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# JUMO flowTRANS DP R

## Meter run R01 and orifice plate R02

### Applications

- For the flow measurement of single-phase aggressive and non-aggressive gases, steam, and liquids
- In nominal widths up to DN 40 designed as a meter run R01
- In nominal widths as of DN 50 designed as a single-part orifice plate R02

### Brief description

The flow measurement based on the differential pressure is universal and can be used in liquids, gases, and steams. The primary element JUMO flowTRANS DP R can be used in a wide range of nominal widths, temperatures, and pressures.

The differential pressure generated via the primary element (orifice plate) is measured using the differential pressure transmitter JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA and converted into a proportional flow signal.

The dimensioning of the primary element depends on the application that is acquired through a checklist. The measuring insert is designed as a standardized orifice plate.

#### Meter run R01

- Orifice plate with ring chamber tapping (carrier rings with replaceable measuring insert)
- Inlet and outlet sections correspond to default standards
- Other design types are possible based on the operating conditions

#### Orifice plate R02

- Orifice plate with single pressure tapping (carrier rings with integrated measuring insert)
- Compact design allows for the direct installation of the valve manifold and differential pressure transmitter on the orifice plate

### Customer benefits

- Globally standardized measurement method according to ISO 5167 is defined, among other factors, by the dimensioning, the design type, and the installation conditions
- Sturdy design, no moving parts  
The service lives are long due to the solid design and the lack of moving parts  
The requirements of the standard on the orifice plate can be checked at any time
- Adaptable to the applications  
Material selection of the system can be adjusted to the application



JUMO flowTRANS DP R01



JUMO flowTRANS DP R02

### Special features

#### Meter run R01

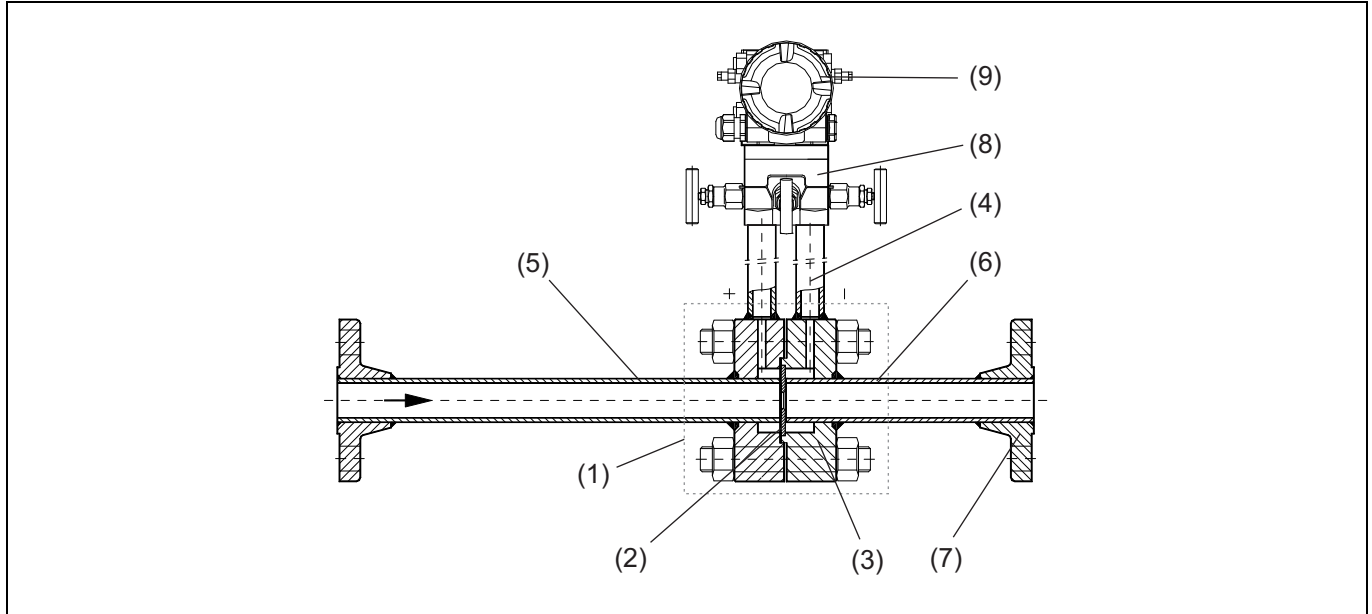
- Nominal pressure up to PN 40 (ASME CL300)
- Nominal width up to DN 40 (1.5")
- Minor influence of installation faults on the measuring accuracy of meter runs

#### Orifice plate R02

- Nominal pressure up to PN 400 (ASME CL2500)
- Nominal width up to DN 1000 (40")
- Single-part and low-cost design of the orifice plate
- Reduced installation costs due to the omission of differential pressure pipes



## Assembly of a flow measuring system



- |                                     |                      |                                       |
|-------------------------------------|----------------------|---------------------------------------|
| (1) Orifice plate (primary element) | (2) Measuring insert | (3) Carrier ring                      |
| (4) Pressure tapping                | (5) Inlet section    | (6) Outlet section                    |
| (7) Pipe flange                     | (8) Valve manifold   | (9) Differential pressure transmitter |

## Measuring principle

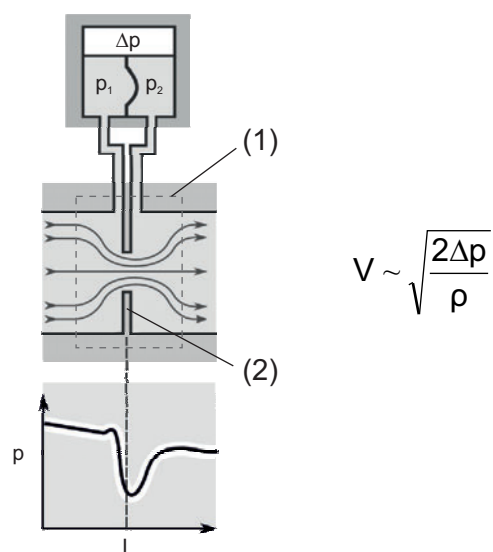
### Differential pressure method with orifice plate

The differential pressure method involves the installation of an orifice plate into the pipe as a measuring insert. The orifice plate reduces the cross section of the pipe and causes a pipe flow constriction.

As a result of the reduction of the cross-section, the flow speed of the medium increases in line with the continuity equation and the static pressure decreases in line with the Bernoulli equation. These two relations can be linked with the volume flow.

To determine the volume flow, the static pressure is measured immediately before ( $p_1$ ) and after ( $p_2$ ) the orifice plate. The differential pressure  $\Delta p = p_1 - p_2$  is calculated from this.

The generated differential pressure is measured with the JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA differential pressure transmitter and converted into a proportional flow signal.



- |                                     |                       |       |                                   |
|-------------------------------------|-----------------------|-------|-----------------------------------|
| (1) Orifice plate (primary element) | (2) Measuring insert  | L     | Pipe length                       |
| p                                   | Static pressure       | $p_1$ | Pressure before the orifice plate |
| $\Delta p$                          | Differential pressure | $p_2$ | Pressure after the orifice plate  |

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## Technical data

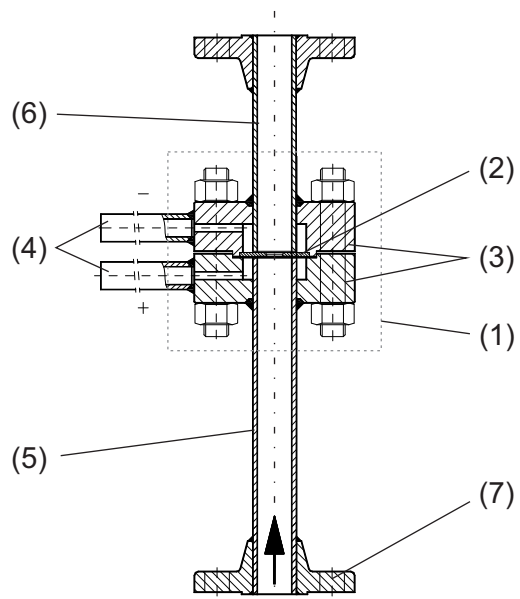
### Design

#### Meter run R01 (to DN 40)

The meter run R01 with the orifice plate (carrier rings with replaceable measuring insert) is a primary element with ring chamber tapping.

The measuring insert is designed as a standardized orifice plate according to DIN EN ISO 5167-2 and in line with the respective operating conditions. Other forms of orifice plate are available upon request.

The meter runs are completely assembled and delivered ready-to-install.



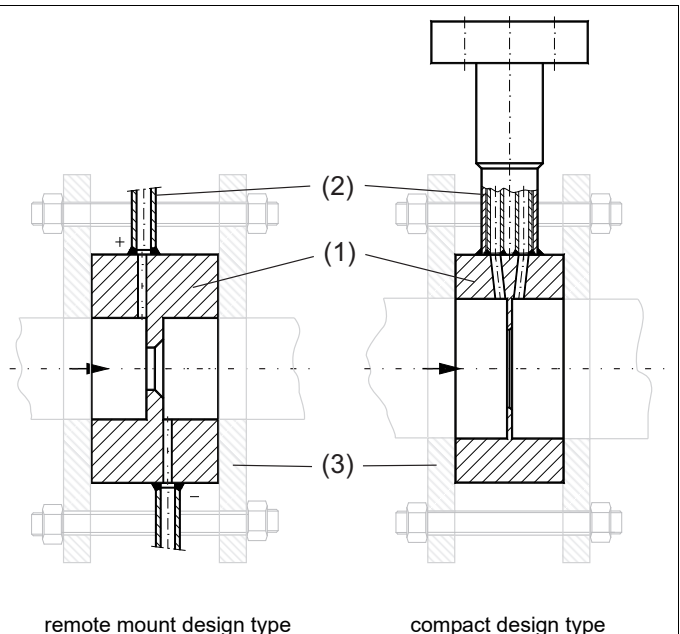
- |                                     |                      |                    |
|-------------------------------------|----------------------|--------------------|
| (1) Orifice plate (primary element) | (2) Measuring insert | (3) Carrier ring   |
| (4) Pressure tapping                | (5) Inlet section    | (6) Outlet section |
| (7) Pipe flange                     |                      |                    |

#### Orifice plate R02 (from DN 50)

The single-part orifice plate (carrier rings with integrated measuring insert) is a primary element with single pressure tapplings in a compact or remote mount design type.

The measuring insert cannot be exchanged and is designed as a standardized orifice plate according to DIN EN ISO 5167-2 and in line with the respective operating conditions. Other forms of orifice plate are available upon request.

The orifice plate is installed between the standardized pipe flanges.



- |                                     |                      |                     |
|-------------------------------------|----------------------|---------------------|
| (1) Orifice plate (primary element) | (2) Pressure tapping | (3) Standard flange |
|-------------------------------------|----------------------|---------------------|

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### Measuring insert (standard orifice plate)

It has proven to be practical to only use certain forms of orifice plates that allow the volume flow to be measured very precisely under suitable conditions.

The essential benefit of using orifice plates standardized according to DIN EN ISO 5167-2 is that all devices can be used considering all manufacturing and installation regulations without them having to be calibrated beforehand.

### Pressure tapplings and standard flanges

Pressure tapping (typical design length approx. 100 mm)	Smooth sockets for screw connections	
	Welded socket	
	Threaded socket	
	Socket with flanges	
	According to DIN EN 61518 (compact)	
Standard flange, meter run R01, sealing surface of orifice plate R02	According to DIN EN 1092-1	Smooth (form B1 and B2)
		Groove (form D)
		Return (form E)
	According to DIN 2696	Lens
	According to ASME B16.5	Smooth (RF and SF)
		Groove (small/large)
		Return (small/large)
		RTJ groove
	Customer-specific flange standards (JIS, BS, etc.) also possible	

### Mechanical features

#### Nominal width

Meter run R01	DN 10 to DN 40 (3/8 to 1.5")
Orifice plate R02	DN 50 to DN 1000 (2 to 40")

#### Nominal pressure

Meter run R01	PN 6 to PN 40 (ASME CL150 to CL300)
Orifice plate R02	To PN 400 (ASME CL2500)

### Materials

The materials are categorically selected based on the medium, pressure, and temperature.

Component	Standard material
<b>Meter run R01</b>	
Measuring insert (standardized orifice plate)	Stainless steel AISI 316 L (1.4404)
Carrier ring	Structural steel or stainless steel AISI 316 L (1.4404)
Inlet and outlet section	Structural steel or stainless steel AISI 316 L (1.4404)
<b>Orifice plate R02</b>	
Measuring insert (standardized orifice plate)	Stainless steel AISI 316 L (1.4404)
Carrier ring	Structural steel or stainless steel AISI 316 L (1.4404)
Pressure tapping	Such as a carrier ring or a suitably adequate pipe material

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## Environmental influences

### Measurement uncertainty

Meter run R01	~0.5 to 1.5 % of the flow coefficient C, depending on the application
Orifice plate R02	~0.5 to 1.2 % of the flow coefficient C, depending on the application

### Pressure loss

Depending on the flow ratio  $\beta$  (d/D), around 30 to 80 % of the differential pressure.

### Calibration

Meter run R01 can be calibrated by empirically determining the flow coefficient "C" on the test bed for particularly stringent requirements.

### Quality assurance

The manufacturing and testing is conducted according to the pertinent directives such as AD data sheets, EN 13480, ASME regulations (without a stamp) or customer specifications.

Acceptance test certificates according to EN 10204 3.1 and 3.2 special acceptance certificates are available upon request.

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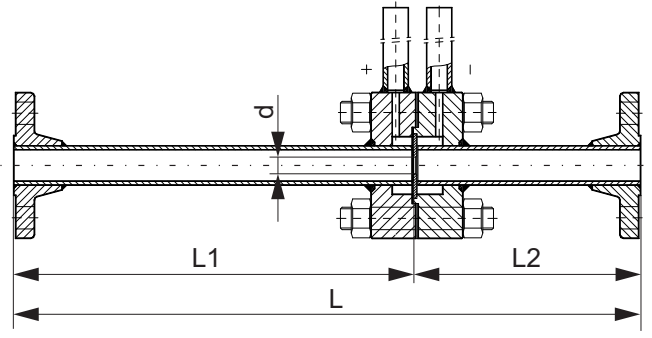
## Dimensions

### Meter run R01

Inlet section L1, outlet section L2						
DN	10	15	20	25	32	40
	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"
L <sup>a</sup>	400	550	700	900	1100	1300
L1	230	380	500	650	800	1000
L2	170	170	200	250	300	300

Other insertion lengths are possible.

**Orifice plate diameter d**  
 It is carefully dimensioned from the specified data while considering the corresponding latest standards as well as regulations and then documented in the calculation sheet.  
 The calculation sheet is part of the scope of delivery.



<sup>a</sup> According to DIN 19205

### Orifice plate R02

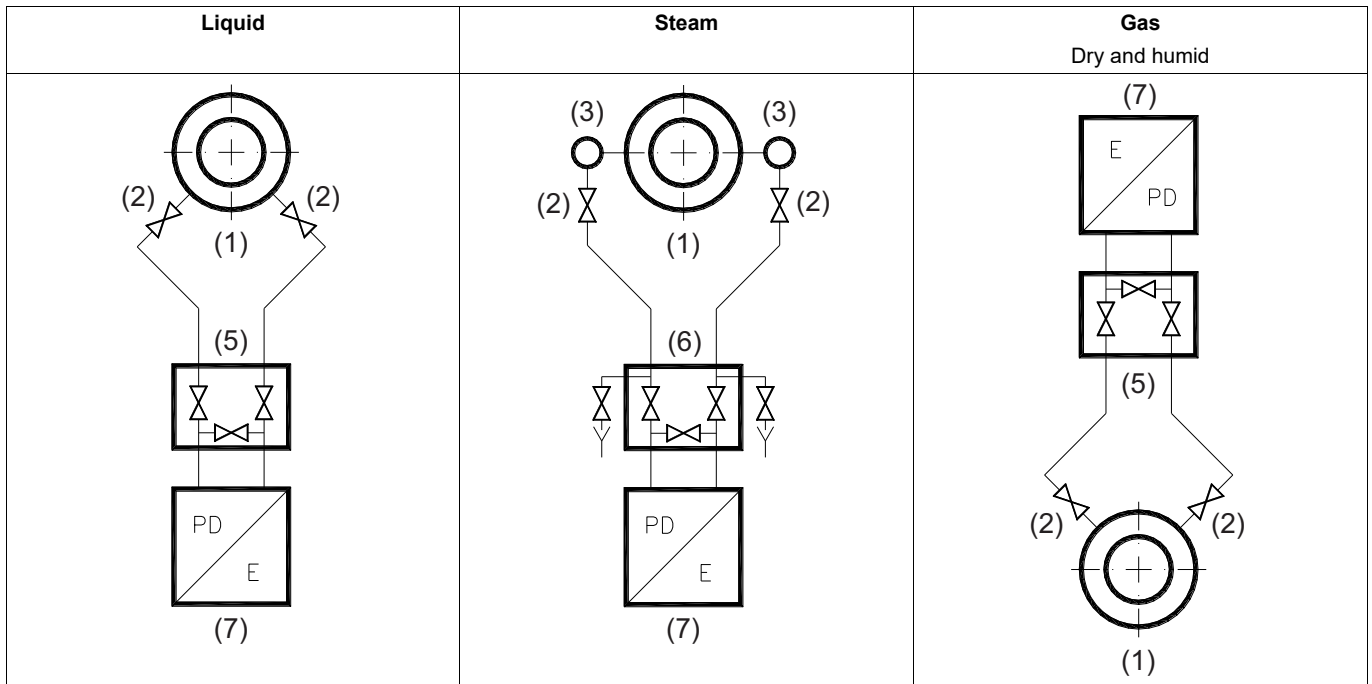
<b>Insertion length L</b> 65 mm, 40 mm, 25 mm (special lengths possible)	
<b>Orifice plate diameter d</b> It is carefully dimensioned from the specified data while considering the corresponding latest standards as well as regulations and then documented in the calculation sheet. The calculation sheet is part of the scope of delivery.	
<b>Inner diameter of the carrier ring d1</b> The inner diameter <b>d1</b> is manufactured larger than the measured pipe inner diameter <b>D</b> according to the specifications of ISO 5167-2 point 5.2.3.6. This ensures that the carrier rings do not protrude into the pipe.	
<b>Outer diameter d4</b> The outer diameter <b>d4</b> is adjusted to the utilized standard flanges.	



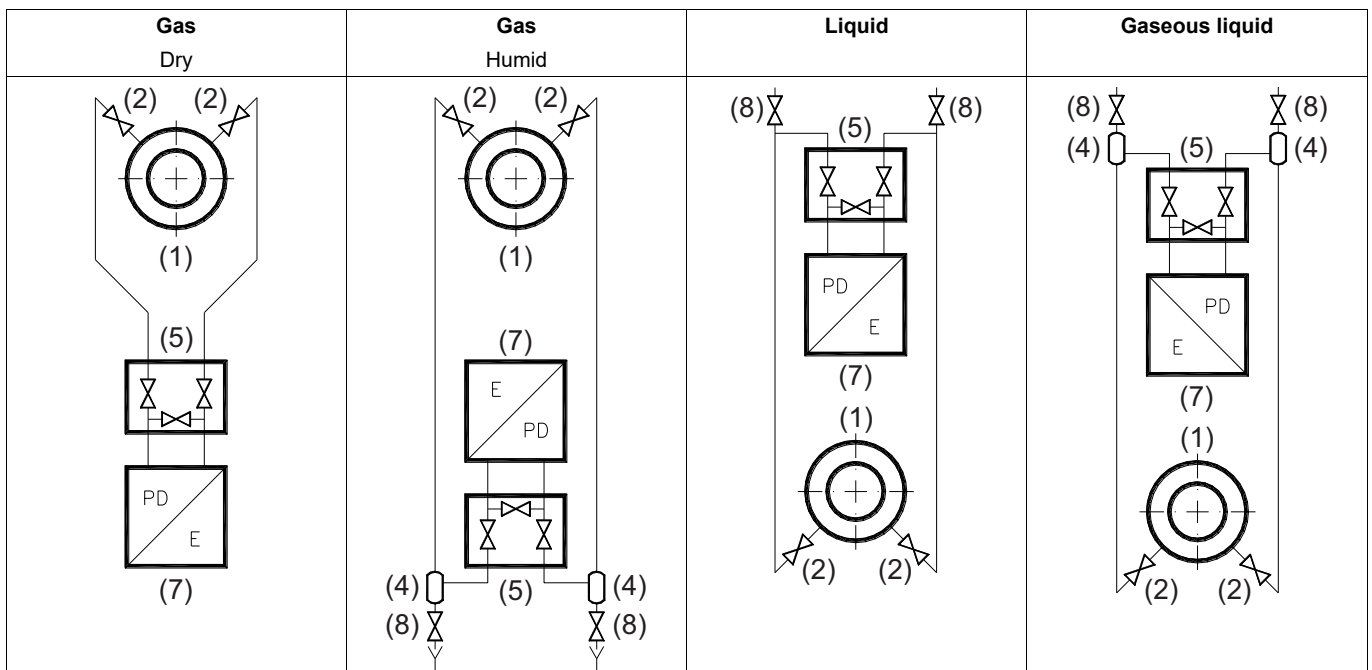
# Mounting

## Principal arrangement of primary elements according to DIN 19216

### Recommended arrangement



### Other possible arrangements



- (1) Primary element
- (2) Orifice plate shut-off valves
- (3) Condensate traps
- (4) Drainage/ventilation traps
- (5) 3-valve manifold
- (6) 5-valve manifold
- (7) Transmitter/measuring device
- (8) Vent valve

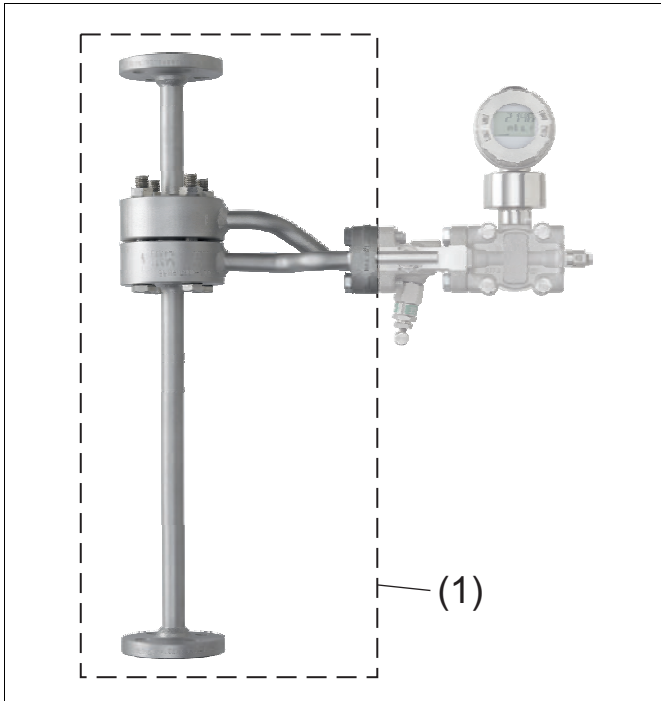
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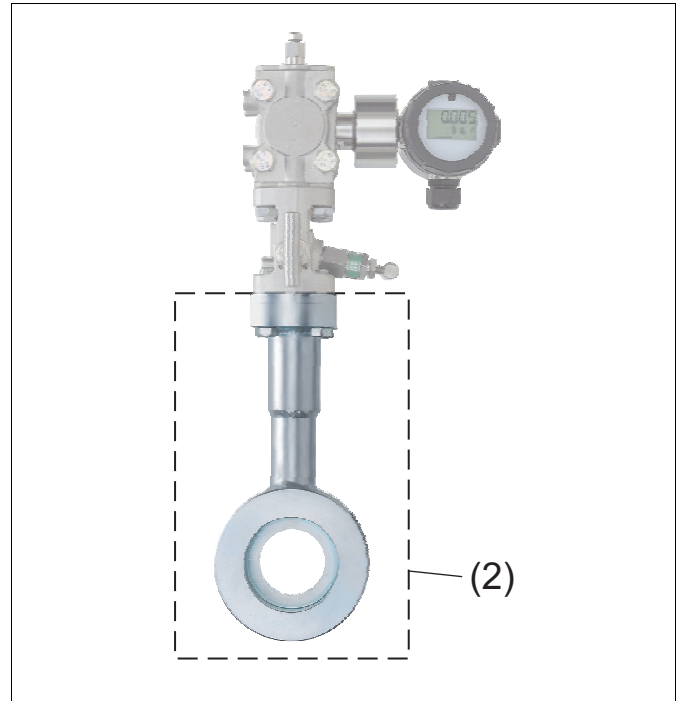
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## Scope of delivery



(1) JUMO flowTRANS DP R01 (meter run)



(2) JUMO flowTRANS DP R02 (orifice plate)

## Accessories

The differential pressure transmitter JUMO dTRANS p02 DELTA or JUMO dTRANS p20 DELTA supplements the meter run JUMO flowTRANS DP R01 or the orifice plate JUMO flowTRANS DP R02 to create a flow measuring system.

Also deliverable:

- Pipe flanges
- Screws and seals for the installation
- Shut-off valves
- Condensate traps
- Drainage or ventilation traps
- Valve manifolds
- Installation accessories