the radio equipment regulations UK S.I. 2017 No. 1206. The full text of the UK Declaration of Conformity is available at the following web address: qr-406051-en.jumo.info.

3.5 Scope of delivery

Device in the ordered version
Brief instructions
Calibration certificate
2 O-rings (seal for the process connection) in the ordered version

4 Technical data

4.1 Electrical safety

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

4.2 Electrical data

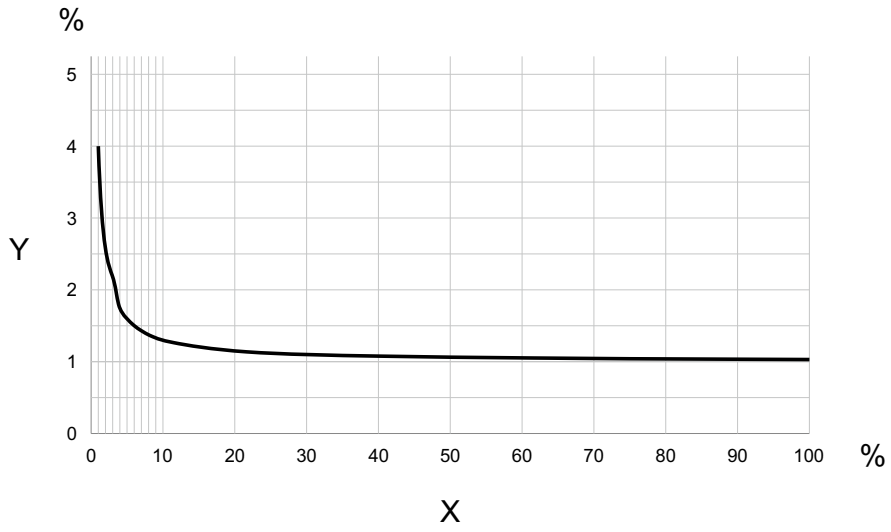
Voltage supply	DC 4.5 to 5.5 V or DC 18 to 30 V SELV, PELV, Class 2
Current consumption	≤ 100 mA
Power consumption	≤ 3 W
Protection rating	DIN EN 61140, Class III (protective low voltage)
Electrical connection	
Connection elements	
Device	M12 plug connector, grounding pin M2.5
Connecting cable	M12 plug connector
Grounding cable	Ring cable lug M2.5
M12 plug connector	IEC 61076-2-101
Version	5-pole, shielded
Protection type	IP67
Connecting cable	
Conductor cross section	≥ AWG 28
Version	5-core, copper, shielded
Temperature resistance	≥ 80 °C
For UL application	
Approved cables[a]	CYJV2/8, CYJV/7, PVVA2/8, PVVA/7
Grounding cable	
Conductor cross section	1.5 mm^2
Version	1-core, copper
Temperature resistance	≥ 80 °C

[a] The cables must be suitable for the voltage, current and temperature used.

4.3 Inputs

4.3.1 Measurands

Flow

$Flow_{max}$	
DN 15 (Low-flow calibration)	60 l/min
DN 15	80 l/min
DN 20	210 l/min
DN 25	320 l/min
DN 32	520 l/min
Accuracy[a]	≤ ±1.0 % of the measured value ±0.03% of $flow_{max}$
Reproducibility	≤ ±0.5 % of measured value ±0.03% of $flow_{max}$
Temperature drift	≤ ±0.05 % of measured value per 10 K temperature change (at -20 to +80 °C)
Response time t_{90}	≤ 2 s
Reference conditions	
Measurement medium	Water
Medium temperature	23 °C (73 °F) ±5 K
Ambient temperature	23 °C (73 °F) ±5 K
Medium pressure	1 to 4 bar
Measuring tube	Horizontal installation, compliance with the required inlet and outlet sections
X = Flow (%) based on $flow_{max}$ Y = Deviation (%) from measured value	

[a] Under reference conditions.

Temperature

Measuring range	-40 to +125 °C
Accuracy	±2 K

Pressure (optional)

Measuring range	
DN 15, DN 20, DN 25	-1 to +16 bar relative pressure
DN 32	-1 to +10 bar relative pressure
Accuracy	
At 20 °C[a]	±0.4% MSP[b]
At -20 to +100 °C[c]	±1% MSP

[a] Includes: linearity, hysteresis, repeatability, deviation of measuring range initial value, and measuring range end value.

[b] MSP = measuring span.

[c] Includes: linearity, hysteresis, repeatability, deviation of measuring range initial 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 end device with JUMO smartCONNECT app
Authentication	Via Bluetooth® radio module and NFC tag
Connection status (configurable)	
Permanently	Active
Temporarily	Restricted (via NFC)
Range	10 m under reference conditions
Radio frequency	
Bluetooth® radio module	2.4 GHz
NFC tag	13.56 MHz
Max. transmission power	
Bluetooth® radio module	0 dBm
NFC tag	–
JUMO smartCONNECT app	
System requirements	
iOS device	iPhone 7 or later (recommended) with iOS 13
Android device	Android 8.0 or later

4.4.2 RS485

Function	Transfer of process data, configuration data, and device information
Communication	Via end device with JUMO DSM software, Modbus master, PLC
Data transmission	Serial
Transmission protocol	JUMO digiLine Modbus RTU
Data format	8 - 1 - no parity 8 - 1 - odd parity 8 - 1 - even parity 8 - 2 - no parity
Data transmission rate	9600 baud 19200 baud 38400 baud
Min. response time	0 to 500 ms
Device address	1 to 247

4.5 Display

Type	TFT display
Size Display range Screen size (diagonal)	 35.04 × 28.03 mm 1.77″
Resolution	128 × 160 RGB
Brightness	15 levels active + 1 level inactive (configurable)
Rotation	0°, 90°, 180°, 270° (configurable)

4 Technical data

4.6 Environmental influences

The product is UL-approved. The approval stipulates that the product may be used indoors only.

Admissible ambient temperature	DIN 60068-2-1, DIN 60068-2-2
At medium temperature ≤ 50 °C	-20 to +50 °C
At medium temperature ≤ 80 °C[a]	-20 to +60 °C
At medium temperature > 80 °C[a]	-20 to +45 °C
Admissible storage temperature	-20 to +60 °C
Climatic conditions	DIN EN 60721-3-1, DIN EN 60721-3-3, DIN EN 60068-2-78
Climate class	3K6
Air temperature	-20 to +55 °C
Relative humidity	≤ 100 % – Condensation on device outer shell
Protection type	DIN EN 60529, EN 50102
	IP65, IP67
Electromagnetic compatibility (EMC)	DIN EN 61326-2-3:2022
Interference emission	Class B[b]
Interference immunity	Industrial requirements
Oscillation	DIN EN 60068-2-6
Amplitude	0,35 mm at 10 to 2000 Hz
Acceleration	5 g at 10 to 2000 Hz
Shock	DIN EN 60068-2-27
Peak acceleration	20 g
Shock duration	11 ms
Pressure Equipment Directive	2014/68/EU
Group 1 fluids - DN ≤ 25	Sound engineering practice acc. to Art. 4, para. 3 i. c. w. Art. 4 para. 1c.i
Group 2 fluids - DN ≤ 32	Sound engineering practice acc. to Art. 4, para. 3 i. c. w. Art. 4 para. 1c.i
Group 1 fluids	Sound engineering practice acc. to Art. 4, para. 3 i. c. w. Art. 4 para. 1c.ii

[a] Without UL approval.

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

4.7 Mechanical features

4.7.1 Device

Weight[a]	
Without screw connection	≥ 215 to ≤ 385 g

[a] Depends on version and DN.

4.7.2 Materials

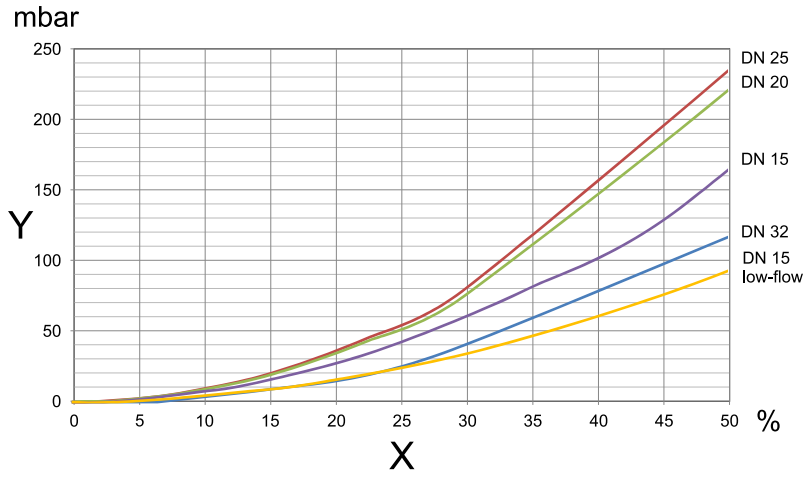
Housing	PA66-GF25
Display cover	PMMA
Components in contact with the medium	
Measuring tube	PPSU
Transducer	PEEK
Seals	
Process connection, transducer	EPDM or FKM (optionally)
Approvals	
Components in contact with the medium	Drinking water certified materials (when using EPDM seals)

4.7.3 Nominal pressure

Nominal pressure level	
DN 15, DN 20, DN 25	PN 16
DN 32	PN 10

4.7.4 Pressure loss diagram

Created under reference conditions ⇨Page 13.

X = $Flow_{max}$ (%) Y = Pressure loss (mbar)	

4 Technical data

4.8 Measurement media

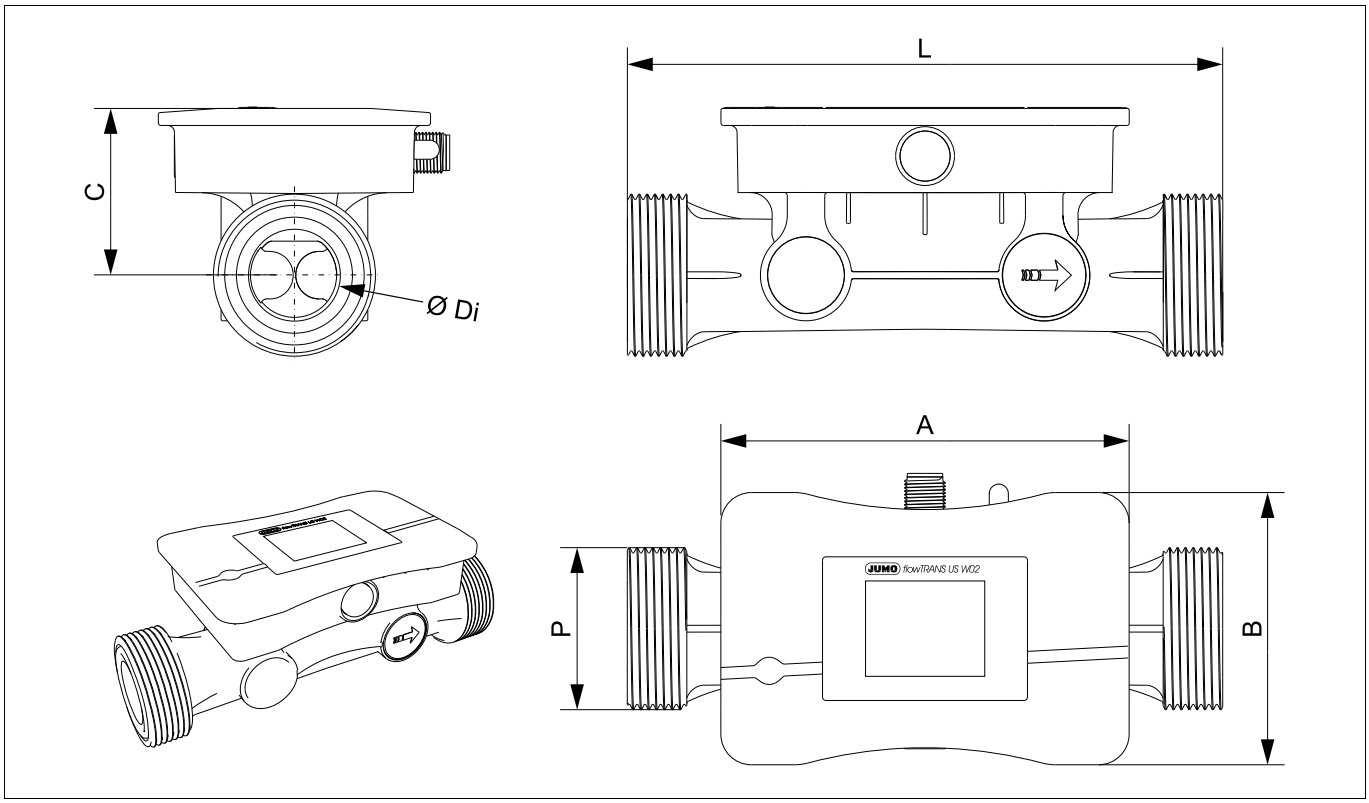
Medium type	Conductive or non-conductive liquids
Viscosity	≤ 100 mPas
Foreign matter content	
Solids	≤ 5 % vol
	≤ 1 % vol
Medium temperature	
Temperature range	-20 to +95 °C
Within the accuracy	-20 to +50 °C
Within the accuracy[a]	-20 to +80 °C
Outside of the accuracy[a, b]	> 80 to 95 °C

[a] Without UL approval.

[b] Return to the accuracy after cooling down.

4.9 Dimensions

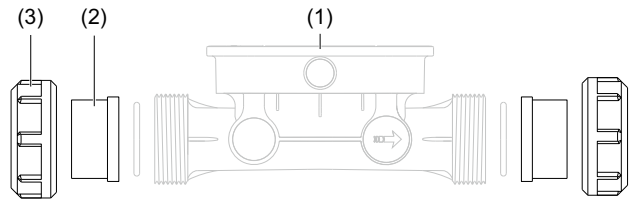
4.9.1 Device



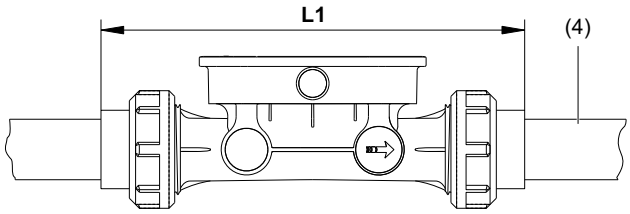
Nominal width	Ø Di [mm]	P	A [mm]	B [mm]	C [mm]	L [mm]
DN 15	16.5	G 1	120	80	43.5	155
DN 20	21.5	G 1 1/4			46	165
DN 25	27	G 1 1/2			49	175
DN 32	34	G 2			52.5	185

4.9.2 Accessories

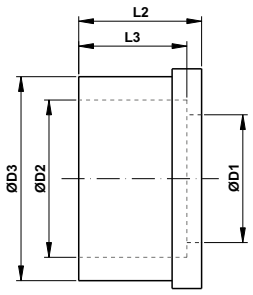
Mounting sets



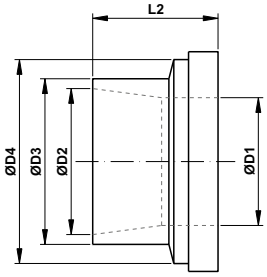
Device (1) with mounting set – consisting of union ends (2) and union nuts (3)



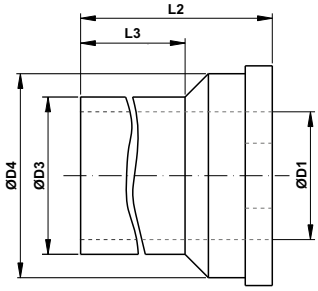
Total installation length (L1) of device and mounting set – installed in the pipe (4)



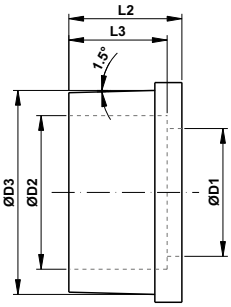
Union end PVC



Union end stainless steel



Union end PP Butt-welding



Union end PP Socket welding

Nominal width	ØD1 [mm]	ØD2 [mm]	ØD3 [mm]	ØD4 [mm]	L1 [mm]	L2 [mm]	L3 [mm]
Union end PVC							
DN 15 to DN 10	10.5	16	23.5	27.5	203	24	16
DN 15	15	20	27.5	-	198	19	16
DN 20	22	25	36	-	209	22	19
DN 25	26	32	41.5	-	225	25	22
DN 32	33	40	53	-	243	29	26
Union end stainless steel							
DN 15 to DN 10	10.5	16	23.5	27.5	203	24	16
DN 15	15	17.3	21.3	27.5	203	21.5	-
DN 20	22	22.9	26.9	36	210	22.5	-
DN 25	26	29.7	33.7	41.5	226	25.5	-
DN 32	33	38.4	42.4	53	236	25.5	-
Union end PP butt-welding							
DN 15	15/16.2	-	20	27.5	266	53	37.75
DN 20	19.8	-	25	36	277.8	56.4	38.6
DN 25	26	-	32	41.5	293	59	41.25
DN 32	32.6	-	40	53	310.6	62.8	41.8
Union end PP socket-welding							
DN 15	17	19.35	27.5	-	198	19	16
DN 20	21	24.3	36	-	207	21	18
DN 25	26	31.25	41.5	-	221	23	20
DN 32	33	39.2	53	-	235	25	22

5 Installation

5.1 Preparing for installation

5.1.1 Installation site

Requirements:

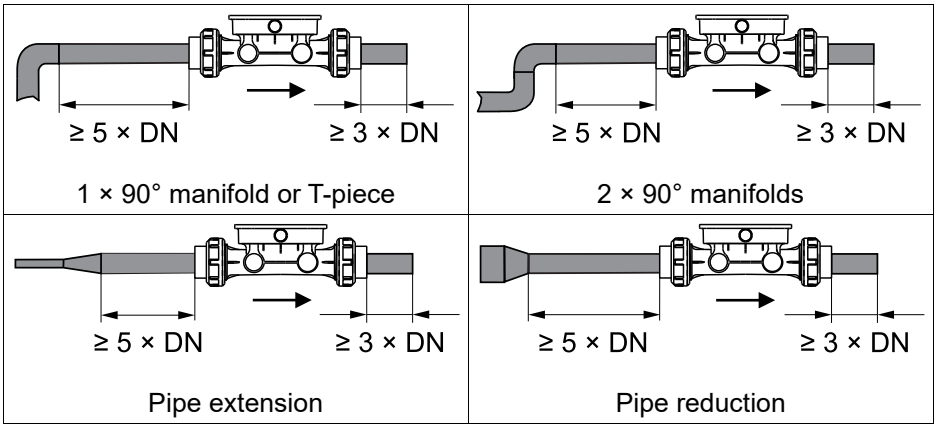
- The device is protected from electromechanical interference.
- The device is protected from UV radiation.
- The device is protected from the weather in outdoor applications.

5.1.2 Inlet and outlet sections

To ensure measurement accuracy, longer inlet and outlet distances may be required depending on the application.

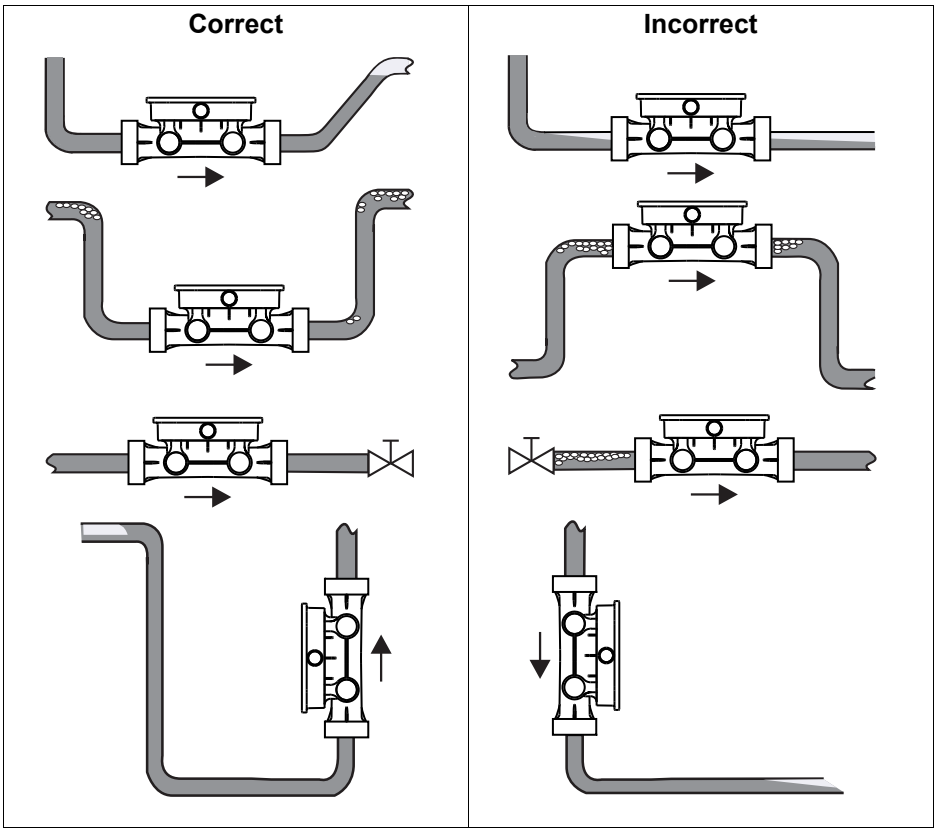
DN = Nominal pipe width

⟶ = Flow direction



5.1.3 Installation position

⟶ = Flow direction



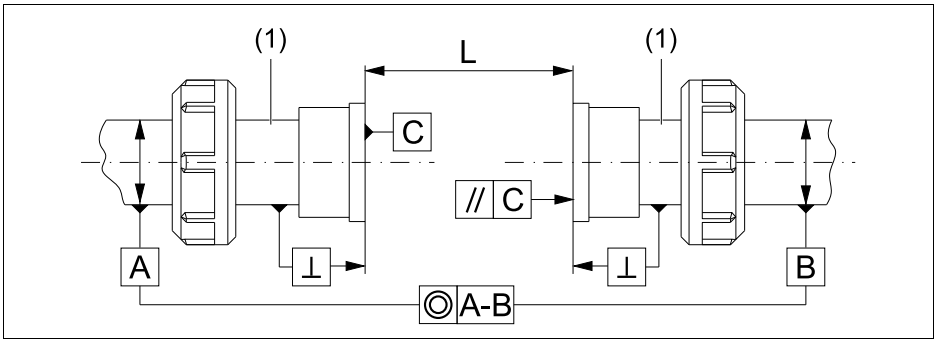
5.1.4 Avoid mechanical strain

Requirements:

- The center axes of both pipe ends are aligned (A-B) before mounting in the pipeline (1).
- The pipe ends are aligned parallel and at an angle to each other (C).
- The insertion length (L) of the device is observed.

Mounting sets, ⇨Page 39.

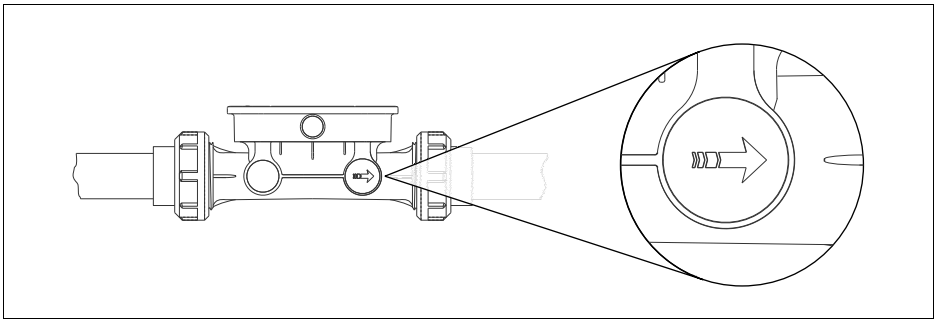
Dimensions, ⇨Page 19.



Nominal width	Insertion length L [mm]
DN 15	155
DN 20	165
DN 25	175
DN 32	185

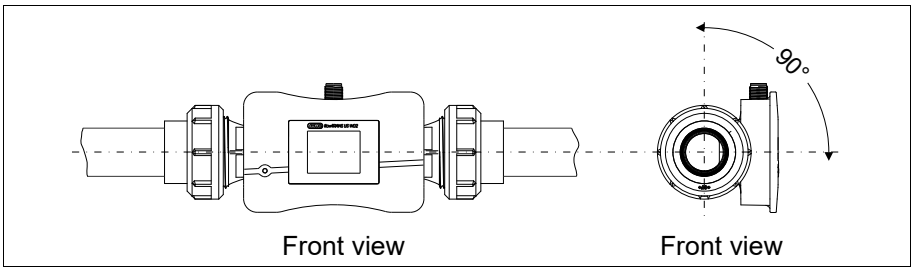
5.1.5 Flow direction

The positive flow direction (⟶) is shown on the transducer covers on both sides of the device and must be observed during installation, in accordance with the application in question.



5.1.6 Alignment of the housing for electronic components

CAUTION! Protect the electronics housing from heating up by hot media. Install the electronics housing oriented 90° to the side at medium temperatures > 60 °C (140 °F).



5 Installation

5.2 Installing the device

Describes the installation in the pipe with accessory mounting kits, ⇨Page 19.

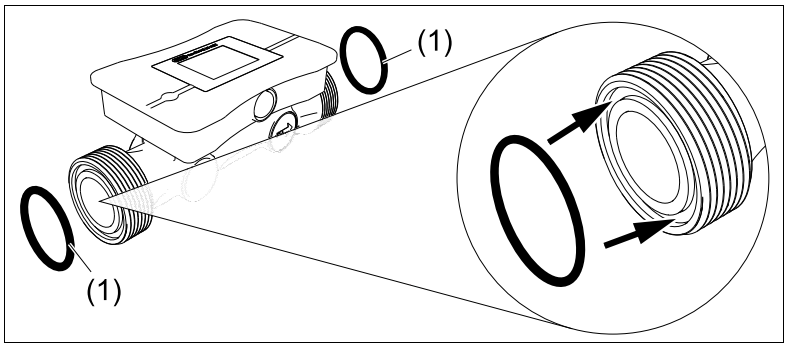
Material	2 O-rings (process connection seals)

Requirements:

- The system has been de-energized and secured against being switched on again.
- The medium circulation of the plant is stopped.
- The pipe is drained and rinsed.
- Suitable protective equipment has been set up.
- The pipe is prepared for installation with the mounting kits.

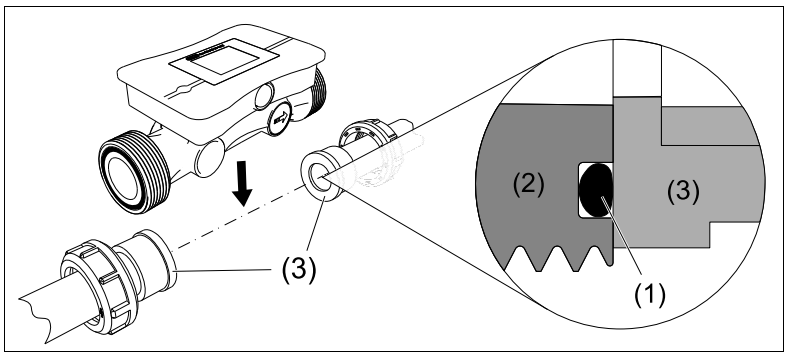
Procedure:

1. Insert the O-rings (1) into the sealing ring grooves in the two process connections.

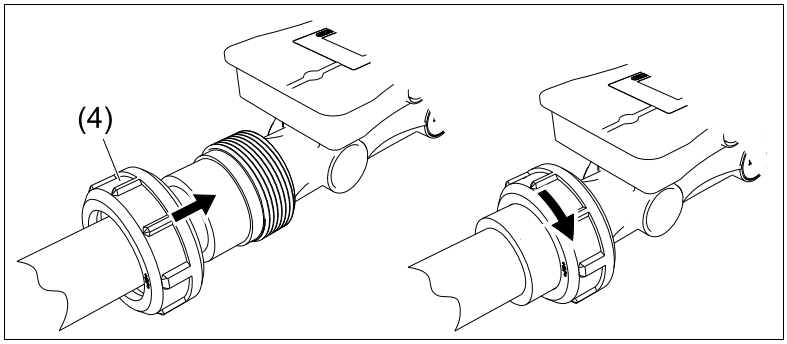


2. Install the device between the two union ends (3) of the mounting set.

   Ensure that the O-rings (1) between the process connections (2) and union ends are correctly positioned.



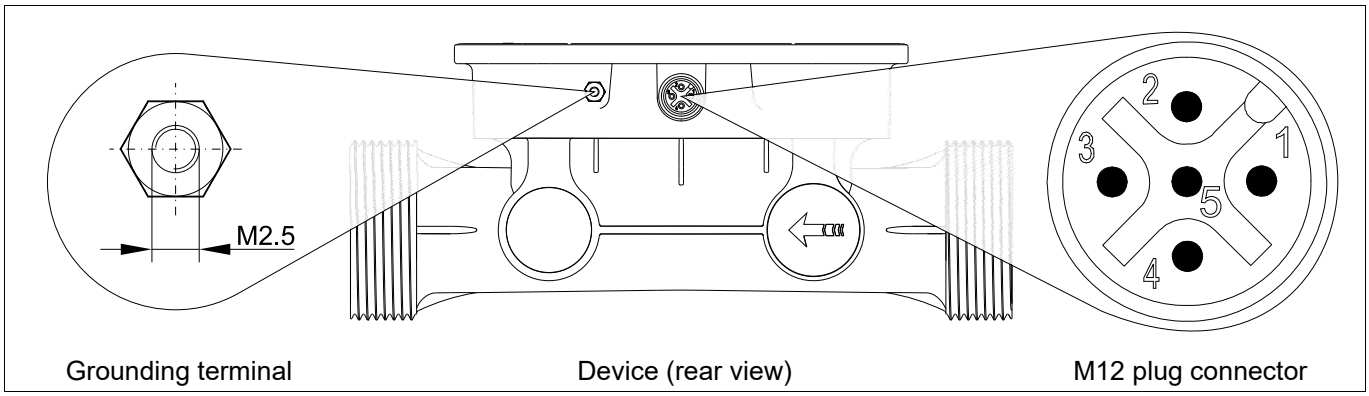
3. Manually screw union nuts (4) on both ends of the pipe to the process connections on the device.



4. Switch on the plant, fill the pipe and check the tightness of the process connections under operating conditions.

The device is now installed in the pipe.

6.1 Connection elements

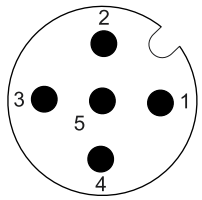


Grounding terminal | Device (rear view) | M12 plug connector

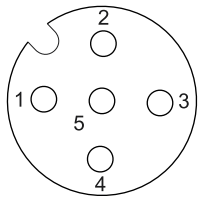
6.1.1 Terminal assignment

M12 plug connection

Designation	Description	Assignment
RS485	DC 5 V	1 BN (Brown)
	DC 24 V	2 WH (White)
	GND	3 BU (Blue)
	RS485 (RxD/TxD-)	4 BK (Black)
	RS485 (RxD/TxD+)	5 GY (Grey)



Device



Connecting cable

6 Electrical connection

6.2 Connecting the device

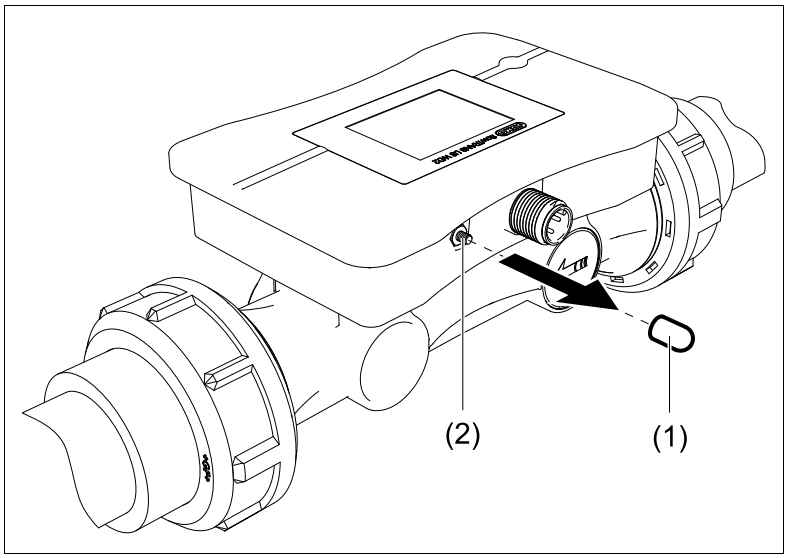
Aids	Torque wrench with socket insert, SW5
Materials	Connecting cable for plug connector M12
	Grounding cable with ring cable lug M2,5
	Hexagon nut DIN EN ISO 4032 M2,5

Requirements:

- The system has been de-energized and secured against being switched on again.
- The connections for grounding, voltage supply and signal processing are professionally prepared.
- The connection cable and the grounding cable are temperature resistant according to the process.
- The connection cable is installed at a minimum distance of 30 cm from high-voltage or high-frequency cables.

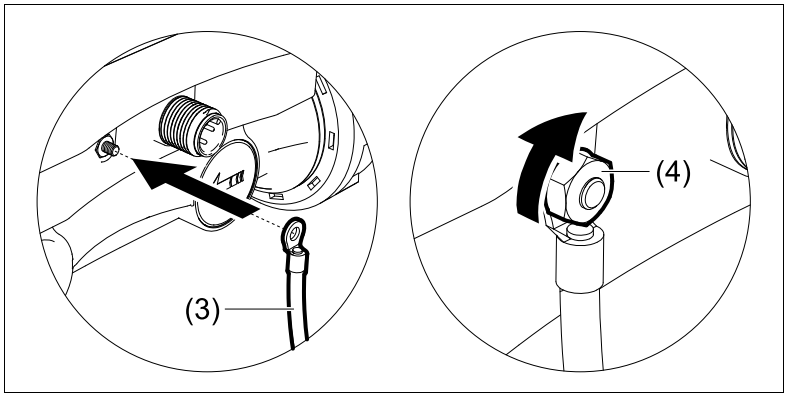
Procedure:

1. Remove the protective cap (1) from the grounding terminal (2).

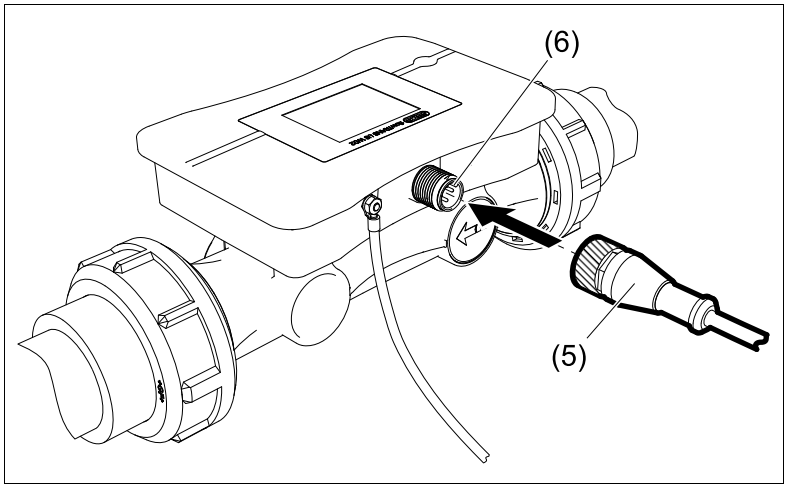


2. Plug the ring cable lug of the grounding cable (3) onto the grounding terminal and secure with the hexagon nut (4).

   Tightening torque: 0.4 Nm.

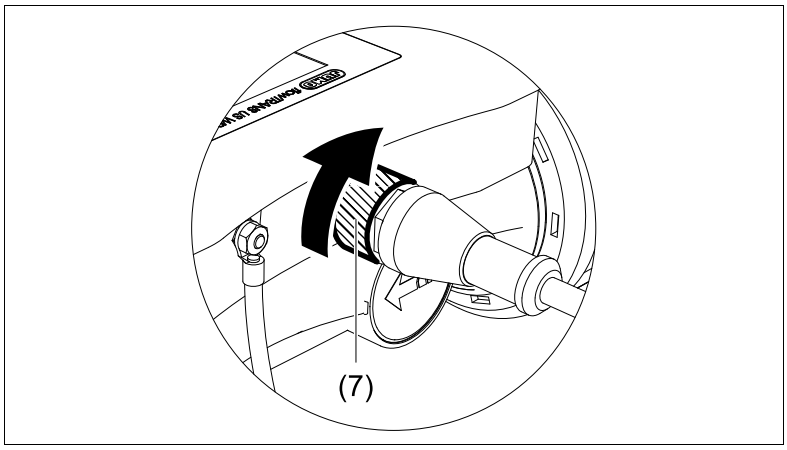


3. Insert the connecting cable (5) into the M12 plug connection (6).



4. Screw the union nut (7) of the connecting cable onto the M12 plug connection.

   Tightening torque: 0.4 Nm.



5. Connect the connecting cable to the device that is processing the signals and to the voltage supply.
6. Lay the connecting cable and the grounding cable so that they are protected from mechanical load.

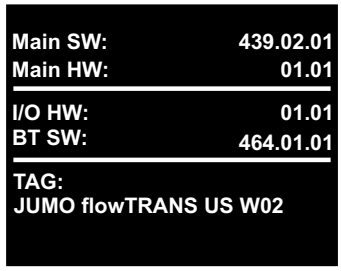
The device is ready for operation as soon as the voltage supply is established,
⇨ "Startup display ", Page 26.

7 Operation

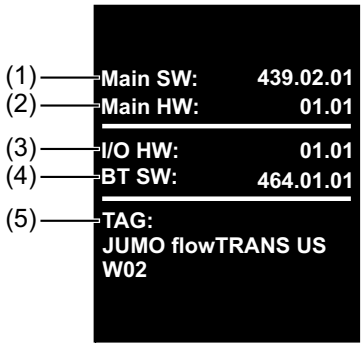
7.1 Display elements

7.1.1 Startup display

The startup display appears on the display as soon as the voltage supply to the device is established. The startup display switches to the process display after approximately five seconds.



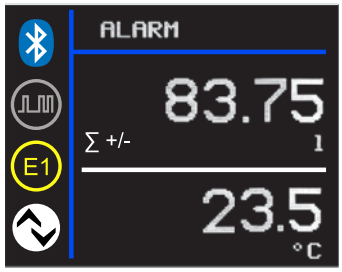
Orientation: 0°, 180°



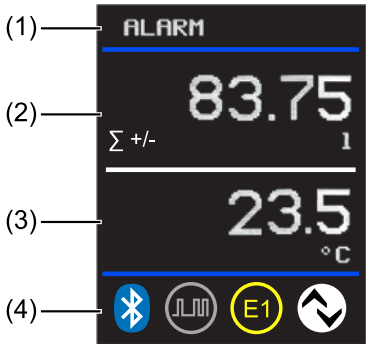
Orientation: 90°, 270°

Pos.	Designation	Description
1	**Startup display**	Shows the device software version.
2, 3		Shows the device hardware version.
4		Shows the Bluetooth module software version.
5		Shows the device TAG (application-spec. marking).

7.1.2 Process display



Orientation: 0°, 180°



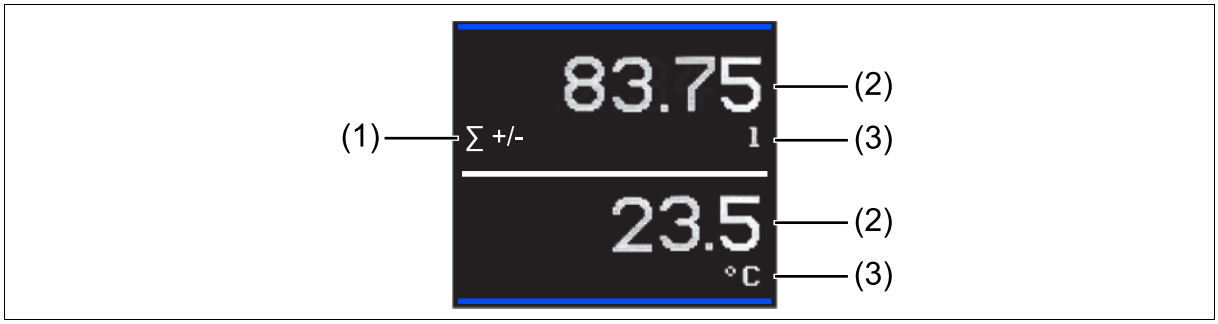
Orientation: 90°, 270°

Pos.	Designation	Description
1	**Status bar**	Shows information about the device status.
2, 3	**Process value display 1**, **Process value display 2**	Show the following values and messages: • Both configured process values (actual values) • The process value system units • The totalizer for the totalizer function • The fill volume or residual volume for the batch function • Error messages, ⇨ "Troubleshooting ", Page 34
4	**Toolbar**	Shows: • The configuration and status of the interface connections

Status bar

Pos.	Symbol, display	Description
1	ALARM	Shows a device error or a warning.
	BATCH	Shows an active batch operation.
	SIM	Shows an input that is in simulation mode.

Process value display 1, process value display 2



Totalizer, totalizer transmission

Only appears when the process value display is configured accordingly.

Pos.	Symbol, display	Description
1	∑ -	Shows negative count mode of the totalizer.
	∑ +	Shows positive count mode of the totalizer.
	∑ +/-	Shows balanced count mode of the totalizer.

Process value (5-digit)

If the process value exceeds the 5-digit display range, the number of decimal places for the process value is reduced.

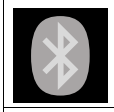
Pos.	Symbol, display	Description
2	12345	Shows the positive process value.
	-12345	Shows the negative process value.

System unit

Pos.	Symbol, display	Description
3	l/s, m^3/h, ft^3/min, l/min, ft^3/h, usgal/min, impgal/min, l/h, cm^3/s, usgal/h, impgal/h, °C, °F, mbar, bar, psi, m/s, %, l, usgal, impgal, m^3, ft^3	Shows the configured system unit of the process value.

Toolbar

Interface connections

Pos.	Symbol, display	Description
1		Interface connection: Bluetooth® Status: Inactive
		Interface connection: Bluetooth® Flashing status: Wait for connection to establish. Permanent status: Active
2		Interface connection: RS485/JUMO digiLine Status: Inactive
		Interface connection: RS485/JUMO digiLine Status: Active

7.2 Interfaces

7.2.1 Bluetooth

The JUMO smartCONNECT app allows the device to be configured and its parameters to be set using an end device. Configuration data and device information are transmitted via Bluetooth. The Bluetooth radio module of the device is permanently active during initial startup.

The app is available for free download from the manufacturer´s websites or alternatively using the QR code:

JETZT BEI Google Play

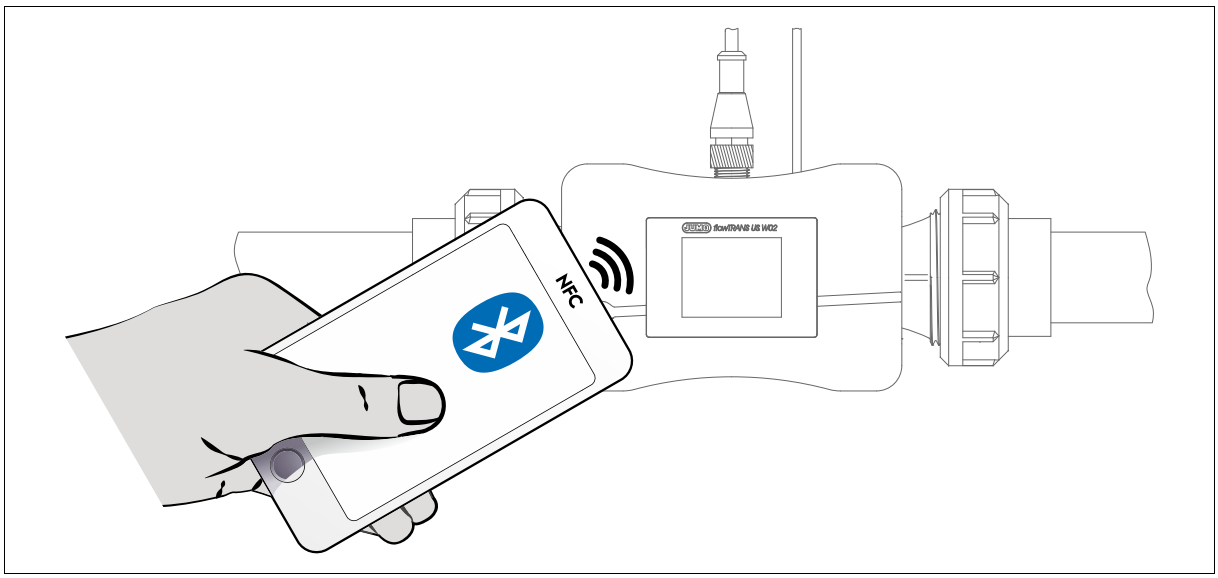
Laden im App Store

Bluetooth® mode

Active: The Bluetooth® radio module is permanently active. The device is detected by the smartCONNECT app as soon as it is within range of the Bluetooth® radio module.

Restricted (via NFC): The Bluetooth® radio module is inactive and can be temporarily activated via an NFC tag in the device. To establish a connection between the NFC tag and the end device, this device must be NFC-capable and held close to the device display.

Inactive: The Bluetooth® radio module can disabled and enabled via Modbus RTU.



7.2.2 JUMO digiLine

JUMO digiLine is a bus-compatible connection system for digital sensors. The connection system enables sensor networks to be established where multiple sensors are connected to one another in a star shape or tree structure.

Multiple sensors simultaneously transfer their measurement data to the next JUMO digiLine master with Plug and Play support or in Modbus operation.

8 Configuration via Bluetooth®

The parameter lists are based on the JUMO smartCONNECT app operating menu. The table headings locate the respective parameters in the app operating menu..

The default settings are shown in **bold** in the following tables.

Sensor > display

Parameter	Value	Description
Language	**German**, English, French, Spanish	National language for the device texts of the process display.
Process value 1, process value 2	No signal, **flow**, **temperature**, pressure, sound velocity, signal strength, fill volume, residual volume, totalizer 1 volume, totalizer 1 volume transmission, totalizer 2 volume, totalizer 2 volume transmission	Parameter output values (can be configured independently of one another).
Brightness	0 to 15 (**8**)	Brightness of the process display backlight.
Rotation	**0°**, 90°, 180°, 270°	Process display alignment.

Sensor

Parameter	Value	Description
TAG number	**JUMO flowTRANS US W02**	TAG designation (text entry with max. 32 characters possible).
Description		Description of the measuring point which can be edited with the JUMO DSM software.
Sensor origin		Displays the last used device (read-only).
Bluetooth® mode	Restricted (via NFC), **active**	Status of the Bluetooth® connection, ⇨ Seite 29.
Default settings	**Inactive**, reset	Resets the device to default settings.

Interface

Parameter	Value	Description
Device address	**1** to 247	Bus user identification for the JUMO digiLine electronic components.
Baud rate	9600 baud/s, **19200 baud/s**, 38400 baud/s	Transmission speed (symbol rate) of the RS485 interface.
Data format	8 - 1 - no parity, 8 - 1 - odd parity, **8 - 1 - even parity**, 8 - 2 - no parity	Output format of the process data.
Min. response time	0 to 500 **(20)**	Minimum time from receipt of a query to sending of the response. Response speed of the JUMO digiLine electronic components adjusts to match to slower bus users.

Parameter	Value	Description
Floating point	**Standard**, LSB first, MSB first	Selectable transmission format for float values (floating-point numbers).

System units

Parameter	Value	Description
Flow	l/s, **l/min**, l/h, cm³/s, m³/h, ft³/min, ft³/h, usgal/min, usgal/h, imp.gal/min, imp.gal/h	System unit for these parameters.
Totalizer	cm³, **l**, m³, ft³, usgal, imp.gal	
Temperature	**°C**, °F	Unit for this parameter in the process value display. The output signal is always output in °C regardless of this setting.
Pressure[a]	**bar**, mbar, psi	System unit for this parameter.

[a] Optional extra

Measurands > flow

Parameter	Value	Description
Filter time constant	Input range: 0.000 to 25.00 (**0.450**)	Optimization of measured value updating. The higher the filter time constant value, the slower the change in measured value at the output. Response time t_{90} with default setting: ≤ 2 s.
Low flow limit value	Input range: 0.000 to 10.00 (**0.050**)	Input value in % of $flow_{max}$ of nominal width (DN) of the device. No process value is output below the limit value.
Low flow hysteresis	Input range: 0.000 to 50.00 (**10.00**)	Input value in % of the low flow. Sets hysteresis of low flow.
Inversion	On, **Off**	Inverts the flow signal, e.g. if the device has been installed in negative flow direction.
Characteristic line	**Standard**, user-defined 1 to 9	Standard: Water User-defined 1 to 9: Not defined

Measurands > flow > fine adjustment

Parameter	Value	Description
Function	On, **Off**	Parameter function
ACTUAL start value	Input range: -99999 to 99999 (**0.000**)	Input value for fine adjustment. Alternatively: parameter **adoption of ACTUAL start value**
ACTUAL end value	Input range: -99999 to 99999 (**100.0**)	Input value for fine adjustment. Alternatively: parameter **adoption of ACTUAL end value**
TARGET start value	Input range: -99999 to 99999 (**0.000**)	Input value for fine adjustment.
TARGET end value	Input range: -99999 to 99999 (**100.0**)	
Adoption of ACTUAL start value	**Inactive**, adopt ACTUAL start value	Travel to ACTUAL start value and use **adopt ACTUAL start value** to adopt the measured flow value. Alternatively: parameter **ACTUAL start value**
Adoption of ACTUAL end value	**Inactive**, adopt ACTUAL end value	Travel to **ACTUAL** end value and use **adopt ACTUAL end value** to adopt the measured flow value. Alternatively: Parameter **ACTUAL end value**

Measurands > temperature

Parameter	Value	Description
Filter time constant	Input range: 0.000 to 25.00 (**1.000**)	Optimization of measured value updating. The higher the filter time constant value, the slower the change in measured value at the output.
Offset	Input range: -10.00 to 10.00 (**0.000**)	Offset correction for zero point adjustment.

Measurands > pressure

Parameter	Value	Description
Filter time constant	Input range: 0.000 to 25.00 (**1.000**)	Optimization of measured value updating. The higher the filter time constant value, the slower the change in measured value at the output.
Offset	Input range: -10000 up to 10000 (**0.000**)	Offset correction for zero point adjustment.

Totalizer

Parameter	Value	Description
Counting mode totalizer 1	**Positive**, negative, balanced	Integrate the flow components depending on the counting modes.
Counting mode totalizer 2	Positive, negative, **balanced**	Positive: Only positive flow components. Negative: Only negative flow components. Balanced: Positive and negative flow components.
Reset all totalizers	**Inactive**, reset	All totalizers and transmissions are reset.

Simulation > flow

Parameter	Value	Description
Simulation	On, **Off**	Parameter function.
Value	Input range: -99999 up to 99999 (**0.000**)	Input value for the simulation.

Simulation > temperature

Parameter	Value	Description
Simulation	On, **Off**	Parameter function.
Value	Input range: -99999 up to 99999 (**0.000**)	Input value for the simulation.

Simulation > pressure

Parameter	Value	Description
Simulation	On, **Off**	Parameter function.
Value	Input range: -99999 up to 99999 (**0.000**)	Input value for the simulation.

9 Troubleshooting

9.1 Process value error

Process value errors are displayed flashing instead of the process value. With error messages in line with the NAMUR classification NE 107, process value errors are supplemented by symbols and a two-line message (alternating with the process display).

Appearance	Cause	Remedy
-----	No process value signal is configured.	Configure a process value signal.
	The process value signal is faulty.	At device restart: Wait for initialization (max. 15 s).
		At device restart, and with the batch function activated: Execute batch.
	Internal device error	Contact the manufacturer.
+++++	The temperature sensor is faulty.	Contact the manufacturer.
<<<<<	The measuring range was undershot.	Operate the device within the device specifications.
>>>>>	The measuring range was exceeded.	Operate the device within the device specifications.

9.2 Error messages in line with NAMUR

Error messages in line with NAMUR classification NE 107 are displayed by symbols and a two-line message (alternating with the process display).

Symbol	Designation
	**Error/failure**

Message	Cause	Remedy
Internal error (TDC comm.)	The device is faulty.	Contact the manufacturer.
Flow invalid	Too many air bubbles in the system.	Bleed the system.
	The sensor is faulty.	Contact the manufacturer.
Temperature invalid	The measuring range has been fallen below/exceeded.	Comply with measuring range.
	The sensor is faulty.	Contact the manufacturer.
Pressure invalid	The measuring range has been fallen below/exceeded.	Comply with measuring range.
	The sensor is faulty.	Contact the manufacturer.
Configuration corrupted	The configuration data in the EEPROM are damaged.	Transfer the configuration data to the device again.
Device not calibrated	The device is not calibrated	Contact the manufacturer.
	The device is faulty.	

Symbol	Designation
	**Functional check**

Message	Cause	Remedy
Simulation active	Simulation mode is active.	Deactivate simulation mode. Alternatively: Restart device.

Symbol	Designation
	**Outside the specification**

Message	Cause	Remedy
Outside the specification	Flow: The measuring range was exceeded.	Comply with measuring range.
	Temperature: The measuring range has been fallen below/exceeded.	
	Pressure: The measuring range has been fallen below/exceeded.	
Undervoltage	The voltage supply to the device is insufficient.	Check the voltage supply to the device.
Overload at C/Q or DO	The switching outputs are overloaded.	Check the connection and load of the switching outputs.
Error analog output	The burden at the analog output is too high.	Observe the specified values for the burden of the analog output.
Max. pulse freq. exceeded	The maximum output frequency of the pulse output has been exceeded.	Check the configuration of the pulse output.
Empty conduit	The meter run is empty.	Fill the meter run or the system.
Air bubbles detected	Air bubbles have been detected in the system.	Bleed the system.

9 Troubleshooting

9.3 Error messages outside NAMUR

Error messages outside NAMUR classification NE 107 are displayed by symbols and a two-line message (alternating with the process display).

Symbol	Designation
	**Caution**

Message	Cause	Remedy
Batch error	The maximum batch time has been exceeded.	Check the filling volume of the batch and restart the process.
	A measurement error occurred during the batch.	Check the process for measurement errors and restart the process.
Batch	The batch is active.	–

10.1 Cleaning device housing

The device housing can be cleaned when the device has been installed.

Clean the device with a cloth dampened with water.

10.2 Decontamination

Use:

- When the medium is changed in the plant.
- Before replacing O-rings.
- Before returning the device.
- Before disposing of the device.

Requirements:

- The device is uninstalled, ⇨Page 38.
- If the medium is a hazardous substance: The information in the safety data sheet is taken into account.
- Suitable protective equipment has been set up.
- Ein geeignetes Reinigungsmittel ist einsatzbereit.
- Ein Reinigungsplatz zum Spülen und Neutralisieren aller mediumberührten Teile ist vorbereitet.

Procedure:

1. ***CAUTION!*** Do not damage the sealing ring grooves of the process connections when removing the O-rings.

   Remove the two O-rings from the sealing ring grooves.

2. ***CAUTION!*** Use only cleaning agents that are compatible with the materials used to make the device.

   Thoroughly flush and neutralize all parts that come into contact with the medium using a suitable cleaning agent.

3. When disposing the device: ⇨Page 38.
4. When continuing to use the device: ⇨Page 37.

10.3 Replacing O-rings

Requirements:

- All components in contact with the medium are decontaminated, ⇨page 37.

Procedure:

1. Check the O-rings previously used for damage and replace if necessary.
2. Install the device, ⇨page 22.

11 Shutdown

11.1 Uninstallation

Requirements:

- The system has been de-energized and secured against being switched on again.
- The medium circulation of the plant is stopped.
- The pipe is drained and rinsed.
- Suitable protective equipment has been set up.
- A clean and dry storage location has been prepared.

Procedure:

1. Manually loosen the union nut of the connecting cable from the M12 plug connection on the device.
2. Pull the connecting cable out of the M12 plug connection and remove from the working range.
3. Release the hexagon nut from the grounding terminal.
4. Remove the grounding cable from the grounding terminal and remove from the working range.
5. Manually loosen the union nuts from the process connections on the device and slide over the ends of the pipe.
6. ***CAUTION!*** Make sure that the O-rings remain in the sealing ring grooves of the process connections of the device.

   Carefully remove the device from the plant and put in a clean and dry place.

11.2 Returns

Requirements:

- Clean the device housing ⇨Page 37.
- Clean the parts that come into contact with the medium ⇨Page 37.

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.

11.3 Disposal

Requirements:

- Clean the device housing ⇨Page 37.
- Clean the parts that come into contact with the medium ⇨Page 37.

- 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.

Without UL approval

Connecting cable

Designation	Part no.
JUMO M12 digiLine master connecting cable for 705001, 5-pole, A-coded, length 10 m	00665547
JUMO M12 digiLine master connecting cable for 705001, 5-pole, A-coded, length 5 m	00665539
JUMO M12 digiLine master connecting cable for 705001, 5-pole, A-coded, length 1.5 m	00665529
JUMO M12 digiLine master connecting cable, 5-pole, A-coded, length 10 m (PG 203590)	00638341
JUMO M12 digiLine master connecting cable, 5-pole, A-coded, length 5 m (PG 203590)	00638337
JUMO M12 digiLine master connecting cable, 5-pole, A-coded, length 1.5 m (PG 203590)	00638333
JUMO M12 connecting cable, 5-pole, A-coded, length 15 m	00638324
JUMO M12 connecting cable, 5-pole, A-coded, length 10 m	00638322
JUMO M12 connecting cable, 5-pole, A-coded, length 5 m	00638315
JUMO M12 connecting cable, 5-pole, A-coded, length 1.5 m	00638313
JUMO M12 connecting cable, 5-pole, A-coded, length 0.5 m	00638312
JUMO Y-distributor 5-pole (connector, socket, socket)	00638327
USB converter (Y distributor M12, USB, DC coupling)	00746250

Electronic components

Designation	Part no.
Plug-in power supply unit 24 V / 1 A	00743955
JUMO digiLine hub	00646871
JUMO power supply unit for JUMO digiLine hub	00661597

Software

Designation	Part no.
JUMO DSM software for JUMO digiLine sensors	00655787
JUMO DSM software for JUMO digiLine sensors incl. data management	00663703

Suitable indicating devices/controllers

Designation	Data sheet
Modular multichannel measuring devices for liquid analysis with integrated controller and paperless recorder JUMO AQUIS touch S/P	202580/ 202581
Scalable measurement, control, and automation system JUMO mTRON T	705000/ 705001
JUMO AQUIS 500 RS indicating device/controller	202569

12 Accessories

Accessories for JUMO AQUIS touch S/P

Designation	Part no.
Pipe-mounted kit for JUMO AQUIS touch S	00602401
Protective roof kit for JUMO AQUIS touch S	00602404
Setup program JUMO AQUIS touch S/P on mini-DVD	00594355

Accessories for JUMO AQUIS 500 RS

Designation	Part no.
Pipe-mounted kit for JUMO AQUIS 500 RS	00398162
Weather protection canopy for JUMO AQUIS 500 RS	00398161
Setup program for JUMO AQUIS 500 on DVD	00483602
PC interface, converter RS232/TTL	00301315
PC interface, converter USB/TTL and adapter (pins/socket)	00456352

13.1 China RoHS

产品组别 Product group: 406051 部件名称 Component Name	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
	铅 （Pb）	汞 （Hg ）	镉 （Cd）	六价铬 （Cr(VI)）	多溴联苯 （PBB）	多溴二苯醚 （PBDE）
外壳 Housing (Gehäuse)	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	○	○	○	○	○	○
电路板 Circuit boards (Leiterplatte)	X	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。
This table is prepared in accordance with the provisions SJ/T 11364.
○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
Indicate the hazardous substances in all homogeneous materials for the part are below the limit of the GB/T 26572.

×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。
Indicate the hazardous substances in at least one homogeneous material of the part exceed the limit of the GB/T 26572.

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