

autarkon[®] Measuring System Flow / Energy meter for technical gases - EDZ / EWZ 150.1 and - EDZ / EWZ 157.1 with microprocessor technology

Application

Measuring and registering the standard volume, the volume or the mass of air, nitrogen, carbon dioxide with pressure and temperature compensation.



EDZ / EWZ 150.1 compact, with traditional Venturi tube



EDZ / EWZ 157.1 compact, with traditional Venturi tube and separate ERW 700 meter

Special features

- Option for conducting plausibility and accuracy tests during operation
- Compact design, no moving parts
- No maintenance, no wear, no soiling (Venturi effect)
- Large measuring dynamics with a simultaneously minimised measuring uncertainty and small pressure loss
- Suitable for billing purposes
- Short inlet section, no outlet section required
- Insensitive to damp and vibration
- Insensitive to media containing oil (air)
- Compact, highly-integrated measuring system (pressure and temperature compensation integrated in the measuring device,

ensuring simple and inexpensive installation)

- Robust and fail-safe measuring system
- Automatic correction of the flow coefficients and expansion number
 - Communication: analogue output signals 4 20 mA
 - Digital outputs
 - MBus / Modbus interface
 - Numerous add-ons



General

EDZ / EWZ 15x.1 is a modular measuring system based on the pressure differential method. Flow measurements with pressure differential devices are based on the principle of narrowing the pipe cross section at one point, thus increasing the flow velocity. The flow rate increase causes the pressure to decrease in the narrowest profile section. The pressure differential thus generated is a measurement of the flow. A Venturi tube is provided as a standard differential pressure device. The Venturi tube provides a high pressure differential that equates to a large measuring range. Transducing the pressure differential into a signal proportional to the volume flow is realised in a pressure differential device with hydraulic zerobalancing. A hydraulic short circuit is generated automatically via the pressure differential device (depending on the flow). This zero-balancing compensates all disturbance variables that influence the zero point and long-term stability (e.g. ageing, temperature changes, changes in static pressure). This means that EDZ / EWZ 15x.1 can measure accurately within the smallest differential pressure ranges while exhibiting excellent long-term stability. Recording of static pressure and the media temperature is integrated in the overall system. Calculation of the mass flow or nominal volume flow occurs in the directly mounted flow/energy meter.

The required inlet section is very short due to the selected diameter ratio of the Venturi tube. An outlet section is not required. Accuracy testing of EDZ / EWZ 15x.1 can be conducted on-site at any time, even during operation.

Applications

- Compressed air metering and leakage detection
- Measurement of pure gases (N₂, Ar, etc)
- CO₂ measurements in breweries
- Measurements for billing purpose of technical gases for maximum



EDZ / EWZ 15x.1 is equipped with an automatic balancing module as standard. This ensures maximum measuring accuracy and a large measuring range. The device functions with absolute zero point and long-term stability thanks to the balancing module. EDZ / EWZ 15x.1 can also be checked for plausibility and correctness at any time during operation due to the threefold valve shut-off module.

Each measuring system is calibrated at an accredited test bench. The achievable **measuring accuracy is** ≤ **1% of the current value**. (See page 11 "Typical measuring uncertainty")



Special features with the balancing module

The pressure differential device of the DT 31x.1 series with a balancing module is characterised by its large dynamic range and outstanding measuring accuracy.

Thanks to the automatic zero-balancing, the device offers zero point stability and achieves the highest level of measuring accuracy even in the lower pressure differential range.

Factors which influence the zero point, such as temperature, pressure changes and ageing, are fully compensated.

The long-term stability of the device series is unequalled due to the constantly recalibrating system.

The influence of temperature and pressure changes on the measuring span is negligible due to the piezo-resistive measuring cell.

Long-term stability with the balancing module

The long term stability is one of the key measuring criteria for the quality of a pressure differential device. Undetected zero point drift of the pressure differential device can have serious implications for the overall measuring accuracy of a billing measurement, in particular when the device is an integral part of a highquality pressure differential billing measurement.

These zero point drifts can be caused by temperature and pressure changes, ageing or by undefined operating conditions or errors which result in application of the measuring membrane.

The system is constantly calibrated by integrating automatic zero-balancing. The DT series, therefore, offers zero-point stability and guarantees overall measuring accuracy for many years.

Application

Measuring and metering technical gases.

Approved pressure differential device

EDZ / EWZ 15x.1 is equipped with a Venturi tube as standard. This enables the achievement of a larger measuring range and simultaneously low pressure loss.



Calculation method:

- Ideal gas law
- Flow correction considering temperature, pressure and compressibility
- GERG 88

Technical data EDZ / EWZ 15x.1

Nominal diameter* DN	25 32	40	50	65	80	100	125	150	200	
Standard volume flow	see diagram	see diagram for nominal diameter determination								
Pressure differential	Venturi tube (diameter ratio 0.39),									
device		、								
Face-to-face length mm	200 250	250	290	320	430	460	650	770	970	
Nominal pressure	PN 16 (highe	r PN on	request)						
Max. medium	50°C compac	t device	, up to 3	50°C wi	th separ	ated var	iants			
temperature										
Temperature input	Pt 100 or Pt	1000, or	Pt 500 f	our-wire	or fixed	resistor				
PT 500 temperature sense	or with protecti	ve sleev	e integra	ated in th	ne meas	uring de	vice (se	ensor cab	ole	
max. 10 m, temperature w	ith integrated	Pt 500 m	ax. 250	°C, high	er tempe	eratures	only wit	h extern	al	
temperature sensor)										
Threefold shut-off module	with test conn	ection in	the mea	asuring o	device					
Intake pressure	1 x 4-20 mA									
Differential pressure ∆p	DT 310.1		DT 311	.1 stanc	dard		[DT 312.1		
	0 – 100 mbai	•	0 – 100	00 mbar			(0 – 2000	mbar	
Analogue output	2 x 4 –20 mA	, freely a	assignat	le						
Digital output	2 x pulse output optocoupler, 5 – 24 V									
	freely assignable 10 mA									
	MBus interface, Modbus interface									
Degree of protection	IP 65									
Material	Wetted parts are made of stainless steel									
Voltage supply	230 V AC									
Test certificate	3 measuring	3 measuring points, water based; calibration with air / gas (extra cost)								

*greater nominal diameters on request

See page 4 for determination of medium density and nominal diameter of the device

Additional equipment

Reduced price without balancing module
Other differential pressure devices (cross probe, dynamic probe, orifice plate, nozzle, etc. on request)
Offset transducer for horizontal and vertical installation
(offset transducer only for vertical installation)
Integrated absolute pressure transmitter 0-5 /10 /16/25/40 bar (abs.)
Threefold valve shut-off module integrated in the measuring device (with test connection)
Additional input module: 2x 4 - 20 mA, 4x transducer supply
Up to 2 additional output cards: for each 2x 4 - 20 mA, for each 2x pulse (optocoupler)
Additional MBus interface, Ethernet interface (IEEE 802.3), RS 485 interface
System test, start-up and instruction of personnel by Metra customer service technicians

Technical data: See data sheet DT 31x.1 (transducer) and ERW 700 (elec. meter)



Nominal diameter determination for EDZ / EWZ 15x.1 (compressed air),

with DT311.1, 0 – 1000 mbar



Approximate determination of the nominal device diameter

Proceed as follows to determine the nominal diameter:

The following is specified:

Fluid:	compressed air
Pressure:	6 bar (abs.)
Temperature:	20 °C
Nominal quantity:	2100 Nm³/h

Determine the density from the table (see below) with 7.13 kg/m³. Follow this value in the diagram (see left) up to 2100 Nm³/h.

The next higher nominal diameter is DN 80.

Medium density (air) depends on the pressure and temperature

Druck	Temperatur [°C]							
bar (abs.)	0	10	20	30	40	50		
1	1,276	1,231	1,189	1,149	1,113	1,078		
2	2,551	2,461	2,377	2,299	2,225	2,156		
3	3,827	3,692	3,566	3,448	3,338	3,235		
4	5,102	4,922	4,754	4,597	4,451	4,313		
5	6,378	6,153	5,943	5,747	5,563	5,391		
6	7,653	7,383	7,131	6,896	6,676	6,469		
7	8,929	8,614	8,32	8,045	7,788	7,548		
8	10,204	9,844	9,508	9;195	8,901	8,626		
9	11,48	11,075	10,697	10,344	10,014	9,704		
10	12,755	12,305	11,885	11,493	11,126	10,782		
11	14,031	13,536	13,074	11,86	12,239	11,86		
12	15,307	14,766	14,262	13,792	13,352	12,939		
13	16,582	15,997	15,451	14,941	14,464	14,017		
14	17,858	17,227	16,64	16,091	15,577	15,095		
15	19,133	18,458	17,828	17,24	16,69	16,173		
16	20,409	19,688	19,017	18,389	17,802	17,251		
17	21,684	20,919	20,205	19,539	18,915	18,33		
18	22,96	22,149	21,394	20,688	20,028	19,408		
19	24,235	22,38	22,582	21,873	21,14	20,486		
20	25,511	24,61	23,771	22,987	22,253	21,564		



Error limits

Typical measuring uncertainty EDZ / EWZ 15x.1 without zero-balancing module for wet calibration *



* only valid when observing ISO 5167

Typical measuring uncertainty EDZ / EWZ 15x.1 with zero-balancing module for wet calibration *



* only valid when observing ISO 5167



Inlet section

Ensure that the internal diameter of the inlet and outlet section corresponds to the internal diameter of the Venturi tube. Necessary reductions and expansions must be realised concentrically.

Necessary inlet section complying with ISO 5167-3 for the standard device with a diameter ratio of 0.39.

Fault	0% additiona	al uncertainty	0.5 % additional uncertainty		
	Inlet section	Outlet section	Inlet section	Outlet section	
90° bend	8 x DN	None	4 x DN	None	
Two or several 90° bends in the same level	8 x DN	None	4 x DN	None	
Two or several 90° bends in different levels	8 x DN	None	4 x DN	None	
Reducer from 2D to 1D	8 x DN	None	4 x DN	None	
Diffuser from 0.5D to 1D	8 x DN	None	4 x DN	None	
Shut-off valve, fully open	8 x DN	None	4 x DN	None	
Ball valve with free pipe cross-section	8 x DN	None	4 x DN	None	

Footprint EDZ / EWZ 157.1, compact

DN	25	32	40	50	65	80	100	125	150	200
Face-to-	200	250	250	290	320	430	460	650	770	970
face length										
L in mm										
Height	330	335	340	345	350	360	370	385	400	
H in mm										

Footprint EDZ / EWZ 150.1, compact

DN	25	32	40	50	65	80	100	125	150	200
Face-to-	200	250	250	290	320	430	460	650	770	970
face length										
L in mm										
Height	310	315	320	325	330	340	350	365	380	
H in mm										



Possible versions / models of EDZ / EWZ 15x.1

(vertical installation of the Venturi tube only possible in the offset model)



EDZ / EWZ 150.1, compact





EDZ / EWZ 157.1, compact

EDZ / EWZ 157.1, remote design



External temperature sensor with immersion sleeve





autarkon EDZ / EWZ 150.1 and EDZ / EWZ 157.1 flow / energy meter with microprocessor technology

Order information / tendering text

Transducer

Venturi tube, flange design, for larger measuring dynamics and simultaneously minimised pressure loss - Small inlet and outlet sections, independent of supply disturbance.

Fluid:							
Operating mode (energy / flow):							
Operating pressure:	_bar (abs.)						
Operating temperature:	_°C						
Place of installation (supply / return):	_						
Installation position (horizontal / vertical):							
Direction of flow (left to right, right to left, from bottom to top, from top to bottom?)							
*possible versions / models:							
- EDZ / EWZ 150.1, compact Venturi tube with a directly-mounted transducer DT 312 with directly mounted flow and energy meter	x.1,						
- EDZ / EWZ 157.1, compact Venturi tube with a directly-mounted transducer DT 31x.1, with separate flow and energy meter ERW 700							
 EDZ / EWZ 150.1, remote design Venturi tube connected to transducer DT 31x.1 via pressure differential pipes, with directly mounted flow and energy meter 							
 EDZ / EWZ 157.1, remote design Venturi tube connected to transducer DT 31x.1 via pressure differential pipes, with separate flow and energy meter ERW 700 							
 Measuring dynamics of 30:1 in relation to the volume flow Measuring uncertainty of ≤ 1% in relation to the current of 230 V AC supply IP 65, max. ambient temperature 50°C Venturi tube including threefold valve shut-off module with tessuitable for plausibility tests during operation Including a balancing module for automatic zero balancing Temperature sensor Pt 500 integrated in the measuring devidence of the current values (error status). Large illuminated graphics display, flexibly continuonthly values, period log, error log, parameter log and min/ Correction of the flow coefficients, expansion number and the of the Venturi tube and pipework 3-point test certificate at an accredited test bench, water base 	value est connection, ice (meter, current values, figured (logger functions for record date (max. log) e temperature-dependent expansion						



Output:

- 1x MBus interface
- 1x Modbus interface
- 1x pulse output for error status

basic equipment:

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

with one additional output module:

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

with two additional output modules:

- 6x analogue current output 4-20 mA, each current vallue is freely assignable, galvanically isolated

- 6x pulse output (optocoupler) for volume / standard volume / mass

- System test, start-up and instruction of personnel by METRA customer service technicians

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