

## Gas Ultrasonic Flowmeter for Permanent Installation

Designed for wall mounting or installation in 19" rack systems

### Features

- Precise bi-directional and highly dynamic flow measurement with the non-intrusive clamp-on technology
- High precision at fast and slow flow rates, high temperature and zero point stability
- Automatic loading of calibration data and transducer detection for a fast and easy set-up (less than 5 min), providing precise and long-term stable results
- User-friendly design
- Transducers available for a wide range of inner pipe diameters (0.3 to 63 in) and fluid temperatures (-40 to +392 °F)
- FM Class 1 Div. 2 approved transducers for hazardous areas available
- Measurement is unaffected by gas density, viscosity, composition, dust, humidity, temperature or pressure

### Applications

Designed for industrial use in harsh environments, in gas processing and natural gas extraction, chemical industry and in the petroleum industry. Practical applications:

- Measurement on natural gas pipelines and in natural gas storage installations
- Measurement of synthesized gas and injection gas
- Measurement for the gas supply industry



FLUXUS G704



FLUXUS G709



Measurement with transducers mounted by PermaRail

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## Function

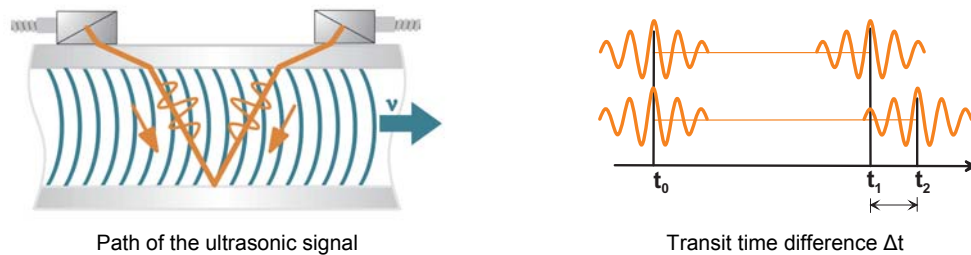
### Measurement Principle

In order to measure the flow of a medium in a pipe, ultrasonic signals are used, employing the transit time difference principle. Ultrasonic signals are emitted by a transducer installed on the pipe and received by a second transducer. These signals are emitted alternately in the flow direction and against it.

As the medium in which the signals propagate is flowing, the transit time of the ultrasonic signals in the flow direction is shorter than against the flow direction.

The transit time difference,  $\Delta t$ , is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow rate.

Two integrated microprocessors control the entire measuring process. This allows the flowmeter to remove disturbance signals, and to check each received ultrasonic wave for its validity which reduces noise.



### Calculation of Volumetric Flow Rate

$$\dot{V} = k_{Re} \cdot A \cdot k_a \cdot \Delta t / (2 \cdot t_{fl})$$

where

- $\dot{V}$  = volumetric flow rate
- $k_{Re}$  = fluid mechanics calibration factor
- $A$  = cross-sectional pipe area
- $k_a$  = acoustical calibration factor
- $\Delta t$  = transit time difference
- $t_{fl}$  = transit time in the medium

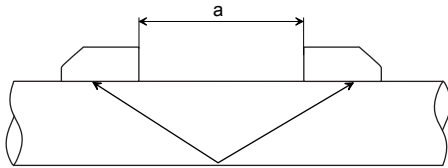
### Number of Sound Paths

The number of sound paths is the number of transits of the ultrasonic signal through the medium in the pipe. Depending on the number of sound paths, the following methods of installation exist:

- **reflect arrangement**  
The number of sound paths is even. Both of the transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easier.
- **diagonal arrangement**  
The number of sound paths is odd. Both of the transducers are mounted on opposite sides of the pipe.
- **direct mode**  
Diagonal mode with 1 sound path. This should be used in the case of a high signal attenuation by the medium, pipe or coatings.

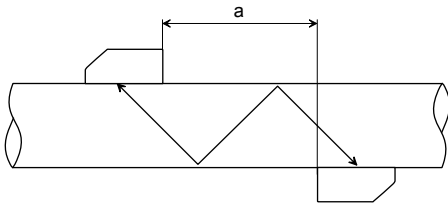
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the transmitter.

As the transducers can be mounted with the transducer mounting fixture in reflect arrangement or diagonal arrangement, the number of sound paths can be adjusted optimally for the application.

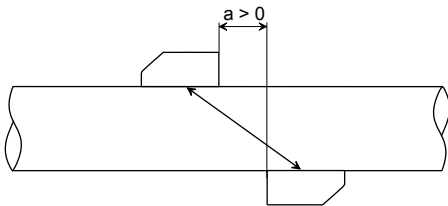


Reflect arrangement, number of sound paths: 2

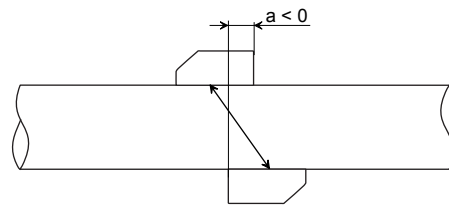
a = transducer distance



Diagonal arrangement, number of sound paths: 3

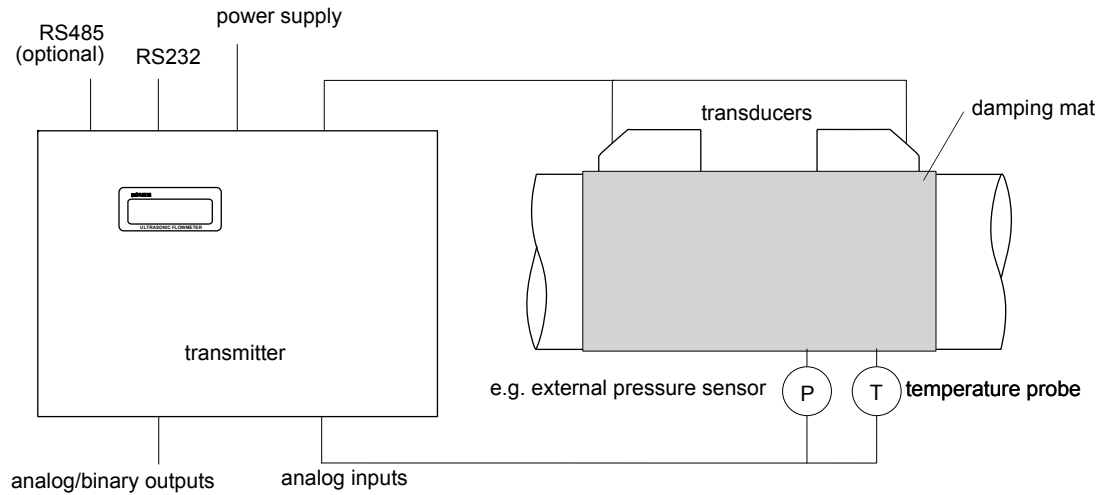


Direct mode, number of sound paths: 1



Direct mode, number of sound paths: 1,  
negative transducer distance

## Typical Measurement Setup



Example of a measurement setup in reflect arrangement with connection of the inputs to an external process pressure and process temperature measurement for standard volumetric flow rate calculation

## Standard Volumetric Flow Rate

The standard volumetric flow rate can be selected as physical quantity to be measured. It will be calculated internally by:

$$\dot{V}_N = \dot{V} \cdot p/p_N \cdot T_N/T \cdot 1/K$$

where

- $\dot{V}_N$  = standard volumetric flow rate
- $\dot{V}$  = operating volumetric flow rate
- $p_N$  = standard pressure (absolute value)
- $p$  = operating pressure (absolute value)
- $T_N$  = standard temperature in K
- $T$  = operating temperature in K
- $K$  = compressibility coefficient of the gas: ratio of the compressibility factors of the gas at operating conditions and at standard conditions  $Z/Z_N$

The operational pressure  $p$  and the operational temperature  $T$  of the medium will be entered directly as fixed values into the transmitter.

or:





If inputs are installed (optional), pressure and temperature can be measured by the customer and fed in the transmitter.

The gas compressibility coefficient  $K$  of the gas is entered in the transmitter:

- as fixed value or
- as approximation according to e.g. AGA8 or GERG

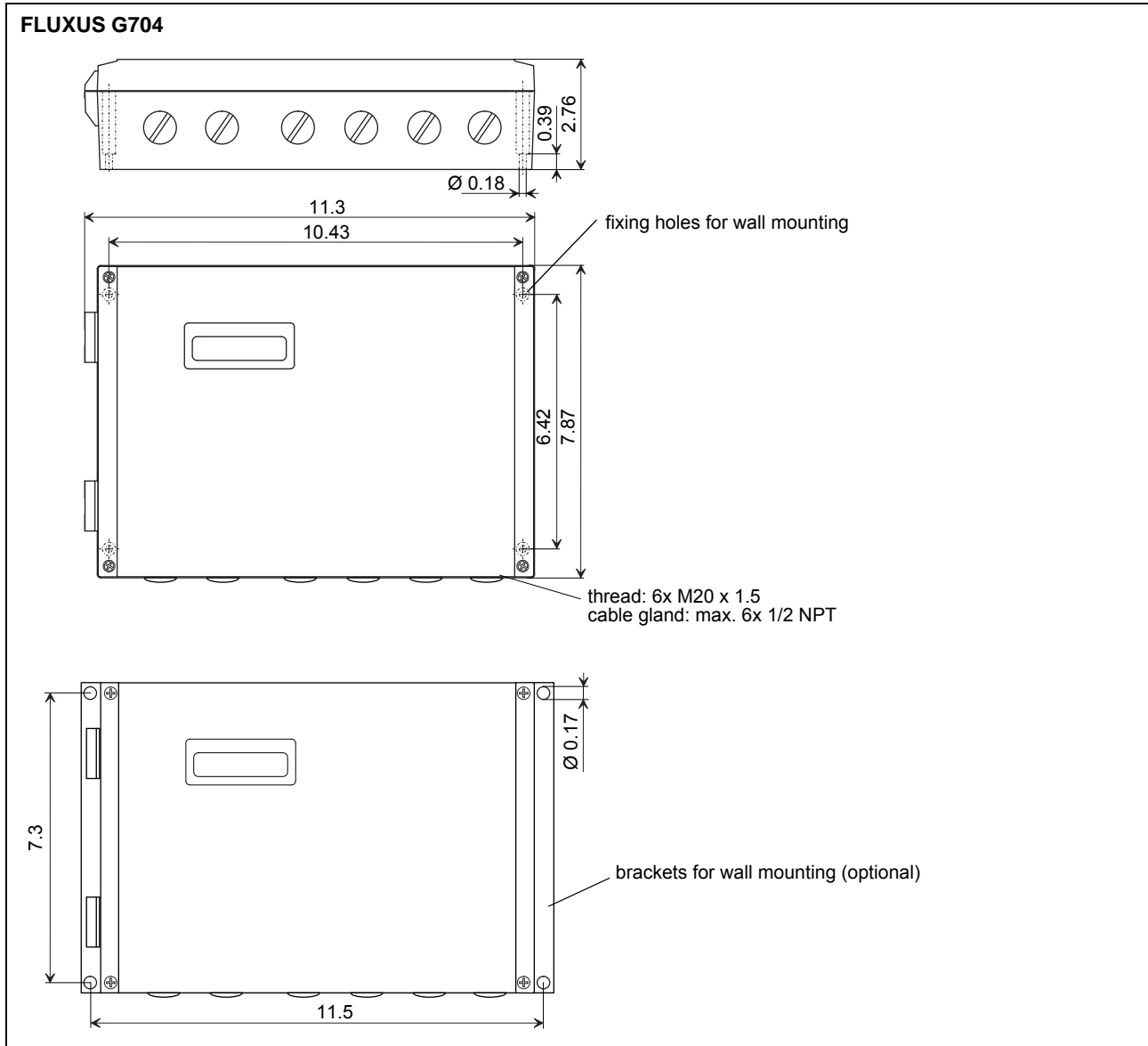
# Flow Transmitter

## Technical Data

FLUXUS	G704	G704.316SE	G709
design	standard field device	field device with stainless steel housing	19 " module
			
<b>measurement</b>			
measurement principle	transit time difference correlation principle		
flow velocity	0.03 to 115 ft/s, depending on pipe diameter		
repeatability	0.15 % of reading ±0.03 ft/s		
medium	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>accuracy</b>			
volumetric flow rate	± 1 to 3 % of reading ±0.03 ft/s depending on application ± 0.5 % of reading ±0.03 ft/s with field calibration		
<b>flow transmitter</b>			
power supply	100 to 230 V/50 to 60 Hz or 20 to 32 V DC		
power consumption	< 15 W		
number of flow measuring channels	1, optional: 2		
signal attenuation	0 to 100 s, adjustable		
measuring cycle (1 channel)	100 to 1000 Hz		
response time	1 s (1 channel), option: 70 ms		
housing material	aluminum, powder coated	stainless steel 316L	aluminum
degree of protection	NEMA 4	NEMA 4X	NEMA 1
dimensions	see dimensional drawing		42HP x 3U (without back panel) see dimensional drawing
weight	6.2 lb	10.5 lb	3.8 lb
fixation	wall mounting, optional: 2 " pipe mounting		19 " rack mounting
ambient temperature	-4 to +140 °F		
display	2 x 16 characters, dot matrix, backlight		
menu language	English, German, French, Dutch, Spanish		
<b>explosion protection (optional)</b>			
F M	marking	 NI/Cl. I,II,III/Div. 2/ GP: A,B,C,D,E,F,G/ T5 Ta = 60 °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>data logger</b>			
loggable values	all physical quantities, totaled values and diagnostic values		
capacity	> 100 000 measured values		
<b>communication</b>			
interface	- process integration (optional): RS485 (emitter) or Modbus RTU or HART or BACnet MS/TP - diagnosis: RS232		
<b>serial data kit (optional)</b>			
software (all Windows™ versions)	-FluxData: download of measurement data, graphical presentation, conversion to other formats (e.g. for Excel™) -FluxKoef: creating medium data sets -FluxSubstanceLoader: upload of medium data sets		
cable	RS232		
adapter	RS232 - USB		

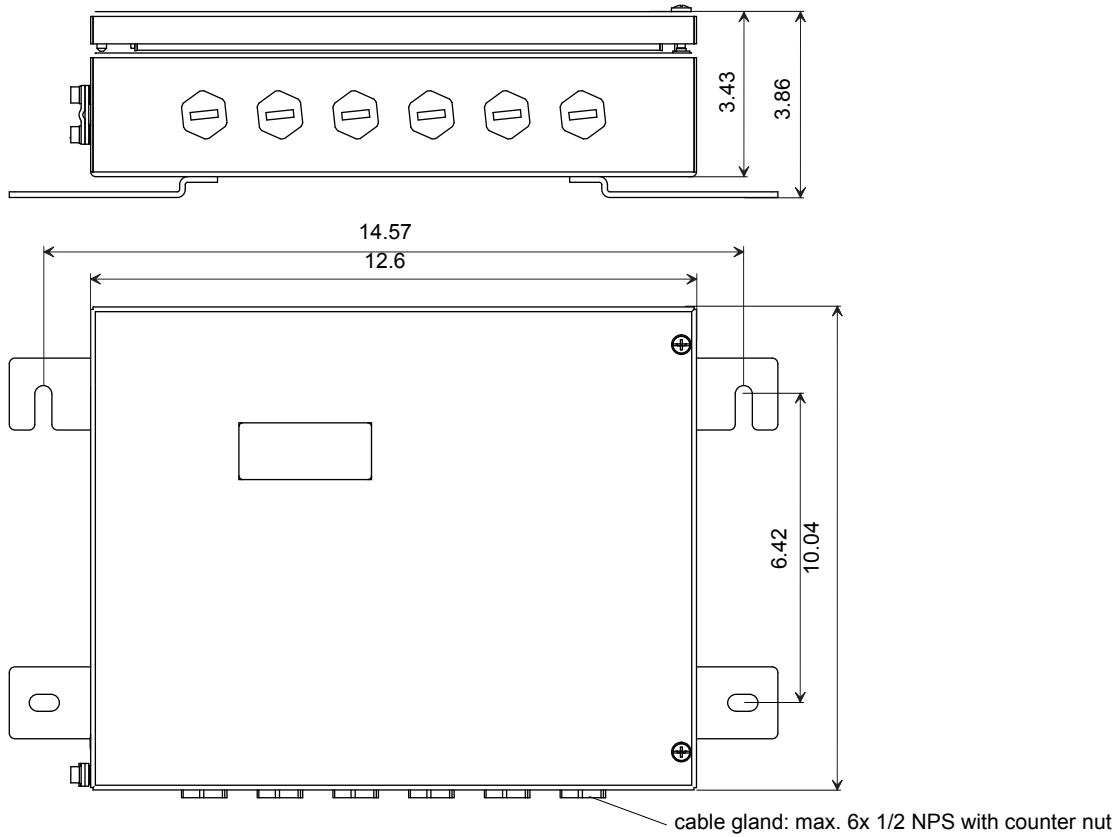
FLUXUS	G704	G704.316SE	G709
<b>outputs (optional)</b>			
The outputs are galvanically isolated from the transmitter.			
number	on request		
<b>current output</b>			
current output	0/4 to 20 mA		
- range	0.1 % of reading ±15 µA		
- accuracy	R <sub>ext</sub> < 500 Ω		
- active output	U <sub>ext</sub> = 4 to 24 V, depending on R <sub>ext</sub> , R <sub>ext</sub> < 1 kΩ		
- passive output			
current output I1 in HART mode	4 to 20 mA		
- range	U <sub>ext</sub> = 10 to 24 V		
- passive output			
<b>voltage output</b>			
range	0 to 1 V or 0 to 10 V		
accuracy	0 to 1 V: 0.1 % of reading ±1 mV 0 to 10 V: 0.1 % of reading ±10 mV		
internal resistance	R <sub>i</sub> = 500 Ω		
<b>frequency output</b>			
range	0 to 5 kHz		
open collector	24 V/4 mA		
<b>binary output</b>			
Reed relay	48 V/100 mA		48 V/100 mA
open collector	24 V/4 mA		24 V/4 mA
optorelay	26 V/100 mA		-
binary output as alarm output	limit, change of flow direction or error		limit, change of flow direction or error
- functions			
binary output as pulse output	0.01 to 1000 units optorelay: 1 to 1000 ms Reed relay, open collector: 80 to 1000 ms		0.01 to 1000 units 80 to 1000 ms
- pulse value			
- pulse width			
<b>inputs (optional)</b>			
The inputs are galvanically isolated from the transmitter.			
number	max. 4, on request		
<b>temperature input</b>			
type	Pt100/Pt1000		
connection	4-wire		
range	-238 to +1040 °F		
resolution	0.01 K		
accuracy	±0.01 % of reading ±0.03 K		
<b>current input</b>			
accuracy	0.1 % of reading ±10 µA	0.1 % of reading ±10 µA	0.1 % of reading ±10 µA
active input	U <sub>i</sub> = 24 V, R <sub>i</sub> = 50 Ω, P <sub>i</sub> < 0.5 W, not short-circuit proof	U <sub>i</sub> = 24 V, R <sub>i</sub> = 50 Ω, P <sub>i</sub> < 0.5 W, not short-circuit proof	U <sub>i</sub> = 15 V, R <sub>i</sub> = 50 Ω, P <sub>i</sub> < 0.5 W, not short-circuit proof
- range	0 to 20 mA	0 to 20 mA	0 to 20 mA
passive input	R <sub>i</sub> = 50 Ω, P <sub>i</sub> < 0.3 W	R <sub>i</sub> = 50 Ω, P <sub>i</sub> < 0.3 W	R <sub>i</sub> = 50 Ω, P <sub>i</sub> < 0.3 W
- range	-20 to +20 mA	-20 to +20 mA	-20 to +20 mA
<b>voltage input</b>			
range	0 to 1 V		
accuracy	0.1 % of reading ±1 mV		
internal resistance	R <sub>i</sub> = 1 MΩ		

### Dimensions

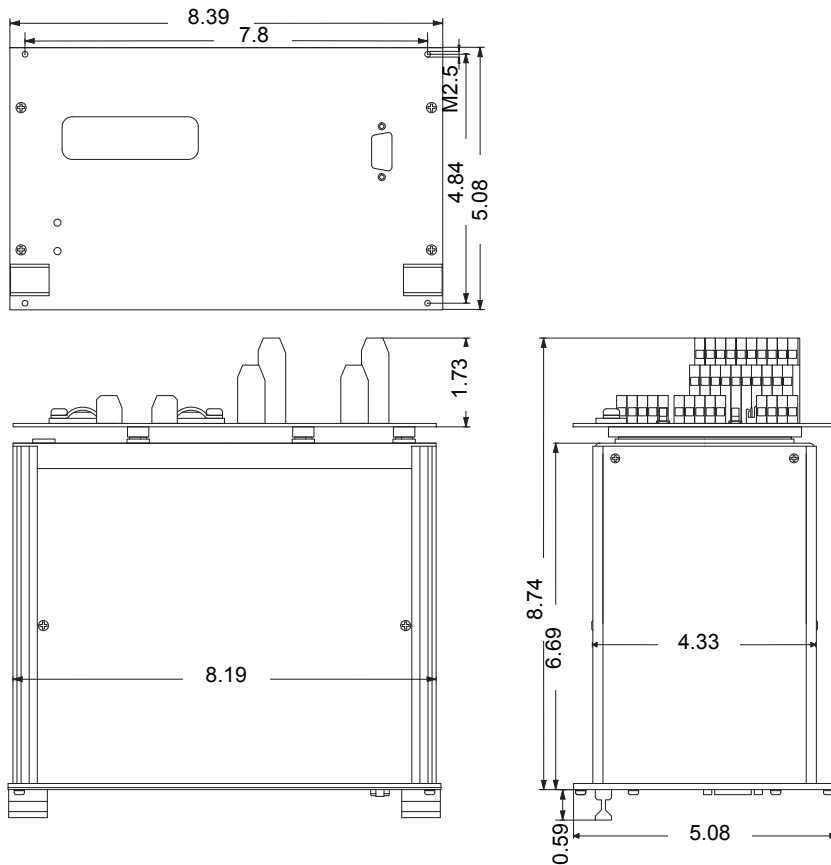




**FLUXUS G704.316SE**



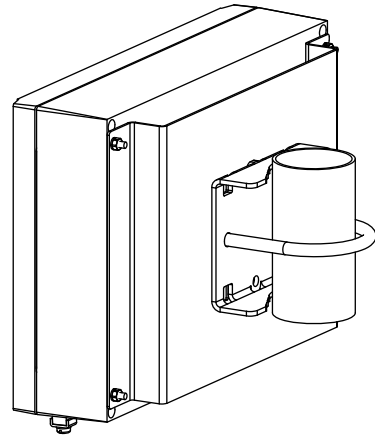
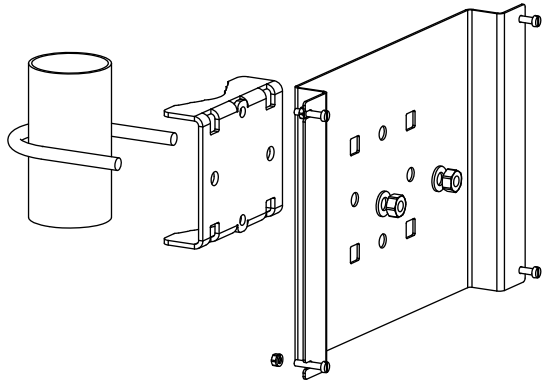
**FLUXUS G709**



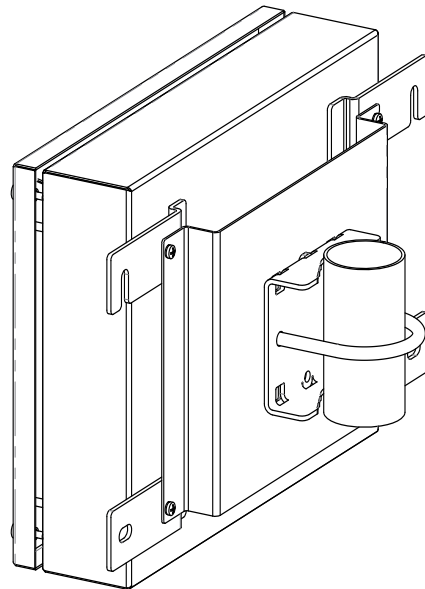
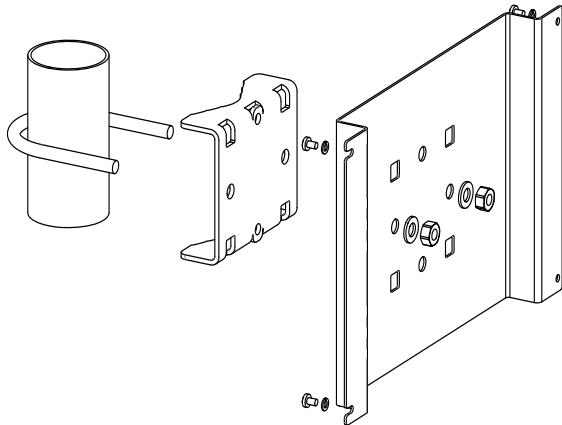
in inch

### 2 " Pipe Mounting Kit (optional)

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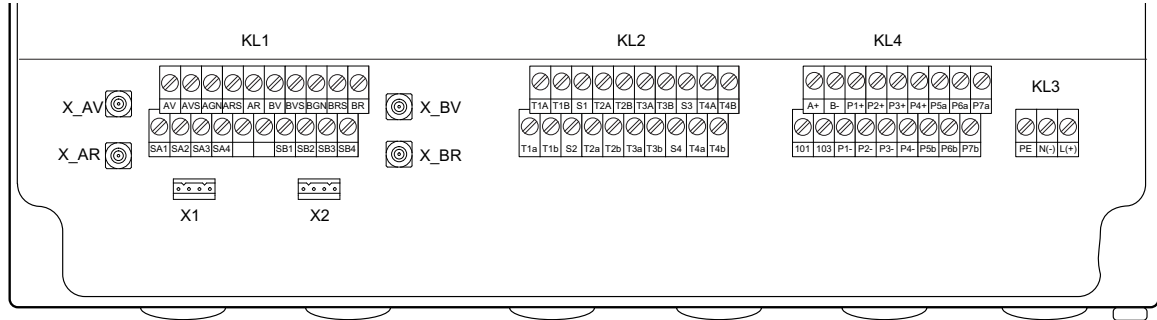


**FLUXUS G704.316SE**



## Terminal Assignment

### FLUXUS G704, G704.316SE



#### power supply

terminal strip KL3

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

#### transducers

terminal strip KL1

extension cable (transducers ****L1*, ****52) transducer cable (transducers ****L1*)			
measuring channel A		measuring channel B	
terminal	connection	terminal	connection
AV	signal	BV	signal
AVS	shield	BVS	shield
ARS	shield	BRS	shield
AR	signal	BR	signal

transducer cable (transducers ****52)		
measuring channel A	measuring channel B	connection
terminal		connection
X_AV	X_BV	SMB connector
X_AR	X_BR	SMB connector

#### outputs<sup>2</sup>

terminal strip KL4

terminal	connection
P1+ to P4+, P1- to P4-	current output, voltage output, frequency output or binary output (Reed relay, open collector)
P5a to P7a, P5b to P7b	binary output

#### RS485, Modbus, BACnet (optional)

terminal strip KL4

terminal	connection
A+	signal +
B-	signal -
101	shield

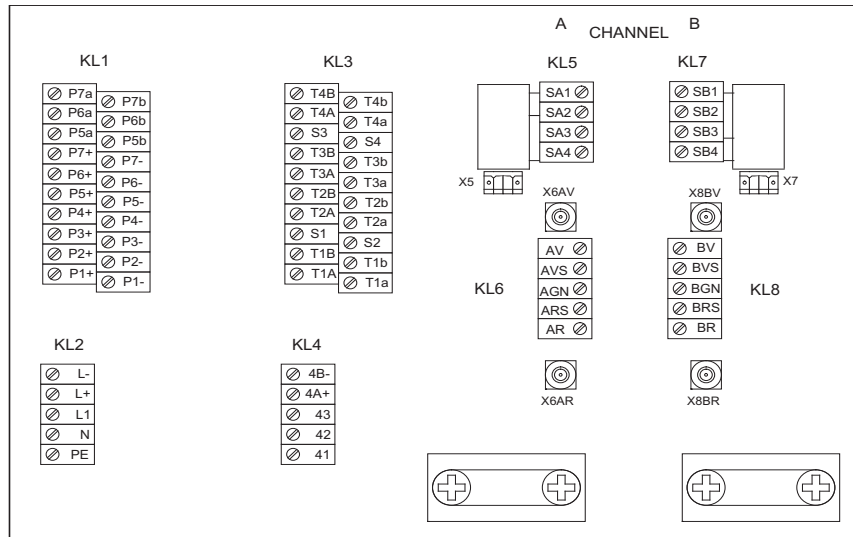
#### inputs<sup>2</sup>

terminal strip KL2

terminal	temperature probe				passive current source connection of an active input	active current source connection of a passive input
	with connector		without connector			
	direct connection	connection with extension cable	direct connection	connection with extension cable		
T1a to T4a	red	red	red	white	not connected	not connected
T1A to T4A	red/blue	gray	red	black	-	+
T1b to T4b	white/blue	blue	white	red	+	not connected
T1B to T4B	white	white	white	green	not connected	-
S1 to S4	shield	shield	-	-	not connected	not connected

<sup>2</sup> The number, type and terminal assignment of the outputs and inputs will be customized.

**FLUXUS G709**



**power supply**

terminal strip KL2

terminal	connection (AC)	terminal	connection (DC)
PE	earth	PE	earth
N	neutral	L-	-
L1	phase	L+	+

**transducers**

terminal strip KL6, KL8

extension cable (transducers ****L1*, ****52) transducer cable (transducers ****L1*)			
measuring channel A		measuring channel B	
terminal	connection	terminal	connection
AV	signal	BV	signal
AVS	shield	BVS	shield
ARS	shield	BRS	shield
AR	signal	BR	signal

**outputs<sup>2</sup>**

terminal strip KL1

terminal	connection
P1+ to P7+, P1- to P7-	current output, voltage output, frequency output or binary output
P5a to P7a, P5b to P7b	binary output

**RS485, Modbus, BACnet (optional)**

terminal strip KL4

terminal	connection
4A+	signal +
4B-	signal -
43	shield

**inputs<sup>2</sup>**

terminal strip KL2

terminal	temperature probe				passive current source connection of an active input	active current source connection of a passive input
	with connector		without connector			
	direct connection	connection with extension cable	direct connection	connection with extension cable		
T1a to T4a	red	red	red	white	not connected	not connected
T1A to T4A	red/blue	gray	red	black	-	+
T1b to T4b	white/blue	blue	white	red	+	not connected
T1B to T4B	white	white	white	green	not connected	-
S1 to S4	shield	shield	-	-	not connected	not connected

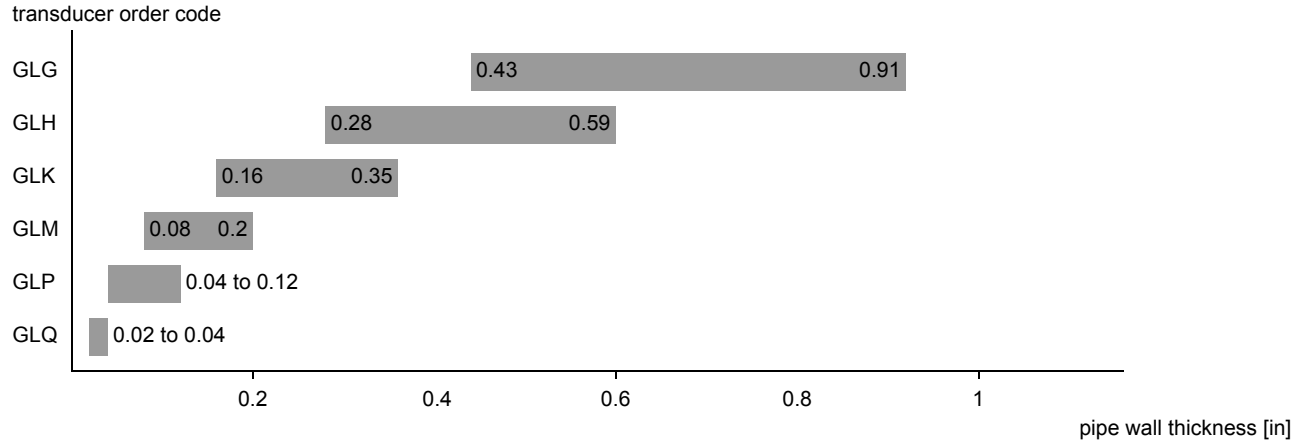
<sup>2</sup> The number, type and terminal assignment of the outputs and inputs will be customized.

## Transducers

### Transducer Selection

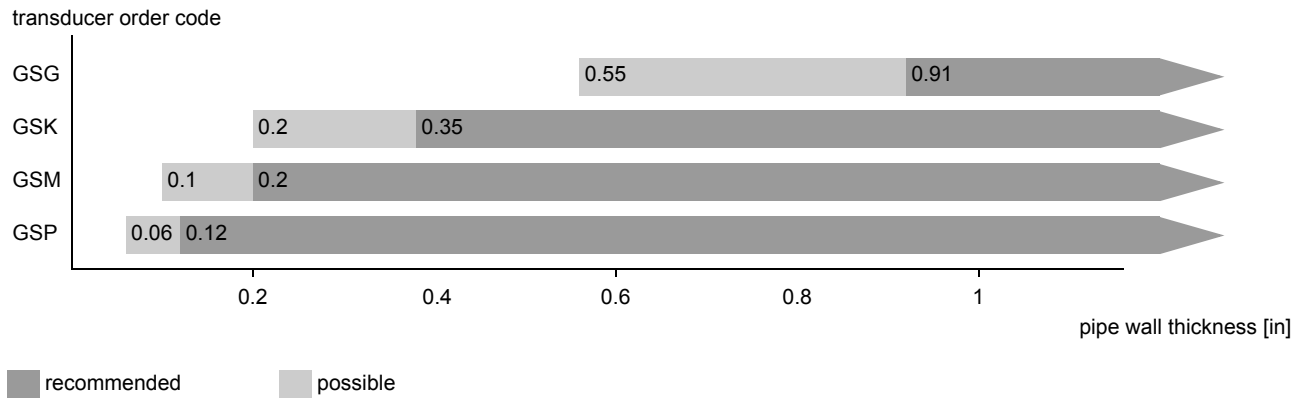
#### Step 1a

Select a Lamb wave transducer:



#### Step 1b

If the pipe wall thickness is not in the range of the Lamb wave transducers, select a shear wave transducer:

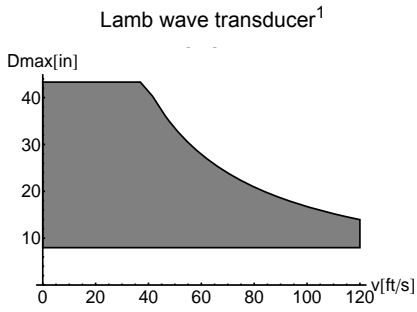


#### Step 2

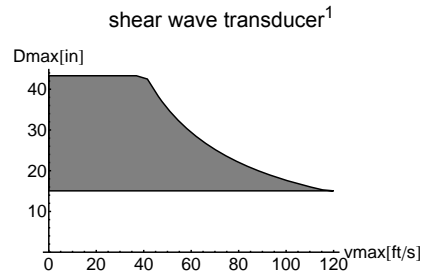
inner pipe diameter  $d$  dependent on the flow velocity  $v$  of the medium in the pipe

The transducers are selected from the characteristics (see next page). Lamb wave transducers are selected from the left column, shear wave transducers from the right column.

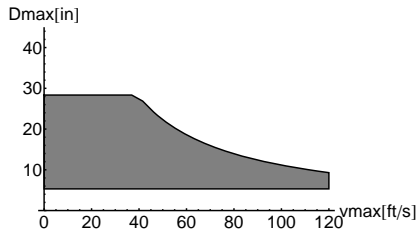
Lamb wave transducers: If the values  $d$  and  $v$  are not in the range, the diagonal arrangement with 1 sound path may be used, i.e. the same characteristics can be used with doubling the inner pipe diameter. If the values are still not in the range, shear waves transducers regarding the pipe wall thickness have to be selected in step 1b.



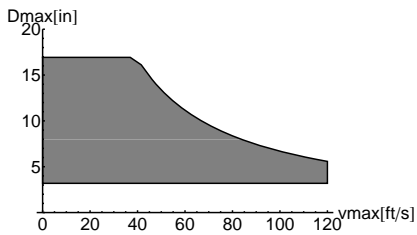
GLG



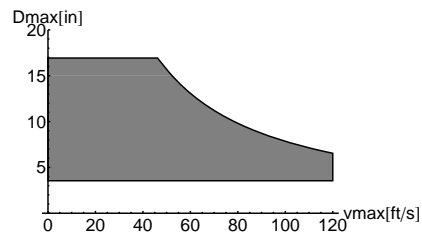
GSG



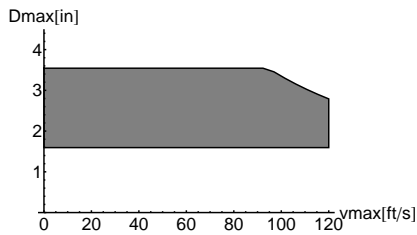
GLH



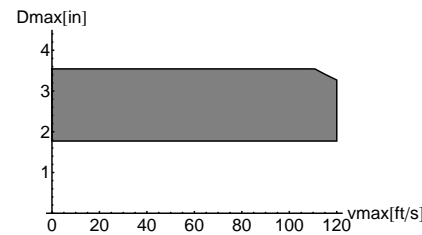
GLK



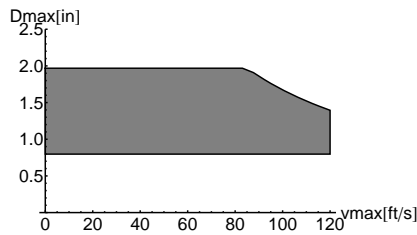
GSK



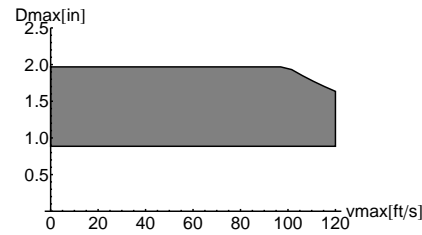
GLM



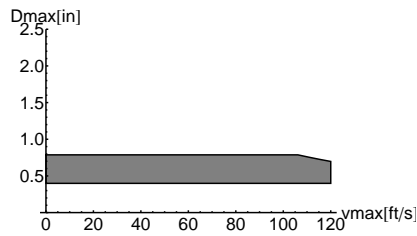
GSM



GLP



GSP



GLQ

<sup>1</sup> inner pipe diameter and max. flow velocity for a typical application with natural gas, nitrogen, oxygen in reflect arrangement with 2 sound paths (Lamb wave transducers)/1 sound path (shear wave transducers)

**Step 3**

min. medium pressure

Lamb wave transducer			
transducer order code	medium pressure <sup>1</sup> [psi]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GLG	218	145	15
GLH	218	145	15
GLK	218 (d > 4.7 in) 145 (d < 4.7 in)	145 (d > 4.7 in) 73 (d < 4.7 in)	15
GLM	145 (d > 2.4 in) 73 (d < 2.4 in)	-	15
GLP	145 (d > 1.4 in) 73 (d < 1.4 in)	-	15
GLQ	145 (d > 0.59 in) 73 (d < 0.59 in)	-	15

shear wave transducer			
transducer order code	medium pressure <sup>1</sup> [psi]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GSG	435	290	15
GSK	435	290	15
GSM	435	290	15
GSP	435	290	15

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

d = inner pipe diameter

**Example**

step						
1	pipe wall thickness selected transducer	in	0.47 GLG or GLH	0.47 GLG or GLH	0.47 GLG or GLH	1.2 GS
2	inner pipe diameter max. flow velocity selected transducer	in ft/s	31.5 49 GLG	23.6 49 GLG or GLH	31.5 98 values not in the range of the characteristics, but by using direct mode, the inner pipe diameter in the characteristics is doubled: GLG	11.8 49 GSK
3	min. medium pressure selected transducer	psi	247 GLG	247 GLG or GLH influence of acoustic noise is reduced with increased transducer frequency, thus recommended: GLH	247 GLG	508 GSK

**Step 4**

for the characters 4 to 11 of the transducer order code (ambient temperature, explosion protection, connection system, extension cable) see page 16

**Step 5**

for the technical data of the selected transducer see page 17 et seqq.

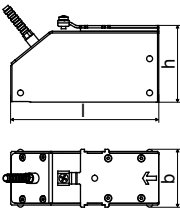
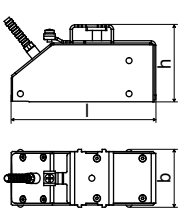


### Transducer Order Code

1, 2	3	4	5, 6	7, 8	9 to 11	12, 13	no. of character				
transducer	transducer frequency	-	ambient temperature	explosion protection	connection system	-	extension cable	/	option		description
GL											set of ultrasonic flow transducers for gas measurement, Lamb wave
GS											set of ultrasonic flow transducers for gas measurement, shear wave
	G										0.2 MHz
	H										0.3 MHz (Lamb wave only)
	K										0.5 MHz
	M										1 MHz
	P										2 MHz
	Q										4 MHz (Lamb wave only)
			N								normal temperature range
			E								extended temperature range (shear wave transducers with transducer frequency M, P)
				F2							FM Class I Div. 2
				NN							not explosion proof
					TS						direct connection or connection via junction box
							XXX				cable length in m, for max. length of extension cable see page 29 0 m: without junction box > 0 m: with junction box JB03 or JBP3 (transducers NEMA 6P)
									IP68		degree of protection NEMA6P
									OS		housing with stainless steel 316
example											
GL	K	-	N	F2	TS	-	030				Lamb wave transducer 0.5 MHz, normal temperature range, FM Class I Div. 2, connection system TS with junction box JB03 and extension cable 30 m (98 ft)
		-				-		/			



## Technical Data

### Shear Wave Transducers (FM or not explosion proof)

technical type		GDG1N52	GDK1N52
order code		<b>GSG-NF2TS</b> <b>GSG-NF2TS/OS</b> <b>GSG-NNNTS</b> <b>GSG-NNNTS/OS</b>	<b>GSK-NF2TS</b> <b>GSK-NF2TS/OS</b> <b>GSK-NNNTS</b> <b>GSK-NNNTS/OS</b>
transducer frequency	MHz	0.2	0.5
<b>medium pressure<sup>1</sup></b>			
min. extended	psi	metal pipe: 290	metal pipe: 290
min.	psi	metal pipe: 435 plastic pipe: 15	metal pipe: 435 plastic pipe: 15
<b>inner pipe diameter d<sup>2</sup></b>			
min. extended	in	9.8	2.8
min. recommended	in	15	3.1
max. recommended	in	31.9	19.7
max. extended	in	43.3	28.3
<b>pipe wall thickness</b>			
min.	in	0.55	0.2
max.	in	-	-
<b>material</b>			
housing		PEEK with stainless steel cap 304, option OS: 316L	PEEK with stainless steel cap 304, option OS: 316L
contact surface		PEEK	PEEK
degree of protection		NEMA 6	NEMA 6
<b>transducer cable</b>			
type		1699	1699
length	ft	16	16
<b>dimensions</b>			
length l	in	5.1	4.98
width b	in	2.01	2.01
height h	in	2.64	2.66
dimensional drawing			
<b>ambient temperature</b>			
min.	°F	-40	-40
max.	°F	+266	+266
temperature compensation		x	x
<b>explosion protection</b>			
<b>F M</b>	order code	GSG-NF2TS GSG-NF2TS/OS	GSK-NF2TS GSK-NF2TS/OS
	<b>explosion protection temperature</b>		
	min.	°F	-40
	max.	°F	+257
	marking	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection	non incendive		

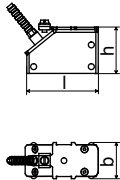
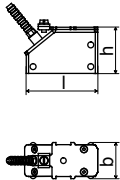
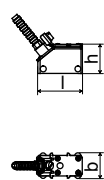



<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:

typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request

pipe diameter min. recommended/max. recommended/max. extended: in diagonal arrangement and for a flow velocity of 49 ft/s

**Shear Wave Transducers (FM or not explosion proof)**

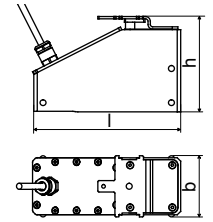
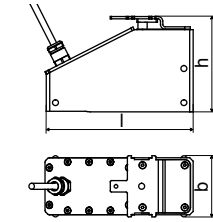
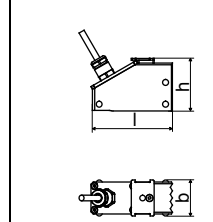
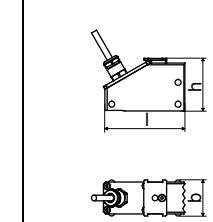
technical type		GDM2N52	GDP2N52	GDQ2N52
order code		<b>GSM-NF2TS</b> <b>GSM-NF2TS/OS</b> <b>GSM-NNNTS</b> <b>GSM-NNNTS/OS</b>	<b>GSP-NF2TS</b> <b>GSP-NF2TS/OS</b> <b>GSP-NNNTS</b> <b>GSP-NNNTS/OS</b>	<b>GSQ-NF2TS</b> <b>GSQ-NF2TS/OS</b> <b>GSQ-NNNTS</b> <b>GSQ-NNNTS/OS</b>
transducer frequency	MHz	1	2	4
<b>medium pressure<sup>1</sup></b>				
min. extended min.	psi psi	metal pipe: 290 metal pipe: 435 plastic pipe: 15	metal pipe: 290 metal pipe: 435 plastic pipe: 15	metal pipe: 290 metal pipe: 435 plastic pipe: 15
<b>inner pipe diameter d<sup>2</sup></b>				
min. extended	in	1.2	0.59	0.24
min. recommended	in	1.6	0.79	0.39
max. recommended	in	3.1	1.6	0.79
max. extended	in	4.7	2.4	1.2
<b>pipe wall thickness</b>				
min. max.	in in	0.1 -	0.06 -	0.04 -
<b>material</b>				
housing		PEEK with stainless steel cap 304, option OS: 316L	PEEK with stainless steel cap 304, option OS: 316L	PEEK with stainless steel cap 304, option OS: 316L
contact surface		PEEK	PEEK	PEEK
degree of protection		NEMA 6	NEMA 6	NEMA 6
<b>transducer cable</b>				
type		1699	1699	1699
length	ft	13	13	9
<b>dimensions</b>				
length l	in	2.52	2.52	1.57
width b	in	1.26	1.26	0.87
height h	in	1.59	1.59	1
dimensional drawing				
<b>ambient temperature</b>				
min. max.	°F °F	-40 +266	-40 +266	-40 +266
temperature compensation		x	x	x
<b>explosion protection</b>				
order code		GSM-NF2TS GSM-NF2TS/OS	GSP-NF2TS GSP-NF2TS/OS	GSQ-NF2TS GSQ-NF2TS/OS
<b>explosion protection temperature</b>				
min. max.	°F °F	-67 +374	-67 +374	-67 +374
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection		non incendive	non incendive	non incendive

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:

typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request  
 pipe diameter min. recommended/max. recommended/max. extended: in diagonal arrangement and for a flow velocity of 49 ft/s

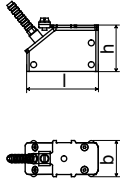
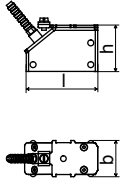
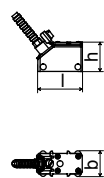



**Shear Wave Transducers (not explosion proof, NEMA 6P)**

technical type		GDG1LI8	GDK1LI8	GDM2LI8	GDP2LI8	
order code		<b>GSG-NNNTS/IP68</b>	<b>GSK-NNNTS/IP68</b>	<b>GSM-NNNTS/IP68</b>	<b>GSP-NNNTS/IP68</b>	
transducer frequency		MHz 0.2	0.5	1	2	
<b>medium pressure<sup>1</sup></b>						
min. extended min.		psi psi	metal pipe: 290 metal pipe: 435 plastic pipe: 15	metal pipe: 290 metal pipe: 435 plastic pipe: 15	metal pipe: 290 metal pipe: 435 plastic pipe: 15	
<b>inner pipe diameter d<sup>2</sup></b>						
min. extended		in	9.8	2.8	1.2	0.59
min. recommended		in	15	3.1	1.6	0.79
max. recommended		in	31.9	19.7	3.1	1.6
max. extended		in	43.3	28.3	4.7	2.4
<b>pipe wall thickness</b>						
min.		in	0.55	0.2	0.1	0.06
max.		in	-	-	-	-
<b>material</b>						
housing			PEEK with stainless steel cap 316Ti	PEEK with stainless steel cap 316Ti	PEEK with stainless steel cap 316Ti	PEEK with stainless steel cap 316Ti
contact surface			PEEK	PEEK	PEEK	PEEK
degree of protection			NEMA 6P	NEMA 6P	NEMA 6P	NEMA 6P
<b>transducer cable</b>						
type			2550	2550	2550	2550
length		ft	39	39	39	39
<b>dimensions</b>						
length l		in	5.12	5.12	2.76	2.76
width b		in	2.13	2.13	1.26	1.26
height h		in	3.29	3.29	1.81	1.81
dimensional drawing						
<b>ambient temperature</b>						
min.		°F	-40	-40	-40	-40
max.		°F	+212	+212	+212	+212
temperature compensation			x	x	x	x

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:  
 typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request  
 pipe diameter min. recommended/max. recommended/max. extended: in diagonal arrangement and for a flow velocity of 49 ft/s

**Shear Wave Transducers (extended temperature range, FM or not explosion proof)**

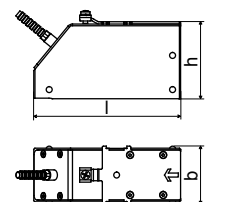
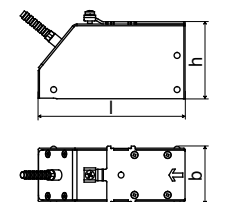
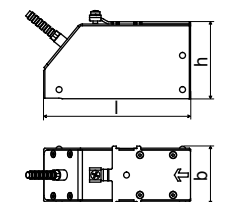



technical type		GDM2E52	GDP2E52	GDQ2E52
order code		<b>GSM-EF2TS</b> <b>GSM-EF2TS/OS</b> <b>GSM-ENNTS</b> <b>GSM-ENNTS/OS</b>	<b>GSP-EF2TS</b> <b>GSP-EF2TS/OS</b> <b>GSP-ENNTS</b> <b>GSP-ENNTS/OS</b>	<b>GSQ-EF2TS</b> <b>GSQ-EF2TS/OS</b> <b>GSQ-ENNTS</b> <b>GSQ-ENNTS/OS</b>
transducer frequency	MHz	1	2	4
<b>medium pressure<sup>1</sup></b>				
min. extended min.	psi psi	metal pipe: 290 metal pipe: 435 plastic pipe: 15	metal pipe: 290 metal pipe: 435 plastic pipe: 15	metal pipe: 290 metal pipe: 435 plastic pipe: 15
<b>inner pipe diameter d<sup>2</sup></b>				
min. extended	in	1.2	0.59	0.24
min. recommended	in	1.6	0.79	0.39
max. recommended	in	3.1	1.6	0.79
max. extended	in	4.7	2.4	1.2
<b>pipe wall thickness</b>				
min.	in	0.1	0.06	0.04
max.	in	-	-	-
<b>material</b>				
housing		PI with stainless steel cap 304, option OS: 316L	PI with stainless steel cap 304, option OS: 316L	PI with stainless steel cap 304, option OS: 316L
contact surface		PI	PI	PI
degree of protection		NEMA 4	NEMA 4	NEMA 4
<b>transducer cable</b>				
type		6111	6111	6111
length	ft	13	13	9
<b>dimensions</b>				
length l	in	2.52	2.52	1.57
width b	in	1.26	1.26	0.87
height h	in	1.59	1.59	1
dimensional drawing				
<b>ambient temperature</b>				
min.	°F	-22	-22	-22
max.	°F	+392	+392	+392
temperature compensation		x	x	x
<b>explosion protection</b>				
order code		GSM-EF2TS GSM-EF2TS/OS	GSP-EF2TS GSP-EF2TS/OS	GSQ-EF2TS GSQ-EF2TS/OS
<b>explosion protection temperature</b>				
min.	°F	-49	-49	-49
max.	°F	+455	+455	+455
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection		non incendive	non incendive	non incendive

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> shear wave transducer:

typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request  
pipe diameter min. recommended/max. recommended/max. extended: in diagonal arrangement and for a flow velocity of 49 ft/s

**Lamb Wave Transducers (FM or not explosion proof)**

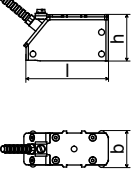
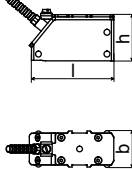
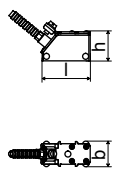


technical type		GRG1N52	GRH1N52	GRK1N52
order code		GLG-NF2TS GLG-NF2TS/OS GLG-NNNTS GLG-NNNTS/OS	GLH-NF2TS GLH-NF2TS/OS GLH-NNNTS GLH-NNNTS/OS	GLK-NF2TS GLK-NF2TS/OS GLK-NNNTS GLK-NNNTS/OS
transducer frequency	MHz	0.2	0.3	0.5
<b>medium pressure<sup>1</sup></b>				
min. extended	psi	metal pipe: 145	metal pipe: 145	metal pipe: 145 (d > 4.7 in) 73 (d < 4.7 in)
min.	psi	metal pipe: 218 plastic pipe: 15	metal pipe: 218 plastic pipe: 15	metal pipe: 218 (d > 4.7 in) 145 (d < 4.7 in) plastic pipe: 15
<b>inner pipe diameter d<sup>2</sup></b>				
min. extended	in	7.5	4.7	2.4
min. recommended	in	8.7	5.5	3.1
max. recommended	in	35.4	23.6	11.8
max. extended	in	63	39.4	19.7
<b>pipe wall thickness</b>				
min.	in	0.43	0.28	0.16
max.	in	0.91	0.59	0.35
<b>material</b>				
housing		PPSU with stainless steel cap 304, option OS: 316L	PPSU with stainless steel cap 304, option OS: 316L	PPSU with stainless steel cap 304, option OS: 316L
contact surface		PPSU	PPSU	PPSU
degree of protection		NEMA 6	NEMA 6	NEMA 6
<b>transducer cable</b>				
type		1699	1699	1699
length	ft	16	16	16
<b>dimensions</b>				
length l	in	5.06	5.06	5.06
width b	in	2.01	2.01	2.01
height h	in	2.66	2.66	2.66
dimensional drawing				
<b>ambient temperature</b>				
min.	°F	-40	-40	-40
max.	°F	+338	+338	+338
temperature compensation		x	x	x
<b>explosion protection</b>				
order code		GLG-NF2TS GLG-NF2TS/OS	GLH-NF2TS GLH-NF2TS/OS	GLK-NF2TS GLK-NF2TS/OS
<b>explosion protection temperature</b>				
min.	°F	-40	-40	-40
max.	°F	+329	+329	+329
marking		 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection		non incandive	non incandive	non incandive

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> Lamb wave transducer:

typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request  
 pipe diameter min. recommended/max. recommended: in reflect arrangement and for a flow velocity of 49 ft/s  
 pipe diameter max. extended: in diagonal arrangement and for a flow velocity of 82 ft/s

**Lamb Wave Transducers (FM or not explosion proof)**

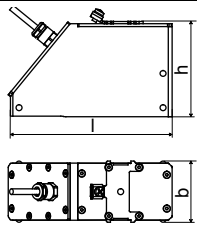
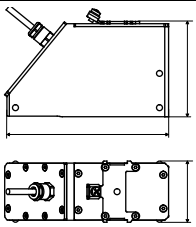
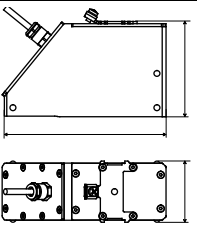
technical type		GRM1N52	GRP1N52	GRQ1N52
order code		<b>GLM-NF2TS</b> <b>GLM-NF2TS/OS</b> <b>GLM-NNNTS</b> <b>GLM-NNNTS/OS</b>	<b>GLP-NF2TS</b> <b>GLP-NF2TS/OS</b> <b>GLP-NNNTS</b> <b>GLP-NNNTS/OS</b>	<b>GLQ-NF2TS</b> <b>GLQ-NF2TS/OS</b> <b>GLQ-NNNTS</b> <b>GLQ-NNNTS/OS</b>
transducer frequency		MHz 1	2	4
<b>medium pressure<sup>1</sup></b>				
min. extended min.		psi psi	-	-
		metal pipe: 145 (d > 2.4 in) 73 (d < 2.4 in) plastic pipe: 15	metal pipe: 145 (d > 1.4 in) 73 (d < 1.4 in) plastic pipe: 15	metal pipe: 145 (d > 0.59 in) 73 (d < 0.59 in) plastic pipe: 15
<b>inner pipe diameter d<sup>2</sup></b>				
min. extended		in	1.2	0.59
min. recommended		in	1.6	0.79
max. recommended		in	3.5	2
max. extended		in	5.9	2.8
<b>pipe wall thickness</b>				
min.		in	0.08	0.04
max.		in	0.2	0.12
<b>material</b>				
housing			PPSU with stainless steel cap 304, option OS: 316L	PPSU with stainless steel cap 304, option OS: 316L
contact surface			PPSU	PPSU
degree of protection			NEMA 4	NEMA 4
<b>transducer cable</b>				
type			1699	1699
length		ft	13	9
<b>dimensions</b>				
length l		in	2.91	2.91
width b		in	1.26	1.26
height h		in	1.59	1.59
dimensional drawing				
				
<b>ambient temperature</b>				
min.		°F	-40	-40
max.		°F	+338	+338
temperature compensation			x	x
<b>explosion protection</b>				
order code			GLM-NF2TS GLM-NF2TS/OS	GLP-NF2TS GLP-NF2TS/OS
explosion protection temperature				
min.		°F	-67	-67
max.		°F	+329	+329
marking			 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860	 NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860
type of protection			non incandive	non incandive

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> Lamb wave transducer:

typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request  
 pipe diameter min. recommended/max. recommended: in reflect arrangement and for a flow velocity of 49 ft/s  
 pipe diameter max. extended: in diagonal arrangement and for a flow velocity of 82 ft/s

**Lamb Wave Transducers (not explosion proof, NEMA 6P)**

technical type		GRG1LI8	GRH1LI8	GRK1LI8
order code		<b>GLG-NNNTS/IP68</b>	<b>GLH-NNNTS/IP68</b>	<b>GLK-NNNTS/IP68</b>
transducer frequency		MHz 0.2	0.3	0.5
<b>medium pressure<sup>1</sup></b>				
min. extended	psi	metal pipe: 145	metal pipe: 145	metal pipe: 145 (d > 4.7 in), 73 (d < 4.7 in)
min.	psi	metal pipe: 218 plastic pipe: 15	metal pipe: 218 plastic pipe: 15	metal pipe: 218 (d > 4.7 in), 145 (d < 4.7 in) plastic pipe: 15
<b>inner pipe diameter d<sup>2</sup></b>				
min. extended	in	7.5	4.7	2.4
min. recommended	in	8.7	5.5	3.1
max. recommended	in	35.4	23.6	11.8
max. extended	in	63	39.4	19.7
<b>pipe wall thickness</b>				
min.	in	0.43	0.28	0.16
max.	in	0.91	0.59	0.35
<b>material</b>				
housing		PPSU with stainless steel cap 316Ti	PPSU with stainless steel cap 316Ti	PPSU with stainless steel cap 316Ti
contact surface		PPSU	PPSU	PPSU
degree of protection		NEMA 6P	NEMA 6P	NEMA 6P
<b>transducer cable</b>				
type		2550	2550	2550
length	ft	39	39	39
<b>dimensions</b>				
length l	in	5.65	5.65	5.65
width b	in	2.13	2.13	2.13
height h	in	3.29	3.29	3.29
dimensional drawing				
<b>ambient temperature</b>				
min.	°F	-40	-40	-40
max.	°F	+212	+212	+212
temperature compensation		x	x	x

<sup>1</sup> depending on application, typical absolute value for natural gas, nitrogen, compressed air

<sup>2</sup> Lamb wave transducer:

typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request

pipe diameter min. recommended/max. recommended: in reflect arrangement and for a flow velocity of 49 ft/s  
 pipe diameter max. extended: in diagonal arrangement and for a flow velocity of 82 ft/s

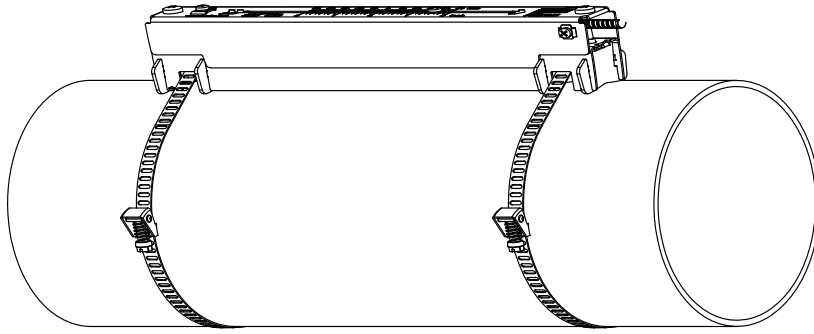
## Transducer Mounting Fixture

### Order Code

1, 2	3	4	5	6	7 to 9	10, 11	no. of character			
transducer mounting fixture	transducer	-	measuring mode	size	-	fixation	outer pipe diameter	/	option	description
PL										PermaLok
VL										PermaRail
	K									transducers with transducer frequency G, H, K
	M									transducers with transducer frequency M, P
	Q									transducers with transducer frequency Q
			D							reflect arrangement or diagonal arrangement/direct mode
			R							reflect arrangement
				S						small
				M						medium
				L						large
						S				tension straps
						W				welding
						N				without fixation
							SK1			0.5 to 2.5 in
							SK2			3 to 6 in
							SK3			8 to 10 in
							SK4			12 to 18 in
							SK5			20 to 36 in
							SK6			42 to 100 in
									IP68	degree of protection NEMA6P
									OS	housing with stainless steel 316
									Z	special design
example										
VL	K	-	D	S	-	S	200			PermaRail and tension straps for transducers with transducer frequency G, H, K
		-			-			/		

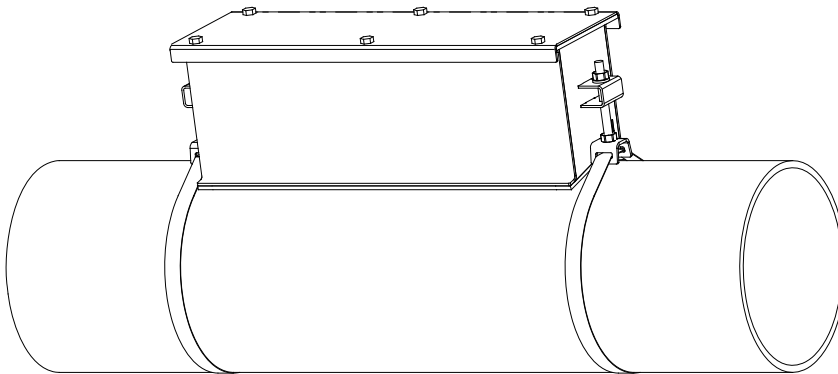


**PermaRail (VLK, VLM, VLQ)**



material: stainless steel 304,  
301, 410, 410  
option OS: 316, 316L, 17-7PH  
inner length:  
**VLK:** 13.7 in,  
option IP68: 14.5 in  
**VLM:** 9.2 in  
**VLQ:** 6.9 in  
dimensions:  
**VLK:** 16.65 x 3.54 x 3.66 in,  
option IP68: 17.44 x 3.7 x 4.13 in  
**VLM:** 12.17 x 2.24 x 2.48 in  
**VLQ:** 9.72 x 1.69 x 1.85 in

**PermaLok PL**



### Coupling Materials for Transducers

	normal temperature range (4th character of transducer order code = N)		extended temperature range (4th character of transducer order code = E)	
	< 212 °F	< 338 °F	< 302 °F	< 392 °F
< 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
long time measurement	coupling foil type VT <sup>1</sup>	coupling foil type VT <sup>2</sup>	coupling foil type VT <sup>1</sup>	coupling foil type VT <sup>2</sup>

<sup>1</sup> < 5 years  
<sup>2</sup> < 6 months

### Technical Data

type	order code	ambient temperature °F	material	remark
coupling compound type N	990739-1	-22 to +266	mineral grease paste	
coupling compound type E	990739-2	-22 to +392	silicone paste	
coupling compound type H	990739-3	-22 to +482	fluoropolymer paste	
coupling foil type VT	990739-0	14 to +392	fluoroelastomer	for transducers with transducer frequency G, H, K
	990739-6			for shear wave transducers with transducer frequency M, P
	990739-14			for shear wave transducers IP68 and Lambwave transducers with transducer frequency M, P
	990739-5			for transducers with transducer frequency Q

### Damping Mats (optional)

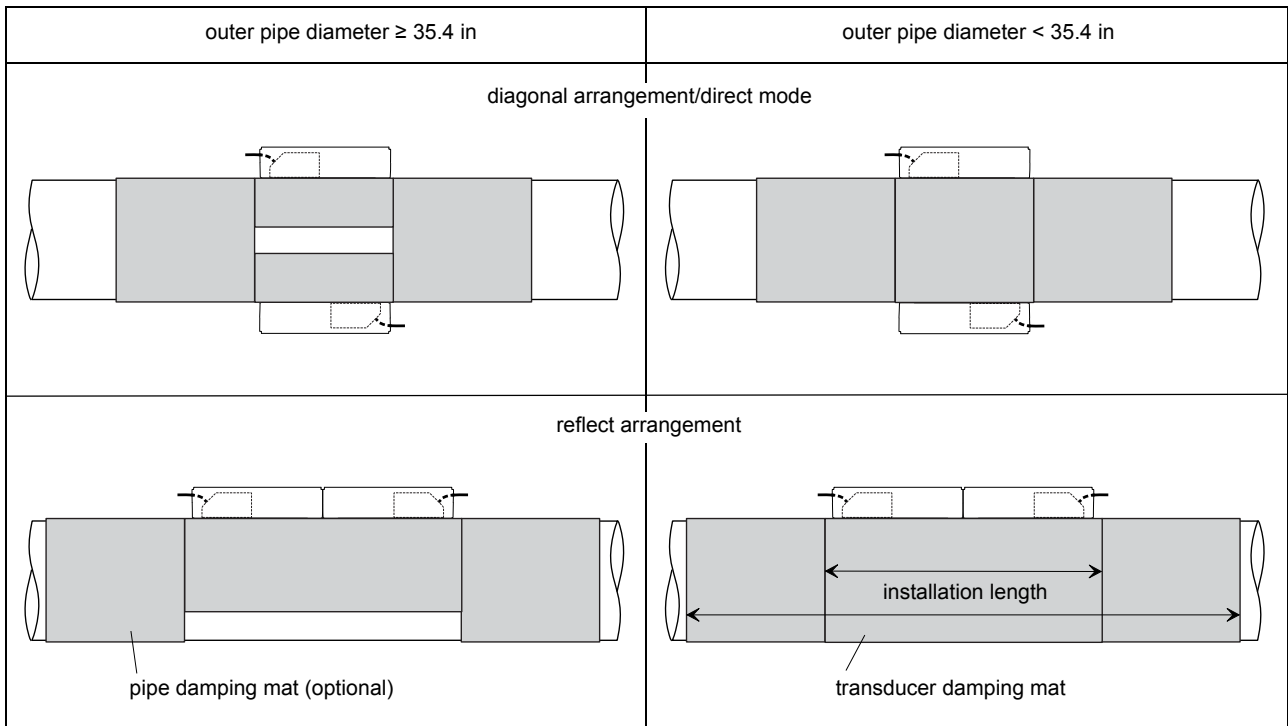
Damping mats will be used for the gas measurement to reduce acoustic noise influences on the measurement.

#### transducer damping mat

Transducer damping mats will be installed below the transducers.

#### pipe damping mat

Pipe damping mats will be installed if the sound propagation is disturbed at reflection points (e.g. flange, weld). Depending on the noise, the pipe damping mats will be installed at one or both sides of the transducer damping mat. If the local conditions



### Technical Data

type		E30R4	E30R3
width	in	8.9	2
thickness	in	0.03	
length (per roll)	ft	32	
weight	lb/ft <sup>2</sup>	2.2	
ambient temperature	°F	-22 to +1760	
properties		self-adhesive	

### Dimensioning

transducer		damping mat							
transducer mounting fixture	order code	type	number of layers	transducer damping mat			transducer damping mat + 2x pipe damping mat		
				max. installation length [in]	number of rolls <sup>1</sup> standard <sup>2</sup>   extended <sup>2</sup>		max. installation length [in]	number of rolls <sup>1</sup> standard   extended	
<b>PermaRail</b>									
VLK	GLG	E30R4	3	35	4	4	72	9	13
	GSG		3		4	4		9	11
	GLH		2		2	3		4	7
	GLK		1		1	1		1	2
	GSK		1		1	1		2	3
VLK-**-****/IP68	GLG	E30R4	3	36	5	5	75.2	10	14
	GSG		3		5	5		10	11
	GLH		2		2	3		5	7
	GLK		1		1	1		2	2
	GSK		1		1	2		2	3
VLM	GLM	E30R3	1	26	1	1	53.5	1	2
	GSM		1		1	1		2	
	GLP		1		1	1		1	
	GSP		1		1	1		1	
VLQ	GLQ	E30R3	1	21.3	1	1	44.1	1	1

<sup>1</sup> calculation on the base of:

- max. installation length (installation of one transducer mounting fixture per transducer in reflect arrangement) and
- max. recommended pipe diameter (standard) or max. extended pipe diameter (extended)  
(for inner pipe diameter max. recommended and max. extended see Technical Data of the Transducers from page 17)

<sup>2</sup> calculation for the number of rolls when both transducers are mounted in one transducer mounting fixture (reflect arrangement) or in diagonal arrangement/direct mode: number of rolls/2 and round up to the nearest integer

## Connection Systems

connection system TS		connection with extension cable	direct connection (only G704, G704.316SE)	transducers technical type
<p>JBP3</p>	<p>JB03</p>			****L*
				****52

transducer frequency (3d character of transducer order code)		G, H, K		M, P		Q		S		
T S	cable length	ft	x	l	x	l	x	l	x	l
	cable length (option LC)	ft	16	≤ 984	13	≤ 984	9	≤ 295	6	≤ 131
	cable length (option IP68)	ft	29	≤ 984	-	-	-	-	-	-
			39	≤ 984	39	≤ 984	-	-	-	-

x = transducer cable length

l = max. length of extension cable

## Transducer Cable

### Technical Data

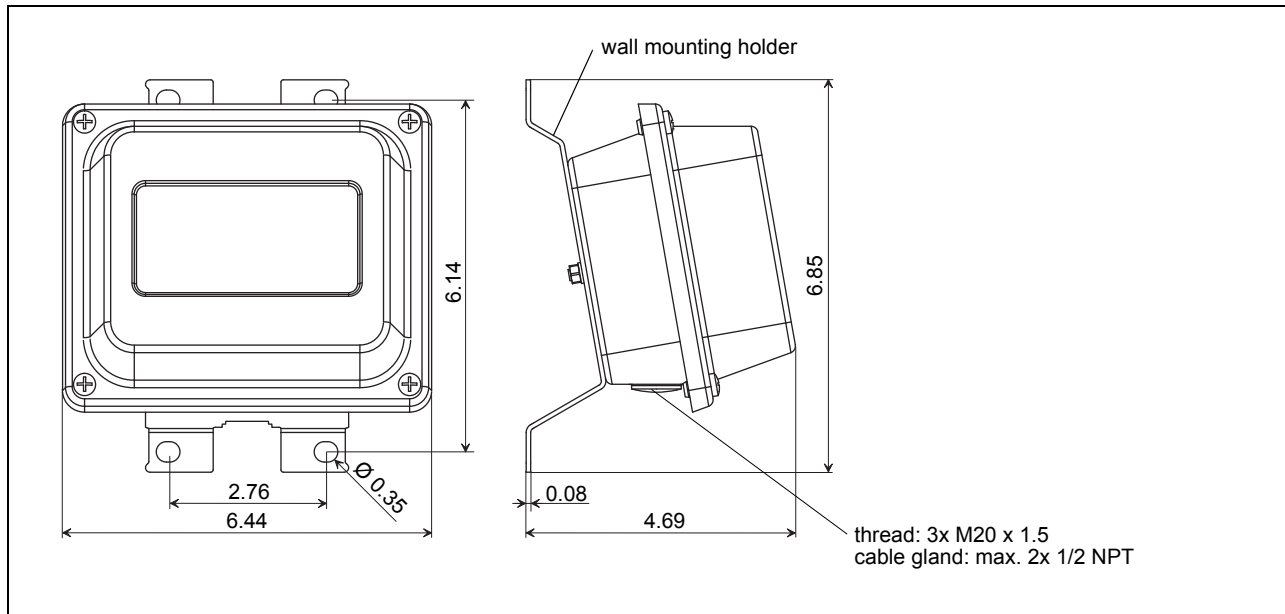
		transducer cable			extension cable
type		1699	2550 (option IP68)	6111	2615
standard length	ft	see table above			-
max. length	ft	-			see table above
ambient temperature	°F	-67 to +392	-40 to +212	-148 to +437	-40 to +158
properties			longitudinal water tight		halogen free fire propagation test according to IEC 60332-1 combustion test according to IEC 60754-2
<b>sheath</b>					
material		stainless steel 304 option OS: 316L	-	stainless steel 304 option OS: 316L	-
outer diameter	in	0.31	-	0.31	-
<b>cable jacket</b>					
material		PTFE	PUR	PFA	PUR
outer diameter	in	0.11	0.2 ±0.01	0.11	0.47
thickness	in	0.01	0.04	0.02	0.08
color		brown	gray	white	black
shield		x	x	x	x

## Junction Box

### Technical Data

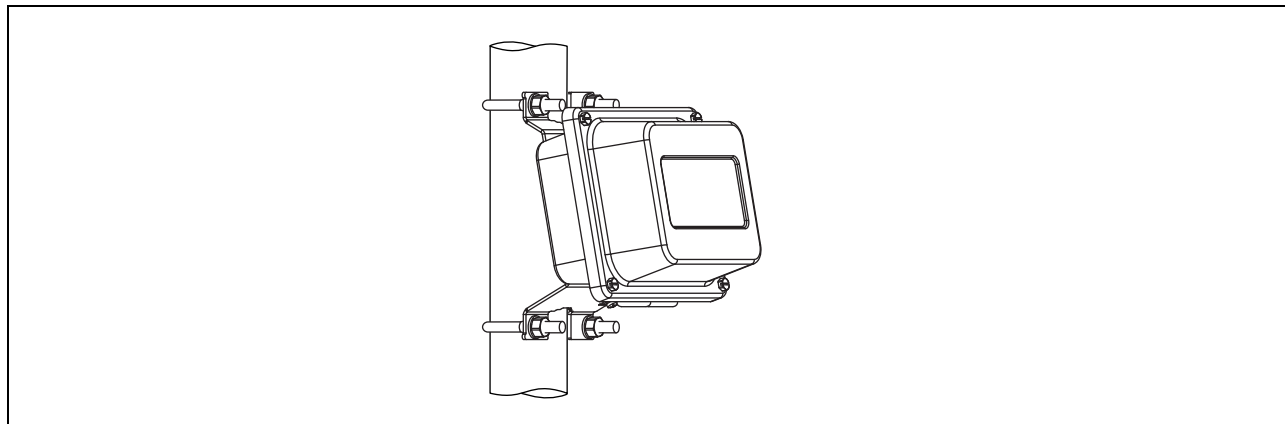
technical type	JB03		JBP3	
dimensions	see dimensional drawing		see dimensional drawing	
fixation	wall mounting, optional: 2 " pipe mounting		wall mounting, optional: 2 " pipe mounting	
<b>material</b>				
housing	stainless steel 304 option OS: 316L		stainless steel 316L	
gasket	silicone		silicone	
degree of protection	NEMA 6		NEMA 6	
<b>ambient temperature</b>				
min.	°F	-40		-40
max.	°F	+176		+176

### Dimensions



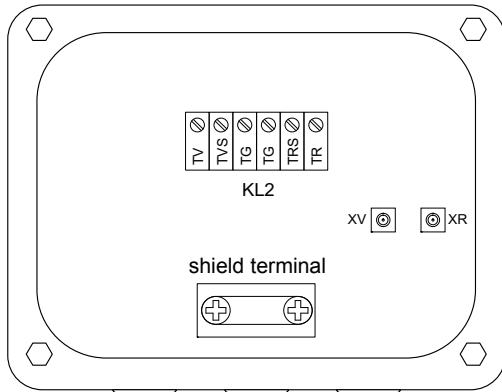
in inch

### 2 " Pipe Mounting Kit (optional)



## Terminal Assignment

### JB03



#### transducers

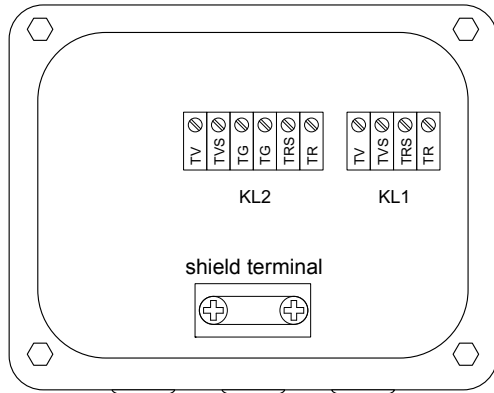
terminal	connection
XV	transducer ↗, SMB connector
XR	transducer ↘, SMB connector
cable gland	external shield

#### extension cable

terminal strip KL2

terminal	connection
TV	signal
TVS	internal shield
TRS	internal shield
TR	signal
shield terminal	external shield

### JBP3



#### transducers

terminal strip KL1

terminal	connection
TV	transducer ↗, signal
TVS	transducer ↗, internal shield
TRS	transducer ↘, internal shield
TR	transducer ↘, signal
cable gland	external shield

#### extension cable

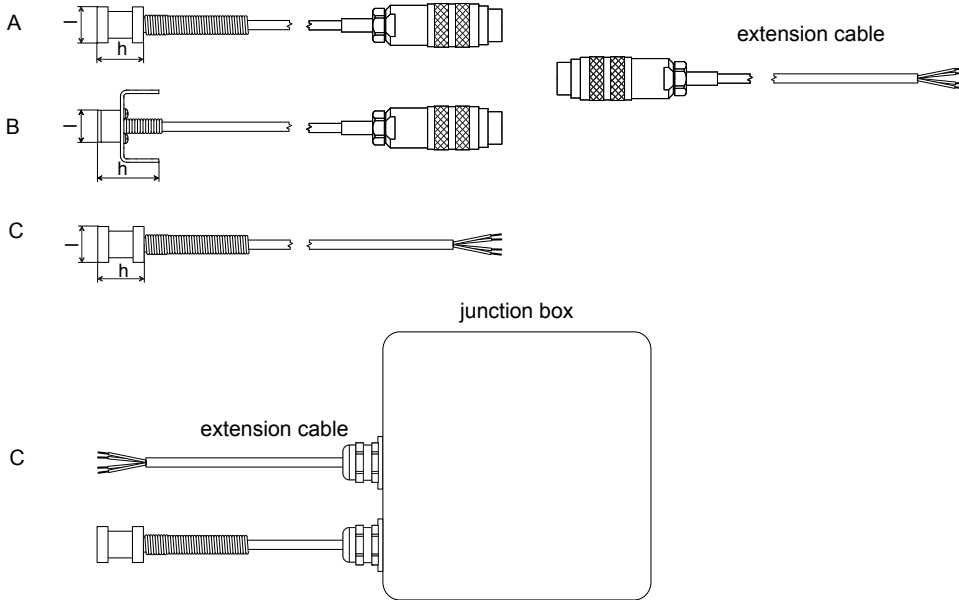
terminal strip KL2

terminal	connection
TV	signal
TVS	internal shield
TRS	internal shield
TR	signal
shield terminal	external shield

## Clamp-on Temperature Probe (optional)

### Technical Data

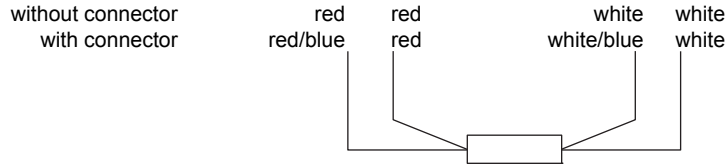
technical type		PT13N	PT13N	PT13N	PT13N	PT13F	PT13F
order code		670413-1	670412-1	770413-1	770412-1	670413-2	670412-2
design		with connector		without connector		with connector short response time	
type		Pt1000	Pt1000 matched according to EN 1434-1	Pt1000	Pt1000 matched according to EN 1434-1	Pt1000	Pt1000 matched according to EN 1434-1
connection		4-wire		4-wire		4-wire	
measuring range	°F	-22 to +482		-40 to +752 (see also Technical Data of Cable)		-58 to +482	
accuracy T		$\pm(0.27 \text{ }^\circ\text{F} + 2 \cdot 10^{-3} \cdot (T \text{ [}^\circ\text{F]} - 32 \text{ }^\circ\text{F}))$ class A		$\pm(0.27 \text{ }^\circ\text{F} + 2 \cdot 10^{-3} \cdot (T \text{ [}^\circ\text{F]} - 32 \text{ }^\circ\text{F}))$ class A		$\pm(0.27 \text{ }^\circ\text{F} + 2 \cdot 10^{-3} \cdot (T \text{ [}^\circ\text{F]} - 32 \text{ }^\circ\text{F}))$ class A	
accuracy $\Delta T$		-	$\leq 0.1 \text{ K}$ ( $3\text{K} < \Delta T < 6 \text{ K}$ ), more corresponding to EN 1434-1	-	$\leq 0.03 \text{ }^\circ\text{F}$ (at 50 °F) 3 point $\Delta T$ check, more corresponding to EN 1434-1	-	$\leq 0.1 \text{ K}$ ( $3\text{K} < \Delta T < 6 \text{ K}$ ), more corresponding to EN 1434-1
response time	s	50				8	
housing		aluminum		360 brass alloy		PEEK, stainless steel 304, copper	
degree of protection		NEMA 4		NEMA 4		NEMA 4	
weight (without connector)	lb	0.6	1.1	0.437	0.875	0.7	1.4
fixation		clamp-on		clamp-on		clamp-on	
accessories		-		-		plastic protection plate, insulation foam	
<b>dimensions</b>							
length l	in	0.59		0.59		0.55	
width b	in	0.59		0.49		1.18	
height h	in	0.79		0.79		1.06	
dimensional drawing		A		C		B	





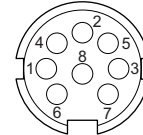
## Connection

### Temperature Probe



### Connector

pin	cable of temperature probe	extension cable
1	white/blue	blue
2	red/blue	gray
3, 4, 5	not connected	
6	red	red
7	white	white
8	not connected	



### Cable data

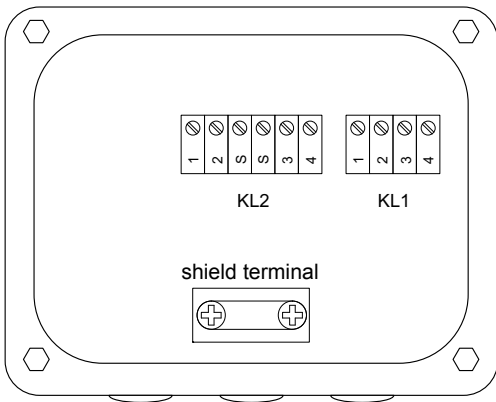
		with connector		without connector	
		cable of temperature probe	extension cable	cable of temperature probe	extension cable
type		4 x 0.25 mm <sup>2</sup> black or white	LIYCY 8 x 0.14 mm <sup>2</sup> gray	4 x 24 AWG	4 x 18 AWG
standard length	ft	9	16/32/82	23	-
max. length	ft	-	656	-	656
cable jacket		PTFE	PVC	fiberglass, PTFE	LS PVC
ambient temperature	°F			max. +752 (fiberglass) max. +266 (transition, PTFE)	

### Junction Box

technical type	<b>JBT3</b>	
dimensions	see dimensional drawing	
fixation	wall mounting optional: 2 " pipe mounting	
<b>material</b>		
housing	stainless steel 304	
gasket	silicone	
degree of protection	NEMA 6	
cable gland	max. 2x 1/2 NPT	
<b>ambient temperature</b>		
min.	°F	-40
max.	°F	+176

**Terminal Assignment**

**JBT3**



**temperature probe (with connector)**  
terminal strip KL1

terminal	connection
1	red
2	red/blue
3	white
4	white/blue

**extension cable (with connector)**  
terminal strip KL2

terminal	connection
1	red
2	gray
3	white
4	blue

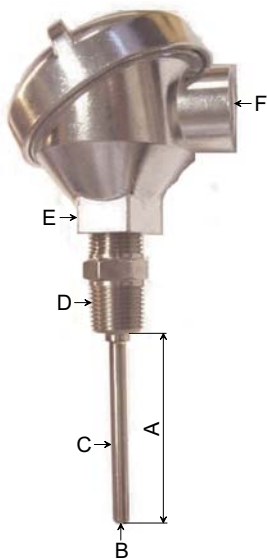
**temperature probe (without connector)**  
terminal strip KL1

terminal	connection
1	red
2	red
3	white
4	white

**extension cable (without connector)**  
terminal strip KL2

terminal	connection
1	white
2	black
3	green
4	red

**Wetted Temperature Probe (optional)**



	type	Pt1000
A	insertion length	6 " or specified length
B	resistance	1 000 Ω, 00385
C	insertion length sheath material	6 " or specified length stainless steel 316
D	thread	1/2 " NPT HEX CPLG. spring loaded
E	head	aluminum screw cover head 4 terminal block
F	thread	3/4 " NPT



FLEXIM AMERICAS Corporation  
Edgewood, NY 11717  
USA  
Tel.: (631) 492-2300  
Fax: (631) 492-2117

internet: [www.flexim.com](http://www.flexim.com)  
e-mail: [usinfo@flexim.com](mailto:usinfo@flexim.com)  
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