DATA SHEET

MEASURING SYSTEM "ultrakon®" HEAT METER EWZ 837

1. IDENTIFICATION

Manufacturer: Bopp & Reuther Messtechnik GmbH
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Product type: Flow / heat quantity measurement using the ultrasonic method

Product name: EWZ 837

2. APPLICATION

Measurement and registration of flow and heat quantity according to the ultrasonic method

Ultrasonic flow transmitter FUE380
with flow transducer FUE080
(compact or remote design)

Flow and energy computer
ERW 700

Temperature sensor
PT1000 / PT100

3. SPECIAL FEATURES

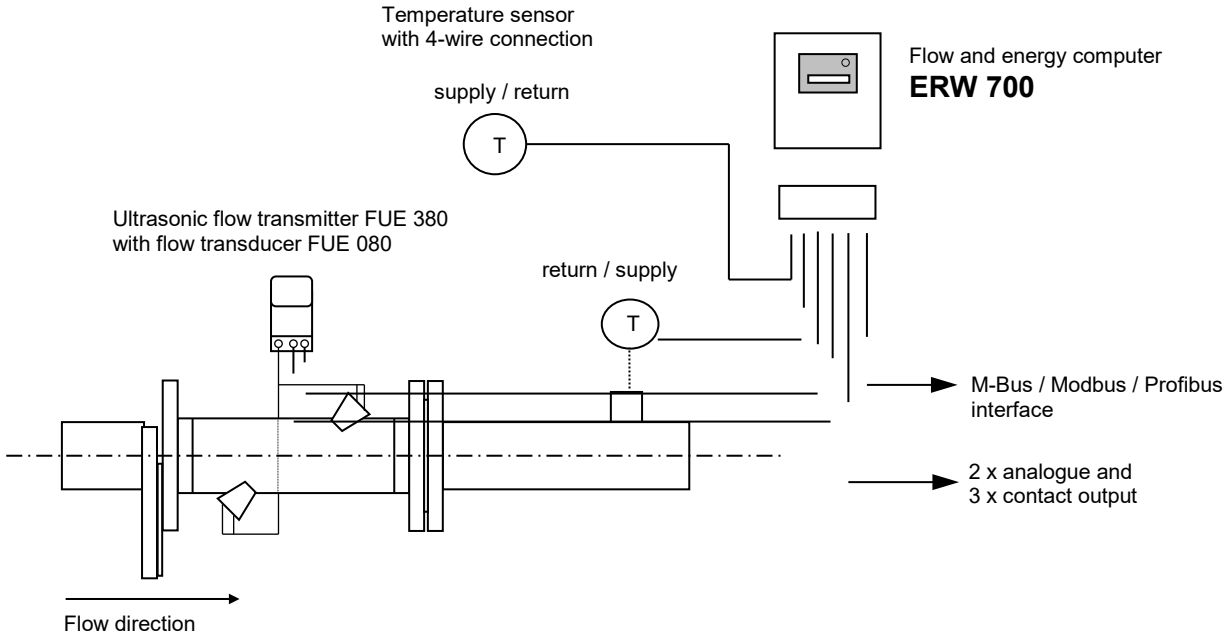
- calibratable measuring system
- robust, static measuring system
- large measuring range with simultaneously high measuring accuracy
- maintenance-free
- Volume transmitter with 2 measuring paths, insensitive to disturbances in the flow profile
- Horizontal and vertical installation
- No pressure loss

4. GENERAL

The EWZ 837 consists of the following components:

- Ultrasonic flow transmitter FUE 380
- Flow transducer FUE 080(with display)
- Flow and energy computer ERW 700 with LC multifunction display
- Temperature sensor PT1000 / PT 100 with thermowell

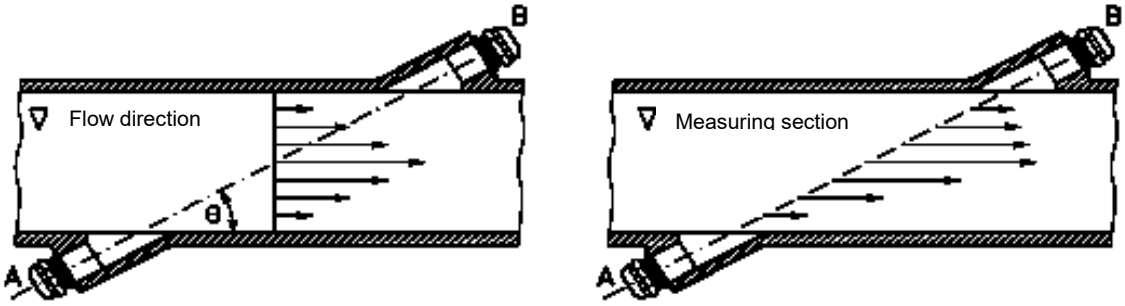
5. MEASURING POINT DIAGRAM



Mode of operation and measuring principle

Flow profile in pipe cross-section

Flow profile at ultrasonic measuring path



Operating time

A sound wave travelling in the same direction as the fluid flow will travel from point A to point B in less time than a sound wave travelling against the direction of flow (from point B to point A). The difference in sound travel time is a measure of the flow velocity in the pipe.

In the SONO 3000 volume transducer, the two ultrasonic transducers are arranged at an angle of 0 to the pipe axis. The transducers function as transmitters and receivers of ultrasonic signals. The measurement is made by determining the time taken for the ultrasonic signal to travel with and against the flow. The principle can be described as follows:

$$V = K = = \frac{t_{mit} - t_{against}}{t_{mit} \times t_{against}} \qquad \frac{\Delta t}{t^2}$$

t_{mit} = time in the direction of flow

$t_{against}$ = time against the direction of flow

v = average flow rate = operating time

K = proportional factor

This measuring principle offers the advantage that it is independent of sound velocity fluctuations of the liquid and thus temperature-independent. The measuring system works independently of the conductivity and is therefore not influenced by the magnetite in the heating water. The proportionality factor K is determined by wet calibrations in the manufacturer's works.

6. TECHNICAL DATA

Ultrasonic flow transmitter FUE 380

Nominal size DN	**50**		**65**		**80**		**100**		**125**		
qp [m³/h]	15	30*	25	50*	40	80*	60	120*	100	200*	
qs [m³/h]	30	45*	50	72*	80	120*	120	180*	200	280*	
qi [m³/h]	0,3		0,5		0,8		1,2		2		
Nominal pressure stage PN	40		40		40		16 / 40		16 / 40		
Overall length [mm]	300		300		350		350		350		
Weight [kg]	10		15		18		20 / 16,5		23 / 53		

Nominal size DN	**150**		**200**		**250**		**300**		**> 300 (up to DN 1200)**
qp [m³/h]	150	300*	250	500*	400	800*	560	1120*	on request
qs [m³/h]	300	420*	500	700*	800	1120*	1120	1560*	on request
qi [m³/h]	3		5		8		11,2		on request
Nominal pressure stage PN	16 / 40		16 / 25 / 40		16 / 25 / 40		16 / 25		on request
Overall length [mm]	500		500		600		500		on request
Weight [kg]	26 / 32		38 / 47 / 55		60 / 76 / 91		66 / 81		on request

Protection class	Sensor connection IP 67 / NEMA 4X / 6	
Tube material	DN 50 - DN 80: red brass or gunmetal	DN 100 - DN 1200: carbon steel 1.0345 / P235 GH

with MID approval, otherwise approval according to EN1434

Transducer FUE 080 (for connection to energy computer ERW700)

Display	LC display, 8-digit, 2 additional digits and symbols for status information	
Digital output	Two passive MOS relay outputs A and B, AC/DC max. ± 35 V, 50 mA	
Galvanic isolation	The two MOS relay outputs A and B are individually galvanically isolated	
Material	Glass fibre reinforced polyamide	
Supply voltage	230 VAC	
Protection class	IP 67 / NEMA 4X / 6 according to EN60529 and DIN 40050	
EMC	- Emitted interference EN 61000-6-4	- Noise immunity EN 61000-6-2
Accuracy	0.5 + 0.02 * qp/q [%], qp according to requirements of EN 1434/OIML	
Medium temperature	Flow transducer mounted on flow transmitter: DN 50 - DN 1200: +2°C to +120°C (calibrated version from +15°C)	
	Flow transducer remote from flow transmitter (calibrated or conformity-assessed from +15°C): DN 50 - DN 80: +2°C to +150°C	DN 100 - DN 1200: +2°C to +200°C
Ambient temperature	-10°C to +60°C (with MID approval: -10°C to +55°C)	
Storage temperature	-40°C to +85°C	

ERW700 Flow computer

Version	Housing for wall/panel mounting	
Material / Housing	ABS (EMC safe)	
Protection class	IP 65 according to IEC 529 / EN 60529 (for wall mounting in plastic housing)	
Entrance	2 x analogue 0/4 - 20 mA (active or passive)	2 x frequency / pulse / status
Temperature input	Pt 1000 / Pt 500 / Pt 100 or default value	
Multifunction graphic display	for P in kW or MW, Q in l/h or m³/h, tw in °C, tk in °C, Δt in K, E in kWh or MWh, V in l or m³	
Output potential free	- 2 x (0)4-20mA galvanically isolated, free assignment to all important instantaneous values - 3 x open collector galvanically isolated (optocoupler). Free assignment to the electrical counters, can also be used as a border contact or status message - M-Bus (Meter Bus) galvanically isolated - Hardware: RS 232 (Modbus RTU, Modbus ASCII)	
Ambient temperature	0°C to 55°C,	
Auxiliary energy	230 VAC or 24 VDC	

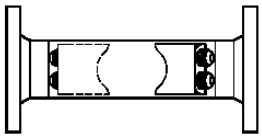
Additional equipment

1 piece Output module: - 2x (0)4-20 mA galvanically isolated, free assignment to all important instantaneous values - 2x open collector galvanically isolated (optocoupler). Free assignment to the electrical counters, can also be used as a border contact or status message
2 pieces Output module: - 2x (0)4-20 mA galvanically isolated, free assignment to all important instantaneous values - 2x open collector galvanically isolated (optocoupler). Free assignment to the electrical counters, can also be used as a border contact or status message
Input module: - 2x (0)4-20 mA, without galvanic isolation, freely assignable (density, temperature, pressure, differential pressure)
Additional 2nd M-Bus interface, Ethernet TCP/IP interface, RS-485 interface; (Profibus DP only without MID)
Density input (0)4-20 mA in connection with density transmitter (for changing mixing ratio)
Density transmitter
Version: 5 m remote (transmitter to ultrasonic volume transducer)
Version: 10 m remote (transmitter to ultrasonic volume transducer)
Version: 20 m remote (transmitter to ultrasonic volume transducer)
Version: 30 m remote (transmitter to ultrasonic volume transducer)
with battery buffering (additionally for 230 VAC version)
Design of the ERW 700 as a 19" plug-in unit
Immersion sleeve, type 200
Thermowell, type 200, weld-in, made of solid material, stainless steel or heat-resistant steel
Sensor connection cable 4-core, shielded
Special version with additional counter (e.g. for bidirectional measurement, limit-dependent tariff switching)
Conformity assessment certificate according to MessEG / MID
System testing, commissioning and instruction of personnel by METRA - customer service technicians

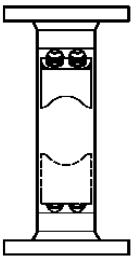
7. INSTALLATION INSTRUCTIONS

Mounting position

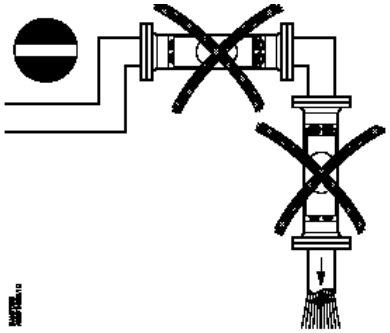
The flow transmitter FUE 380 can be installed in horizontal and vertical pipelines



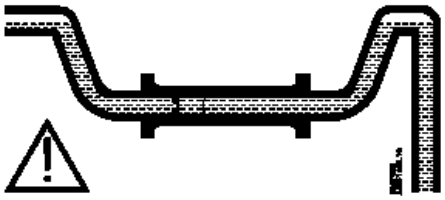
Recommended mounting



No limitation for vertical installation.
The flow transmitter must always completely be filled with liquid



Avoid:
- Installation at the highest point of the system
- Installation on vertical tubes with free outlet



For partially filled pipes or pipes with a free outlet, the flow meter should be placed in a U-shaped pipeline

Inlet- and outlet sections

For maximum performance, straight inlet and outlet sections are required, as well as appropriate spacing between the volume transmitter, manifolds, pump and valves. It is also important to centre the flow meter with respect to the pipe flanges and seals.

Valves must always be installed downstream of the flow meter. The only exception is when the volume transmitter is installed in a vertical pipe. In this case, a non-return valve is required below the volume transmitter in order to be able to make a possible zero point adjustment. It is essential to choose a valve that does not interfere with the flow when fully open.

Select a position on the line where the inlet section to the volume transmitter has a straight course as indicated below.

The volume transmitters from DN50 to DN1200 require the straight minimum inlet distances shown below for a fully developed flow profile.

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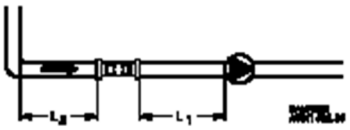
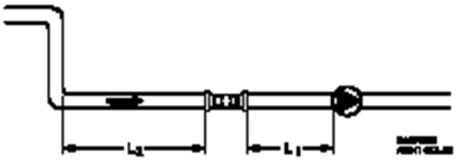
90° elbow

L_2	L_1
Min 10 x Tue	Min 3 x Tue



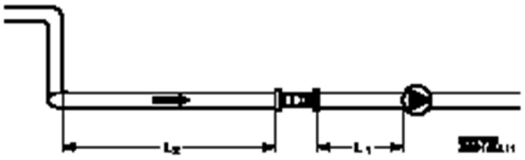
2 x 90° elbows on the same level

L_2	L_1
Min 10 x Tue	3 x Tue



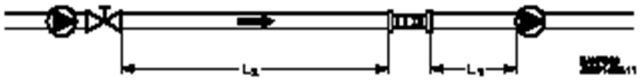
2 x 90° elbow on 2 levels

L_2	L_1
Min 15 x Tue	3 x Tue



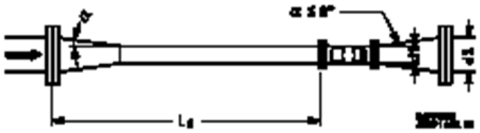
Valve (partially open)

L_2	L_1
25 x Tue	3 x Tue



Reducer

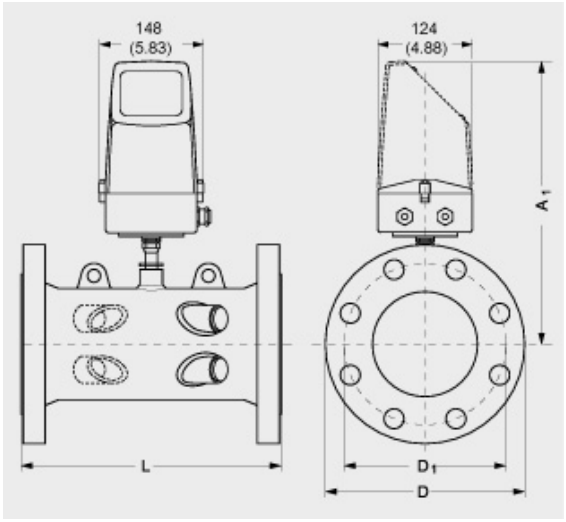
L_2	L_1
10 x Tue	0 x Tue



L2 - inlet straight length, L1 - outlet straight length
Di - nominal size or inner diameter of the flow transmitter

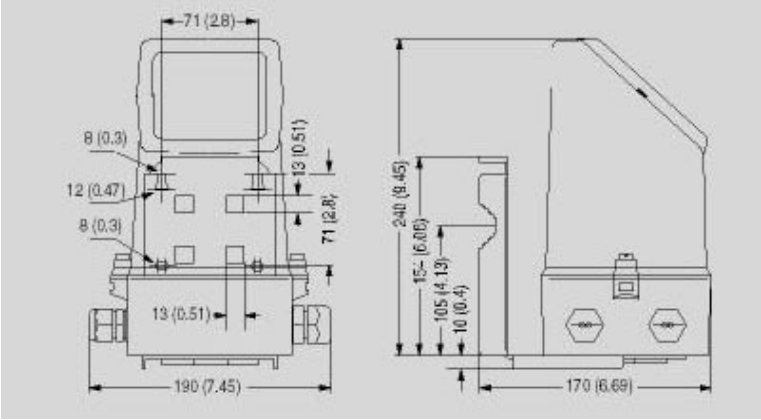
Dimensions

Ultrasonic flow transmitter FUE 380 with flow transducer FUE 080



qp [m³/h]	50	65	80	100	125	150	200	250	300	350
Pressure stage PN	40	40	40	16 / 40	16 / 40	16 / 40	16/25/40	16/25/40	16 / 25	on request
L [mm]	300	300	350	350	350	500	500	600	500	
D [mm]	165	185	200	220	250	285	340	405	460	
D1 [mm]	125	145	160	180	210	240	295	355	410	
A1 [mm]	320	330	350	361	374	388	414	440	466	

Flow transducer FUE 080 for compact and remote design



Dimensions FUE 080	
Wide	190 mm
Depth	170 mm
Height (with wall mounting kit)	240 mm

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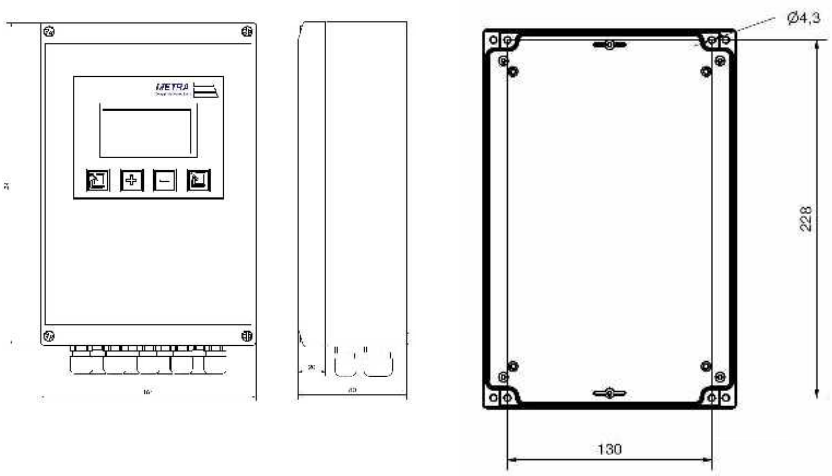
Flow- and energy computer (wall mounting)



Temperature sensor with protective sleeve

Connection head	Form J, die-cast aluminium
Cable gland	M16 x 1.5
Ambient temperature	-20 to +100°C
Protection tube	Stainless steel 1.4571 7.8 mm with fitting tolerance for protective sleeves
Measuring insert	Platinum temperature sensor acc. to DIN EN60751
Nominal value, class	PT1000, class AA PT100, class A
Connection	Two- or four-wire circuit, shielded or unshielded
Medium temperature	PT1000, -50 to +200°C PT100, -50 to +400°C
Operating pressure	25 bar without protective sleeve 40 bar with standard-protective sleeve
Minimum immersion depth	30 mm
Installation length (EL)	95 to 400 mm
Response time	$t_{0,5}$ < 8 s $t_{0,5}$ < 22 s (installed in protective sleeve)
Ambient conditions	climatic 0 to +70°C Protection class IP65 electromagnetic E1 mechanical M3 environmental class C
Accessories	Protective sleeve

Type approvals

Type approvals heat	
EU Directive acc. to 2014/32/EU (MID) Temperature sensor pair for heat energy meters	DE-16-MI004-PTB023 Rev.0
Temperature range heat	0 to 180°C
Temperature difference heat	3 to 180 K

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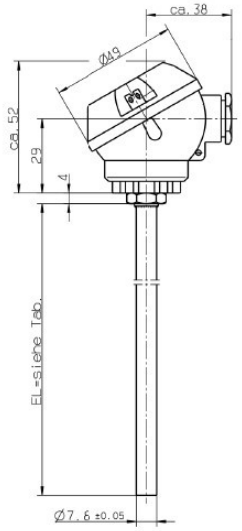
Type approval cold	
German approval acc. to MessEV Temperature sensor pair for cold energy meters	DE-16-M-PTB044 Rev.0
Temperature range cold	0 to 120°C
Temperature difference cold	3 to 85 K

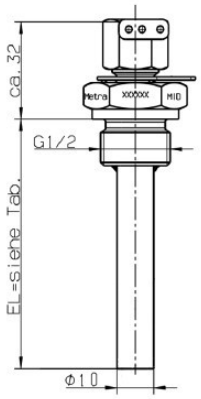
MessEV = Mess- und Eichverordnung (Measuring and Verification Ordinance)
MID = Measuring Instruments Directive



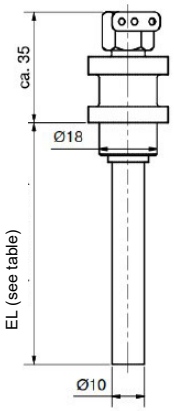
resistance thermometer	
EL	130 mm 250 mm 300 mm other lengths on request

protective sleeve	
EL	75 mm 160 mm 300 mm other lengths on request

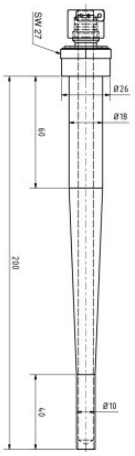
Standard protective sleeve



weld-in protective sleeve



weld-in protective sleeve
(without type approval)



8. ORDER AND TENDER TEXT

Heat meter „ultrakon®“ EWZ 837 in Micro processor technology

consisting of:

Flow meter FUE 380 / 080 (Ultrasonic)
Medium ....., DN ....., PN .....
Nominal flow ..... m^3/h, t/h,
Operating temperature ..... °C, operating pressure ..... bar (abs.),
Mounting length horizontal / vertical
Protection class IP 67
3 point measuring protocol on certified test rig (water)

Flow- and energy computer ERW 700
Suitable for wall and panel mounting
Outputs: 2 x (0)4-20 mA galvanically isolated, free assignment to all important current values
2 x Open collector galvanically isolated (Opto-coupler). Free assigment to the
Electrical counters and can be used as a limit contact or status signal
M-Bus (Meter Bus) galvanically isolated
Hardware: RS 232 (Modbus RTU, Modbus ASCII)
Graphical multifunctional display for Q, P, tw, tk, Δt
Protection class IP 65
Power supply 230 VAC
2 x PT 1000 temperature sensor including protective sleeve Type 160,
3 Point measuring protocol on certified test rig (water)

MEASURING SYSTEM "ultrakon®"
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Accessories

1 output module: - 2 x (0)4-20 mA galvanically isolated, free assignment to all important instantaneous values - 2 x open collector galvanically isolated (optocoupler). Free assignment to the electrical totalizers, can also be used as a limit contact or status signal
2 output modules: - 2 x (0)4-20 mA galvanically isolated, free assignment to all important instantaneous values - 2 x open collector galvanically isolated (optocoupler). Free assignment to the electrical totalizers, can also be used as a limit contact or status signal
Input module - 2 x (0) 4-20 mA, without galvanic isolation, freely assignable (density, temperature, pressure, differential pressure)
additional 2nd M-Bus interface, Ethernet TCP/IP interface, RS-485 interface; (Profibus DP only without MID)
Density input (0) 4-20 mA in conjunction with density sensor (with changing mixing ratio)
Density meter
Version: 5 m abgesetzt (Messumformers zu Ultraschall-Volumengeber)
Version: 10 m remote (transmitter to ultrasonic volume transmitter)
Version: 20 m remote (transmitter to ultrasonic volume transmitter)
Version: 30 m remote (transmitter to ultrasonic volume transmitter)
with battery backup (additionally for 230 VAC version)
Design of the ERW 700 as a 19" plug-in unit
thermowell, Type 200
thermowell, Type 200, weld-in-, made of solid material, stainless steel or heat-resistant steel
Sensor connection cable 4-wire, shielded
Special version with additional totalizer (e.g. for bidirectional measurement, limit-dependent tariff switching)
Conformity assessment certificate according to MessEG / MID
System testing, commissioning and instruction of personnel by METRA customer service technicians