

Portable Ultrasonic Flow Measurement of Gas

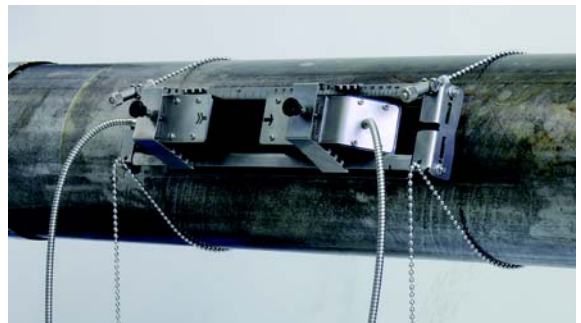
New portable instrument for non-invasive, quick ultrasonic flow measurement with clamp-on technology for all types of piping

Features

- Non-invasive measurement using the clamp-on method for precise bi-directional, highly dynamic flow measurement
- New portable, easy-to-use flowmeter with 2 flow measurement channels, multiple inputs/outputs, an integrated data logger and a serial interface in the standard version
- Automatic loading of calibration data and transducer detection, reduces set-up times and provides precise, long-term stable results
- Li-Ion battery for 14 hours of measurement operation
- Proven clamp-on method; transducers available for a wide range of rated diameters (DN 30...1600) and temperatures in the range of -40...+170 °C; resistant to dust and humidity
- Integrated wall thickness measurement
- Water and dust-tight; resistant against oil, many liquids and dirt
- Robust, water-tight (IP 67) transport case with comprehensive accessories
- QuickFix for fast mounting of the flowmeter in difficult conditions



FLUXUS G601 supported by handle



Measurement with transducers mounted by the portable Variofix mounting fixture

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
 - Supervision of permanently installed meters, service and maintenance



Measurement equipment in transport case

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Function

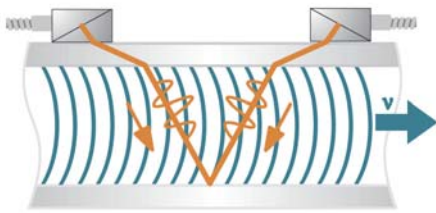
Measuring Principle

For the flow measurement of the medium, ultrasonic signals are used, employing the transit time difference principle. Ultrasonic signals are emitted by a transducer installed on one side of a pipe, reflected on the opposite side and received by a second transducer. These signals are emitted alternatively in flow direction and against it.

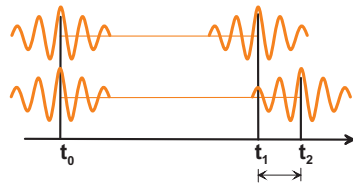
As the medium in which the signals propagate is flowing, the transit time of the ultrasonic signals in flow direction is shorter than against the flow direction.

The transit time difference Δt is measured and allows to determine the average flow velocity on the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area average of the flow velocity, which is proportional to the volume flow.

The received ultrasonic signals will be checked for their usefulness for the measurement and the plausibility of the measured values will be evaluated. The complete measuring cycle is controlled by the integrated microprocessors. Disturbance signals will be eliminated by statistical signal processing.



Path of the ultrasonic signal



Transit time difference Δt

Calculation of the Volume Flow

$$Q = k_{Re} \cdot A \cdot k_{\alpha} \cdot \Delta t / (2 \cdot t_t)$$

with:

Q - volume flow

k_{Re} - fluid mechanics correction factor

A - cross-sectional area of the pipe

k_{α} - flowmeter constant

Δt - transit time difference

t_t - transit time of the medium

Number of Sound Paths

The number of sound paths is the number of transits of the ultrasonic signals through the medium in the pipe.

reflection mode: number of sound paths = even, the transducers are mounted on the same side of the pipe, correct positioning of the transducers easier

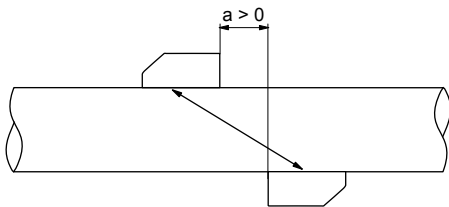
diagonal mode: number of sound paths = odd, the transducers are mounted on opposite sides of the pipe

The mode to be used depends on the application. If the number of sound paths is increased, the accuracy of the measurement will be better, but the signal attenuation is increased.

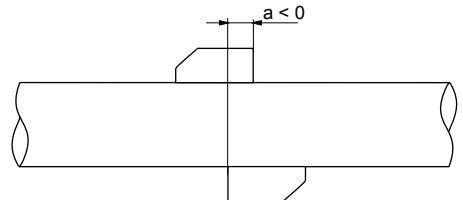
In case of a high signal attenuation by medium, pipe and coatings, diagonal mode with 1 sound path will be used.

The optimum number of sound paths for the parameters of the application will be determined automatically by the flowmeter

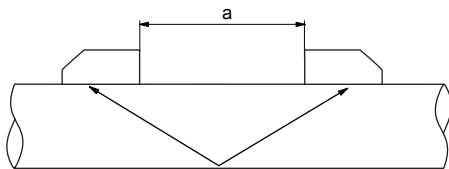
As the transducers can be mounted with the supplied transducer mounting fixture in reflection mode or diagonal mode the number of sound paths can be adjusted optimally to the application.



Diagonal mode, 1 sound path



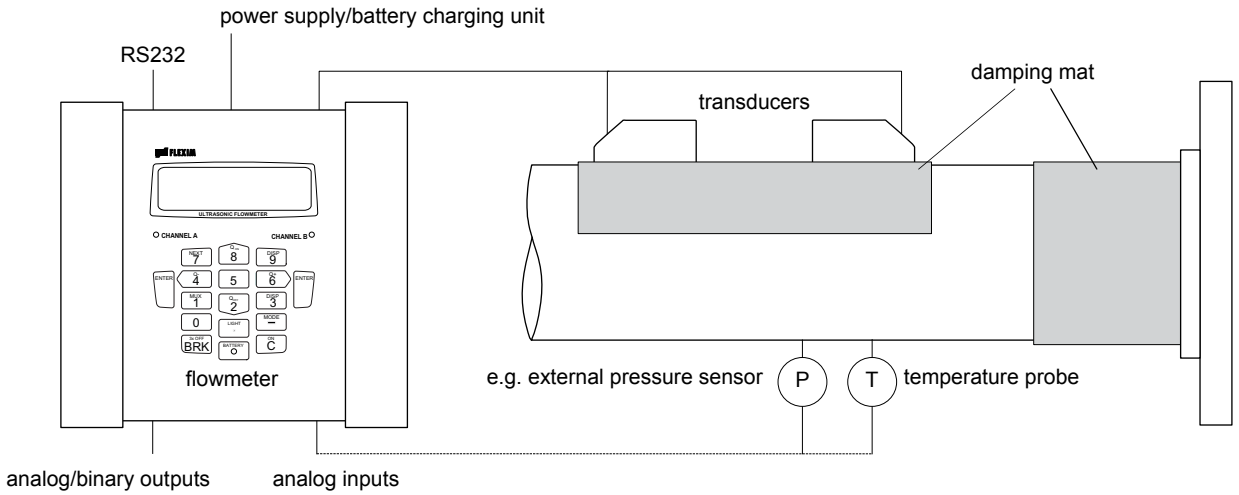
Diagonal mode, 1 sound path, negative transducer distance



Reflex mode, 2 sound paths

a - transducer distance

Typical Measurement Setup



Example for a measurement setup in reflection mode with FLUXUS G601, connection of the inputs with an external process pressure and process temperature measurement for standard volume flow calculation

Standard Volume Flow

The standard volume flow of the medium can be selected as physical quantity to be measured. It will be calculated internally by:

$$V_N = V \cdot p/p_N \cdot T_N/T \cdot 1/K$$

with:

- V_N - standard volume flow
- V - operational volume flow
- p_N - standard pressure (absolute value)
- p - operational pressure (absolute value)
- T_N - standard temperature in K
- T - operational temperature in K
- K - gas compressibility factor

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

Or:


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

The gas compressibility factor K will be entered in the flowmeter:

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

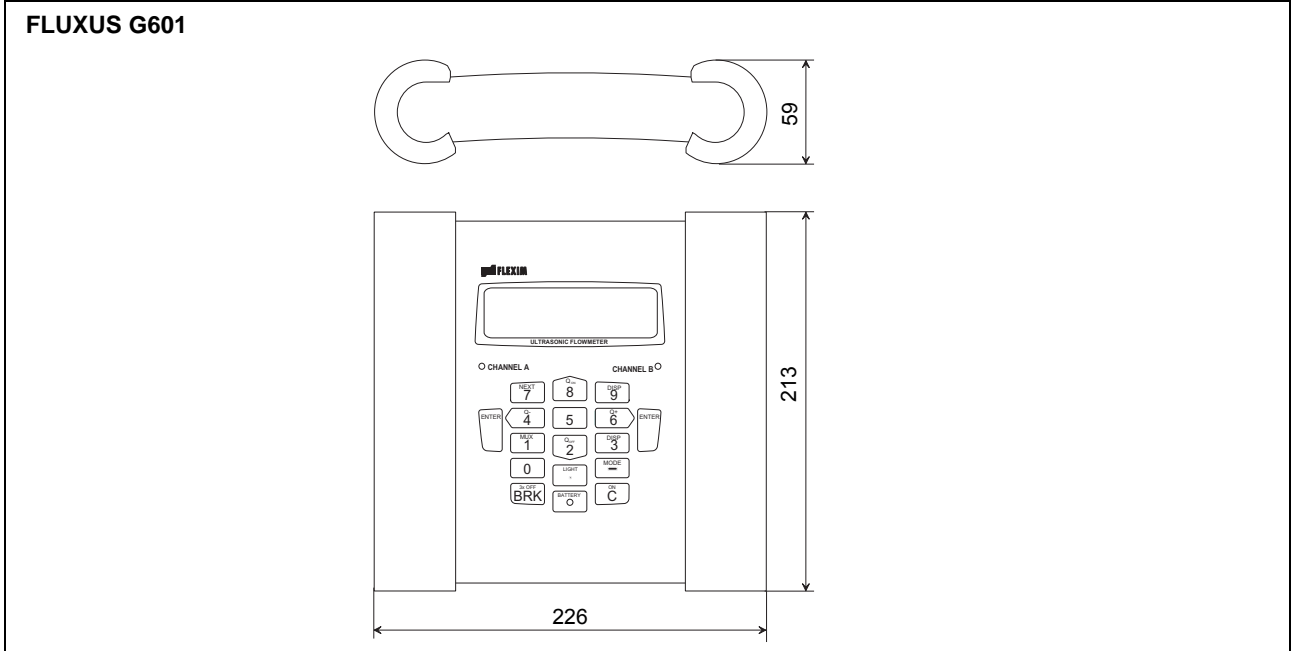
Flowmeter

Technical Data

FLUXUS	G601
design	portable
	
measurement	
measuring principle	transit time difference correlation principle
flow velocity	0.01...35 m/s, pipe diameter dependent
repeatability	0.15 % of reading ± 0.01 m/s
accuracy	
- volume flow	$\pm 1...3$ % of reading ± 0.01 m/s depending on application ± 0.5 % of reading ± 0.01 m/s with field calibration
medium	gases with a ratio of the characteristic acoustic impedances of pipe wall and gas < 3000, e.g. nitrogen, air, oxygen, hydrogen, argon, helium, ethylene, propane
flowmeter	
power supply	100...240 V/50...60 Hz (power supply), 10.5...15 V DC (socket at flowmeter) or integrated battery
battery	Li-Ion, 7.2 V/4.5 Ah operating time (without outputs, inputs and backlight): > 14 h
power consumption	< 6 W
number of flow measuring channels	2
signal damping	0...100 s, adjustable
measuring cycle (1 channel)	100...1000 Hz
response time	1 s (1 channel), option: 70 ms
material	PA, TPE, AutoTex, stainless steel
degree of protection according to EN 60529	IP 65
weight	1.9 kg
fixation	QuickFix pipe mounting fixture
operating temperature	-10...+60 °C
display	2 x 16 characters, dot matrix, backlit
menu language	English, German, French, Dutch, Spanish
measuring functions	
physical quantities	operational volume flow, standard volume flow, mass flow, vflow velocity
totalizers	volume, mass
calculation functions	average, difference, sum
data logger	
loggable values	all physical quantities and totalized values
capacity	> 100 000 measured values

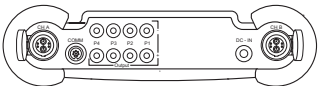
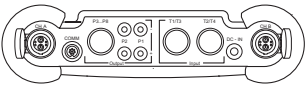
FLUXUS		G601	
communication			
interface	RS232/USB		
serial data kit			
software (all Windows™ versions)	- FluxData: download of measured data, graphical presentation, conversion to other formats (e.g. for Excel™) - FluxKoeff: creating medium data sets		
cable	RS232		
adapter	RS232 - USB		
outputs			
	The outputs are galvanically isolated from the flowmeter.		
number	see standard scopes of supply on page 9, max. on request		
accessories	output adapter (if number of outputs > 4)		
current output			
range	0/4...20 mA		
accuracy	0.1 % of reading ±15 µA		
active output	$R_{ext} < 200 \Omega$		
passive output	$U_{ext} = 4...16 \text{ V}$, dependent on R_{ext} $R_{ext} < 500 \Omega$		
frequency output			
range	0...10 kHz		
open collector	24 V/4 mA		
binary output			
optorelay	32 V/100 mA		
binary output as alarm output	limit, change of flow direction or error		
- functions			
binary output as pulse output	0.01...1000 units		
- pulse value			
- pulse width	1...1000 ms		
inputs			
	The inputs are galvanically isolated from the flowmeter.		
number	see standard scopes of supply on page 9, max. 4		
accessories	input adapter (if number of inputs > 2)		
temperature input			
designation	Pt100/Pt1000		
connection	4-wire		
range	-150...+560 °C		
resolution	0.01 K		
accuracy	±0.01 % of reading ±0.03 K		
current input			
range	passive: -20...+20 mA		
accuracy	0.1 % of reading ±10 µA		
passive input	$R_i = 50 \Omega$, $P_i < 0.3 \text{ W}$		
voltage input			
range	0...1 V		
accuracy	0.1 % of reading ±1 mV		
internal resistance	$R_i = 1 \text{ M}\Omega$		

Dimensions

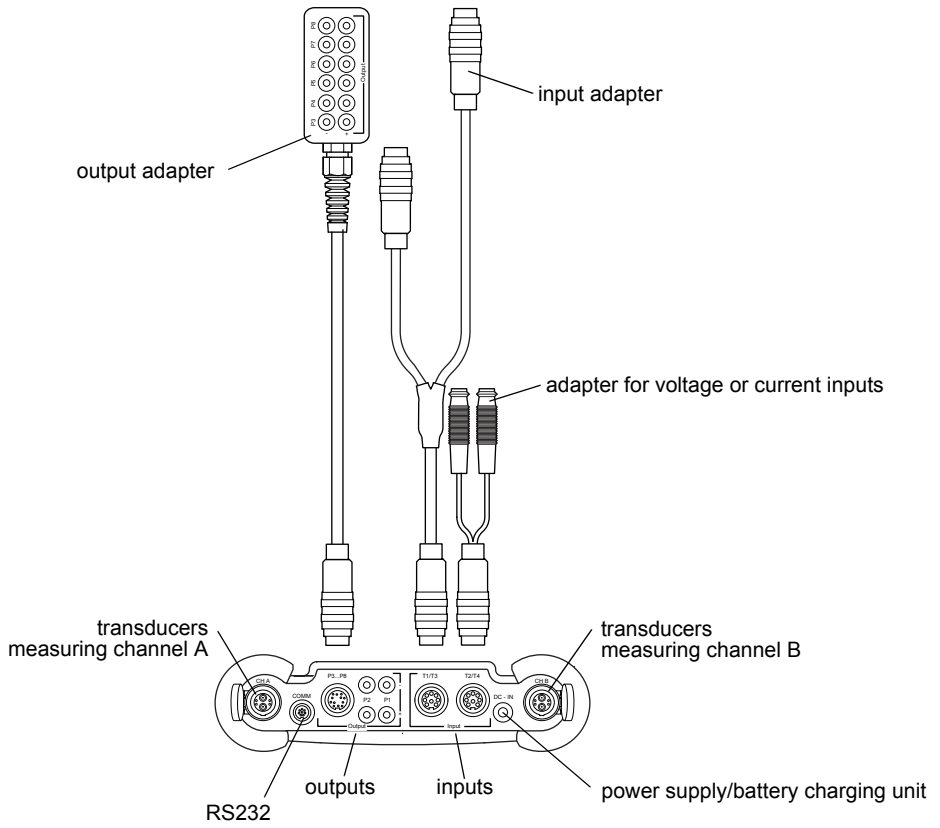


in mm

Standard Scopes of Supply

	G601 Standard	G601 Multifunctional
application	all flow measurements on gas	sophisticated measuring tasks, e.g. temporary substitute of other flowmeters with compensation of input quantities (e.g. density, viscosity) and simultaneous measured value output
inputs/outputs		
passive current output	2	2
binary output	2	2
frequency output	-	1
temperature input	-	1
passive current input	-	2
voltage input	-	1
accessories		
transport case	x	x
power supply, power cable	x	x
battery	x	x
output adapter	-	x
input adapter	-	2
adapter for voltage or current inputs	-	3
QuickFix pipe mounting fixture for flowmeter	x	x
serial data kit	x	x
textile tension belt for transducer mounting	4	4
portable Variofix mounting fixture PVF and chains	-	4
measuring tape	x	x
damping mats with installation kit	x	x
wall thickness probe	-	x
user manual, Quick Start Guide	x	x
connector board at the upper side of the flowmeter		

Connection of Adapters



Example for the Equipment of a Transport Case

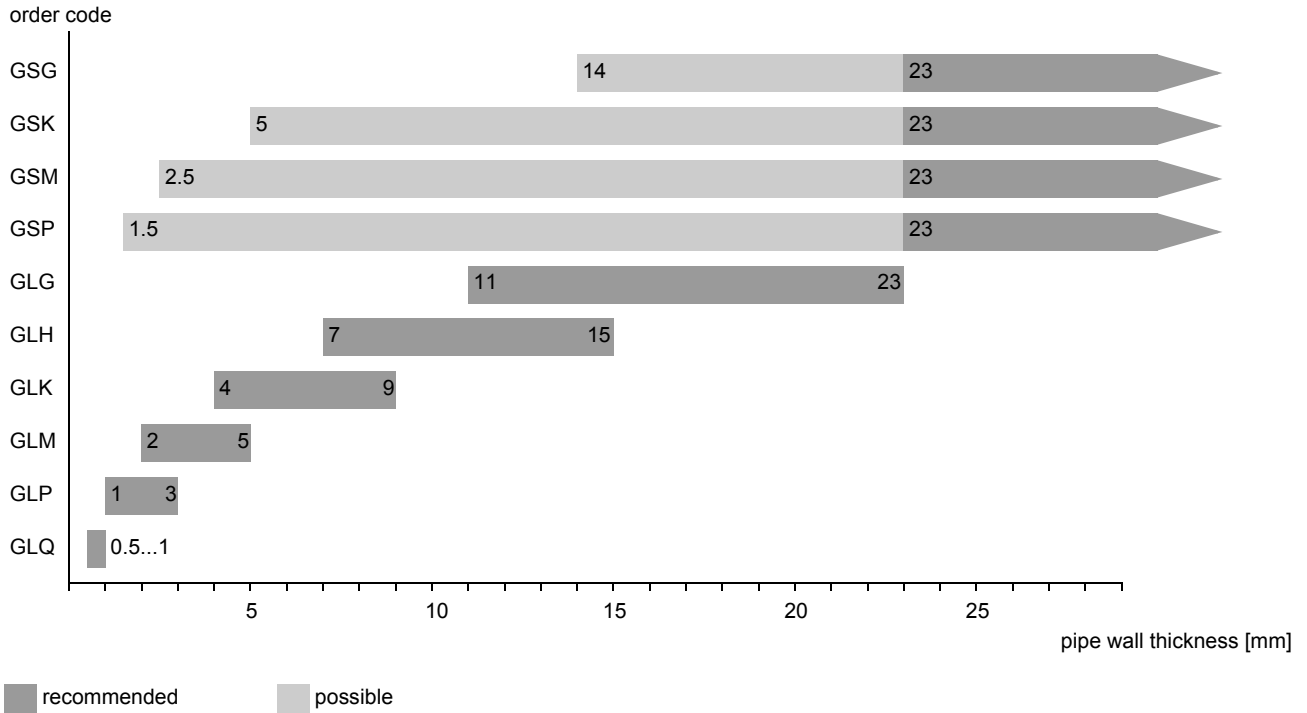


Transducers

Transducer Selection

Step 1:

pipe wall thickness ≤ 23 mm: Lamb wave transducers
 pipe wall thickness > 23 mm: shear wave transducers



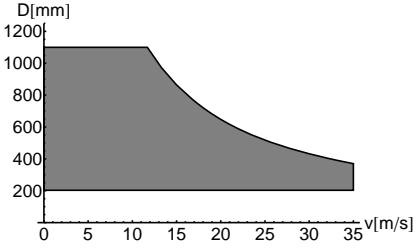
Step 2:

outer 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.

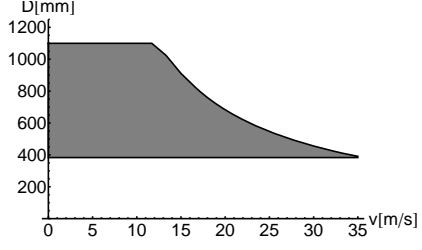
Lamb wave transducers: If the values D and v are not in the range, diagonal mode with 1 sound path may be used, i.e. the same characteristics can be used with doubling the outer pipe diameters. If the values are still not in the range, shear waves transducers regarding the pipe wall thickness have to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

Lamb wave transducers¹

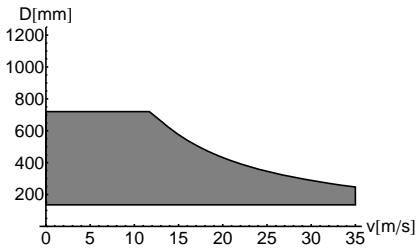


GLG

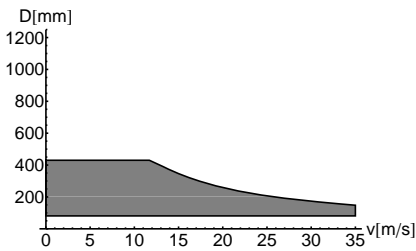
shear wave transducers¹



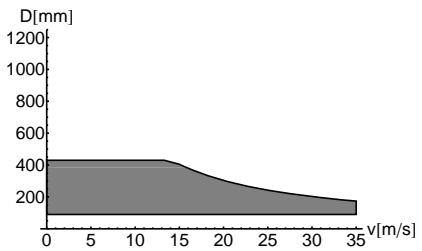
GSG



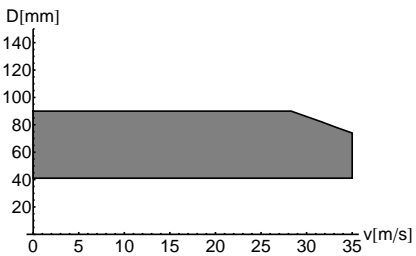
GLH



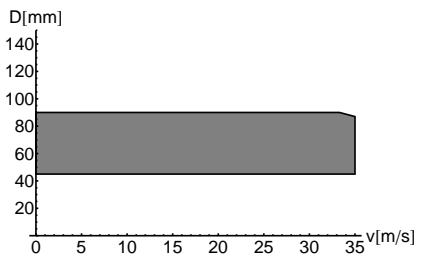
GLK



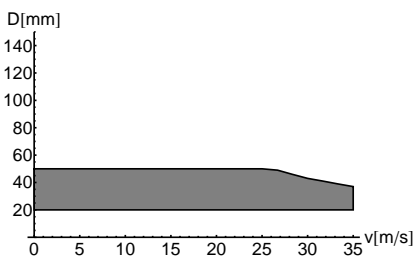
GSK



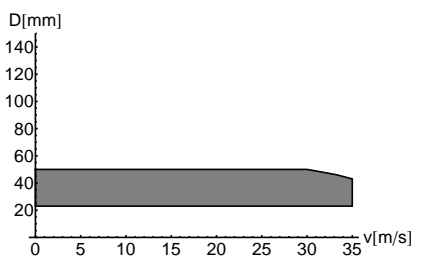
GLM



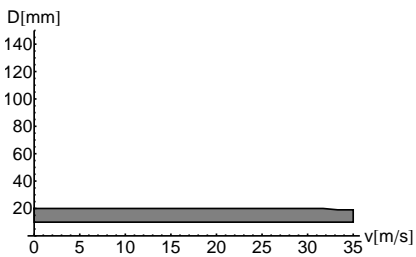
GSM



GLP



GSP



GLQ

¹ outer pipe diameter and max. flow velocity for a typical application with natural gas, N₂, O₂ in reflection mode with 2 sound paths (Lamb wave transducers)/1 sound path (shear wave transducers)

Step 3:

min. medium pressure

Lamb wave transducers			
order code	medium pressure [bar]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GLG	15	10	1
GLH	15	10	1
GLK	15 (> DN 120) 10 (< DN 120)	10 (> DN 120) 5 (< DN 120)	1
GLM	10 (> DN 60) 5 (< DN 60)	-	-
GLP	10 (> DN 35) 5 (< DN 35)	-	-
GLQ	10 (> DN 15) 5 (< DN 15)	-	-

shear wave transducers			
order code	medium pressure [bar]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GSG	30	20	1
GSK	30	20	1
GSM	30	20	1
GSP	30	20	1

Examples

step						
1	selected transducer	mm	12 GLG or GLH	12 GLG or GLH	12 GLG or GLH	30 GS
2	outer pipe diameter max. flow velocity selected transducer	mm m/s	800 15 GLG	600 15 GLG or GLH	800 30 values not in the range of the characteristics, but by using diagonal mode with 1 sound path, the outer pipe diameter in the characteristics is doubled: GLG	300 15 GSK
3	min. medium pressure selected transducer	bar	17 GLG	17 GLG or GLH influence of noise is reduced with increased transducer frequency, thus recommended: GLH	17 GLG	35 GSK

Step 4:

for determination of character 4...11 of the transducer order code (temperature, explosion protection, connection system, extension cable) see page 15

Step 5:

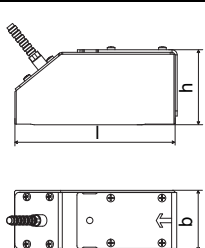
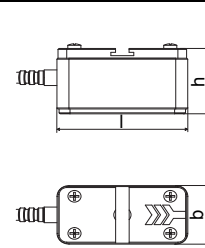
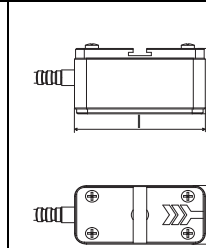
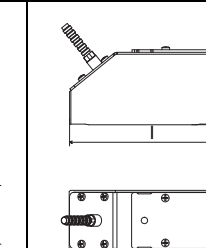
for the technical data of the selected transducer see page 16 et seqq.

Order Code Key for Transducers

1, 2	3	4	5, 6	7, 8	9...11	no. of character		
transducer model	transducer frequency	-	temperature	explosion protection	connection system	-	extension cable	
							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 (Lamb wave only)
	Q							4 MHz (Lamb wave only)
		N						normal temperature range
			NN					not explosion proof
				NL				with Lemo connector
						XXX	cable length in m, for max. length of extension cable see page 23	
example								
GL	K	-	N	NN	NL	-	000	Lamb wave transducer 0.5 MHz, normal temperature range, connection system NL with Lemo connector
		-				-		

Technical Data

Shear Wave Transducers

technical type		GDK1NZ7		GDM1NZ7		GDP1NZ7		GDG1NZ7	
order code		GSK-NNNNL		GSM-NNNNL		GSP-NNNNL		GSG-NNNNL	
transducer frequency		MHz		1		2		0.2	
medium pressure¹									
min. extended		bar		20		20		20	
min.		bar		metal pipe: 30 plastic pipe: 1		metal pipe: 30 plastic pipe: 1		metal pipe: 30 plastic pipe: 1	
outer pipe diameter²									
min. extended		mm		70		30		15	
min. recommended		mm		80		40		20	
max. recommended		mm		500		80		40	
max. extended		mm		720		120		60	
pipe wall thickness									
min.		mm		5		2.5		1.5	
max.		mm		-		-		-	
material									
housing		PEEK with stainless steel cap304 (1.4301)		stainless steel 304 (1.4301)		stainless steel 304 (1.4301)		PEEK with stainless steel cap304 (1.4301)	
contact surface		PEEK		PEEK		PEEK		PEEK	
degree of protection according to EN 60529		IP 67		IP 67		IP 67		IP 67	
transducer cable									
type		1699		1699		1699		1699	
length		m		5		4		4	
dimensions									
length l		mm		126.5		60		60	
width b		mm		47		30		30	
height h		mm		55.9		33.5		33.5	
dimensional drawing									
operating temperature									
min.		°C		-40		-40		-40	
max.		°C		+130		+130		+130	

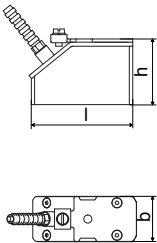
¹ depending on application, typical value for natural gas, N₂, compressed air

² shear wave transducers:

typical values for natural gas, N₂, O₂, pipe diameters for other gases on request

pipe diameter min. recommended/max. recommended/max. extended: in diagonal mode and for a flow velocity of 15 m/s

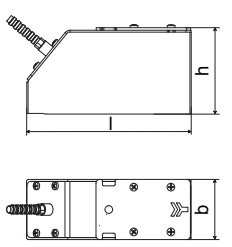
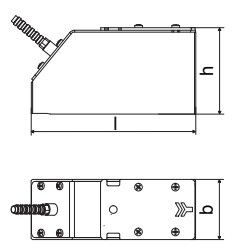
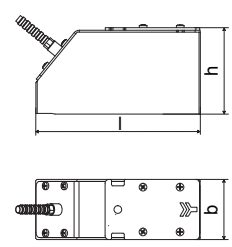
Shear Wave Transducers (high temperature)

technical type		GDM2EZ7	GDP2EZ7
order code		GSM-ENNNL	GSP-ENNNL
transducer frequency	MHz	1	2
medium pressure¹			
min. extended min.	bar bar	20 metal pipe: 30 plastic pipe: 1	20 metal pipe: 30 plastic pipe: 1
outer pipe diameter²			
min. extended	mm	30	15
min. recommended	mm	40	20
max. recommended	mm	80	40
max. extended	mm	120	60
pipe wall thickness			
min.	mm	2.5	1.5
max.	mm	-	-
material			
housing		PI with stainless steel cap304 (1.4301)	PI with stainless steel cap304 (1.4301)
contact surface		PI	PI
degree of protection according to EN 60529		IP 65	IP 65
transducer cable			
type		6111	6111
length	m	4	4
dimensions			
length l	mm	69.5	69.5
width b	mm	32.5	32.5
height h	mm	61	61
dimensional drawing			
operating temperature			
min.	°C	-30	-30
max.	°C	+200	+200

¹ depending on application, typical value for natural gas, N₂, compressed air

² shear wave transducers:
 typical values for natural gas, N₂, O₂, pipe diameters for other gases on request
 pipe diameter min. recommended/max. recommended/max. extended: in diagonal mode and for a flow velocity of 15 m/s

Lamb Wave Transducers

technical type		GRH1NC3	GRK1NC3	GRG1NC3
order code		GLH-NNNNL	GLK-NNNNL	GLG-NNNNL
transducer frequency	MHz	0.3	0.5	0.2
medium pressure¹				
min. extended	bar	metal pipe: 10	metal pipe: 10 (> DN 120) 5 (< DN 120)	metal pipe: 10
min.	bar	metal pipe: 15 plastic pipe: 1	metal pipe: 15 (> DN 120) 10 (< DN 120) plastic pipe: 1	metal pipe: 15 plastic pipe: 1
outer pipe diameter²				
min. extended	mm	120	60	190
min. recommended	mm	140	80	220
max. recommended	mm	600	300	900
max. extended	mm	1000	500	1600
pipe wall thickness				
min.	mm	7	4	11
max.	mm	15	9	23
material				
housing		PPSU with stainless steel cap304 (1.4301)	PPSU with stainless steel cap304 (1.4301)	PPSU with stainless steel cap304 (1.4301)
contact surface		PPSU	PPSU	PPSU
degree of protection according to EN 60529		IP 65	IP 65	IP 65
transducer cable				
type		1699	1699	1699
length	m	5	5	5
dimensions				
length l	mm	128.5	128.5	128.5
width b	mm	47	47	47
height h	mm	69.9	69.9	69.9
dimensional drawing				
operating temperature				
min.	°C	-40	-40	-40
max.	°C	+170	+170	+170

¹ depending on application, typical value for natural gas, N₂, compressed air

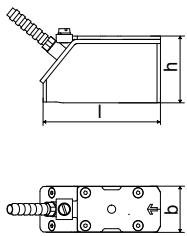
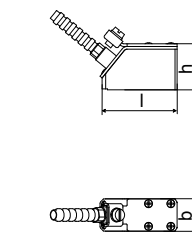
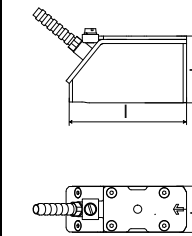
² Lamb wave transducers:

typical values for natural gas, N₂, O₂, pipe diameters for other gases on request

pipe diameter min. recommended/max. recommended: in reflection mode and for a flow velocity of 15 m/s

pipe diameter max. extended: in diagonal mode and for a flow velocity of 25 m/s

Lamb Wave Transducers

technical type		GRM1NC3	GRQ1NC3	GRP1NC3
order code		GLM-NNNNL	GLQ-NNNNL	GLP-NNNNL
transducer frequency	MHz	1	4	2
medium pressure¹				
min. extended min.	bar bar	- metal pipe: 10 (> DN 60) 5 (< DN 60)	- metal pipe: 10 (> DN 15) 5 (< DN 15)	- metal pipe: 10 (> DN 35) 5 (< DN 35)
outer pipe diameter²				
min. extended	mm	30	7	15
min. recommended	mm	40	10	20
max. recommended	mm	90	22	50
max. extended	mm	150	35	70
pipe wall thickness				
min.	mm	2	0.5	1
max.	mm	5	1	3
material				
housing		PPSU with stainless steel cap304 (1.4301)	PPSU with stainless steel cap304 (1.4301)	PPSU with stainless steel cap304 (1.4301)
contact surface		PPSU	PPSU	PPSU
degree of protection according to EN 60529		IP 65	IP 65	IP 65
transducer cable				
type		1699	1699	1699
length	m	4	3	4
dimensions				
length l	mm	74	42	74
width b	mm	28	18	28
height h	mm	42.9	25.5	42.9
dimensional drawing				
operating temperature				
min.	°C	-40	-40	-40
max.	°C	+170	+170	+170

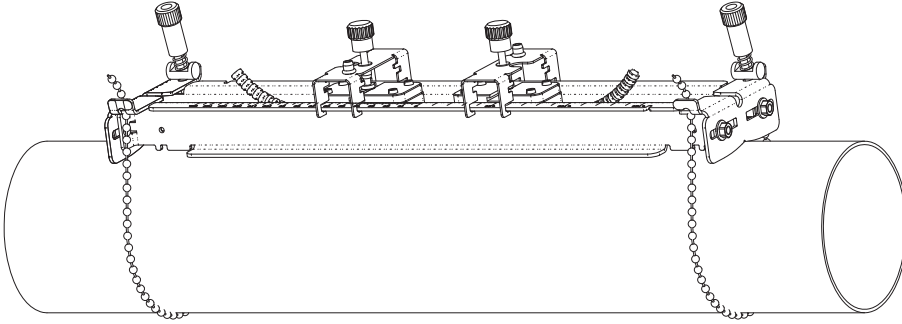
¹ depending on application, typical value for natural gas, N₂, compressed air

² Lamb wave transducers:

typical values for natural gas, N₂, O₂, pipe diameters for other gases on request
 pipe diameter min. recommended/max. recommended: in reflection mode and for a flow velocity of 15 m/s
 pipe diameter max. extended: in diagonal mode and for a flow velocity of 25 m/s

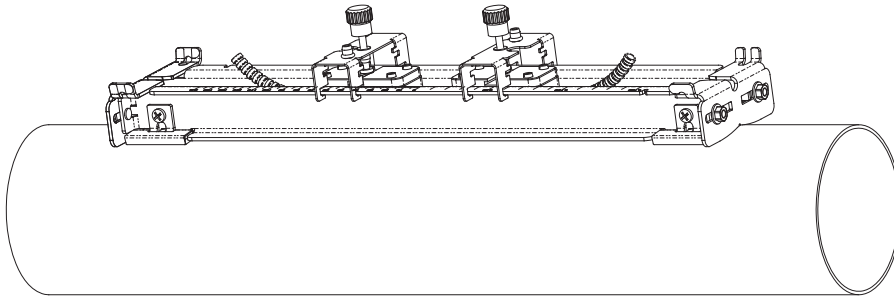
Transducer Mounting Fixtures

Portable Variofix Rail PVF and Chains



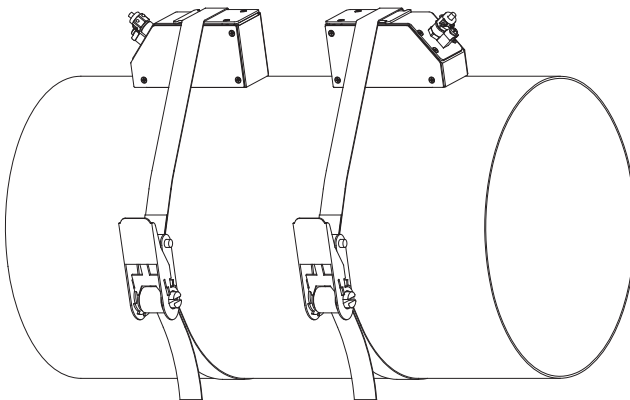
material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
 dimensions: 414 x 84 x 50 mm
 chain length: 2 m

Portable Variofix Rail PVF and Magnets (option)



material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
 dimensions: 414 x 84 x 45 mm

Tension Belts



material: steel, powder coated and textile belt
 length: 5/7 m
 temperature: max. 60 °C
 outer pipe diameter: max. 1500/2000 mm

Coupling Materials for Transducers

	normal temperature range (4th character of transducer order code = N)		extended temperature range (4th character of transducer order code = E)	
	< 100 °C	100...170 °C	< 150 °C	150...200 °C
< 2 h	coupling compound type N	coupling compound type E	coupling compound type E	coupling compound type E or H
< 24 h	coupling compound type N	coupling compound type E	coupling compound type E	coupling foil type VT

Technical Data

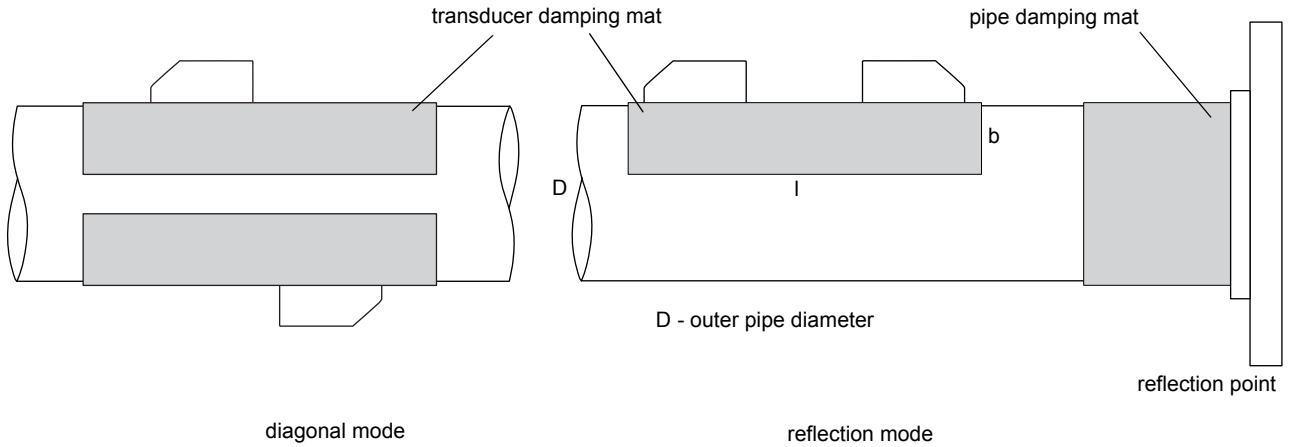
type	order code	temperature °C	material	remark
coupling compound type N	990739-1	-30...+130	mineral grease paste	
coupling compound type E	990739-2	-30...+200	silicone paste	
coupling compound type H	990739-3	-30...+250	fluoropolymer paste	
coupling foil type VT	990739-0	-10...+150, peak max. 200 °C	fluoroelastomer	for transducers with transducer frequency G, H, K
	990739-6			for transducers with transducer frequency M, P
	990739-5			for transducers with transducer frequency Q
	990739-10			for transducers with transducer frequency S

Damping Mats (Option)

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

Transducer damping mats will be installed below the transducers.

Pipe damping mats will be installed at reflection points, e.g. flange, weld.



Selection of Damping Mats

type	description	outer pipe diameter mm	dimensions l x b x h mm	transducer frequency (3rd character of transducer order code)						technical type	temperature °C	remark
				G	H	K	M	P				
transducer damping mat												
D	for temporary installation (multiple use), fixed with coupling compound	< 80	450 x 115 x 0.5	-	-	-	x	x	D20S3	-25...+60		
		≥ 80	900 x 230 x 0.5	-	-	x	x	-	D20S2			
			900 x 230 x 1.3	x	x	-	-	-	D50S2			
pipe damping mat												
A	for temporary installation (multiple use), fixed with coupling compound	< 300	300 x 100 x 0.5	x	x	x	x	x	A20S4	-25...+60	for number of pieces see table below	
B	self-adhesive	≥ 300	l x 100 x 0.9	x	x	x	x	x	B35R2	-35...+50	l - see table below	

Number of Pieces for Pipe Damping Mat Type A

(depending on the outer pipe diameter)

mm	G, H	K, M, P
100	13	7
200	26	13
300	38	19

Length of Pipe Damping Mat Type B

(length l depending on transducer frequency and outer pipe diameter)

outer pipe diameter D mm	transducer frequency	
	G, H	K, M, P
300	12 m	6 m
500	32 m	16 m
1000	126 m	63 m

Connection Systems

transducer frequency (3rd character of transducer order code)		G, H, K			M, P			Q			S		
cable length	m	x 2	y 3	l ≤ 100	x 2	y 2	l ≤ 100	x 2	y 1	l ≤ 50	x 1	y 1	l ≤ 20

x, y - transducer cable length
l - max. length of extension cable

Transducer Cables

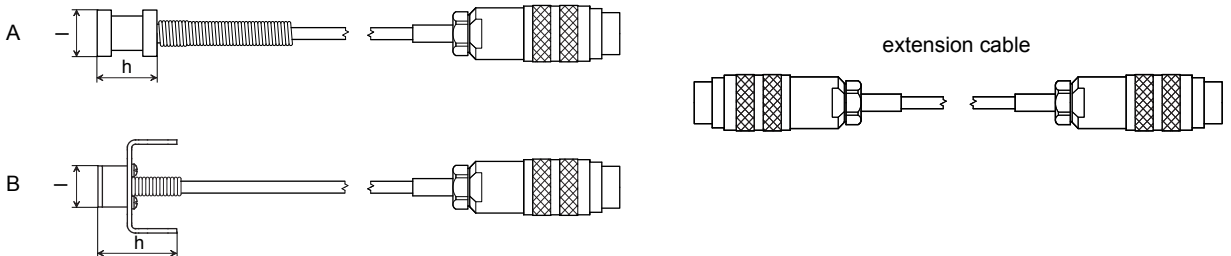
Technical Data

		transducer cable	extension cable
item number		1699	2551
standard length	m	see table above	5 10
max. length	m	-	see table above
temperature	°C	-55...+200	< 115
sheath			
material		stainless steel 304 (1.4301)	-
outer diameter	mm	8	-
material		PTFE	TPE-O
outer diameter	mm	2.9	8
thickness	mm	0.3	
color		brown	black
shield		x	x

Temperature Probes (option)

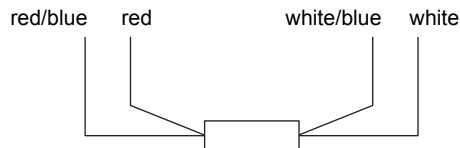
Technical Data

order code		670415-1	670414-1	670415-2	670414-2
type		Pt100	Pt100 paired according to DIN 1434-1	Pt100	Pt100 paired according to DIN 1434-1
design		4-wire		4-wire	
measuring range	°C	-30...+250		-50...+250	
accuracy T		$\pm(0.15\text{ °C} + 2 \cdot 10^{-3} \cdot T)$, class A		$\pm(0.15\text{ °C} + 2 \cdot 10^{-3} \cdot T)$, class A	
accuracy ΔT		-	$\leq 0.1\text{ K}$ ($3\text{K} < \Delta T < 6\text{ K}$), 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		PEEK, stainless steel 304 (1.4301), Cu	
degree of protection according to EN 60529		IP 66			
weight (without connector)	kg	0.25	0.5	0.32	0.64
fixation		clamp on		clamp on	
accessories		-		plastic protection plate, isolation foam	
dimensions					
length l	mm	15		14	
width b	mm	15		30	
height h		20		27	
dimensional drawing		A		B	



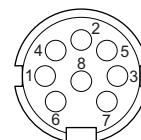
Connection

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	



Cables

		cable of temperature probe	extension cable
type		4 x 0.25mm ² black or white	LIYCY 8 x 0.14mm ² black
standard length	m	3	5/10/25
max. length	m	-	50
cable jacket		PTFE	PTFE

Wall Thickness Probe (Option)

The pipe wall thickness is an important pipe parameter which has to be determined exactly for a good measuring result. However, the pipe wall thickness often is unknown.

The wall thickness probe will be connected to the flowmeter instead of the flow transducers. The wall thickness measurement mode is activated automatically then.

The wall thickness probe is pressed with coupling compound on the pipe. The wall thickness is displayed on the flowmeter and can be stored directly in the parameter record of the pipe.

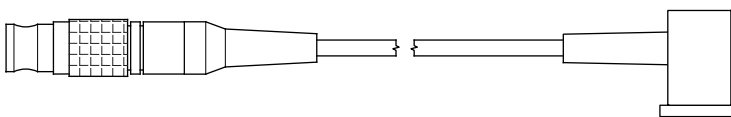


Wall thickness measurement

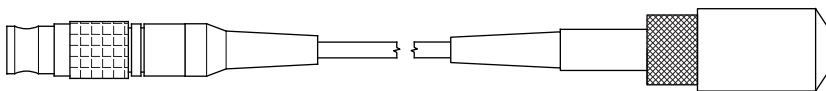
Technical Data

technical type		DWQ1xZ7	DWP1EZ7
		reverse polarity protected	
measuring range ¹	mm	1...200	
resolution	mm	0.01	
linearity	mm	0.1	
operating temperature	°C	-20...+60	-20...+200, peak max. 540 °C
cable length	m	1.5	1.2

¹ The measuring range depends on the attenuation of the ultrasonic signal in the pipe. For strongly attenuating plastics (e.g. PFA, PTFE, PP) the measuring range will be lower.



DWQ1xZ7



DWP1EZ7



FLEXIM GmbH
Wolfener Str. 36
12681 Berlin
Germany
Tel.: +49 (30) 93 66 76 60
Fax: +49 (30) 93 66 76 80

internet: www.flexim.com
e-mail: info@flexim.com

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