

MEASURING SYSTEM "autarkon®" FLOW / ENERGY METER EDZ / EWZ 120.1 / 127.1

1. IDENTIFICATION

Manufacturer: Bopp & Reuther Messtechnik GmbH
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Product type: Flow / energy measurement with compact orifice

Product name: EDZ / EWZ 120.1 / 127.1

2. APPLICATION

Measurement and registration of the mass, volume and energy of steam and liquids, with pressure and temperature compensation



EDZ / EWZ 120.1 compact
with measuring orifice and integrated
flow and energy computer ERW 700



EDZ / EWZ 127.1 compact
with measuring orifice and separate
flow and energy computer ERW 700

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3. SPECIAL FEATURES

- Plausibility and accuracy check possible during operation
- Compact design, no moving parts
- no maintenance, no wear
- High measurement dynamics with the smallest measurement uncertainty at the same time
- Suitable for billing transactions
- Inlet section / outlet section required according to DIN EN ISO 5167
- Compact, highly integrated measuring system (pressure and temperature compensation integrated in the measuring device, thus simple and cost-effective mounting)
- Robust and reliable measuring system
- Automatic correction of the flow coefficients and the expansion number
- Communication:
 - analogue output signals 4 - 20 mA
 - Digital outputs
 - M-Bus / Modbus interface
 - numerous expansion options

4. GENERAL

The EDZ / EWZ 12x.1 is a modular measuring system and is based on the differential pressure method. Flow measurement with differential pressure transducers is based on reducing the pipe cross-section at one point and thereby increasing the flow velocity. The increase in velocity causes the pressure in the narrowest cross-section to drop. The resulting differential pressure is a measure of the flow rate. An orifice plate is provided as standard as the differential pressure transducer. The orifice plate provides a high differential pressure, which is synonymous with a large measuring range. The differential pressure is converted into a signal proportional to the flow rate in a differential pressure transmitter with hydraulic zero balancing. Depending on the flow rate, a hydraulic short circuit is automatically generated above the differential pressure transmitter. This adjustment compensates for all disturbance variables influencing the zero point and the long-term stability, such as ageing, temperature changes, changes in the static pressure. This enables the EDZ / EWZ 12x.1 to measure accurately down to the smallest differential pressure ranges with outstanding long-term stability. The recording of the static pressure as well as the media temperature is integrated in the overall system. The calculation of the mass flow or standard volume flow is carried out in the directly installed flow/energy computer.

The required inlet distance is a function of the orifice plate's opening ratio (opening ratio = d/D ; d = throttle diameter, D = internal pipe diameter). As standard, the orifice plate is manufactured with an opening ratio of 0.5. However, the orifice can be adapted to any operating point.

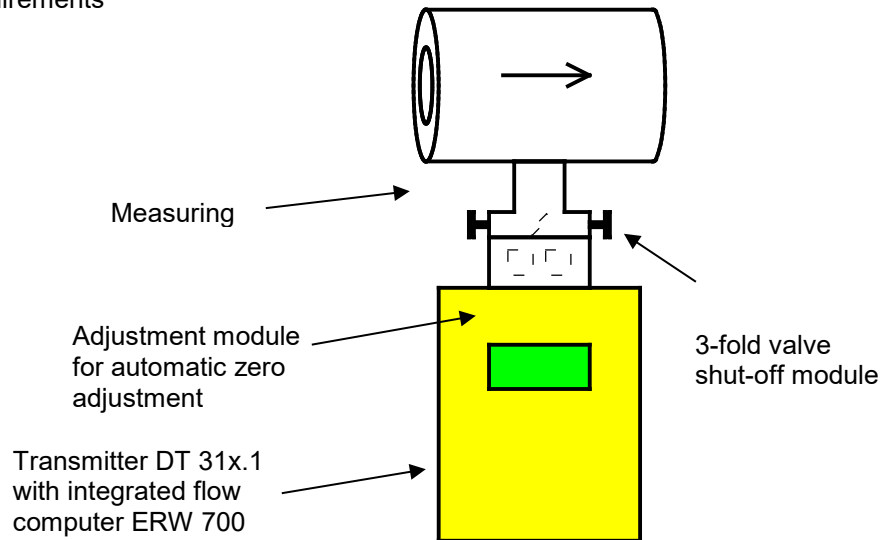
An accuracy check of the EDZ / EWZ 12x.1 is possible on site at any time, even during operation.

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5. MEASURING STSYSTEM

- Measurement of steam, water, water-glycol mixture and thermal oil
- Billing measurements for steam and liquids for highest Accuracy and plausibility requirements

!! Attention !!!
 Flow direction as standard from left to right



The EDZ / EWZ 12x.1 is equipped with an automatic adjustment module as standard. This guarantees the highest measuring accuracy with a large measuring range at the same time. Due to the adjustment module, the unit operates with absolute zero point and long-term stability. The EDZ / EWZ 12x.1 can be checked for plausibility and correctness at any time - even during operation - thanks to its 3-fold valve shut-off module.

Each measuring system is calibrated on an accredited test bench. The achievable **measuring accuracy is ≤ 1 % of the instantaneous value** with a measuring dynamic of 30 : 1, related to the nominal flow rate.

Special features with adjustment module

The differential pressure transmitters of the DT 31x.1 series with balancing module are characterised by a large dynamic range with the highest measuring accuracy at the same time.

Due to the automatic zero adjustment, the transmitter operates absolutely zero-point stable and achieves highest measuring accuracy also in the lower differential pressure range.

The factors influencing the zero point, such as temperature, pressure changes and ageing influences, are as follows are fully compensated.

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The long-term stability of the transmitter series is guaranteed by the constantly self-calibrating system unrivalled.

The influence of changes in temperature and pressure on the measuring span is not significant due to the piezoresistive measuring cell is negligible.

Long-term stability with adjustment module

Long-term stability is one of the most important measurement criteria for the quality of a transmitter. Especially as a component of a high-quality differential pressure calculation measurement, an undetected zero drift of the transmitter can have a catastrophic effect on the overall measurement accuracy of a calculation measurement.

These zero drifts can be caused by temperature and pressure changes, ageing influences or by undefined operating conditions or operating errors that cause the measuring diaphragm to be applied.

By incorporating the automatic zero adjustment, the system continuously calibrates itself. This makes the DT series absolutely zero-point stable and guarantees the overall measurement accuracy for many years.

Application

Measuring and counting of steam, water, water-glycol mixture and thermal oil.

Differential pressure sensor

The EDZ / EWZ 12x.1 is equipped with a measuring orifice as standard.

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6. TECHNICAL DATA

EDZ / EWZ 12x.1

Nominal size* DN	15	20	25	32	40	50	65	80	100	125	150	200	250	
Standard volume flow Steam	See diagram nominal diameter determination ($\Delta p = 0 - 1000 \text{ mbar}$)													
Nominal volume flow/max. Water m ³ /h	1.8	3	5	8	11	18	31	42	72	107	158	265	415	
Differential pressure sensor	Measuring aperture (focal ratio 0.5), Other opening ratio possible (extra charge)													
Overall length mm	65 mm													
Nominal pressure	PN 40 (higher PN on request)													
Max. Medium temperature	250°C compact unit , up to 350°C remote version													
Temperature input	Pt 100 or Pt 1000, or Pt 500 Four-wire or fixed resistor													
PT 500 temperature sensor with protective sleeve integrated in the meter (standard). An external temperature sensor is required for temperatures above 250°C.														
3-fold shut-off module with test connection integrated in the meter														
Pressure input	1 piece 4-20mA													
Differential pressure Δp	DT 310.1			DT 311.1 Standard						DT 312.1				
	0 - 100 mbar			0 - 1000 mbar						0 - 2000 mbar				
Output analogue	2 x 4 -20 mA, freely assignable													
Output digital	2 x pulse outputs optocoupler, freely assignable							5 - 24 V						
								10 mA						
M-Bus interface, Modbus interface														
Protection class	IP 65													
Material	Parts in contact with medium Stainless steel													
Power supply	230 V AC													
Measurement protocol	3 measuring points, basis water; calibration with air / gas (extra charge)													

*larger nominal diameters on request

Determining the medium density and the nominal unit width see page 4

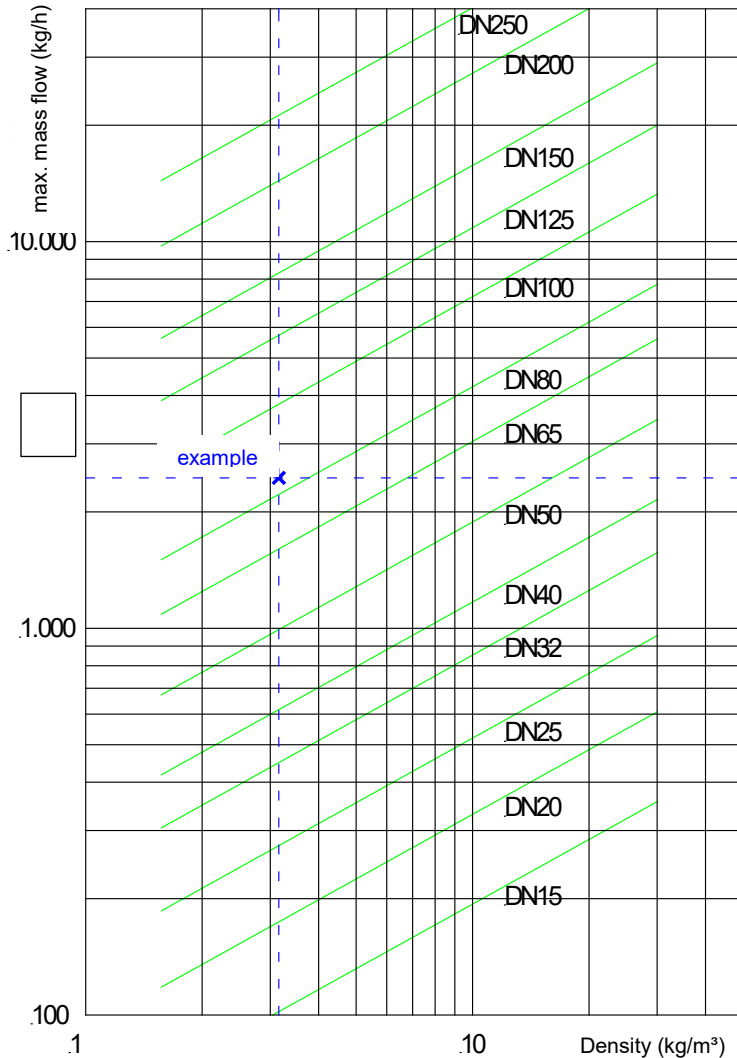
Additional equipment

Without adjustment module – price reduction
Remote transmitter for horizontal or vertical installation (with vertical installation only remote transmitter possible)
Integrated absolute pressure transmitter 0-5 /10 /16/25/40 bar (abs.)
3-fold valve shut-off module integrated in the meter (with test connection)
Additional input module: 2x 4 - 20 mA, 4x transmitter supply
up to 2x additional output card: 2x 4 - 20 mA each, 2x pulses each (optocoupler)
Additional 2nd M-Bus interface, Ethernet interface, RS 485 interface (IEEE 802.3)
System testing, commissioning and instruction of personnel by Metra customer service technicians

(additional technical data: see data sheet DT 31x.1 (transmitter) and ERW 700 (electric computer))

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Nominal size determination for EDZ / EWZ 120.1 and 127.1 (steam),
 with DT 311.1, 0 - 1000 mbar



Approximate determination of the nominal width of the unit

To determine the nominal size, proceed as follows:

Example:

are given:

Medium:	Steam
Pressure:	6 bar (abs.)
Temperature:	159°C
Nominal quantity:	2500 kg/h
Diameter ratio:	d/D = 0.5

From the table (see below), determine the density as 3.17 kg/m³. With this value perpendicular to the diagram (see left), go up to the level of 2500 kg/h.

The nearest higher nominal size is DN 100

Important:

The steam meter can be optimised for any operating point via the diameter ratio d/D. Please contact the manufacturer METRA Energie-Messtechnik for this.
 (Phone: +49 6232 / 657 - 0)

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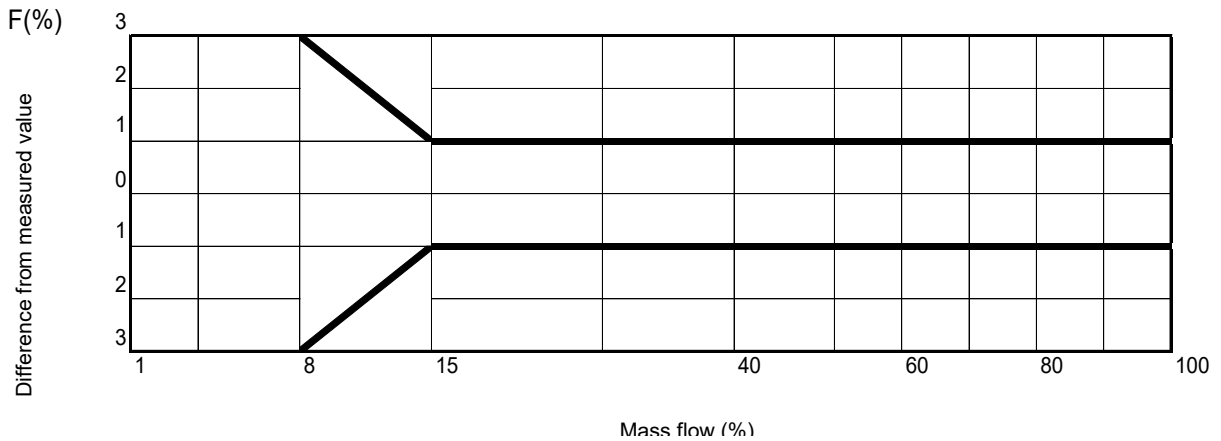
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Determination of steam density as a function of steam pressure and steam temperature (saturated steam table)

Steam pressure p (bar abs)	Steam temperature t (°C)	Steam density ρ (kg/m³)	Steam pressure p (bar abs)	Steam temperature t (°C)	Steam density ρ (kg/m³)	Steam pressure p (bar abs)	Steam temperature t (°C)	Steam density ρ (kg/m³)
1.0	99.63	0.59	9.0	175.63	4.65	21.0	214.85	10.54
1.5	111.37	0.86	10.0	179.88	5.15	22.0	217.24	11.03
2.0	120.23	1.13	11.0	184.07	5.64	23.0	219.55	11.52
2.5	127.43	1.39	12.0	187.96	6.13	24.0	221.78	12.02
3.0	133.54	1.65	13.0	191.61	6.62	25.0	223.94	12.51
3.5	138.87	1.91	14.0	195.04	7.11	26.0	226.04	13.01
4.0	143.62	2.16	15.0	198.29	7.60	27.0	228.07	13.51
4.5	147.92	2.42	16.0	201.37	8.09	28.0	230.05	14.76
5.0	151.84	2.67	17.0	204.31	8.57	29.0	231.97	14.51
6.0	158.84	3.17	18.0	207.11	9.07	30.0	233.84	15.01
7.0	164.96	3.67	19.0	209.80	9.55			
8.0	170.41	4.16	20.0	212.37	10.05			

Error limits

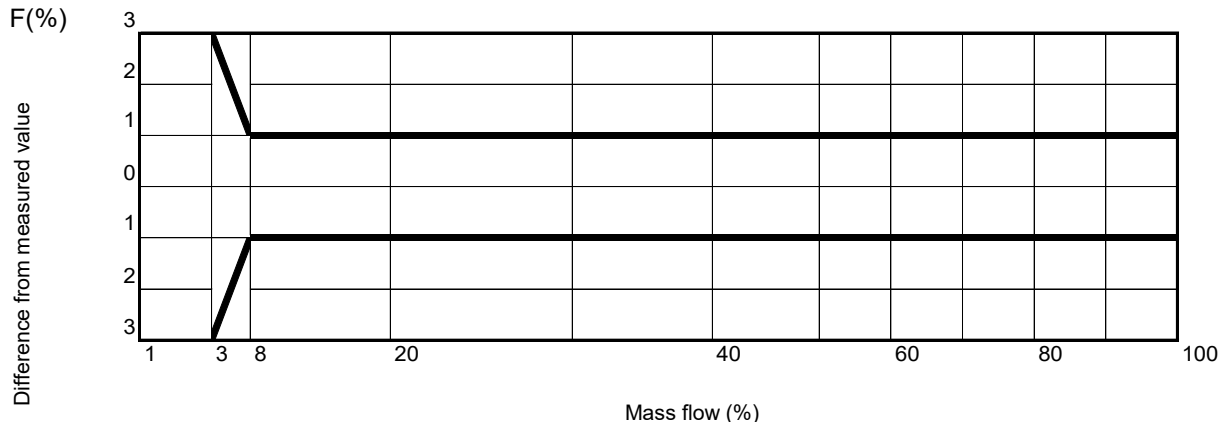
Typical measurement uncertainty EDZ / EWZ 12x.1 without zero adjustment module with wet calibration* (with DT 311.1, 0 - 1000 mbar)



*only valid in compliance with ISO 5167

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Typical measurement uncertainty EDZ / EWZ 12x.1 with zero adjustment module during wet calibration* (with DT 311.1, 0 - 1000 mbar)



* only valid if ISO 5167 is observed

Entry route

Make sure that the inner pipe diameter of the inlet and outlet section corresponds to the inner diameter of the orifice plate. Necessary reductions and extensions must be carried out concentrically.

We recommend an inlet section of at least 15x DN and an outlet section of at least 4x DN.

For standard-compliant installation, the recommendations of DIN EN ISO 5167 must be observed.

Space requirement EDZ / EWZ 127.1, compact

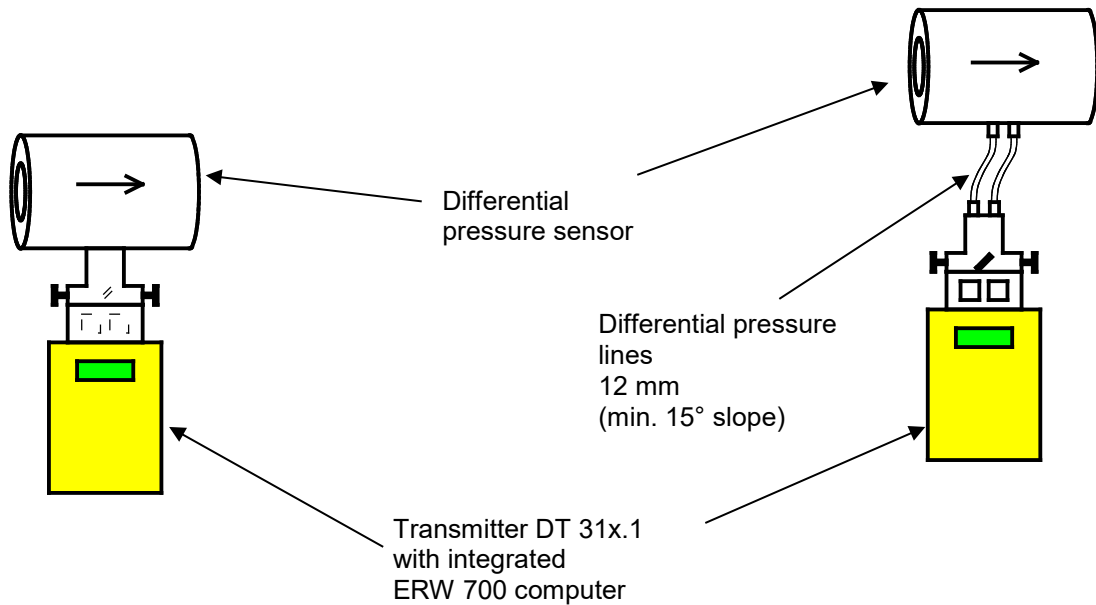
DN	15	20	25	32	40	50	65	80	100	125	150	200	250
Overall length B in mm	65 mm												
Height H in mm	320	325	330	335	340	345	350	360	370	385	400	430	450

Space requirement EDZ / EWZ 120.1, compact

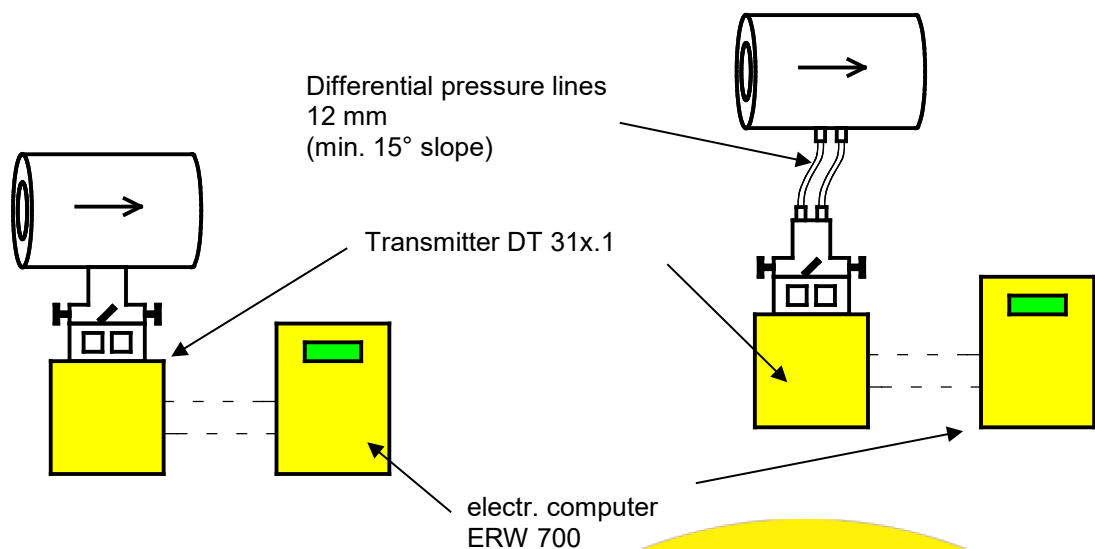
DN	15	20	25	32	40	50	65	80	100	125	150	200	250
Overall length B in mm	65 mm												
Height H in mm	300	305	310	315	320	325	330	340	350	365	380	410	430

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Possible versions / designs of the EDZ / EWZ 12x.1
 (vertical mounting position of the orifice plate only possible in offset design)
The converter technology must be installed below the orifice plate



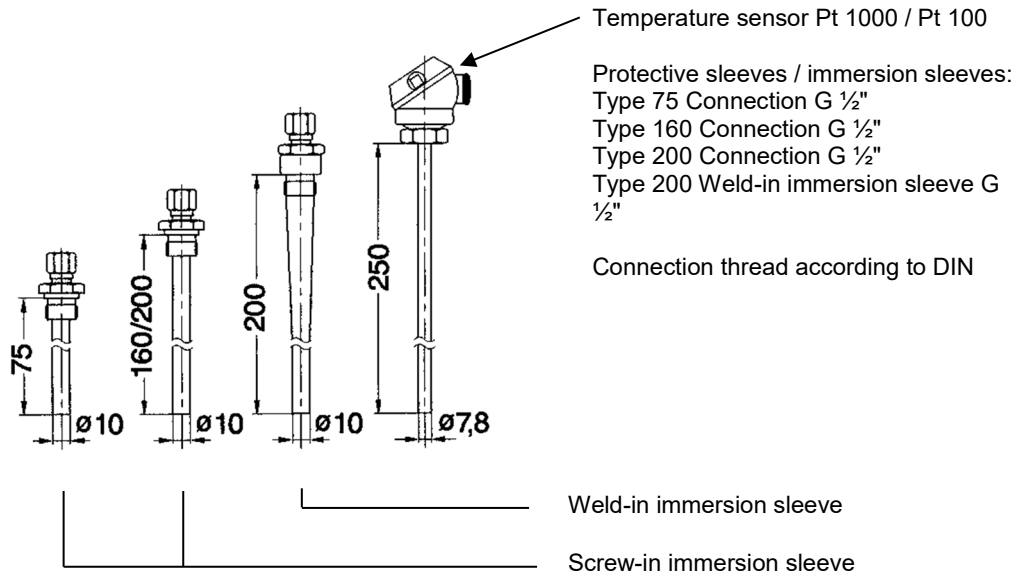
EDZ / EWZ 120.1 compact EDZ / EWZ 120.1 remote



EDZ / EWZ 127.1 compact EDZ / EWZ 127.1 remote

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External temperature sensor with immersion sleeve



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7. ORDER AND TENDER TEXT

Flow / energy meter "autarkon®" EDZ / EWZ 120.1 and EDZ / EWZ 127.1 in microprocessor technology, consisting of:

Ordering information / text for invitation to tender

Transducer:

Orifice plate for intermediate flanging (overall length 65 mm)

Medium: _____

Operating mode (energy / flow): _____

Operating pressure: _____ bar (abs.)

Operating temperature: _____ °C

Installation location (flow / return): _____

Installation position (horizontal / vertical): _____

Flow direction (from left to right, from right to left, from bottom to top, from top to bottom?) _____

*Possible versions / designs:

- EDZ / EWZ 120.1, compact
 Orifice plate with directly mounted DT 31x.1 transmitter, ERW 700 computer integrated in the housing of the transmitter
- EDZ / EWZ 127.1, compact
 Orifice plate with directly mounted DT 31x.1 transmitter, with separate ERW 700 computer
- EDZ / EWZ 120.1, offset
 Orifice plate connected to DT 31x.1 transmitter via differential pressure lines, ERW 700 computer integrated in the housing of the transmitter
- EDZ / EWZ 127.1, detached
 Orifice plate connected to DT 31x.1 transmitter via differential pressure lines, with separate computer ERW 700

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- Measuring dynamics 30:1 on volumetric flow
- **Measurement uncertainty $\leq 1\%$ on the instantaneous value**
- Power supply 230 VAC
- Protection class IP 65, max. ambient temperature 50°C
- Orifice plate including 3-fold valve shut-off module with test connection, suitable for plausibility testing during operation
- including adjustment module for automatic zero adjustment (for large measuring dynamics and highest measuring accuracy)
- Temperature sensor Pt 500 integrated in the measuring device
- Electr. computer with LCD multifunction display for all relevant values (totalizer, instantaneous values, error status). Large illuminated graphic display, flexibly configurable (logger functions for set day, monthly values, period memory, error memory, parameter memory and min/max. memory).
- Correction of the flow coefficient and the expansion number and the temperature-related expansion of the Venturi tube and pipeline
- 3-point measurement protocol on accredited test bench, water basis

Output:

- Error status, freely assignable
- 1x M-Bus interface
- 1x Modbus interface

Basic equipment:

- 2x analogue current output 4-20mA, freely assignable to each instantaneous value, galvanically isolated
- 2x pulse output (optocoupler) for volume / standard volume / mass

with an additional output module:

- 4x analogue current output 4-20mA, freely assignable to each instantaneous value, galvanically isolated
- 4x pulse output (optocoupler) for volume / standard volume / mass

with two additional output modules:

- 6x analogue current output 4-20mA, freely assignable to each instantaneous value, galvanically isolated

- 6x pulse output (optocoupler) for volume / standard volume / mass **with special output module:**
Outputs possible up to expansion stage 2 and additional 2nd M-Bus interface or Ethernet TCP/IP interface or RS-485 interface

System testing, commissioning and instruction of personnel by METRA customer service technicians