



**FLEXIM**

**Technical specification**

**FLUXUS G831**

## **Ultrasonic gas flowmeters for permanent installation in hazardous areas**

### **Features**

- Two measuring channels
- Flameproof/explosion proof housing for hazardous areas
- Intrinsic safe process inputs for the integration of external pressure and temperature sensors
- More precise measurement at unfavorable measuring points through integrated disturbance correction
- Bidirectional communication and support of common bus technologies (Profibus PA, Foundation Fieldbus, HART, Modbus, BACnet)
- Certification: ATEX/IECEx zone 1, FM Class I Div. 1+2

### **Applications**

- Chemical industry
- Petrochemical industry
- Oil and gas industry



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TSFLUXUS\_G831V1-2-1US\_Lus, 2022-12-06

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## Transmitter

### Technical data

		FLUXUS G831 (831-AA1)	FLUXUS G831 (831-AA2)	FLUXUS G831 (831-ANN)	FLUXUS G831**-F10
design		explosion-proof field device zone 1 (intrinsic safety: outputs, process interfaces)	explosion-proof field device zone 1 (intrinsic safety: outputs, inputs, process interfaces)	explosion-proof field device zone 1	explosion-proof field device FM
<b>measurement</b>					
measurement principle		transit time difference correlation principle			
synchronized channel averaging		x (2 measuring channels necessary)			
flow velocity	ft/s	measuring range: 0.03 to 115, depending on pipe diameter			
repeatability		0.15 % MV ±0.02 ft/s			
fluid		all acoustically conductive gases, e.g., nitrogen, air, oxygen, hydrogen, argon, helium, ethylene, propane			
temperature compensation		corresponding to the recommendations in ANSI/ASME MFC-5.1-2011			
<b>measurement uncertainty (volumetric flow rate)</b>					
measurement uncertainty of the measuring system <sup>1</sup>		±0.3 % MV ±0.02 ft/s includes calibration certificate traceable to NIST			
measurement uncertainty at the measuring point		±1 to 2 % MV ±0.02 ft/s, contact FLEXIM for an application specific uncertainty evaluation			
<b>transmitter</b>					
power supply	V	20 to 32 V DC, U <sub>m</sub> = 120 V	• 100 to 230 V/50 to 60 Hz or • 20 to 32 V DC		
power consumption	W	< 4	< 8		
number of measuring channels		1, optional: 2			
damping	s	0 to 100 (adjustable)			
measuring cycle	Hz	100 to 1000 (1 channel)			
response time	s	1 (1 channel), option: 0.02			
housing material		cast aluminum EN AC 44200 mod, special heavy-duty coating (C5 according to EN ISO 12944)			
degree of protection		IP66	TYPE 4X/IP66		
dimensions	inch	see dimensional drawing			
mounting position		aluminum housing: <b>TF8-*831**-A1A****-*****-G,</b> <b>TF8-*831**-A1A****-*****-K,</b> <b>DE8-*831**-A1A**-***-FF,</b> <b>DE8-*831**-A1A**-***-PA:</b> upper housing in upper position	-		
weight	lb	14.3			
fixation		wall mounting, 2" pipe mounting			
ambient temperature	°F	-40 to +122/140 (< -4 without operation of the display)	-40 to +140 (< -4 without operation of the display)		
display		128 x 64 pixels, backlight			
menu language		English, German, French, Spanish, Dutch, Russian, Polish, Turkish, Italian			
<b>explosion protection</b>					
• ATEX/IECEx					
marking		<b>C E 0637 Ex II2G II2D</b> Ex db eb ia IIC T6 Gb Ex tb ia IIIC T100 °C Db T <sub>a</sub> -40...+60 °C  <b>TF8-*831**-A1A****-*****-G,</b> <b>TF8-*831**-A1A****-*****-K,</b> <b>DE8-*831**-A1A**-***-FF,</b> <b>DE8-*831**-A1A**-***-PA:</b> T <sub>a</sub> -40...+50 °C	<b>C E 0637 Ex II(1)2G II(1)2D</b> Ex db eb ia [ia] IIC T6 Gb Ex tb ia [ia] IIIC T100 °C Db T <sub>a</sub> -40...+60 °C  <b>TF8-*831**-A1A****-*****-G,</b> <b>TF8-*831**-A1A****-*****-K,</b> <b>DE8-*831**-A1A**-***-FF,</b> <b>DE8-*831**-A1A**-***-PA:</b> T <sub>a</sub> -40...+50 °C	<b>C E 0637 Ex II2G II2D</b> Ex db eb IIC T6 Gb Ex tb IIIC T100 °C Db T <sub>a</sub> -40...+60 °C	-
certification		IBExU20ATEX1103 X, IECEx IBE 20.0015X	IBExU20ATEX1103 X, IECEx IBE 20.0015X	IBExU20ATEX1103 X, IECEx IBE 20.0015X	-

<sup>1</sup> with aperture calibration of the transducers

<sup>2</sup> outside the explosive atmosphere (housing cover open)

	FLUXUS G831 (831-AA1)	FLUXUS G831 (831-AA2)	FLUXUS G831 (831-ANN)	FLUXUS G831**-F10						
<b>• FM</b>										
marking	-	-	-	 NI, Cl. I, II, III, Div. 2, GP A, B, C, D, F, G / T4A  Cl. I Div. 1, GP. A, B, C, D / T6 For Group A, conduit seal of connection compartment is required within 18 inches.  Cl. II, Div. 1, GP. E, F, G / T6 Cl. III, Div. 1 / T6  $T_a = -40^\circ\text{C} \text{ to } +60^\circ\text{C}$						
<b>measuring functions</b>										
physical quantities	operating volumetric flow rate, standard volumetric flow rate, mass flow rate, flow velocity									
totalizer	volume, mass									
calculation functions	average, difference, sum (2 measuring channels necessary)									
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times									
<b>communication interfaces</b>										
service interfaces	measured value transmission, parametrization of the transmitter: USB <sup>2</sup>									
process interfaces	intrinsic safety, max. 1 option: <ul style="list-style-type: none"> <li>• HART</li> <li>• Profibus PA</li> <li>• FF H1</li> </ul>		max. 1 option: <ul style="list-style-type: none"> <li>• Modbus RTU/RS485</li> <li>• HART</li> <li>• Profibus PA</li> <li>• FF H1</li> <li>• BACnet MS/TP</li> </ul>							
<b>accessories</b>										
data transmission kit	USB cable									
software	<ul style="list-style-type: none"> <li>• FluxDiagReader: reading of measured values and parameters, graphical representation</li> <li>• FluxDiag (optional): reading of measurement data, graphical representation, report generation, parametrization of the transmitter</li> </ul>									
<b>data logger</b>										
loggable values	all physical quantities, totalized physical quantities and diagnostic values									
capacity	max. 800 000 measured values									
<b>outputs</b>										
The outputs are galvanically isolated from the transmitter.										
<b>• switchable current output</b>										
number	-									
range	mA									
accuracy	-									
active output	-									
passive output	-									
current output in HART mode	-									
• range	mA									
• active output	-									
• passive output	-									
<b>• current output</b>										
number	configurable according to NAMUR NE43									
range	mA	max. 3								
accuracy	-	4 to 20 (3.2 to 24)								
passive output	-	0.04 % MV $\pm 3 \mu\text{A}$								
current output in HART mode	-	$R_{ext} < 530 \Omega$								
• range	mA	$U_{ext} = 9 \text{ to } 30 \text{ V}$ , depending on $R_{ext}$ ( $R_{ext} < 458 \Omega$ at 20 V)								
• active output	-	option								
• passive output	-									
intrinsic safety parameters	$U_i = 29 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 0.725 \text{ W}$ $C_i = 1 \text{ nF}$ $L_i = 50 \text{ nH}$									

<sup>1</sup> with aperture calibration of the transducers<sup>2</sup> outside the explosive atmosphere (housing cover open)

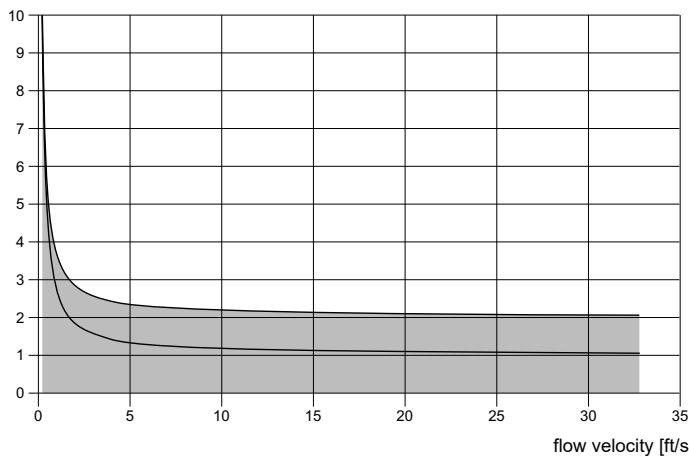
		FLUXUS G831 (831-AA1)	FLUXUS G831 (831-AA2)	FLUXUS G831 (831-ANN)	FLUXUS G831**-F10
<b>• digital output</b>					
functions		• frequency output • binary output • pulse output		• frequency output • binary output • pulse output	
number		max. 2		max. 3	
operating parameters		$U_{ext} = (8.2 \pm 0.1) \text{ V DC}$		$U_{ext} = (8.2 \pm 0.1) \text{ V DC}$	
<b>frequency output</b>					
• range	kHz	0 to 10		0 to 10	
<b>binary output</b>			limit, change of flow direction or error		limit, change of flow direction or error
<b>pulse output</b>					
• pulse value	units	0.01 to 1000		0.01 to 1000	
• pulse width	ms	0.05 to 1000		0.05 to 1000	
intrinsic safety parameters		$U_i = 29 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 0.725 \text{ W}$ $C_i = 1 \text{ nF}$ $L_i = 50 \text{ nH}$		-	
<b>inputs</b>					
		not short-circuit proof	The inputs are galvanically isolated from the transmitter.		
<b>• temperature input</b>					
number		-	max. 1	max. 1	
type		-	Pt100/Pt1000	Pt100/Pt1000	
connection		-	4-wire	4-wire	
range	°F	-	-238 to +1040	-238 to +1040	
resolution	K	-	0.01	0.01	
accuracy			$\pm 0.01 \% \text{ MV} \pm 0.03 \text{ K}$	$\pm 0.01 \% \text{ MV} \pm 0.03 \text{ K}$	
intrinsic safety parameters			$U_o = 9.2 \text{ V}$ $I_o = 25 \text{ mA}$ $P_o = 0.057 \text{ W}$ $C_o = 4283 \text{ nF}$ $L_o = 57 \text{ mH}$	-	
<b>• switchable current input</b>					
		All switchable current inputs are jointly switched to active or passive.			
number		-	max. 2		
accuracy		-	$\pm 0.1 \% \text{ MV} \pm 0.01 \text{ mA}$		
active input		-	$U_{out} = \text{max. } 28 \text{ V}, R_{int} = 75 \Omega$		
• range	mA	-	0 to 24		
passive input		-	$R_{int} = 35 \Omega, U_{out} = 26 \text{ V}, I_{max} \leq 24 \text{ mA}$		
• range	mA	-	0 to 20		
<b>• current input</b>					
number		-	max. 1	-	
accuracy		-	$\pm 0.1 \% \text{ MV} \pm 0.01 \text{ mA}$	-	
active input		-	$U_{int} < 20 \text{ V}, R_{int} = 385 \Omega$	-	
• range	mA	-	0 to 20	-	
intrinsic safety parameters			$U_o = 29.2 \text{ V}$ $I_o = 88 \text{ mA}$ $P_o = 0.64 \text{ W}$ $C_o = 73 \text{ nF}$ $L_o = 4.1 \text{ mH}$	-	

<sup>1</sup> with aperture calibration of the transducers

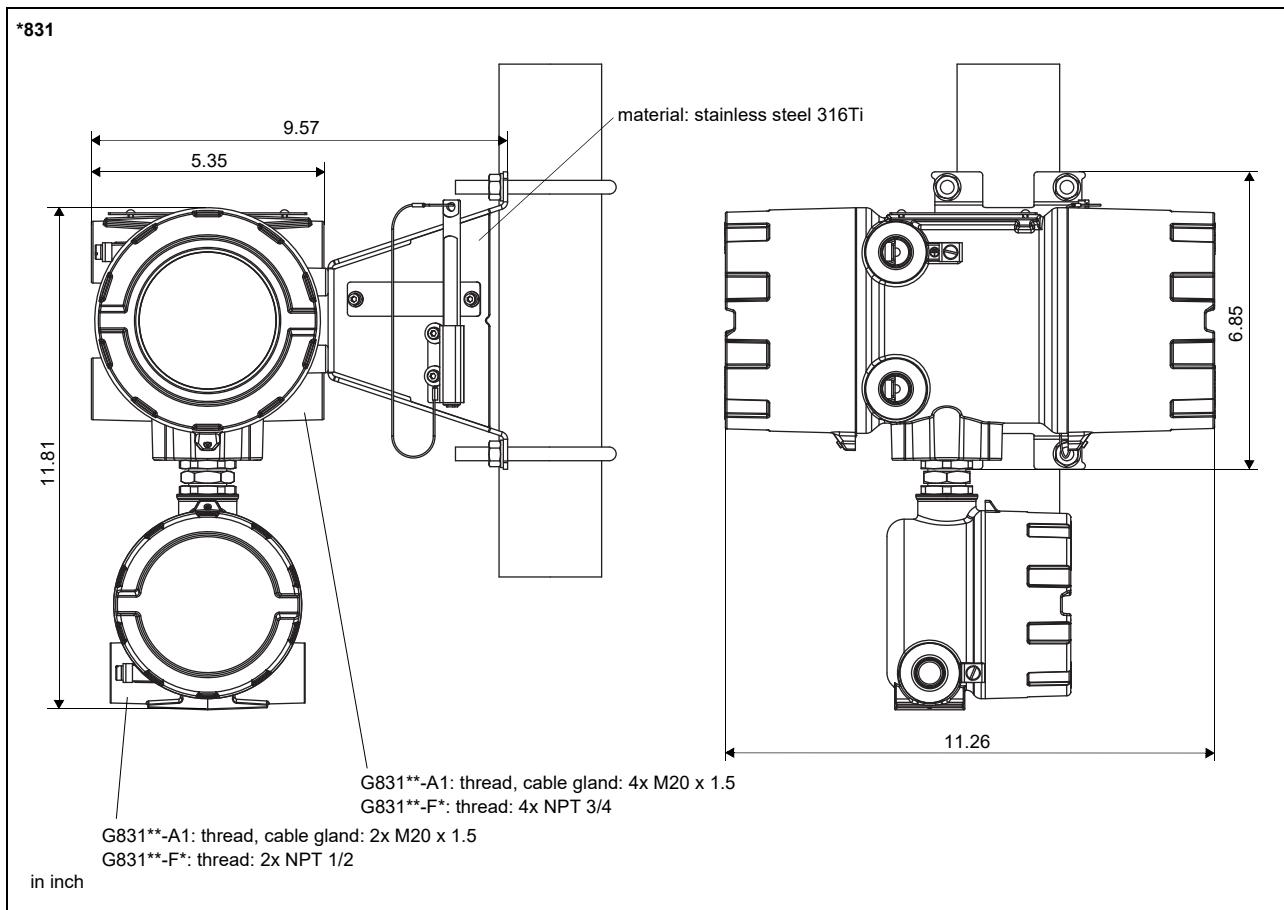
<sup>2</sup> outside the explosive atmosphere (housing cover open)

#### Measurement uncertainty

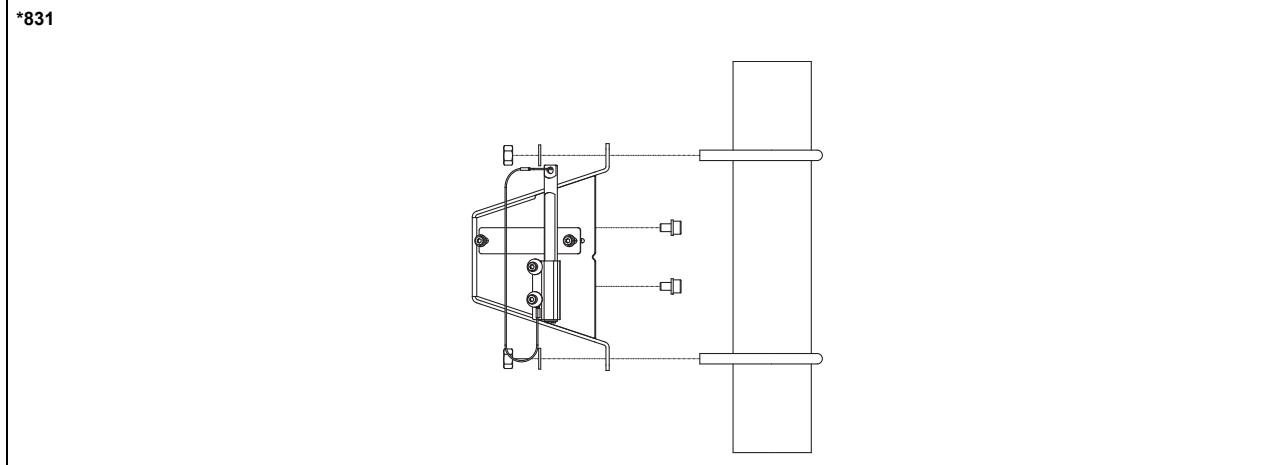
measurement uncertainty [%]



## Dimensions



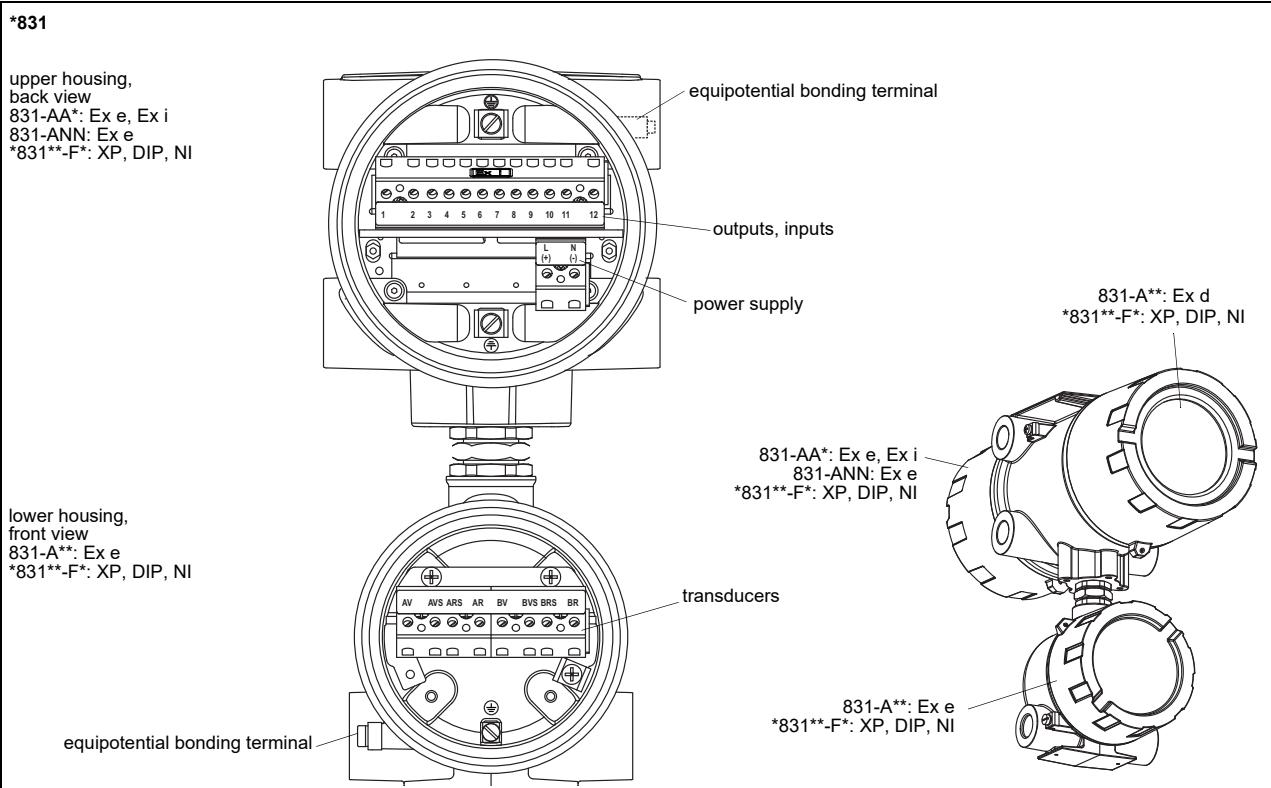
## Wall and 2" pipe mounting kit



## 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...+140 °F

## Terminal assignment



### power supply<sup>1</sup>

AC		DC	
terminal	connection	terminal	connection
L	phase	(+)	+
N	neutral	(-)	-

### 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, inputs<sup>1, 2</sup>

terminal	connection
depending on configuration	passive current output, digital output, current input
3, 4, 5, 6	temperature input
11+, 12-	passive current output/HART
11-, 12+	active current output/HART
11, 12	Modbus RTU, FF H1, Profibus PA, BACnet MS/TP

### temperature probe

terminal	direct connection	connection with extension cable
3	red	red
4	red	black
5	white	green
6	white	white
USB	type C Hi-Speed USB 2.0 Device	service (FluxDiag/FluxDiagReader)

<sup>1</sup> cable (by customer): e.g., flexible wires, with insulated wire ferrules, wire cross-section: AWG14 to 24

<sup>2</sup> The number, type and terminal assignment are customized.

## Transducers

### Overview

#### Shear wave transducers

	technical type				
	G	K	M	P	Q
zone 1 normal temperature range	GDG1N81 GLG1N81	GDK1N81 GLK1N81	GDM2N81 GLM2N81	GDP2N81 GLP2N81	GDQ2N81 GLQ2N81
zone 1 IP68	GDG1LI1	GDK1LI1	GDM2LI1	GDP2LI1	
zone 1 extended temperature range	GDG1E83 GLG1E83	GDK1E83 GLK1E83	GDM2E85 GLM2E85	GDP2E85 GLP2E85	GDQ2E85 GLQ2E85
FM Class I Div. 1 normal temperature range	GDG1N62 GLG1N62	GDK1N62 GLK1N62	GDM1N62 GLM1N62	GDP1N62 GLP1N62	GDQ1N62 GLQ1N62
FM Class I Div. 2 normal temperature range	CDG1N52 CLG1N52	CDK1N52 CLK1N52	CDM2N52 CLM2N52	CDP2N52 CLP2N52	CDQ2N52 CLQ2N52
FM Class I Div. 2 extended temperature range			CDM2E52 CLM2E52	CDP2E52 CLP2E52	CDQ2E52 CLQ2E52
<b>inner pipe diameter d</b>					
min. extended	inch	7.1	2.4	1.2	0.59
min. recommended	inch	8.7	3.1	1.6	0.79
max. recommended	inch	35.4	11.8	5.9	2
max. extended	inch	43.3	14.2	7.1	2.4
<b>pipe wall thickness</b>					
min.	inch	0.43	0.2	0.1	0.05
<b>fluid pressure</b>					
min. extended	psi	metal pipe: 290			
min.	psi	metal pipe: 435, plastic pipe: 15			

for further data see Technical specification TS\_G8xx-transducersVx-xXX\_Lus

#### Lamb wave transducers

	technical type						
	F	G	H	K	M	P	Q
zone 1 normal temperature range	GRF1N83 GTF1N83	GRG1N83 GTG1N83	GRH1N83 GTH1N83	GRK1N83 GTK1N83	GRM1N83 GTM1N83	GRP1N83 GTP1N83	GRQ1N83 GTQ1N83
zone 1 higher temperatures			GRG1S83 GTG1S83	GRH1S83 GTH1S83	GRK1S83 GTK1S83	GRM1S83 GTM1S83	
zone 1 IP68	GRF1LI3	GRG1LI3	GRH1LI3	GRK1LI3	GRM1LI3	GRP1LI3	
FM Class I Div. 1		GRG1N62 GTG1N62	GRH1N62 GTH1N62	GRK1N62 GTK1N62	GRM1N62 GTM1N62	GRP1N62 GTP1N62	GRQ1N62 GTQ1N62
FM Class I Div. 2	GRF1N52 GTF1N52	GRG1N52 GTG1N52	GRH1N52 GTH1N52	GRK1N52 GTK1N52	GRM1N52 GTM1N52		
FM Class I Div. 2 higher temperatures		GRG1S52 GTG1S52	GRH1S52 GTH1S52	GRK1S52 GTK1S52	GRM1S52 GTM1S52		
<b>fluid pressure</b>							
min. extended	psi	metal pipe: 145	metal pipe: 145	metal pipe: 145 (d > 4.7 inch) 44 (d < 4.7 inch)	metal pipe: 44 (d < 2.4 inch)	metal pipe: 44 (d < 1.4 inch)	metal pipe: 44 (d < 0.59 inch)
min.	psi	metal pipe: 218 plastic pipe: 15	metal pipe: 218 plastic pipe: 15	metal pipe: 218 (d > 4.7 inch) 145 (d < 4.7 inch) plastic pipe: 15	metal pipe: 145 (d > 2.4 inch) 73 (d < 2.4 inch) plastic pipe: 15	metal pipe: 145 (d > 1.4 inch) 73 (d < 1.4 inch) plastic pipe: 15	metal pipe: 145 (d > 0.59 inch) 73 (d < 0.59 inch) plastic pipe: 15
<b>inner pipe diameter d</b>							
min. extended	inch	8.7	7.1	4.3	2.4	1.2	0.59
min. recommended	inch	10.6	8.7	5.5	3.1	1.6	0.79
max. recommended	inch	47.2	35.4	23.6	11.8	5.9	2
max. extended	inch	63	55.1	39.4	14.2	7.1	2.4
<b>pipe wall thickness ****N**, ****L**</b>							
min.	inch	0.59	0.43	0.31	0.2	0.1	0.05
max.	inch	1.3	0.94	0.63	0.39	0.2	0.12
max. extended	inch	1.4	-	-	-	-	-
<b>pipe wall thickness ****S**</b>							
min.	inch		0.42	0.28	0.17	0.08	
max.	inch		0.93	0.62	0.37	0.19	

for further data see Technical specification TS\_G8xx-transducersVx-xXX\_Lus

## Transducer mounting fixture

PermaRail	PermaFix
	
	PermaFix with bolt mounting plates
	

for further data see Technical specification TS\_G8xx-transducersVx-xXX\_Lus

## Coupling materials for transducers

	normal temperature range	extended temperature range		
	< 212 °F	< 338 °F	< 302 °F	< 392 °F
< 24 h	coupling compound type N or coupling pad type VT	coupling compound type E or coupling pad type VT	coupling compound type E or H or coupling pad type VT	coupling pad type TF
long time measurement	coupling pad type VT	coupling pad type VT	coupling pad type VT	

for further data see Technical specification TS\_G8xx-transducersVx-xXX\_Lus

## Damping material

	damping mat	damping coat
order code	ACC-PE-GNNN-/DPD2	ACC-PE-GNNN-/DPD1
type	E30R4	E30R3

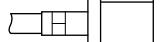
for further data see Technical specification TS\_G8xx-transducersVx-xXX\_Lus

## Connection systems

connection system T1		
connection with extension cable	direct connection	transducers technical type
<p>JB01</p>	<p>direct connection</p>	*****8*
<p>JB01</p>		*****L1*
<p>terminal board for junction box (junction box by customer)</p>		*****62
connection system TS		
connection with extension cable	direct connection	transducers technical type
<p>JB04</p>		*****52

for further data see Technical specification TS\_G8xx-transducersVx-xXX\_Lus

## Temperature probes

PT12N (order code: ACC-PE-****-/T332)	PT12N (order code: ACC-PE-****-/T382)
<ul style="list-style-type: none"><li>• clamp-on</li><li>• ATEX zone 0/1 (intrinsic safety)</li><li>• for 831-AA2, 831-AA3</li></ul>	<ul style="list-style-type: none"><li>• clamp-on</li><li>• ATEX zone 1</li><li>• for 831-ANN</li></ul>
-49 to +446 °F	-49 to +482 °F
	

see Technical specification TS\_PTVx-xXX