

Features

- Time measurement for the accurate and repeatable determination of concentration, density and density-related physical quantities
- Certification: ATEX/IECEX zone 1
- Flameproof/explosion proof housing for hazardous areas
- Intrinsic safe process inputs for the integration of external pressure and temperature sensors
- Bidirectional communication and HART
- Two measuring channels

Applications


For a wide range of fluids, e.g. H₂SO₄, HF, HCl, HNO₃, sugar solution (Brix), brine in:

Chemical industry, petrochemical industry, oil and gas industry, pharmaceutical industry, semiconductor industry, mechanical and electrical industries, food industry



Transmitter

Technical data

PIOX S831 (831-AA2)	
	
design	explosion-proof field device zone 1 (intrinsic safety: inputs, HART)
measurement	
• analysis	
transit time (repeatable)	$1/(50 \cdot f_a) \pm 10^{-4} \cdot t$
transit time (absolute)	$1/(5 \cdot f_a) \pm 10^{-4} \cdot t$
	f_a - transducer frequency, t - total transit time e.g. for transducers with transducer frequency M ($f_a = 1$ MHz): repeatable: $20 \text{ ns} \pm 10^{-4} \cdot t$, absolute: $200 \text{ ns} \pm 10^{-4} \cdot t$ The total measurement uncertainty of a physical quantity for analysis is supplied order-related as it depends on the fluid, operating range and installation. For the basis of calculation see document TIPIOX-S_uncert_analysis.
• flow	
measurement principle	transit time difference correlation principle
flow velocity	m/s 0.01...25
repeatability	0.15 % MV ± 0.005 m/s
fluid	all acoustically conductive liquids with < 10 % gaseous or solid content in volume
temperature compensation	corresponding to the recommendations in ANSI/ASME MFC-5.1-2011
measurement uncertainty (volumetric flow rate)	
measurement uncertainty of the measuring system ¹	± 0.3 % MV ± 0.005 m/s
measurement uncertainty at the measuring point ²	± 1 % MV ± 0.005 m/s
transmitter	
power supply	20...32 V DC, $U_m = 120$ V
power consumption	W < 4
number of measuring channels	1, optional: 2
damping	s 0...100 (adjustable)
measuring cycle	Hz 100...1000 (1 channel)
response time	s 1 (1 channel), option: 0.02
housing material	cast aluminum, special heavy-duty coating
degree of protection	IP66
dimensions	mm see dimensional drawing
weight	kg 6.5
fixation	wall mounting, 2" pipe mounting
ambient temperature	°C -40...+60 (< -20 without operation of the display)
display	128 x 64 pixels, backlight
menu language	English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian
explosion protection	
• ATEX/IECEX	
marking	CE 0637 Ex II(1)2G II(1)2D Ex db eb ia [ia] IIC T6 Gb Ex tb ia [ia] IIC T100 °C Db T _a -40...+60 °C
certification ATEX	IBExU20ATEX1103 X
certification IECEX	IECEX IBE 20.0015X
measuring functions	
physical quantities	see table below
totaliser	volume, mass
calculation functions	average, difference, sum (2 measuring channels necessary)
diagnostic functions	signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times
communication interfaces	
service interfaces	measured value transmission, parametrisation of the transmitter: USB ³
process interfaces	HART (intrinsic safety, optional)

¹ with aperture calibration of the transducers

² for transit time difference principle and reference conditions

³ outside the explosive atmosphere (housing cover open)

PIOX S831 (831-AA2)	
accessories	
data transmission kit	USB cable
software	<ul style="list-style-type: none"> FluxDiagReader: reading of measured values and parameters, graphical presentation FluxDiag (optional): reading of measurement data, graphical presentation, report generation, parametrisation of the transmitter
data logger	
loggable values	all physical quantities, totalised physical quantities and diagnostic values
capacity	max. 800 000 measured values
outputs	
• current output	
number	1
range	mA 4...20 (3.2...24)
accuracy	0.04 % MV ±3 µA
passive output	$U_{ext} \leq 29 \text{ V DC}$, depending on R_{ext} ($R_{ext} < 830 \Omega$ at 29 V)
current output in HART mode	
• range	mA 4...20 (3.5...22)
• passive output	$U_{ext} = 9...29 \text{ V DC}$
intrinsic safety parameters	$U_i = 29 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 0.725 \text{ W}$ $C_i = 1 \text{ nF}$ $L_i = 50 \text{ nH}$
inputs	
• temperature input	
number	max. 1
type	Pt100/Pt1000
connection	4-wire
range	°C -150...+560
resolution	K 0.01
accuracy	
intrinsic safety parameters	$U_o = 9.2 \text{ V}$ $I_o = 25 \text{ mA}$ $P_o = 0.057 \text{ W}$ $C_o = 4283 \text{ nF}$ $L_o = 57 \text{ mH}$
• current input	
number	max. 1
accuracy	±0.1 % MV ±0.01 mA
active input	$U_{int} < 20 \text{ V}$, $R_{int} = 360 \Omega$
• range	mA 0...20
intrinsic safety parameters	$U_o = 29.2 \text{ V}$ $I_o = 88 \text{ mA}$ $P_o = 0.64 \text{ W}$ $C_o = 73 \text{ nF}$ $L_o = 4.1 \text{ mH}$

¹ with aperture calibration of the transducers

² for transit time difference principle and reference conditions

³ outside the explosive atmosphere (housing cover open)

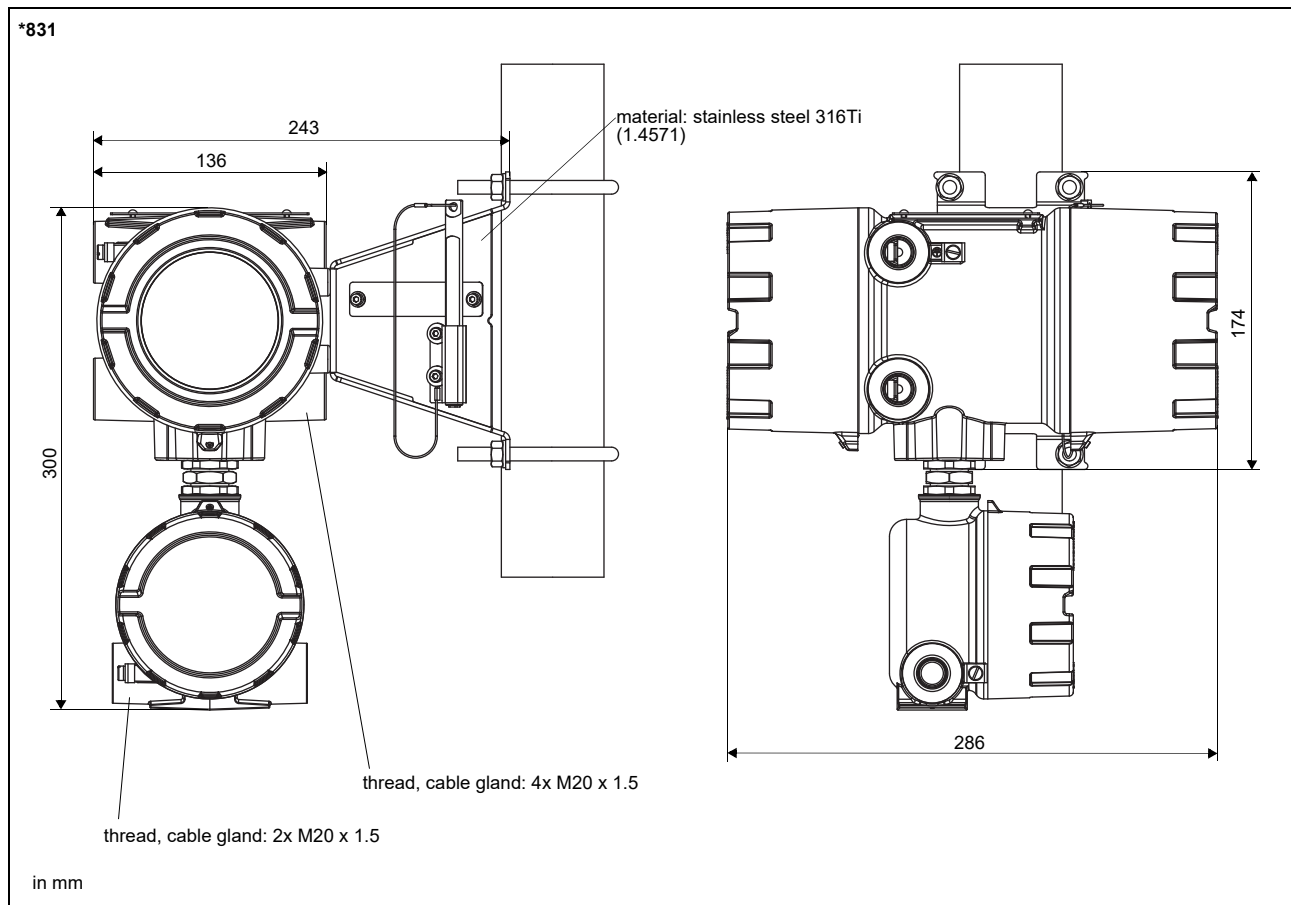
Physical quantities

The available physical quantities depend on the fluid data set in the transmitter.

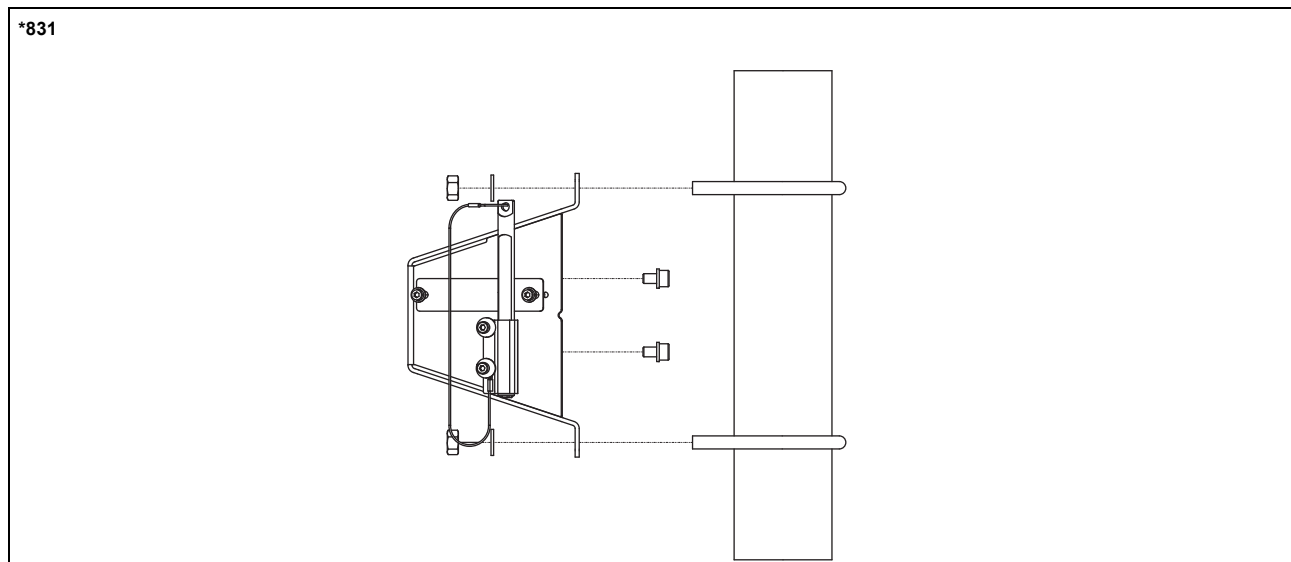
fluid data set	physical quantities	remark	
NN	no fluid data set	• sound speed, volumetric flow rate	
MD	standard fluid data set	<ul style="list-style-type: none"> analysis¹: concentration, mass fraction, volume fraction, density, normalised density, normalised sound speed, sound speed flow: volumetric flow rate, flow velocity, mass flow rate 	application-specific fluid data set from FLEXIM database
CU	customised fluid data set	<ul style="list-style-type: none"> analysis¹: concentration, mass fraction, volume fraction, density, normalised density, normalised sound speed, sound speed flow: volumetric flow rate, flow velocity, mass flow rate further customised physical quantities¹ 	data set developed by FLEXIM in cooperation with the customer

¹ min. 1 input or process interface with inputs necessary for fluid temperature

Dimensions



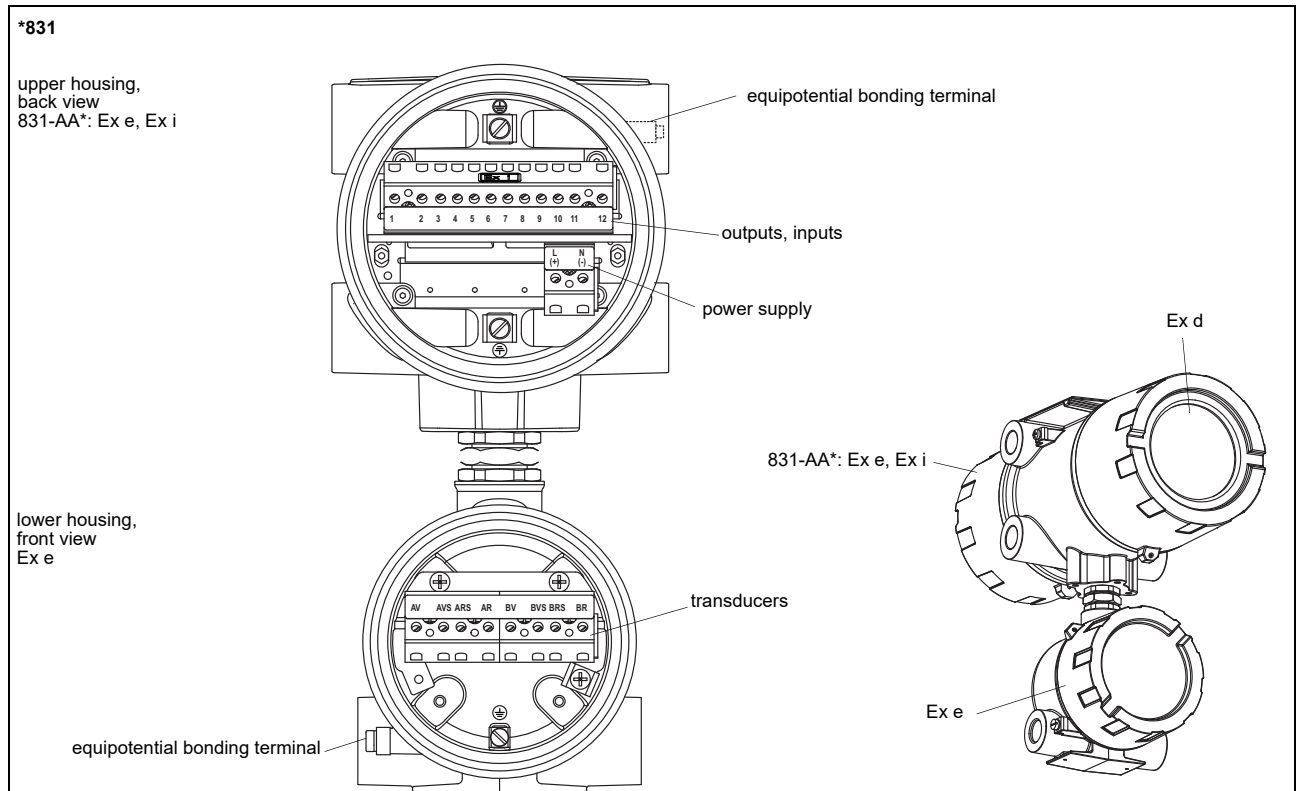
2" pipe mounting kit



Storage

- do not store outdoors
- store within the original package
- store in a dry and dust-free place
- protect against sunlight
- keep all openings closed
- storing temperature: -40...+60 °C

Terminal assignment



power supply ¹				
DC				
terminal		connection		
(+)		+		
(-)		-		
transducers, extension cable				
measuring channel A		measuring channel B		transducer
terminal	connection	terminal	connection	
AV	signal	BV	signal	↑
AVS	internal shield	BVS	internal shield	
ARS	internal shield	BRS	internal shield	⤴
AR	signal	BR	signal	
cable gland	external shield	cable gland	external shield	↑ ⤴
outputs ^{1, 2}				
terminal		connection		
11+, 12-		current output, HART		
USB		type C Hi-Speed USB 2.0 Device	service (FluxDiag/FluxDiagReader)	
inputs ²				
temperature probe				
terminal	direct connection	connection with extension cable		
3	red	red		
4	red/blue	blue		
5	white/blue	grey		
6	white	white		
current input ¹				
terminal		connection		
1		-		
2		+		

¹ cable (by customer): e.g. flexible wires, with insulated wire ferrules, wire cross-section: 0.25...2.5 mm²

² The number, type and terminal assignment are customised.

Transducers


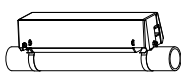
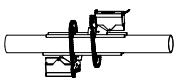
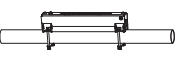
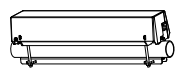
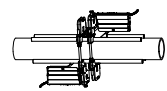
Overview

Shear wave transducers

		technical type				
		G	K	M	P	Q
zone 1 normal temperature range		CDG1N81 CLG1N81	CDK1N81 CLK1N81	CDM2N81 CLM2N81	CDP2N81 CLP2N81	CDQ2N81 CLQ2N81
zone 1 IP68		CDG1L11	CDK1L11	CDM2L11	CDP2L11	
zone 1 extended temperature range		CDG1E83 CLG1E83	CDK1E83 CLK1E83	CDM2E85 CLM2E85	CDP2E85 CLP2E85	CDQ2E85 CLQ2E85
inner pipe diameter d						
min. extended	mm	400	100	50	25	10
min. recommended	mm	500	200	100	50	25
max. recommended	mm	4000	2000	1000	400	150
max. extended	mm	6500	2400	1200	480	240
pipe wall thickness						
min.	mm	11	5	2.5	1.2	0.6

for further data see Technical specification TS_F8xx-transducersVx-xxx_Leu

Transducer mounting fixture

Variofix L	Variofix C	transducer box WI for Wavelnjector with chains
		
Variofix L with bolt mounting plates	Variofix C with bolt mounting plates	transducer box WI for Wavelnjector with threaded rods
		
outer pipe diameter: max. 48 mm	outer pipe diameter: VCM: max. 46 mm VCC: max. 36 mm	outer pipe diameter: 35...380 mm

for further data see Technical specification TS_F8xx-transducersVx-xxx_Leu

Coupling materials for transducers

	normal temperature range		extended temperature range			Wavelnjector WI-400	
	< 100 °C	< 170 °C	< 150 °C	< 200 °C	200...240 °C	< 280 °C	280...400 °C
< 24 h	coupling compound type N or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or coupling foil type VT	coupling compound type E or H or coupling foil type VT	coupling foil type TF	coupling foil type A and coupling foil type VT	coupling foil type B and coupling foil type VT
long time measurement	coupling foil type VT	coupling foil type VT	coupling foil type VT	coupling foil type VT			

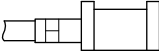
for further data see Technical specification TS_F8xx-transducersVx-xxx_Leu

Connection systems

connection system T1		
connection with extension cable	direct connection	transducers technical type
<p>JB01</p>		<p>****g*</p>
<p>JB01</p>		<p>****L*</p>

for further data see Technical specification TS_F8xx-transducersVx-xxx_Leu

Temperature probes

PT12N (order code: ACC-PE-xxxx-/T332)
<ul style="list-style-type: none">• clamp-on• ATEX zone 0 (intrinsic safety)
-45...+230 °C


see Technical specification TS_PTVx-xxx_Leu