## Permanently Installed Gas Ultrasonic Flowmeter

Designed for wall mounting or installation in 19" rack systems

### Features

- Non-invasive measurement using the clamp-on technology for precise bi-directional, highly dynamic flow measurement
- ATEX, IEC, FM approved transducers for hazardous areas available
- Automatic loading of calibration data and transducer detection reduce set-up times and provide precise, long-term stable results
- Transducers available for a wide range of inner pipe diameters (7...1600 mm) and fluid temperatures (-40...+200 °C)
- Proven clamp-on technology, transducers resistant to dust and humidity
- Measurement is unaffected by gas density, viscosity and composition, dust, humidity, temperature or pressure
- User-friendly design

FLUXUS G704


FLUXUS G709

### 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


Measurement with transducers mounted by Variofix L

# Table of Contents

# Function

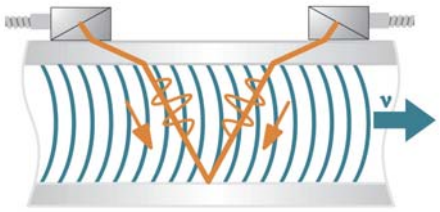
## Measurement Principle

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 one side of a pipe, reflected by the opposite pipe wall and received by a second transducer. These signals are emitted alternately in the flow direction and against it.

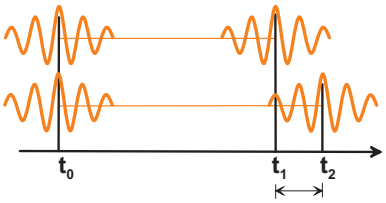
As the medium in which the signals propagate is flowing, the transit time of the ultrasonic signals in the flow direction is shorter than against the flow direction.

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.

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.




Path of the ultrasonic signal




Transit time difference $\Delta t$

## Calculation of Volumetric Flow Rate

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

where:

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

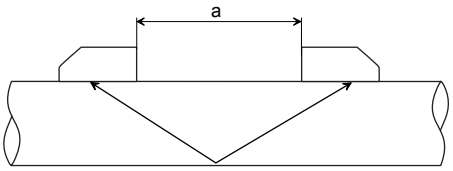
## Number of Sound Paths

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:

- **reflection mode**
  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 mode**
  The number of sound paths is odd. Both of the transducers are mounted on opposite sides of the pipe. In the case of a high signal attenuation by the medium, pipe and coatings, diagonal mode with 1 sound path will be used.

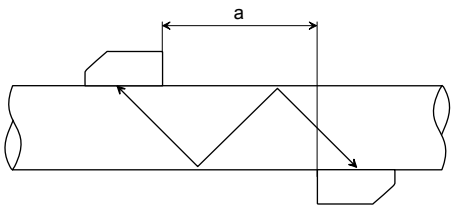
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be detemined automatically by the transmitter.

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

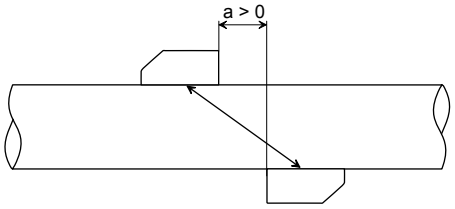



Reflection mode, number of sound paths: 2

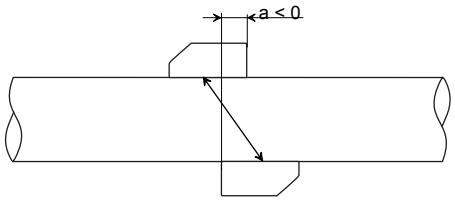
a - transducer distance




Diagonal mode, number of sound paths: 3

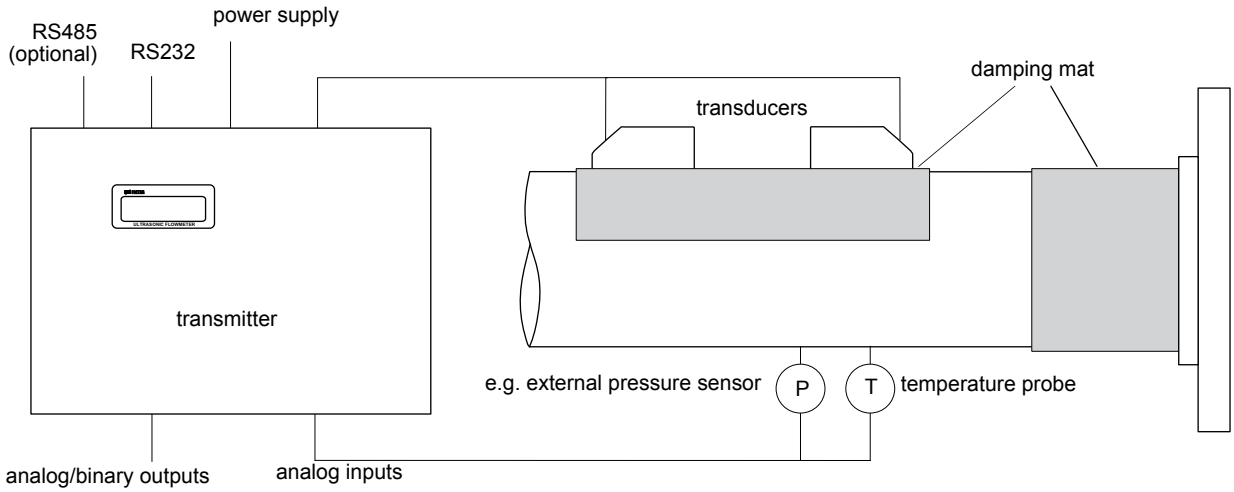



Diagonal mode , number of sound paths: 1




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

## Typical Measurement Setup




Example of a measurement setup in reflection mode 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:

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

where:

| | | |
|---|---|---|
| $V_N$ | - | standard volumetric flow rate |
| $V$ | - | operational volumetric flow rate |
| $p_N$ | - | 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 transmitter.

Or:

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

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

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

# Flow Transmitter

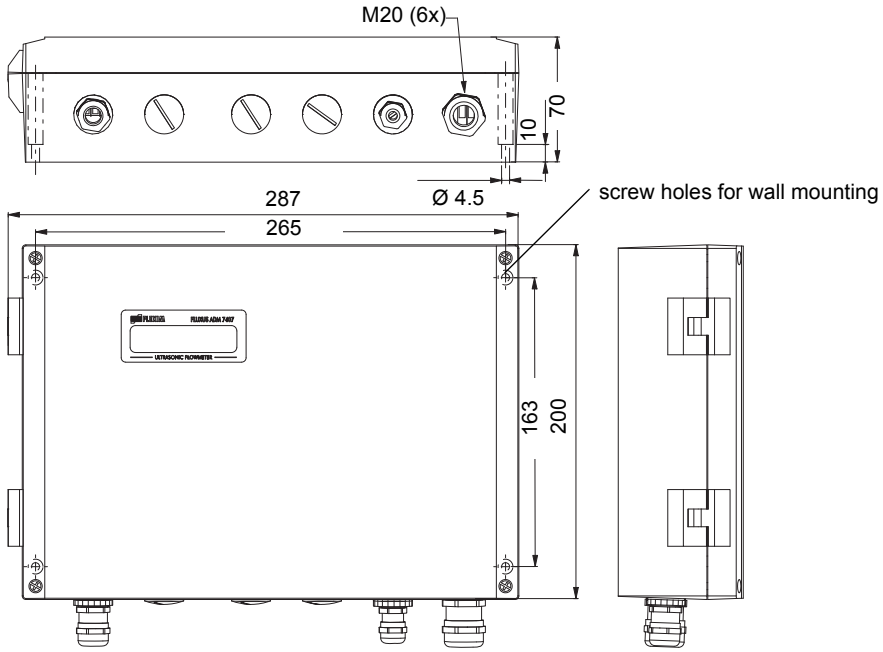
## Technical Data

| FLUXUS | G704 | G704 A2 | G709 |
|---|---|---|---|
| design | standard field device | field device for ATEX zone 2 | 19 " module |
| |  | |  |
| **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 | | | |
| - volumetric flow rate | ± 1...3 % of reading ±0.01 m/s depending on application<br>± 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,<br>e.g. nitrogen, air, oxygen, hydrogen, argon, helium, ethylene, propane | | |
| temperature compensation | corresponding to the recommendations in ANSI/ASME MFC-5M-1985 | | |
| **flow transmitter** | | | |
| power supply | 100...240 V/50...60 Hz or<br>20...32 V DC | | |
| power consumption | < 15 W | | |
| number of flow measuring channels | 1, optional: 2 | | |
| signal damping | 0...100 s, adjustable | | |
| measuring cycle (1 channel) | 100...1000 Hz | | |
| response time | 1 s (1 channel), optional: 70 ms | | |
| housing material | aluminum, powder coated | | aluminum |
| degree of protection<br>according to EN 60529 | IP 65 | IP 65 | IP 20 |
| dimensions | see dimensional drawing | | 42HP x 3U<br>(without back panel)<br>see dimensional drawing |
| weight | 2.8 kg | | 1.7 kg |
| fixation | wall mounting, optional: 2 " pipe mounting | | 19 " rack mounting |
| operating temperature | -20...+60 °C | | |
| display | 2 x 16 characters, dot matrix, backlit | | |
| menu language | English, German, French, Dutch, Spanish | | |
| **explosion protection** | | | |
| **ATEX** zone | - | 2 | - |
| **ATEX** marking | - | CE Ⓔx II3G<br>Ex nA II T4<br>$T_a$ -20...+60 °C<br>Ⓔx II3D Ex tD A22 IP65 T100 °C | - |
| **measuring functions** | | | |
| physical quantities | operational volumetric flow rate, standard volumetric flow rate, mass flow, flow velocity | | |
| totalizers | volume, mass | | |
| calculation functions | average, difference, sum | | |
| diagnostic functions | sound velocity, signal amplitude, SNR, SCNR,<br>standard deviation of amplitudes and transit times | | |
| **data logger** | | | |
| loggable values | all physical quantities, totalized values and diagnostic values | | |
| capacity | > 100 000 measured values | | |

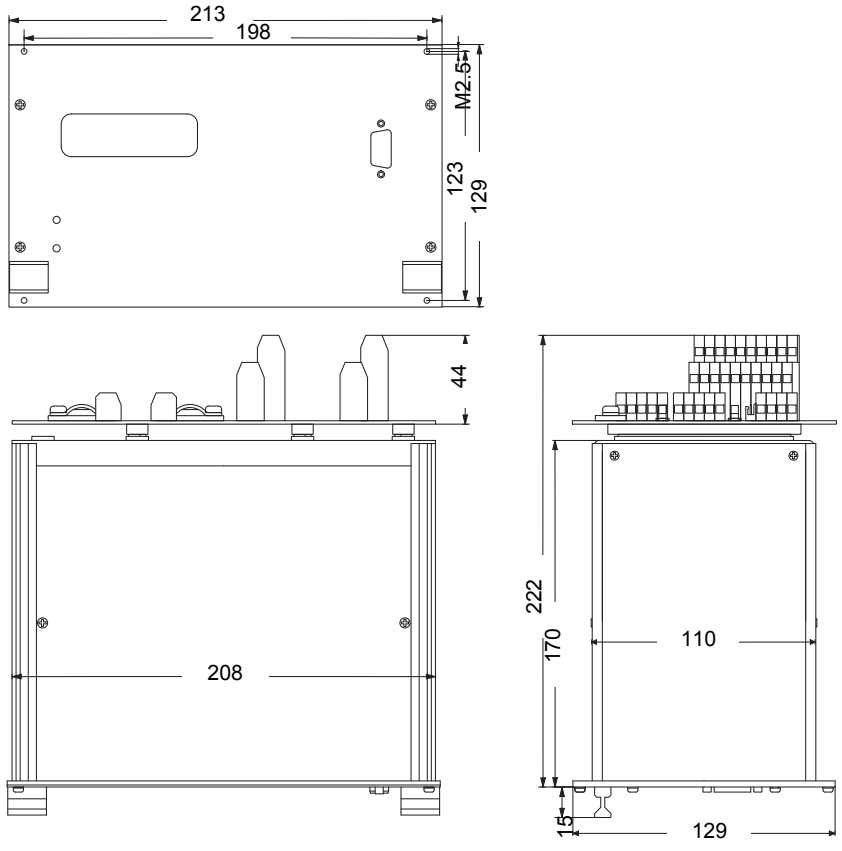
| FLUXUS | G704 | G704 A2 | G709 |
|---|---|---|---|
| **communication** | | | |
| interface | - process integration: optional: RS485 (Modbus, sender) or HART<br>- diagnosis: RS232 | | |
| **serial data kit (optional)** | | | |
| software (all Windows™ versions) | - FluxData: download of measured data, graphical presentation, conversion to other formats (e.g. for Excel™)<br>- FluxKoef: creating medium data sets | | |
| cable | RS232 | | |
| adapter | RS232 - USB | | |
| **outputs (optional)** | | | |
| | The outputs are galvanically isolated from the transmitter. | | |
| number | on request | | |
| | **current output** | | |
| current output<br>- range<br>- accuracy<br>- active output<br>- passive output | <br>0/4...20 mA<br>0.1 % of reading ±15 µA<br>$R_{ext}$ < 500 Ω<br>$U_{ext}$ = 4...24 V, dependent on $R_{ext}$, $R_{ext}$ < 1 kΩ | | |
| current output I1 in HART mode<br>- range<br>- passive output | <br>4...20 mA<br>$U_{ext}$ = 10...24 V | | |
| | **voltage output** | | |
| range<br>accuracy<br><br>internal resistance | 0...1 V or 0...10 V<br>0...1 V: 0.1 % of reading ±1 mV<br>0...10 V: 0.1 % of reading ±10 mV<br>$R_i$ = 500 Ω | | |
| | **frequency output** | | |
| range<br>open collector | 0...1 kHz or 0...5 kHz<br>24 V/4 mA | | |
| | **binary output** | | |
| Reed relay<br>open collector<br>optorelay | -<br>-<br>26 V/100 mA | | 48 V/0.25 A<br>24 V/4 mA<br>- |
| binary output as alarm output<br>- functions | <br>limit, change of flow direction or error | | <br>limit, change of flow direction or error |
| binary output as pulse output<br>- pulse value<br>- pulse width | <br>0.01...1000 units<br>1...1000 ms | | <br>0.01...1000 units<br>80...1000 ms |
| **inputs (optional)** | | | |
| | The inputs are galvanically isolated from the transmitter. | | |
| number | max. 4, on request | | |
| | **temperature input** | | |
| designation<br>connection<br>range<br>resolution<br>accuracy | Pt100/Pt1000<br>4-wire<br>-150...+560 °C<br>0.01 K<br>±0.01 % of reading ±0.03 K | | |
| | **current input** | | |
| range<br><br>accuracy<br>active input<br>passive input | active: 0...20 mA<br>passive: -20...+20 mA<br>0.1 % of reading ±10 µA<br>$U_i$ = 24 V, $R_i$ = 50 Ω, $P_i$ < 0.5 W, not short circuit proof<br>$R_i$ = 50 Ω, $P_i$ < 0.3 W | | |
| | **voltage input** | | |
| range<br>accuracy<br>internal resistance | 0...1 V<br>0.1 % of reading ±1 mV<br>$R_i$ = 1 MΩ | | |

## Dimensions

**FLUXUS G704**



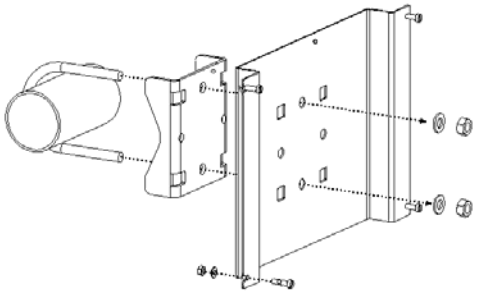

**FLUXUS G709**

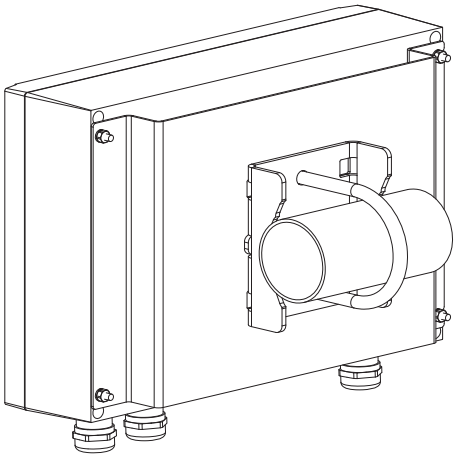



in mm

## 2 " Pipe Mounting Kit (optional)

**FLUXUS G704**

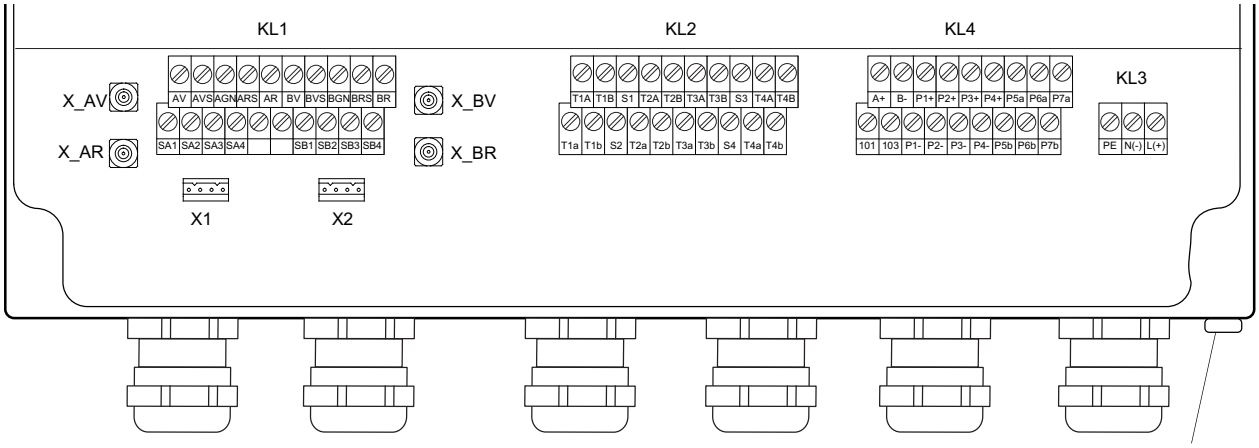




for vertical and horizontal pipes

# Terminal Assignment

## FLUXUS G704




### Power Supply

terminal strip KL3

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

### Transducers

terminal strip KL1

| extension cable for connection system TS<br>transducer cable for connection system TS<br>(zone 1) | | | |
|---|---|---|---|
| measuring channel A | | measuring channel B | |
| terminal co | nnection t | erminal co | nnection |
| AV | signal | BV | signal |
| AVS | shield | BVS | shield |
| ARS | shield | BRS | shield |
| AR | signal | BR | signal |

| transducer cable for connection system TS, AS<br>(ATEX zone 2, FM or without explosion protection) | | |
|---|---|---|
| measuring channel A | measuring channel B | |
| terminal | | connection |
| X_AV | X_BV | SMB connector |
| X_AR | X_BR | SMB connector |
| X1 | X2 | AMP-Quick connector[1] |

[1] connection system AS

### Outputs[2]

terminal strip KL4

| terminal co | nnection |
|---|---|
| P1+...P4+, P1-...P4- | current output, voltage output, frequency output or binary output (optorelay) |
| P5a...P7a, P5b...P7b | binary output (optorelay) |

### RS485 (optional)

terminal strip KL4

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

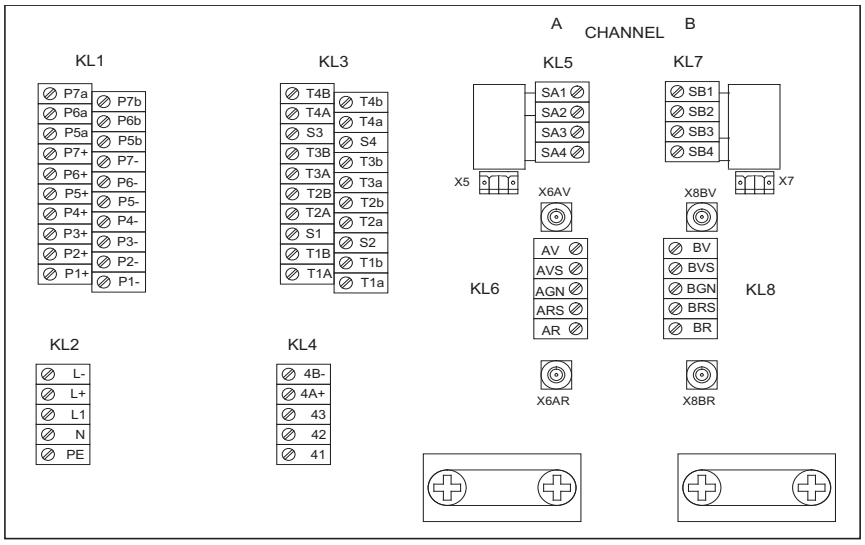
### Inputs[2]

terminal strip KL2

| | temperature probe | | passive current source | active current source |
|---|---|---|---|---|
| terminal con | nection | connection with extension cable | connection con | nection |
| T1a...T4a | red | red | not connected | not connected |
| T1A...T4A | red/blue | gray | - | + |
| T1b...T4b | white/blue | blue | + | not connected |
| T1B...T4B | white | white | not connected | - |
| S1...S4 | shield | shield | not connected | not connected |

[2] The number, type and terminal assignment of the outputs and inputs will be customized.

## FLUXUS G709




### Transducers

terminal strip KL6, KL8

| extension cable for connection system TS<br>transducer cable for connection system TS<br>(zone 1) | | | |
|---|---|---|---|
| **measuring channel A** | | **measuring channel B** | |
| **terminal con** | **nection** | **term inal con** | **nection** |
| AV | signal | BV | signal |
| AVS | shield | BVS | shield |
| ARS | shield | BRS | shield |
| AR | signal | BR | signal |

| transducer cable for connection system TS, AS<br>(ATEX zone 2, FM or without explosion protection) | | |
|---|---|---|
| **measuring channel A** | **measuring channel B** | |
| **terminal** | | **connection** |
| X6AV | X8BV | SMB connector |
| X6AR | X8BR | SMB connector |
| X5 | X7 | AMP-Quick connector[1] |

[1] connection system AS

### Power Supply

terminal strip KL2

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

### Outputs[2]

terminal strip KL1

| terminal con | nection |
|---|---|
| P1+...P7+, P1-...P7- | current output, voltage output, frequency output or binary output (open collector) |
| P5a...P7a, P5b...P7b | binary output (Reed relay) |

### RS485 (optional)

terminal strip KL4

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

### Inputs[2]

terminal strip KL3

| | temperature probe | | passive current source | active current source |
|---|---|---|---|---|
| **terminal co** | **nnection** | **connection with extension cable** | **connection co** | **nnection** |
| T1a...T4a | red | red | not connected | not connected |
| T1A...T4A | red/blue | gray | - | + |
| T1b...T4b | white/blue | blue | + | not connected |
| T1B...T4B | white | white | not connected | - |
| S1...S4 | shield | shield | not connected | not connected |

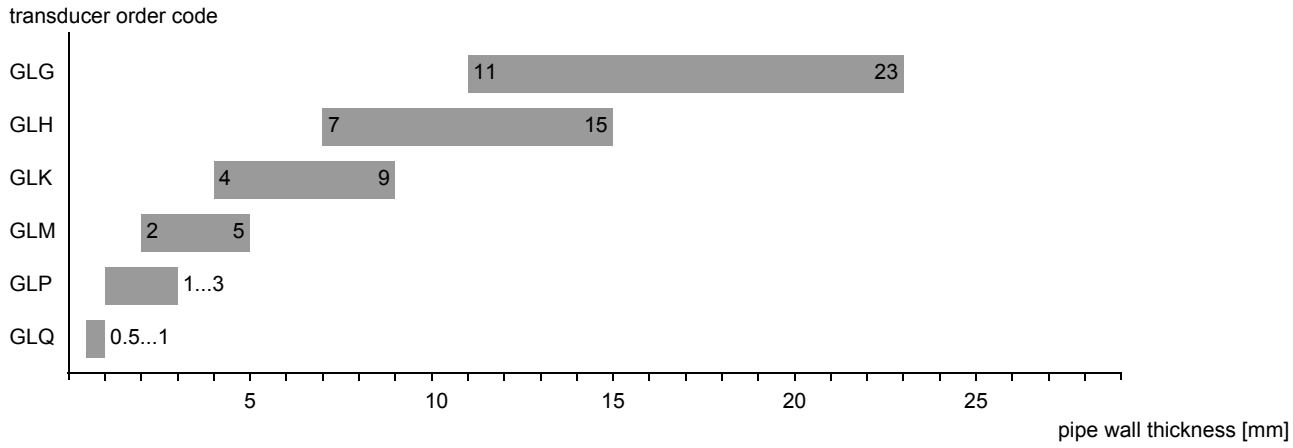
[2] The number, type and terminal assignment of the outputs and inputs will be customized.

# Transducers

## Transducer Selection

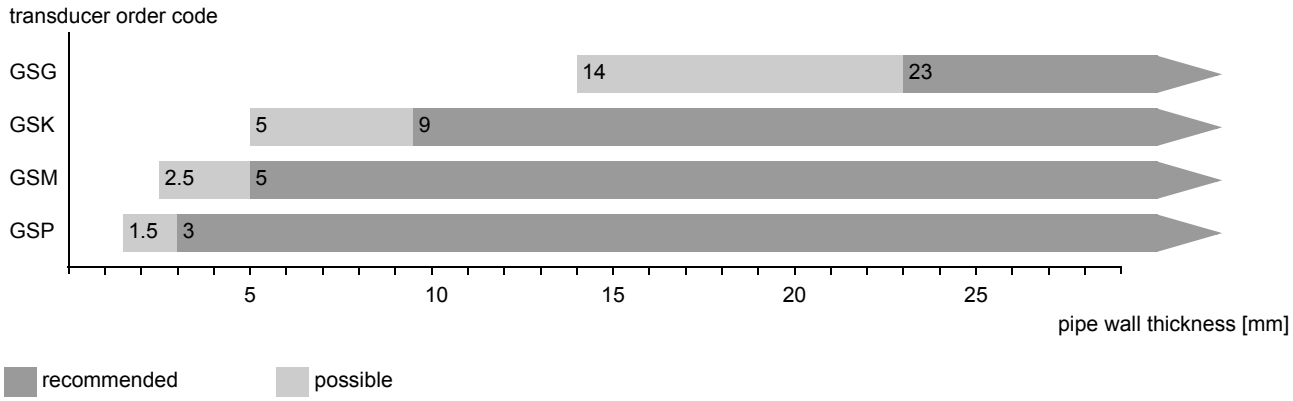
### Step 1a

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:



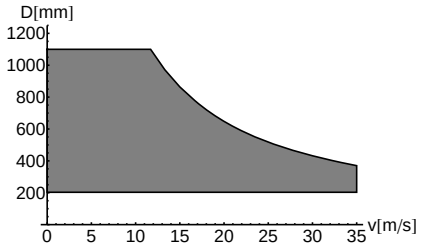

### Step 2

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

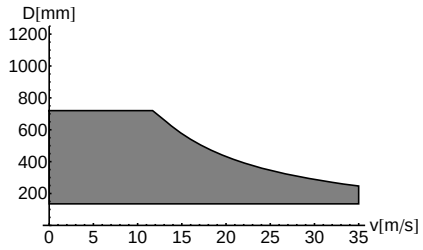
The transducers are selected from the characteristics (see next page). Lamb wave transducers are selected from the left column, shear wave transducers from the right column.

Lamb wave transducers: If the values d and v are not in the range, diagonal mode 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.

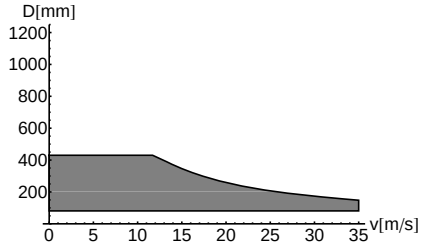
Lamb wave transducers[1]



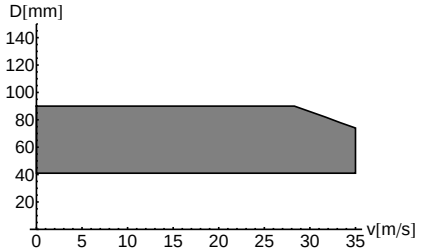

GLG



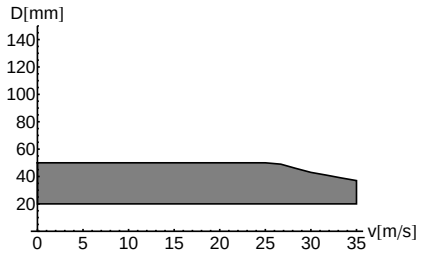

GLH



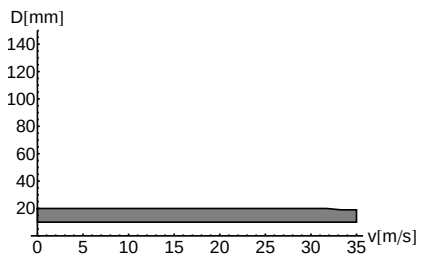

GLK




GLM

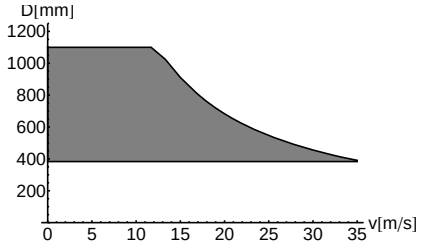



GLP

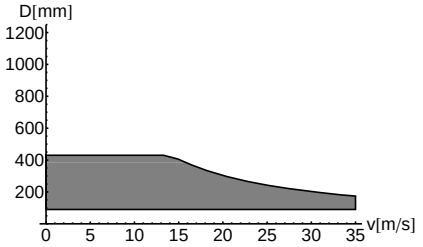



GLQ

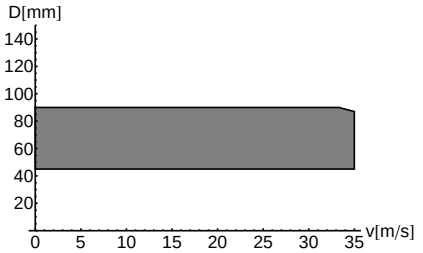
shear wave transducers[1]



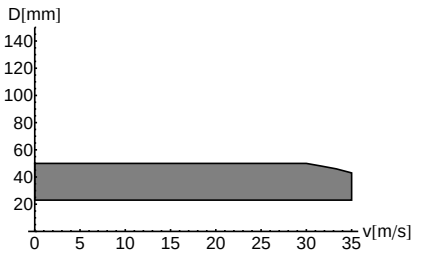

GSG




GSK




GSM




GSP

[1] inner pipe diameter and max. flow velocity for a typical application with natural gas, nitrogen, oxygen in reflection mode with 2 sound paths (Lamb wave transducers)/1 sound path (shear wave transducers)

### Step 3

min. medium pressure

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

| shear wave transducers | | | |
|---|---|---|---|
| transducer order code | medium pressure[1] [ 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 |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

d - inner pipe diameter

### Examples

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

### Step 4

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

### Step 5

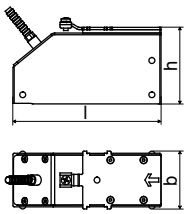
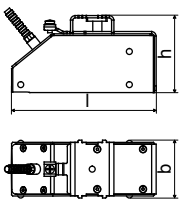
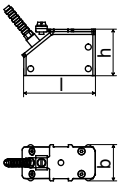
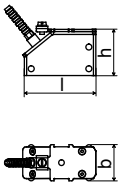
for the technical data of the selected transducer see page 16 et seqq.

## Transducer Order Codes

| 1, 2 | 3 | | 4 | 5, 6 | 7, 8 | | 9...11 | | 12, 13 | no. of character |
|---|---|---|---|---|---|---|---|---|---|---|
| transducer | transducer frequency | - | temperature | explosion protection | connection system | - | extension cable | / | options | 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, Q) |
| | | | | A1 | | | | | | ATEX zone 1 |
| | | | | A2 | | | | | | ATEX zone 2 |
| | | | | F2 | | | | | | FM Class I Div. 2 |
| | | | | I1 | | | | | | IEC zone 2 |
| | | | | NN | | | | | | not explosion proof |
| | | | | | AS | | | | | with Amphenol connector (not explosion proof transducers) |
| | | | | | TS | | | | | direct connection or connection via junction box |
| | | | | | | | XXX | | | cable length in m, for max. length of extension cable see page 47<br>connection system TS:<br>0 m: without junction box<br>> 0 m: with junction box JB01 (zone 1), JB02 (ATEX zone 2, FM), JB03 (not explosion proof), JBP2 (IP 68 transducers for ATEX zone 2), JBP3 (not explosion proof IP 68 transducers) |
| | | | | | | | | | IP68 | degree of protection IP 68 (with connection system TS) |
| | | | | | | | | | OS | housing with stainless steel 316 (with connection system TS) |
| example | | | | | | | | | | |
| GL | K | - | N | A1 | TS | - | 030 | | | Lamb wave transducer 0.5 MHz, normal temperature range, zone 1, connection system TS with junction box JB01 and 30 m extension cable |
| | | - | | | | - | | / | | |

# Technical Data

## Shear Wave Transducers (zone 1)

| technical type | | GDG1N81 | GDK1N81 | GDM2N81 | GDP2N81 |
|---|---|---|---|---|---|
| order code | | GSG-NA1TS<br>GSG-NA1TS/OS<br>GSG-NI1TS<br>GSG-NI1TS/OS | GSK-NA1TS<br>GSK-NA1TS/OS<br>GSK-NI1TS<br>GSK-NI1TS/OS | GSM-NA1TS<br>GSM-NA1TS/OS<br>GSM-NI1TS<br>GSM-NI1TS/OS | GSP-NA1TS<br>GSP-NA1TS/OS<br>GSP-NI1TS<br>GSP-NI1TS/OS |
| transducer frequency | MHz | 0.2 | 0.5 | 1 | 2 |
| **medium pressure**[1] | | | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | | |
| min. extended | mm | 250 | 70 | 30 | 15 |
| min. recommended | mm | 380 | 80 | 40 | 20 |
| max. recommended | mm | 810 | 500 | 80 | 40 |
| max. extended | mm | 1100 | 720 | 120 | 60 |
| **pipe wall thickness** | | | | | |
| min.<br>max. | mm<br>mm | 14<br>- | 5<br>- | 2.5<br>- | 1.5<br>- |
| **material** | | | | | |
| housing<br><br><br>contact surface | | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK |
| degree of protection according to EN 60529 | | IP 65 | IP 65 | IP 65 | IP 65 |
| **transducer cable** | | | | | |
| type<br>length | <br>m | 1699<br>5 | 1699<br>5 | 1699<br>4 | 1699<br>4 |
| **dimensions** | | | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 129.5<br>51<br>67 | 126.5<br>51<br>67.5 | 62.5<br>32<br>40.5 | 62.5<br>32<br>40.5 |
| dimensional drawing | |  |  |  |  |
| **operating temperature** | | | | | |
| min.<br>max. | °C<br>°C | -40<br>+130 | -40<br>+130 | -40<br>+130 | -40<br>+130 |
| temperature compensation | | x | x | x | x |

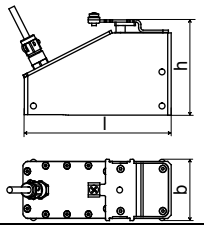
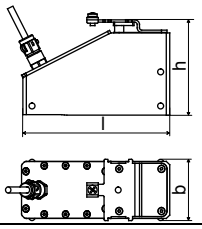
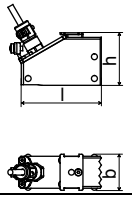
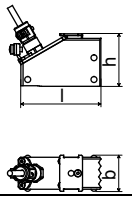
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GDG1N81 | GDK1N81 | GDM2N81 | GDP2N81 |
|---|---|---|---|---|---|---|
| **explosion protection** | | | | | | |
| ATEX / IEC Ex | transducer ATEX | | GSG-NA1TS<br>GSG-NA1TS/OS | GSK-NA1TS<br>GSK-NA1TS/OS | GSM-NA1TS<br>GSM-NA1TS/OS | GSP-NA1TS<br>GSP-NA1TS/OS |
| | transducer IEC Ex | | GSG-NI1TS<br>GSG-NI1TS/OS | GSK-NI1TS<br>GSK-NI1TS/OS | GSM-NI1TS<br>GSM-NI1TS/OS | GSP-NI1TS<br>GSP-NI1TS/OS |
| | zone | | 1 | 1 | 1 | 1 |
| | **explosion protection temperature** | | | | | |
| | min. | °C | -55 | -55 | -55 | -55 |
| | max. | °C | +180 | +180 | +180 | +180 |
| | marking | | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX |
| | certification ATEX | | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X |
| | certification IEC Ex | | IECEx IBE08.0007 X | IECEx IBE08.0007 X | IECEx IBE08.0007 X | IECEx IBE08.0007 X |
| | type of protection | | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |

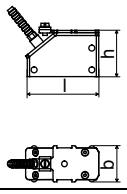
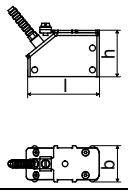
## Shear Wave Transducers (zone 1, IP 68)

| technical type | | GDG1LI1 | GDK1LI1 | GDM2LI1 | GDP2LI1 |
|---|---|---|---|---|---|
| order code | | **GSG-NA1TS/IP68**<br>**GSG-NI1TS/IP68** | **GSK-NA1TS/IP68**<br>**GSK-NI1TS/IP68** | **GSM-NA1TS/IP68**<br>**GSM-NI1TS/IP68** | **GSP-NA1TS/IP68**<br>**GSP-NI1TS/IP68** |
| transducer frequency | MHz | 0.2 | 0.5 | 1 | 2 |
| **medium pressure**[1] | | | | | |
| min. extended | bar | metal pipe: 20 | metal pipe: 20 | metal pipe: 20 | metal pipe: 20 |
| min. | bar | metal pipe: 30<br>plastic pipe: 1 | metal pipe: 30<br>plastic pipe: 1 | metal pipe: 30<br>plastic pipe: 1 | metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | | |
| min. extended | mm | 250 | 70 | 30 | 15 |
| min. recommended | mm | 380 | 80 | 40 | 20 |
| max. recommended | mm | 810 | 500 | 80 | 40 |
| max. extended | mm | 1100 | 720 | 120 | 60 |
| **pipe wall thickness** | | | | | |
| min. | mm | 14 | 5 | 2.5 | 1.5 |
| max. | mm | - | - | - | - |
| **material** | | | | | |
| housing | | PEEK with stainless steel cap 316Ti (1.4571) | PEEK with stainless steel cap 316Ti (1.4571) | PEEK with stainless steel cap 316Ti (1.4571) | PEEK with stainless steel cap 316Ti (1.4571) |
| contact surface | | PEEK | PEEK | PEEK | PEEK |
| degree of protection according to EN 60529 | | IP 68 | IP 68 | IP 68 | IP 68 |
| **transducer cable** | | | | | |
| type | | 2550 | 2550 | 2550 | 2550 |
| length | m | 12 | 12 | 12 | 12 |
| **dimensions** | | | | | |
| length l | mm | 128.5 | 128.5 | 70 | 70 |
| width b | mm | 54 | 54 | 32 | 32 |
| height h | mm | 83.5 | 83.5 | 46 | 46 |
| dimensional drawing | |  |  |  |  |
| **operating temperature** | | | | | |
| min. | °C | -40 | -40 | -40 | -40 |
| max. | °C | +100 | +100 | +100 | +100 |
| temperature compensation | | x | x | x | x |
| **explosion protection** | | | | | |
| **ATEX / IECEx** transducer ATEX | | GSG-NA1TS/IP68 | GSK-NA1TS/IP68 | GSM-NA1TS/IP68 | GSP-NA1TS/IP68 |
| transducer IEC Ex | | GSG-NI1TS/IP68 | GSK-NI1TS/IP68 | GSM-NI1TS/IP68 | GSP-NI1TS/IP68 |
| zone | | 1 | 1 | 1 | 1 |
| **explosion protection temperature** | | | | | |
| min. | °C | -55 | -55 | -55 | -55 |
| max. | °C | +180 | +180 | +180 | +180 |
| marking | | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX |
| certification ATEX | | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X |
| certification IEC Ex | | IECEx IBE08.0007 X | IECEx IBE08.0007 X | IECEx IBE08.0007 X | IECEx IBE08.0007 X |
| type of protection | | gas: powder filling<br>dust: protection by enclosure | gas: powder filling<br>dust: protection by enclosure | gas: powder filling<br>dust: protection by enclosure | gas: powder filling<br>dust: protection by enclosure |
| necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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 (zone 1, extended temperature range)

| technical type | | GDM2E85 | GDP2E85 |
|---|---|---|---|
| order code | | **GSM-EA1TS**<br>**GSM-EA1TS/OS**<br>**GSM-EI1TS**<br>**GSM-EI1TS/OS** | **GSP-EA1TS**<br>**GSP-EA1TS/OS**<br>**GSP-EI1TS**<br>**GSP-EI1TS/OS** |
| transducer frequency | MHz | 1 | 2 |
| **medium pressure**[1] | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 30<br>40<br>80<br>120 | 15<br>20<br>40<br>60 |
| **pipe wall thickness** | | | |
| min.<br>max. | mm<br>mm | 2.5<br>- | 1.5<br>- |
| **material** | | | |
| housing<br><br><br>contact surface | | PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PI | PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PI |
| degree of protection according to EN 60529 | | IP 56 | IP 56 |
| **transducer cable** | | | |
| type<br>length | <br>m | 6111<br>4 | 6111<br>4 |
| **dimensions** | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 62.5<br>32<br>40.5 | 62.5<br>32<br>40.5 |
| dimensional drawing | |  |  |
| **operating temperature** | | | |
| min.<br>max. | °C<br>°C | -30<br>+200 | -30<br>+200 |
| temperature compensation | | x | x |

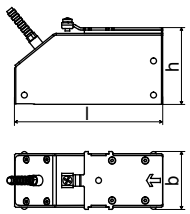
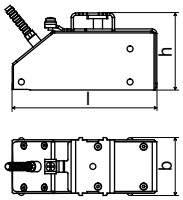
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GDM2E85 | GDP2E85 |
|---|---|---|---|---|
| **explosion protection** | | | | |
| **ATEX / IEC Ex** | transducer ATEX | | GSM-EA1TS<br>GSM-EA1TS/OS | GSP-EA1TS<br>GSP-EA1TS/OS |
| | transducer IEC Ex | | GSM-EI1TS<br>GSM-EI1TS/OS | GSP-EI1TS<br>GSP-EI1TS/OS |
| | zone | | 1/2 (gas/dust) | 1/2 (gas/dust) |
| | **explosion protection temperature** | | | |
| | min.<br>max. | °C<br>°C | -45<br>+225 | -45<br>+225 |
| | marking | | CE 0044; Ex II2G<br>II3D<br>Ex eq II T6...T2<br>Ex tD A22 IP56 TX | CE 0044; Ex II2G<br>II3D<br>Ex eq II T6...T2<br>Ex tD A22 IP56 TX |
| | certification ATEX | | IBExU07ATEX1168 X | IBExU07ATEX1168 X |
| | certification IEC Ex | | IECEx IBE08.0007 X | IECEx IBE08.0007 X |
| | type of protection | | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C |

## Shear Wave Transducers (ATEX zone 2, FM or without explosion protection)

| technical type | | GDG1N52 | GDK1N52 |
|---|---|---|---|
| order code | | **GSG-NA2TS**<br>**GSG-NA2TS/OS**<br>**GSG-NF2TS**<br>**GSG-NF2TS/OS**<br>**GSG-NNNTS**<br>**GSG-NNNTS/OS** | **GSK-NA2TS**<br>**GSK-NA2TS/OS**<br>**GSK-NF2TS**<br>**GSK-NF2TS/OS**<br>**GSK-NNNTS**<br>**GSK-NNNTS/OS** |
| transducer frequency | MHz | 0.2 | 0.5 |
| medium pressure[1] | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| inner pipe diameter d[2] | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 250<br>380<br>810<br>1100 | 70<br>80<br>500<br>720 |
| pipe wall thickness | | | |
| min.<br>max. | mm<br>mm | 14<br>- | 5<br>- |
| material | | | |
| housing<br><br><br>contact surface | | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK |
| degree of protection according to EN 60529 | | IP 67 | IP 67 |
| transducer cable | | | |
| type<br>length | <br>m | 1699<br>5 | 1699<br>5 |
| dimensions | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 129.5<br>51<br>67 | 126.5<br>51<br>67.5 |
| dimensional drawing | |  |  |
| operating temperature | | | |
| min.<br>max. | °C<br>°C | -40<br>+130 | -40<br>+130 |
| temperature compensation | | x | x |

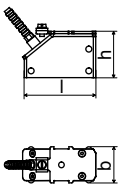
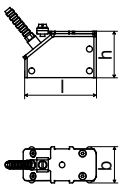
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GDG1N52 | GDK1N52 |
|---|---|---|---|---|
| explosion protection | | | | |
| ATEX | transducer | | GSG-NA2TS<br>GSG-NA2TS/OS | GSK-NA2TS<br>GSK-NA2TS/OS |
| | zone | | 2 | 2 |
| | explosion protection temperature | | | |
| | min.<br>max. | °C<br>°C | -55<br>+190 | -55<br>+190 |
| | marking | | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+190 °C<br>II3D Ex tD A22 IP67 TX | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+190 °C<br>II3D Ex tD A22 IP67 TX |
| | certification | | - | - |
| | type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C |
| FM | transducer | | GSG-NF2TS<br>GSG-NF2TS/OS | GSK-NF2TS<br>GSK-NF2TS/OS |
| | explosion protection temperature | | | |
| | min.<br>max. | °C<br>°C | -40<br>+125 | -40<br>+125 |
| | marking | | FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 | FM APPROVED 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 |

## Shear Wave Transducers (ATEX zone 2, FM or without explosion protection)

| technical type | | GDM2N52 | GDP2N52 |
|---|---|---|---|
| order code | | **GSM-NA2TS**<br>**GSM-NA2TS/OS**<br>**GSM-NF2TS**<br>**GSM-NF2TS/OS**<br>**GSM-NNNTS**<br>**GSM-NNNTS/OS** | **GSP-NA2TS**<br>**GSP-NA2TS/OS**<br>**GSP-NF2TS**<br>**GSP-NF2TS/OS**<br>**GSP-NNNTS**<br>**GSP-NNNTS/OS** |
| transducer frequency | MHz | 1 | 2 |
| **medium pressure**[1] | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 30<br>40<br>80<br>120 | 15<br>20<br>40<br>60 |
| **pipe wall thickness** | | | |
| min.<br>max. | mm<br>mm | 2.5<br>- | 1.5<br>- |
| **material** | | | |
| housing<br><br><br>contact surface | | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK | PEEK with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PEEK |
| degree of protection according to EN 60529 | | IP 67 | IP 65 |
| **transducer cable** | | | |
| type<br>length | <br>m | 1699<br>4 | 1699<br>4 |
| **dimensions** | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 62.5<br>32<br>40.5 | 62.5<br>32<br>40.5 |
| dimensional drawing | |  |  |
| **operating temperature** | | | |
| min.<br>max. | °C<br>°C | -40<br>+130 | -40<br>+130 |
| temperature compensation | | x | x |

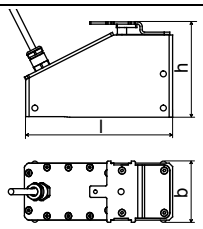
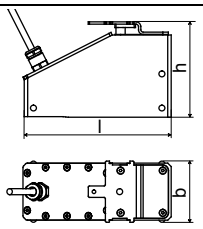
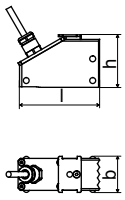
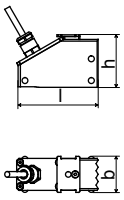
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GDM2N52 | GDP2N52 |
|---|---|---|---|---|
| **explosion protection** | | | | |
| **ATEX** | transducer | | GSM-NA2TS<br>GSM-NA2TS/OS | GSP-NA2TS<br>GSP-NA2TS/OS |
| | zone | | 2 | 2 |
| | **explosion protection temperature** | | | |
| | min.<br>max. | °C<br>°C | -55<br>+190 | -55<br>+190 |
| | marking | | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+190 °C<br>II3D Ex tD A22 IP67 TX | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+190 °C<br>II3D Ex tD A22 IP67 TX |
| | certification | | - | - |
| | type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C |
| **FM** | transducer | | GSM-NF2TS<br>GSM-NF2TS/OS | GSP-NF2TS<br>GSP-NF2TS/OS |
| | **explosion protection temperature** | | | |
| | min.<br>max. | °C<br>°C | -55<br>+190 | -55<br>+190 |
| | 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 | non incendive |

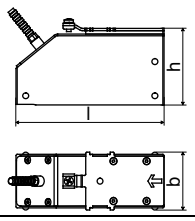
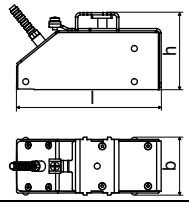
## Shear Wave Transducers (ATEX zone 2 or without explosion protection, IP 68)

| technical type | | GDG1LI8 | GDK1LI8 | GDM2LI8 | GDP2LI8 |
|---|---|---|---|---|---|
| order code | | **GSG-NA2TS/IP68<br>GSG-NNNTS/IP68** | **GSK-NA2TS/IP68<br>GSK-NNNTS/IP68** | **GSM-NA2TS/IP68<br>GSM-NNNTS/IP68** | **GSP-NA2TS/IP68<br>GSP-NNNTS/IP68** |
| transducer frequency | MHz | 0.2 | 0.5 | 1 | 2 |
| **medium pressure**[1] | | | | | |
| min. extended | bar | metal pipe: 20 | metal pipe: 20 | metal pipe: 20 | metal pipe: 20 |
| min. | bar | metal pipe: 30<br>plastic pipe: 1 | metal pipe: 30<br>plastic pipe: 1 | metal pipe: 30<br>plastic pipe: 1 | metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | | |
| min. extended | mm | 250 | 70 | 30 | 15 |
| min. recommended | mm | 380 | 80 | 40 | 20 |
| max. recommended | mm | 810 | 500 | 80 | 40 |
| max. extended | mm | 1100 | 720 | 120 | 60 |
| **pipe wall thickness** | | | | | |
| min. | mm | 14 | 5 | 2.5 | 1.5 |
| max. | mm | - | - | - | - |
| **material** | | | | | |
| housing | | PEEK with stainless steel cap 316Ti (1.4571) | PEEK with stainless steel cap 316Ti (1.4571) | PEEK with stainless steel cap 316Ti (1.4571) | PEEK with stainless steel cap 316Ti (1.4571) |
| contact surface | | PEEK | PEEK | PEEK | PEEK |
| degree of protection according to EN 60529 | | IP 68 | IP 68 | IP 68 | IP 68 |
| **transducer cable** | | | | | |
| type | | 2550 | 2550 | 2550 | 2550 |
| length | m | 12 | 12 | 12 | 12 |
| **dimensions** | | | | | |
| length l | mm | 128.5 | 128.5 | 70 | 70 |
| width b | mm | 54 | 54 | 32 | 32 |
| height h | mm | 83.5 | 83.5 | 46 | 46 |
| dimensional drawing | |  |  |  |  |
| **operating temperature** | | | | | |
| min. | °C | -40 | -40 | -40 | -40 |
| max. | °C | +100 | +100 | +100 | +100 |
| temperature compensation | | x | x | x | x |
| **explosion protection** | | | | | |
| **ATEX** transducer | | GSG-NA2TS/IP68 | GSK-NA2TS/IP68 | GSM-NA2TS/IP68 | GSP-NA2TS/IP68 |
| zone | | 2 | 2 | 2 | 2 |
| **explosion protection temperature** | | | | | |
| min. | °C | -40 | -40 | -40 | -40 |
| max. | °C | +90 | +90 | +90 | +90 |
| marking | | CE Ex<br>II3G Ex nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX | CE Ex<br>II3GEx nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX | CE Ex<br>II3G Ex nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX | CE Ex<br>II3G Ex nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX |
| certification | | - | - | - | - |
| type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

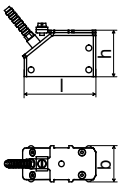
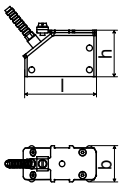
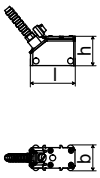
## Shear Wave Transducers (connection system AS, without explosion protection)

| technical type | | GDG1NZ7 | GDK1NZ7 |
|---|---|---|---|
| order code | | **GSG-NNNAS** | **GSK-NNNAS** |
| transducer frequency | MHz | 0.2 | 0.5 |
| **medium pressure**[1] | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 250<br>380<br>810<br>1100 | 70<br>80<br>500<br>720 |
| **pipe wall thickness** | | | |
| min.<br>max. | mm<br>mm | 14<br>- | 5<br>- |
| **material** | | | |
| housing<br><br>contact surface | | PEEK with stainless steel cap 304 (1.4301)<br>PEEK | PEEK with stainless steel cap 304 (1.4301)<br>PEEK |
| degree of protection according to EN 60529 | | IP 67 | IP 67 |
| **transducer cable** | | | |
| type<br>length | <br>m | 1699<br>5 | 1699<br>5 |
| **dimensions** | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 129.5<br>51<br>67 | 126.5<br>51<br>67.5 |
| dimensional drawing | |  |  |
| **operating temperature** | | | |
| min.<br>max. | °C<br>°C | -40<br>+130 | -40<br>+130 |
| temperature compensation | | x | x |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

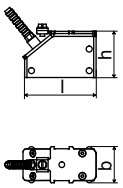
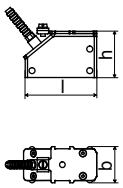
## Shear Wave Transducers (connection system AS, without explosion protection)

| technical type | | GDM2NZ7 | GDP2NZ7 | GDQ2NZ7 |
|---|---|---|---|---|
| order code | | G**SM-NNNAS** | G**SP-NNNAS** | G**SQ-NNNAS** |
| transducer frequency | MHz | 1 | 2 | 4 |
| **medium pressure**[1] | | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | |
| **inner pipe diameter d**[2] | | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 30<br>40<br>80<br>120 | 15<br>20<br>40<br>60 | |
| **pipe wall thickness** | | | | |
| min.<br>max. | mm<br>mm | 2.5<br>- | 1.5<br>- | |
| **material** | | | | |
| housing<br><br>contact surface | | PEEK with stainless steel cap 304 (1.4301)<br>PEEK | PEEK with stainless steel cap 304 (1.4301)<br>PEEK | PEEK with stainless steel cap 304 (1.4301)<br>PEEK |
| degree of protection according to EN 60529 | | IP 67 | IP 67 | IP 67 |
| **transducer cable** | | | | |
| type<br>length | <br>m | 1699<br>4 | 1699<br>4 | 1699<br>3 |
| **dimensions** | | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 62.5<br>32<br>40.5 | 62.5<br>32<br>40.5 | 39<br>22<br>25.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min.<br>max. | °C<br>°C | -40<br>+130 | -40<br>+130 | -40<br>+130 |
| temperature compensation | | x | x | x |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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 (extended temperature range, ATEX zone 2, FM or without explosion protection)

| technical type | | GDM2E52 | GDP2E52 |
|---|---|---|---|
| order code | | **GSM-EA2TS**<br>**GSM-EA2TS/OS**<br>**GSM-EF2TS**<br>**GSM-EF2TS/OS**<br>**GSM-ENNTS**<br>**GSM-ENNTS/OS** | **GSP-EA2TS**<br>**GSP-EA2TS/OS**<br>**GSP-EF2TS**<br>**GSP-EF2TS/OS**<br>**GSP-ENNTS**<br>**GSP-ENNTS/OS** |
| transducer frequency | MHz | 1 | 2 |
| **medium pressure**[1] | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 30<br>40<br>80<br>120 | 15<br>20<br>40<br>60 |
| **pipe wall thickness** | | | |
| min.<br>max. | mm<br>mm | 2.5<br>- | 1.5<br>- |
| **material** | | | |
| housing<br><br><br>contact surface | | PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PI | PI with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PI |
| degree of protection according to EN 60529 | | IP 56 | IP 56 |
| **transducer cable** | | | |
| type<br>length | <br>m | 6111<br>4 | 6111<br>4 |
| **dimensions** | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 62.5<br>32<br>40.5 | 62.5<br>32<br>40.5 |
| dimensional drawing | |  |  |
| **operating temperature** | | | |
| min.<br>max. | °C<br>°C | -30<br>+200 | -30<br>+200 |
| temperature compensation | | x | x |

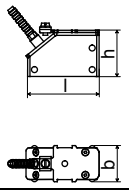
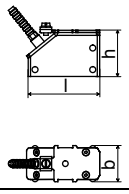
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GDM2E52 | GDP2E52 |
|---|---|---|---|---|
| **explosion protection** | | | | |
| **ATEX** | transducer | | GSM-EA2TS<br>GSM-EA2TS/OS | GSP-EA2TS<br>GSP-EA2TS/OS |
| | zone | | 2 | 2 |
| | **explosion protection temperature** | | | |
| | min.<br>max. | °C<br>°C | -45<br>+235 | -45<br>+235 |
| | marking | | CE Ex<br>II3G Ex nA II T6...T2<br>Ta -45...+235 °C<br>II3D Ex tD A22 IP56 TX | CE Ex<br>II3G Ex nA II T6...T2<br>Ta -45...+235 °C<br>II3D Ex tD A22 IP56 TX |
| | certification | | - | - |
| | type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C |
| **FM** | transducer | | GSM-EF2TS<br>GSM-EF2TS/OS | GSP-EF2TS<br>GSP-EF2TS/OS |
| | **explosion protection temperature** | | | |
| | min.<br>max. | °C<br>°C | -45<br>+235 | -45<br>+235 |
| | marking | | FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 | FM APPROVED 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 |

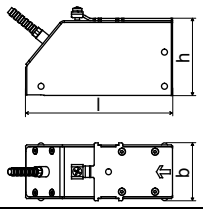
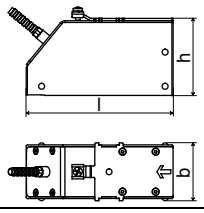
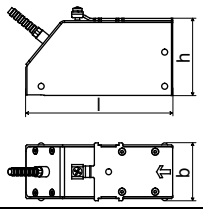
## Shear Wave Transducers (extended temperature range, without explosion protection, connection system AS)

| technical type | | GDM2EZ7 | GDP2EZ7 |
|---|---|---|---|
| order code | | **GSM-ENNAS** | **GSP-ENNAS** |
| transducer frequency | MHz | 1 | 2 |
| **medium pressure**[1] | | | |
| min. extended<br>min. | bar<br>bar | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 | metal pipe: 20<br>metal pipe: 30<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | |
| min. extended<br>min. recommended<br>max. recommended<br>max. extended | mm<br>mm<br>mm<br>mm | 30<br>40<br>80<br>120 | 15<br>20<br>40<br>60 |
| **pipe wall thickness** | | | |
| min.<br>max. | mm<br>mm | 2.5<br>- | 1.5<br>- |
| **material** | | | |
| housing<br><br>contact surface | | PI with stainless steel cap 304 (1.4301)<br>PI | PI with stainless steel cap 304 (1.4301)<br>PI |
| degree of protection according to EN 60529 | | IP 65 | IP 65 |
| **transducer cable** | | | |
| type<br>length | <br>m | 6111<br>4 | 6111<br>4 |
| **dimensions** | | | |
| length l<br>width b<br>height h | mm<br>mm<br>mm | 62.5<br>32<br>40.5 | 62.5<br>32<br>40.5 |
| dimensional drawing | |  |  |
| **operating temperature** | | | |
| min.<br>max. | °C<br>°C | -30<br>+200 | -30<br>+200 |
| temperature compensation | | x | x |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducers:
typical values for natural gas, nitrogen, oxygen, 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 (zone 1)

| technical type | | GRG1N83 | GRH1N83 | GRK1N83 |
|---|---|---|---|---|
| order code | | **GLG-NA1TS<br>GLG-NA1TS/OS<br>GLG-NI1TS<br>GLG-NI1TS/OS** | **GLH-NA1TS<br>GLH-NA1TS/OS<br>GLH-NI1TS<br>GLH-NI1TS/OS** | **GLK-NA1TS<br>GLK-NA1TS/OS<br>GLK-NI1TS<br>GLK-NI1TS/OS** |
| transducer frequency | MHz | 0.2 | 0.3 | 0.5 |
| **medium pressure**[1] | | | | |
| min. extended | bar | metal pipe: 10 | metal pipe: 10 | metal pipe:<br>10 (d > 120 mm)<br>5 (d < 120 mm) |
| min. | bar | metal pipe: 15<br>plastic pipe: 1 | metal pipe: 15<br>plastic pipe: 1 | metal pipe:<br>15 (d > 120 mm)<br>10 (d < 120 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 190 | 120 | 60 |
| min. recommended | mm | 220 | 140 | 80 |
| max. recommended | mm | 900 | 600 | 300 |
| max. extended | mm | 1600 | 1000 | 500 |
| **pipe wall thickness** | | | | |
| min. | mm | 11 | 7 | 4 |
| max. | mm | 23 | 15 | 9 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) |
| 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 | 51 | 51 | 51 |
| height h | mm | 67.5 | 67.5 | 67.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +170 | +170 | +170 |
| temperature compensation | | x | x | x |

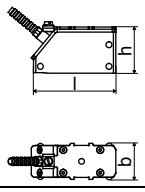
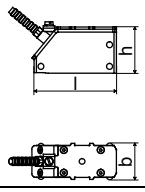
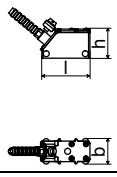
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GRG1N83 | GRH1N83 | GRK1N83 |
|---|---|---|---|---|---|
| **explosion protection** | | | | | |
| ATEX/IECEx | transducer ATEX | | GLG-NA1TS<br>GLG-NA1TS/OS | GLH-NA1TS<br>GLH-NA1TS/OS | GLK-NA1TS<br>GLK-NA1TS/OS |
| | transducer IEC Ex | | GLG-NI1TS<br>GLG-NI1TS/OS | GLH-NI1TS<br>GLH-NI1TS/OS | GLK-NI1TS<br>GLK-NI1TS/OS |
| | zone | | 1 | 1 | 1 |
| | **explosion protection temperature** | | | | |
| | min.<br>max. | °C<br>°C | -55<br>+140 | -55<br>+140 | -55<br>+140 |
| | marking | | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX |
| | certification ATEX | | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X |
| | certification IEC Ex | | IECEx IBE08.0007 X | IECEx IBE08.0007 X | IECEx IBE08.0007 X |
| | type of protection | | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |

## Lamb Wave Transducers (zone 1)

| technical type | | GRM1N83 | GRP1N83 | GRQ1N83 |
|---|---|---|---|---|
| order code | | **GLM-NA1TS**<br>**GLM-NA1TS/OS**<br>**GLM-NI1TS**<br>**GLM-NI1TS/OS** | **GLP-NA1TS**<br>**GLP-NA1TS/OS**<br>**GLP-NI1TS**<br>**GLP-NI1TS/OS** | **GLQ-NA1TS**<br>**GLQ-NA1TS/OS**<br>**GLQ-NI1TS**<br>**GLQ-NI1TS/OS** |
| transducer frequency | MHz | 1 | 2 | 4 |
| **medium pressure**[1] | | | | |
| min. extended<br>min. | bar<br>bar | -<br>metal pipe:<br>10 (d > 60 mm)<br>5 (d < 60 mm)<br>plastic pipe: 1 | -<br>metal pipe:<br>10 (d > 35 mm)<br>5 (d < 35 mm)<br>plastic pipe: 1 | -<br>metal pipe:<br>10 (d > 15 mm)<br>5 (d < 15 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 30 | 15 | 7 |
| min. recommended | mm | 40 | 20 | 10 |
| max. recommended | mm | 90 | 50 | 22 |
| max. extended | mm | 150 | 70 | 35 |
| **pipe wall thickness** | | | | |
| min. | mm | 2 | 1 | 0.5 |
| max. | mm | 5 | 3 | 1 |
| **material** | | | | |
| housing<br><br><br>contact surface | | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PPSU | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PPSU | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404)<br>PPSU |
| degree of protection according to EN 60529 | | IP 65 | IP 65 | IP 65 |
| **transducer cable** | | | | |
| type | | 1699 | 1699 | 1699 |
| length | m | 4 | 4 | 3 |
| **dimensions** | | | | |
| length l | mm | 74 | 74 | 42 |
| width b | mm | 32 | 32 | 22 |
| height h | mm | 40.5 | 40.5 | 25.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +170 | +170 | +170 |
| temperature compensation | | x | x | x |

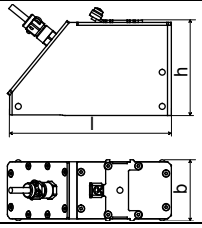
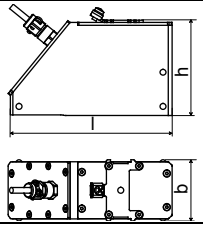
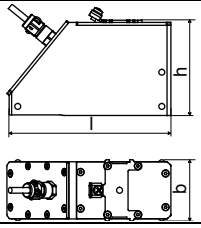
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GRM1N83 | GRP1N83 | GRQ1N83 |
|---|---|---|---|---|---|
| **explosion protection** | | | | | |
| ATEX/IEC Ex | transducer ATEX | | GLM-NA1TS<br>GLM-NA1TS/OS | GLP-NA1TS<br>GLP-NA1TS/OS | GLQ-NA1TS<br>GLQ-NA1TS/OS |
| | transducer IEC Ex | | GLM-NI1TS<br>GLM-NI1TS/OS | GLP-NI1TS<br>GLP-NI1TS/OS | GLQ-NI1TS<br>GLQ-NI1TS/OS |
| | zone | | 1 | 1 | 1 |
| | **explosion protection temperature** | | | | |
| | min.<br>max. | °C<br>°C | -55<br>+140 | -55<br>+140 | -55<br>+140 |
| | marking | | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX | CE 0044; Ex II2G II2D<br>Ex eq II T6...T3<br>Ex tD A21 IP65 TX |
| | certification ATEX | | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X |
| | certification IEC Ex | | IECEx IBE08.0007 X | IECEx IBE08.0007 X | IECEx IBE08.0007 X |
| | type of protection | | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure | gas: increased safety, powder filling<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |
| remark | | | | | on request |

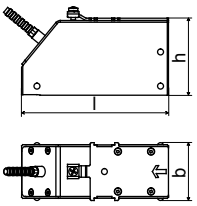
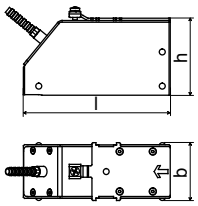
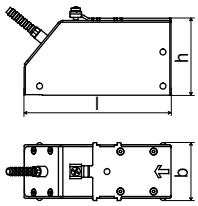
## Lamb Wave Transducers (zone 1, IP 68)

| technical type | | GRG1LI3 | GRH1LI3 | GRK1LI3 |
|---|---|---|---|---|
| order code | | **GLG-NA1TS/IP68** | **GLH-NA1TS/IP68** | **GLK-NA1TS/IP68** |
| transducer frequency | MHz | 0.2 | 0.3 | 0.5 |
| **medium pressure**[1] | | | | |
| min. extended | bar | metal pipe: 10 | metal pipe: 10 | metal pipe:<br>10 (d > 120 mm)<br>5 (d < 120 mm) |
| min. | bar | metal pipe: 15<br>plastic pipe: 1 | metal pipe: 15<br>plastic pipe: 1 | metal pipe:<br>15 (d > 120 mm)<br>10 (d < 120 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 190 | 120 | 60 |
| min. recommended | mm | 220 | 140 | 80 |
| max. recommended | mm | 900 | 600 | 300 |
| max. extended | mm | 1600 | 1000 | 500 |
| **pipe wall thickness** | | | | |
| min. | mm | 11 | 7 | 4 |
| max. | mm | 23 | 15 | 9 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap 316Ti (1.4571) | PPSU with stainless steel cap 316Ti (1.4571) | PPSU with stainless steel cap 316Ti (1.4571) |
| contact surface | | PPSU | PPSU | PPSU |
| degree of protection according to EN 60529 | | IP 68 | IP 68 | IP 68 |
| **transducer cable** | | | | |
| type | | 2550 | 2550 | 2550 |
| length | m | 12 | 12 | 12 |
| **dimensions** | | | | |
| length l | mm | 143.5 | 143.5 | 143.5 |
| width b | mm | 54 | 54 | 54 |
| height h | mm | 83.5 | 83.5 | 83.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +100 | +100 | +100 |
| temperature compensation | | x | x | x |
| **explosion protection** | | | | |
| ATEX transducer | | GLG-NA1TS/IP68 | GLH-NA1TS/IP68 | GLK-NA1TS/IP68 |
| ATEX zone | | 1 | 1 | 1 |
| ATEX **explosion protection temperature** | | | | |
| ATEX min. | °C | -55 | -55 | -55 |
| ATEX max. | °C | +140 | +140 | +140 |
| ATEX marking | | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX | CE 0044; Ex II2G II2D<br>Ex q II T6...T3<br>Ex tD A21 IP68 TX |
| ATEX certification | | IBExU07ATEX1168 X | IBExU07ATEX1168 X | IBExU07ATEX1168 X |
| ATEX type of protection | | gas: powder filling<br>dust: protection by enclosure | gas: powder filling<br>dust: protection by enclosure | gas: powder filling<br>dust: protection by enclosure |
| ATEX necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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 (ATEX zone 2, FM or without explosion protection)

| technical type | | GRG1N52 | GRH1N52 | GRK1N52 |
|---|---|---|---|---|
| order code | | **GLG-NA2TS**<br>**GLG-NA2TS/OS**<br>**GLG-NF2TS**<br>**GLG-NF2TS/OS**<br>**GLG-NNNTS**<br>**GLG-NNNTS/OS** | **GLH-NA2TS**<br>**GLH-NA2TS/OS**<br>**GLH-NF2TS**<br>**GLH-NF2TS/OS**<br>**GLH-NNNTS**<br>**GLH-NNNTS/OS** | **GLK-NA2TS**<br>**GLK-NA2TS/OS**<br>**GLK-NF2TS**<br>**GLK-NF2TS/OS**<br>**GLK-NNNTS**<br>**GLK-NNNTS/OS** |
| transducer frequency | MHz | 0.2 | 0.3 | 0.5 |
| **medium pressure**[1] | | | | |
| min. extended | bar | metal pipe: 10 | metal pipe: 10 | metal pipe:<br>10 (d > 120 mm), 5 (d < 120 mm) |
| min. | bar | metal pipe: 15<br>plastic pipe: 1 | metal pipe: 15<br>plastic pipe: 1 | metal pipe:<br>15 (d > 120 mm), 10 (d < 120 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 190 | 120 | 60 |
| min. recommended | mm | 220 | 140 | 80 |
| max. recommended | mm | 900 | 600 | 300 |
| max. extended | mm | 1600 | 1000 | 500 |
| **pipe wall thickness** | | | | |
| min. | mm | 11 | 7 | 4 |
| max. | mm | 23 | 15 | 9 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) |
| contact surface | | PPSU | PPSU | PPSU |
| degree of protection according to EN 60529 | | IP 67 | IP 67 | IP 67 |
| **transducer cable** | | | | |
| type | | 1699 | 1699 | 1699 |
| length | m | 5 | 5 | 5 |
| **dimensions** | | | | |
| length l | mm | 128.5 | 128.5 | 128.5 |
| width b | mm | 51 | 51 | 51 |
| height h | mm | 67.5 | 67.5 | 67.5 |
| dimensional drawing | |  |  |  |
| temperature compensation | | x | x | x |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +170 | +170 | +170 |

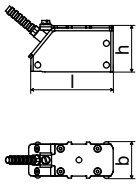
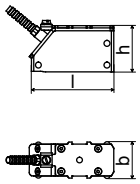
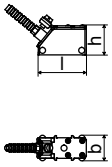
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GRG1N52 | GRH1N52 | GRK1N52 |
|---|---|---|---|---|---|
| **explosion protection** | | | | | |
| **ATEX** | transducer | | GLG-NA2TS<br>GLG-NA2TS/OS | GLH-NA2TS<br>GLH-NA2TS/OS | GLK-NA2TS<br>GLK-NA2TS/OS |
| | zone | | 2 | 2 | 2 |
| | **explosion protection temperature** | | | | |
| | min.<br>max. | °C<br>°C | -55<br>+150 | -55<br>+150 | -55<br>+150 |
| | marking | | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+150 °C<br>II3D Ex tD A22 IP67 TX | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+150 °C<br>II3D Ex tD A22 IP67 TX | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+150 °C<br>II3D Ex tD A22 IP67 TX |
| | certification | | - | - | - |
| | type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |
| **FM** | transducer | | GLG-NF2TS<br>GLG-NF2TS/OS | GLH-NF2TS<br>GLH-NF2TS/OS | GLK-NF2TS<br>GLK-NF2TS/OS |
| | **explosion protection temperature** | | | | |
| | min.<br>max. | °C<br>°C | -40<br>+165 | -40<br>+165 | -40<br>+165 |
| | marking | | NI/Cl. I,II,III/Div. 2 /<br>GP A,B,C,D,E,F,G/<br>Temp. Codes dwg 3860 | NI/Cl. I,II,III/Div. 2 /<br>GP A,B,C,D,E,F,G/<br>Temp. Codes dwg 3860 | NI/Cl. I,II,III/Div. 2 /<br>GP A,B,C,D,E,F,G/<br>Temp. Codes dwg 3860 |
| | type of protection | | non incendive | non incendive | non incendive |

## Lamb Wave Transducers (ATEX zone 2, FM or without explosion protection)

| technical type | | GRM1N52 | GRP1N52 | GRQ1N52 |
|---|---|---|---|---|
| order code | | **GLM-NA2TS**<br>**GLM-NA2TS/OS**<br>**GLM-NF2TS**<br>**GLM-NF2TS/OS**<br>**GLM-NNNTS**<br>**GLM-NNNTS/OS** | **GLP-NA2TS**<br>**GLP-NA2TS/OS**<br>**GLP-NF2TS**<br>**GLP-NF2TS/OS**<br>**GLP-NNNTS**<br>**GLP-NNNTS/OS** | **GLQ-NA2TS**<br>**GLQ-NA2TS/OS**<br>**GLQ-NF2TS**<br>**GLQ-NF2TS/OS**<br>**GLQ-NNNTS**<br>**GLQ-NNNTS/OS** |
| transducer frequency | MHz | 1 | 2 | 4 |
| **medium pressure**[1] | | | | |
| min. extended | bar | - | - | - |
| min. | bar | metal pipe:<br>10 (d > 60 mm)<br>5 (d < 60 mm)<br>plastic pipe: 1 | metal pipe:<br>10 (d > 35 mm)<br>5 (d < 35 mm)<br>plastic pipe: 1 | metal pipe:<br>10 (d > 15 mm)<br>5 (d < 15 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 30 | 15 | 7 |
| min. recommended | mm | 40 | 20 | 10 |
| max. recommended | mm | 90 | 50 | 22 |
| max. extended | mm | 150 | 70 | 35 |
| **pipe wall thickness** | | | | |
| min. | mm | 2 | 1 | 0.5 |
| max. | mm | 5 | 3 | 1 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) | PPSU with stainless steel cap 304 (1.4301), option OS: 316L (1.4404) |
| 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 | 4 | 3 |
| **dimensions** | | | | |
| length l | mm | 74 | 74 | 42 |
| width b | mm | 32 | 32 | 22 |
| height h | mm | 40.5 | 40.5 | 25.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +170 | +170 | +170 |
| temperature compensation | | x | x | x |

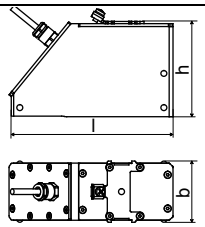
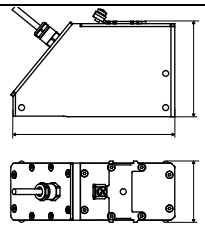
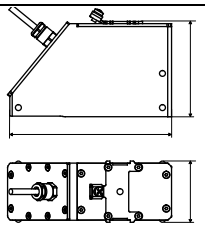
[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

continued on next page

| technical type | | | GRM1N52 | GRP1N52 | GRQ1N52 |
|---|---|---|---|---|---|
| **explosion protection** | | | | | |
| **ATEX** | transducer | | GLM-NA2TS<br>GLM-NA2TS/OS | GLP-NA2TS<br>GLP-NA2TS/OS | GLQ-NA2TS<br>GLQ-NA2TS/OS |
| | zone | | 2 | 2 | 2 |
| | **explosion protection temperature** | | | | |
| | min.<br>max. | °C<br>°C | -55<br>+150 | -55<br>+150 | -55<br>+150 |
| | marking | | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+150 °C<br>II3D Ex tD A22 IP67 TX | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+150 °C<br>II3D Ex tD A22 IP67 TX | CE Ex<br>II3G Ex nA II T6...T3<br>Ta -55...+150 °C<br>II3D Ex tD A22 IP67 TX |
| | certification | | - | - | - |
| | type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| | necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |
| **FM** | transducer | | GLM-NF2TS<br>GLM-NF2TS/OS | GLP-NF2TS<br>GLP-NF2TS/OS | GLQ-NF2TS<br>GLQ-NF2TS/OS |
| | **explosion protection temperature** | | | | |
| | min.<br>max. | °C<br>°C | -55<br>+165 | -55<br>+165 | -55<br>+165 |
| | marking | | FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 | FM APPROVED NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 | FM APPROVED 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 |
| remark | | | | | on request |

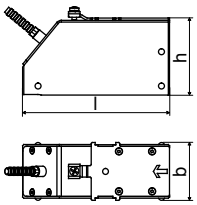
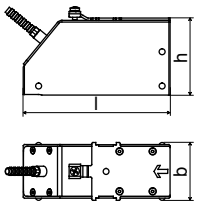
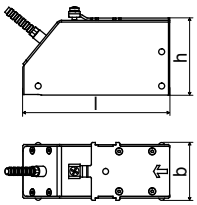
## Lamb Wave Transducers (ATEX zone 2 or without explosion protection, IP 68)

| technical type | | GRG1LI8 | GRH1LI8 | GRK1LI8 |
|---|---|---|---|---|
| order code | | **GLG-NA2TS/IP68**<br>**GLG-NNNTS/IP68** | **GLH-NA2TS/IP68**<br>**GLH-NNNTS/IP68** | **GLK-NA2TS/IP68**<br>**GLK-NNNTS/IP68** |
| transducer frequency | MHz | 0.2 | 0.3 | 0.5 |
| **medium pressure**[1] | | | | |
| min. extended | bar | metal pipe: 10 | metal pipe: 10 | metal pipe:<br>10 (d > 120 mm)<br>5 (d < 120 mm) |
| min. | bar | metal pipe: 15<br>plastic pipe: 1 | metal pipe: 15<br>plastic pipe: 1 | metal pipe:<br>15 (d > 120 mm)<br>10 (d < 120 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 190 | 120 | 60 |
| min. recommended | mm | 220 | 140 | 80 |
| max. recommended | mm | 900 | 600 | 300 |
| max. extended | mm | 1600 | 1000 | 500 |
| **pipe wall thickness** | | | | |
| min. | mm | 11 | 7 | 4 |
| max. | mm | 23 | 15 | 9 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap<br>316Ti (1.4571) | PPSU with stainless steel cap<br>316Ti (1.4571) | PPSU with stainless steel cap<br>316Ti (1.4571) |
| contact surface | | PPSU | PPSU | PPSU |
| degree of protection according to EN 60529 | | IP 68 | IP 68 | IP 68 |
| **transducer cable** | | | | |
| type | | 2550 | 2550 | 2550 |
| length | m | 12 | 12 | 12 |
| **dimensions** | | | | |
| length l | mm | 143.5 | 143.5 | 143.5 |
| width b | mm | 54 | 54 | 54 |
| height h | mm | 83.5 | 83.5 | 83.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +100 | +100 | +100 |
| temperature compensation | | x | x | x |
| **explosion protection** | | | | |
| **ATEX** transducer | | GLG-NA2TS/IP68 | GLH-NA2TS/IP68 | GLK-NA2TS/IP68 |
| zone | | 2 | 2 | 2 |
| **explosion protection temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +90 | +90 | +90 |
| marking | | CE Ex<br>II3G Ex nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX | CE Ex<br>II3G Ex nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX | CE Ex<br>II3G Ex nA II T6...T5<br>Ta -40...+90 °C<br>II3D Ex tD A22 IP68 TX |
| certification | | - | - | - |
| type of protection | | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure | gas: non sparking<br>dust: protection by enclosure |
| necessary transducer mounting fixture | | Variofix L or Variofix C | Variofix L or Variofix C | Variofix L or Variofix C |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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

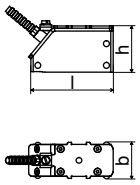
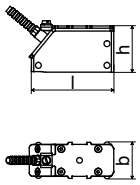
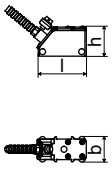
## Lamb Wave Transducers (without explosion protection, with connection system AS)

| technical type | | GRG1NC3 | GRH1NC3 | GRK1NC3 |
|---|---|---|---|---|
| order code | | **GLG-NNNAS** | **GLH-NNNAS** | **GLK-NNNAS** |
| transducer frequency | MHz | 0.2 | 0.3 | 0.5 |
| **medium pressure**[1] | | | | |
| min. extended | bar | metal pipe: 10 | metal pipe: 10 | metal pipe:<br>10 (d > 120 mm)<br>5 (d < 120 mm) |
| min. | bar | metal pipe: 15<br>plastic pipe: 1 | metal pipe: 15<br>plastic pipe: 1 | metal pipe:<br>15 (d > 120 mm)<br>10 (d < 120 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 190 | 120 | 60 |
| min. recommended | mm | 220 | 140 | 80 |
| max. recommended | mm | 900 | 600 | 300 |
| max. extended | mm | 1600 | 1000 | 500 |
| **pipe wall thickness** | | | | |
| min. | mm | 11 | 7 | 4 |
| max. | mm | 23 | 15 | 9 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap 304 (1.4301) | PPSU with stainless steel cap 304 (1.4301) | PPSU with stainless steel cap 304 (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 | 51 | 51 | 51 |
| height h | mm | 67.5 | 67.5 | 67.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +170 | +170 | +170 |
| temperature compensation | | x | x | x |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, 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 (without explosion protection, with connection system AS)

| technical type | | GRM1NC3 | GRP1NC3 | GRQ1NC3 |
|---|---|---|---|---|
| order code | | **GLM-NNNAS** | **GLP-NNNAS** | **GLQ-NNNAS** |
| transducer frequency | MHz | 1 | 2 | 4 |
| **medium pressure**[1] | | | | |
| min. extended | bar | - | - | - |
| min. | bar | metal pipe:<br>10 (d > 60 mm)<br>5 (d < 60 mm)<br>plastic pipe: 1 | metal pipe:<br>10 (d > 35 mm)<br>5 (d < 35 mm)<br>plastic pipe: 1 | metal pipe:<br>10 (d > 15 mm)<br>5 (d < 15 mm)<br>plastic pipe: 1 |
| **inner pipe diameter d**[2] | | | | |
| min. extended | mm | 30 | 15 | 7 |
| min. recommended | mm | 40 | 20 | 10 |
| max. recommended | mm | 90 | 50 | 22 |
| max. extended | mm | 150 | 70 | 35 |
| **pipe wall thickness** | | | | |
| min. | mm | 2 | 1 | 0.5 |
| max. | mm | 5 | 3 | 1 |
| **material** | | | | |
| housing | | PPSU with stainless steel cap 304 (1.4301) | PPSU with stainless steel cap 304 (1.4301) | PPSU with stainless steel cap 304 (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 | 4 | 3 |
| **dimensions** | | | | |
| length l | mm | 74 | 74 | 42 |
| width b | mm | 32 | 32 | 22 |
| height h | mm | 40.5 | 40.5 | 25.5 |
| dimensional drawing | |  |  |  |
| **operating temperature** | | | | |
| min. | °C | -40 | -40 | -40 |
| max. | °C | +170 | +170 | +170 |
| temperature compensation | | x | x | x |
| remark | | | | on request |

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

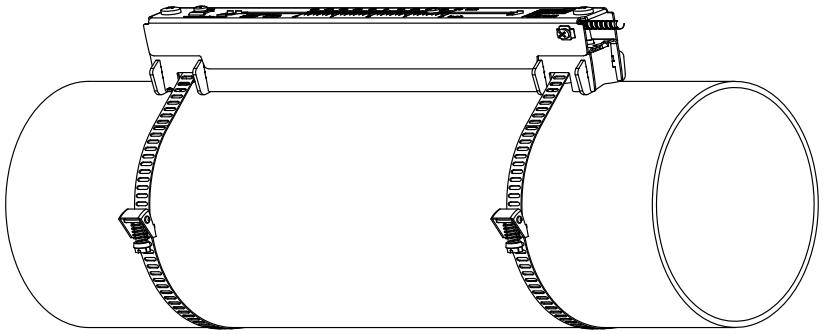
[2] Lamb wave transducers:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other gases on request
pipe diameter min. recommended/max. recommended: in reflection mode and for a flow velocity of 15 m/s
pipe diameter max. extended: in diagonal mode and for a flow velocity of 25 m/s

# Transducer Mounting Fixtures

## Order Codes

| 1, 2 | 3 | | 4 | 5 | | 6 | 7...9 | | 10, 11 | no. of character |
|---|---|---|---|---|---|---|---|---|---|---|
| transducer mounting fixture | transducer | - | measuring mode | size | - | fixation | outer pipe diameter | / | option | description |
| VL | | | | | | | | | | Variofix L |
| VC | | | | | | | | | | Variofix C |
| | K | | | | | | | | | transducers with transducer frequency G, H, K |
| | M | | | | | | | | | transducers with transducer frequency M, P |
| | Q | | | | | | | | | transducers with transducer frequency Q |
| | | | D | | | | | | | reflection mode or diagonal mode |
| | | | R | | | | | | | reflection mode |
| | | | | S | | | | | | small |
| | | | | M | | | | | | medium |
| | | | | L | | | | | | large |
| | | | | | | S | | | | tension straps |
| | | | | | | W | | | | welding |
| | | | | | | N | | | | without fixation |
| | | | | | | | 002 | | | 10...20 mm |
| | | | | | | | 004 | | | 20...40 mm |
| | | | | | | | T36 | | | 40...360 mm |
| | | | | | | | 013 | | | 10...130 mm |
| | | | | | | | 036 | | | 130...360 mm |
| | | | | | | | 092 | | | 360...920 mm |
| | | | | | | | 200 | | | 920...2000 mm |
| | | | | | | | | | IP68 | degree of protection IP 68 |
| | | | | | | | | | OS | housing with stainless steel 316 |
| | | | | | | | | | Z | special design |
| example | | | | | | | | | | |
| VL | K | - | D | S | - | S | 200 | | | Variofix L and tension straps for transducers with transducer frequency G, H, K |
| | | - | | | - | | | / | | |

## Variofix L (VL)



material: stainless steel 304 (1.4301), 301 (1.4310)
option OS: 316 (1.4571), 316L (1.4404), 17-7PH (1.4568)

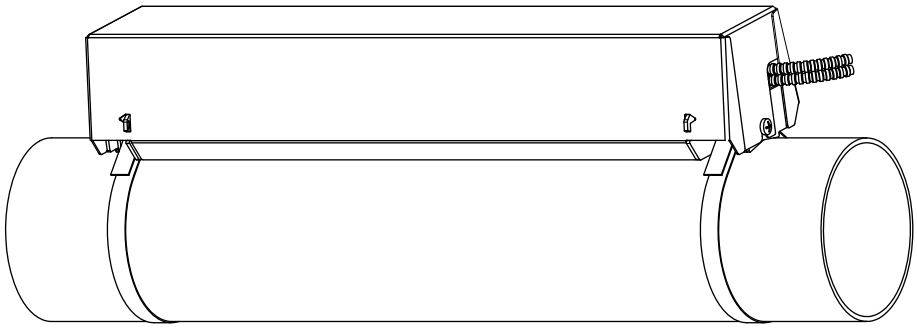
inner length:

**VLK**: 348 mm,
option IP68: 368 mm
**VLM**: 234 mm
**VLQ**: 176 mm

dimensions:

**VLK**: 423 x 90 x 93 mm,
option IP68: 443 x 94 x 105 mm
**VLM**: 309 x 57 x 63 mm
**VLQ**: 247 x 43 x 47 mm

## Variofix C (VC)



material: stainless steel 304 (1.4301), 301 (1.4310)
option OS: 316 (1.4571)

inner length:

**VCK-xL**: 500 mm,
**VCK-xS**: 350 mm,
**VCM**: 400 mm
**VCQ**: 250 mm

dimensions:

**VCK-xL**: 560 x 122 x 102 mm,
option IP68: 560 x 126 x 120 mm
**VCK-xS**: 410 x 122 x 102 mm,
option IP68: 410 x 126 x 120 mm
**VCM**: 460 x 96 x 80 mm
**VCQ**: 310 x 85 x 62 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 |
| long time measure-ment | indoor | coupling compound type N | coupling compound type E | coupling foil type VT[1] | coupling foil type VT[2] |
| | outdoor | coupling foil type VT | coupling foil type VT | coupling foil type VT[1] | coupling foil type VT[2] |

[1] < 5 years

[2] < 6 months

### Technical Data

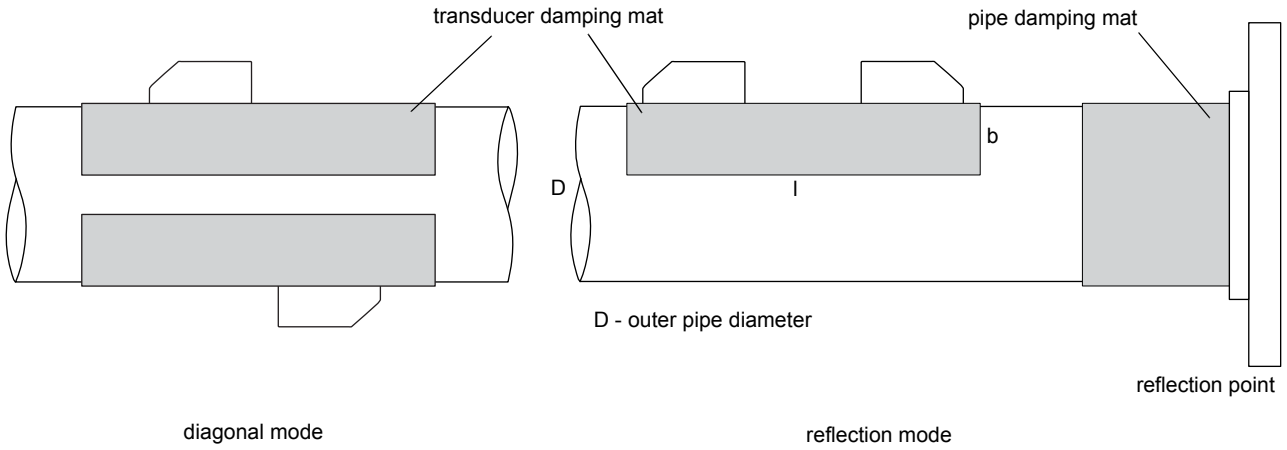
| **type** | **order code** | **temperature** °C | **material** | **remark** |
|---|---|---|---|---|
| coupling compound type N | 990739-1 | -30...+130 | mineral grease paste | |
| coupling compound type E | 990739-2 | -30...+200 | silicone paste | |
| coupling compound type H | 990739-3 | -30...+250 | fluoropolymer paste | |
| coupling foil type VT | 990739-0 | -10...+150, peak max. 200 | fluoroelastomer | for transducers with transducer frequency G, H, K |
| | 990739-6 | | | for shear wave transducers with transducer frequency M, P |
| | 990739-14 | | | for IP 68 shear wave transducers and Lambwave transducers with transducer frequency M, P |
| | 990739-15 | | | for shear wave transducers with transducer frequency Q |
| | 990739-5 | | | for Lambwave transducers with transducer frequency Q |

## Damping Mats (optional)

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 | dimensions l x b x h | transducer frequency (3rd character of transducer order code) | | | | | technical type | temperature | remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | mm | mm | G | H | K | M | P | | °C | |
| **transducer damping mat** | | | | | | | | | | | |
| C | self-adhesive, for stationary installation | < 80 | 450 x 115 x 0.5 | - | - | - | x | x | C20S3 | -25...+60 | |
| | | ≥ 80 | 900 x 230 x 0.5 | - | - | x | x | - | C20S2 | | |
| | | | 900 x 230 x 1.3 | x | x | - | - | - | C50S2 | | |
| **pipe damping mat** | | | | | | | | | | | |
| B | self-adhesive, for stationary installation | | l x 100 x 0.9 | x | x | x | x | x | B35R2 | -35...+50 | l - see table below |

### Length of Pipe Damping Mat - Type B

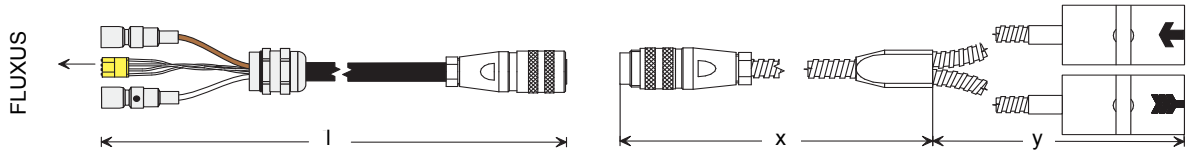
(length l depending on transducer frequency and outer pipe diameter)

| outer pipe diameter D | transducer frequency | |
|---|---|---|
| | G, H | K, M, P |
| mm | m | m |
| 100 | 2 | 1 |
| 200 | 6 | 3 |
| 300 | 12 | 6 |
| 500 | 32 | 16 |
| 1000 | 126 | 63 |

# Connection Systems

## Connection System AS (not explosion proof transducers)

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




## Connection System TS

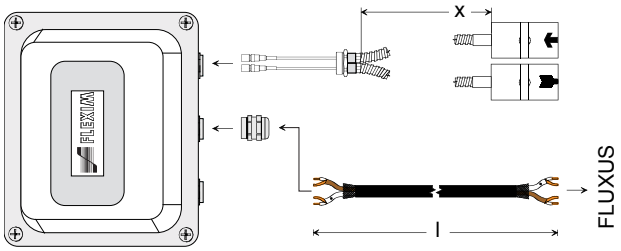
| transducer frequency (3rd character of transducer order code) | | G, H, K | | M, P | | Q | | S | |
|---|---|---|---|---|---|---|---|---|---|
| | | x | l | x | l | x | l | x | l |
| cable length | m | 5 | ≤ 300 | 4 | ≤ 300 | 3 | ≤ 90 | 2 | ≤ 40 |

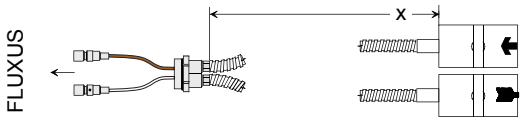
connection via junction box

direct connection
(only G704, G704 A2)

ATEX zone 2, FM, without explosion protection

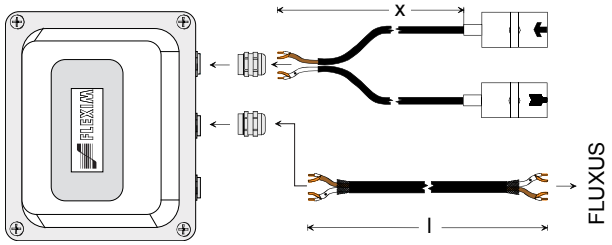
JB02, JB03

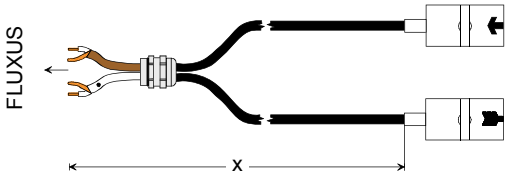



zone 1 , ATEX zone 2 (transducers IP 68), without explosion protection (transducers IP 68)

JB01, JBP2, JBP3




x, y - transducer cable length

l - max. length of extension cable

# Transducer Cables

## Technical Data

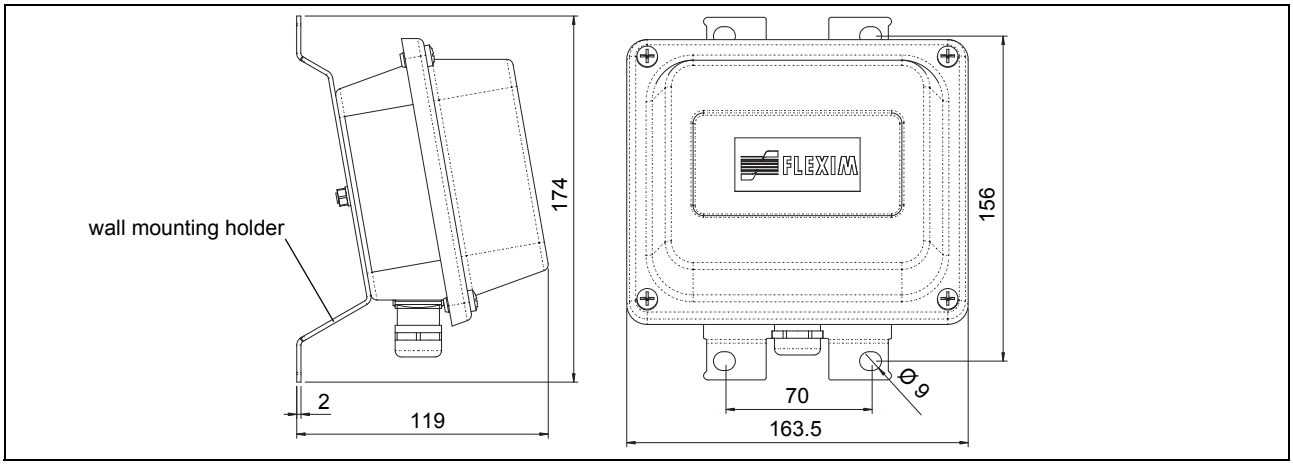
| | | transducer cable | | | extension cable | |
|---|---|---|---|---|---|---|
| item number | | 1699 | 2550 | 6111 | 2551 | 2615 |
| connection system | | | | | AS | TS |
| standard length | m | see table above | 12 | see table above | 1<br>10 | - |
| max. length | m | - | - | - | see table above | see table above |
| temperature | °C | -55...+200 | -40...+100 | -100...+225 | -25...+80 | -40...+70 |
| properties | | | longitudinal water tight | | | halogen free<br>fire propagation test according to IEC 60332-1<br>combustion test according to IEC 60754-2 |
| sheath | | | | | | |
| material | | stainless steel 304 (1.4301)<br>option OS: 316L (1.4404) | - | stainless steel 304 (1.4301)<br>option OS: 316L (1.4404) | - | - |
| outer diameter | mm | 8 | - | 8 | - | - |
| cable jacket | | | | | | |
| material | | PTFE | PUR | PFA | TPE-O | PUR |
| outer diameter | mm | 2.9 | 5.2 ±0.2 | 2.7 | 8 | 12 |
| thickness | mm | 0.3 | 0.9 | 0.5 | | 2 |
| color | | brown | gray | white | black | black |
| shield | | x | x | x | x | x |

# Junction Box

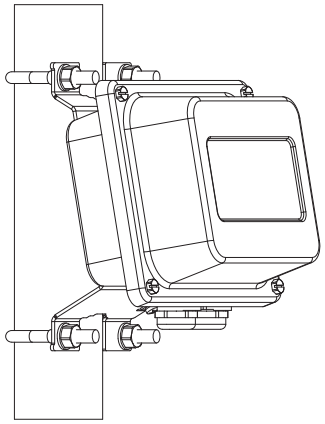
## Technical Data

| technical type | | JB01S4E3M | JB02 | JB03 | JBP2 | JBP3 |
|---|---|---|---|---|---|---|
| dimensions | | see dimensional drawing | see dimensional drawing | see dimensional drawing | see dimensional drawing | see dimensional drawing |
| fixation | | wall mounting optional: 2 " pipe mounting | wall mounting optional: 2 " pipe mounting | wall mounting optional: 2 " pipe mounting | wall mounting optional: 2 " pipe mounting | wall mounting optional: 2 " pipe mounting |
| **material** | | | | | | |
| housing | | stainless steel 316L (1.4404) | stainless steel 304 (1.4301) option OS: 316L (1.4404) | stainless steel 304 (1.4301) option OS: 316L (1.4404) | stainless steel 316L (1.4404) | stainless steel 316L (1.4404) |
| gasket | | silicone | silicone | silicone | silicone | silicone |
| degree of protection according to EN 60529 | | IP 67 | IP 67 | IP 67 | IP 67 | IP 67 |
| cable gland | | M20 | M20 | M20 | M20 | M20 |
| **operating temperature** | | | | | | |
| min. | °C | -40 | -40 | -40 | -40 | -40 |
| max. | °C | +80 | +80 | +80 | +80 | +80 |
| **explosion protection** | | | | | | |
| ATEX zone | | 1 | 2 | - | 2 | - |
| ATEX marking | | CE 0044 Ex II2G Ex e mb II (T6)...T4 $T_a$ -40...+(70) 80 °C Ex II2D Ex tD A21 IP67 T 100 °C | CE Ex II3G Ex nA II T6...T4 $T_a$ -40...+80 °C Ex II3D Ex tD A22 IP67 T 100 °C | - | CE Ex II3G Ex nA II T6...T4 $T_a$ -40...+80 °C Ex II3D Ex tD A22 IP67 T 100 °C | - |
| ATEX certification | | IBExU06ATEX1161 | - | - | - | - |
| ATEX type of protection | | junction box: increased safety<br>decoupled network: encapsulation | non sparking, protection by enclosure | - | non sparking, protection by enclosure | - |

## Dimensions

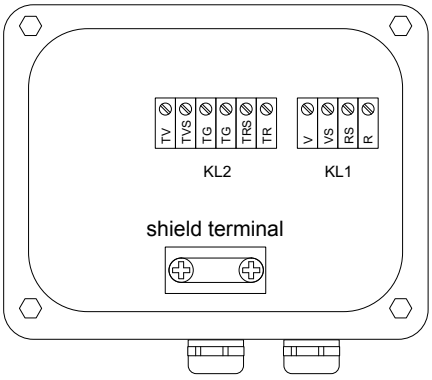


## 2 " Pipe Mounting Kit (optional)



## Terminal Assignment

### JB01




**Transducers**

terminal strip KL1

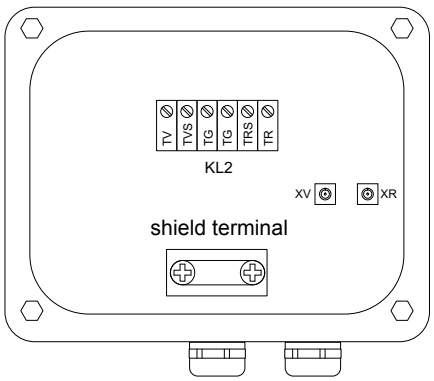
| terminal c | onnection |
|---|---|
| V | transducer ↑, signal |
| VS | transducer ↑, internal shield |
| RS | transducer ⅄, internal shield |
| R | transducer ⅄, signal |
| cable gland | external shield |

**Extension Cable**

terminal strip KL2

| terminal c | onnection |
|---|---|
| TV | signal |
| TVS | internal shield |
| TRS | internal shield |
| TR | signal |
| shield terminal | external shield |

### JB02, JB03




**Transducers**

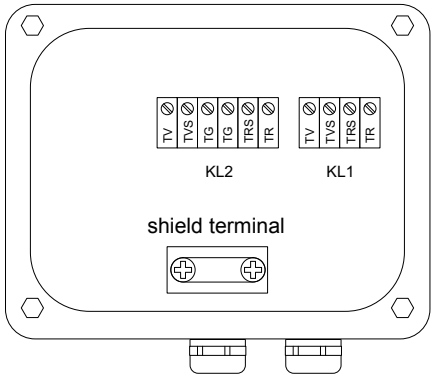
| terminal con | nection |
|---|---|
| XV | transducer ↑, SMB connector |
| XR | transducer ⅄, SMB connector |
| cable gland | external shield |

**Extension Cable**

terminal strip KL2

| terminal con | nection |
|---|---|
| TV | signal |
| TVS | internal shield |
| TRS | internal shield |
| TR | signal |
| shield terminal | external shield |

## JBP2, JBP3




### Transducers

terminal strip KL1

| terminal c | onnection |
|---|---|
| TV | transducer ↑, signal |
| TVS | transducer ↑, internal shield |
| TRS | transducer ⅄, internal shield |
| TR | transducer ⅄, signal |
| cable gland | external shield |

### Extension Cable

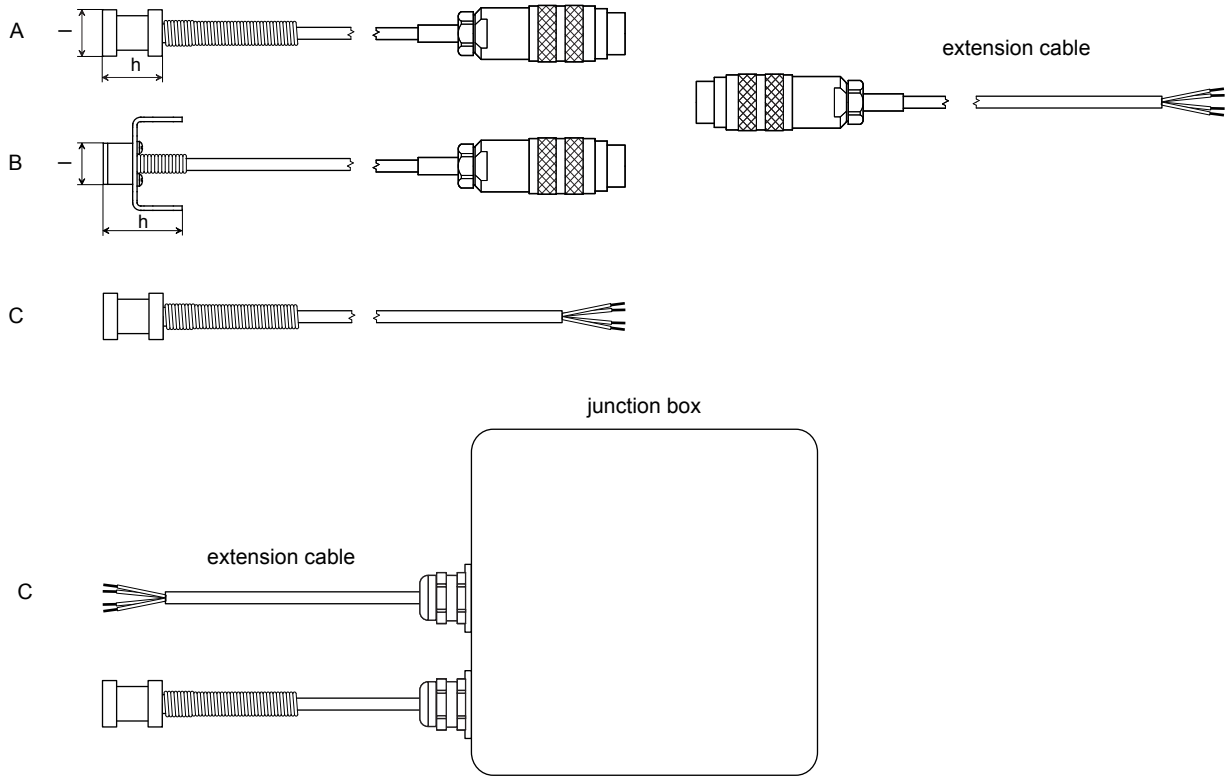
terminal strip KL2

| terminal c | onnection |
|---|---|
| TV | signal |
| TVS | internal shield |
| TRS | internal shield |
| TR | signal |
| shield terminal | external shield |

# Temperature Probes (optional)

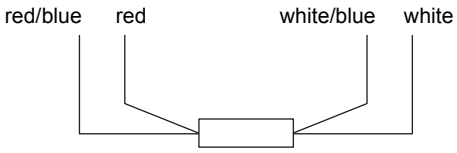
## Technical Data

| order code | | **670415-1<br>770415-1** | **670414-1<br>770414-1** | **770415-1A2** | **770414-1A2** | **670415-2** | **670414-2** |
|---|---|---|---|---|---|---|---|
| type | | Pt100 | Pt100 matched according to DIN 1434-1 | Pt100 | Pt100 matched according to DIN 1434-1 | Pt100 | Pt100 matched according to DIN 1434-1 |
| design | | 4-wire | | 4-wire | | 4-wire | |
| measuring range | °C | -30...+250 | | -30...+250 | | -50...+250 | |
| accuracy T | | ±(0.15 °C + 2 · $10^{-3}$ · T [°C]), class A | | ±(0.15 °C + 2 · $10^{-3}$ · T [°C]), class A | | ±(0.15 °C + 2 · $10^{-3}$ · T [°C]), class A | |
| accuracy ΔT | | - | ≤ 0.1 K (3K < ΔT < 6 K), more corresponding to EN 1434-1 | - | ≤ 0.1 K (3K < ΔT < 6 K), more corresponding to EN 1434-1 | - | ≤ 0.1 K (3K < ΔT < 6 K), more corresponding to EN 1434-1 |
| response time | s | 50 | | 50 | | 8 | |
| housing | | aluminum | | aluminum | | PEEK, stainless steel 304 (1.4301), Cu | |
| degree of protection according to EN 60529 | | IP 66 | | IP 66 | | IP 66 | |
| weight (without connector) | kg | 0.25 | 0.5 | 0.25 | 0.5 | 0.32 | 0.64 |
| fixation | | clamp-on | | clamp-on | | clamp-on | |
| accessories | | - | | - | | plastic protection plate, isolation foam | |
| **dimensions** | | | | | | | |
| length l | mm | 15 | | 15 | | 14 | |
| width b | mm | 15 | | 15 | | 30 | |
| height h | mm | 20 | | 20 | | 27 | |
| dimensional drawing | | 670415-1: A<br>770415-1: C | 670414-1: A<br>770414-1: C | C | | B | |
| **explosion protection** | | | | | | | |
| **ATEX** zone | | - | | 2 | | - | |
| **explosion protection temperature** | | | | | | | |
| **ATEX** min. | | - | | -30 | | - | |
| **ATEX** max. | | - | | +250 | | - | |
| **ATEX** marking | | - | | CE Ex II3G<br>Ex nA II T6...T2<br>Ta -30...+250 °C | | - | |



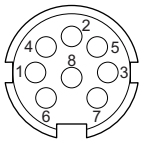

## Connection

### 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 | |



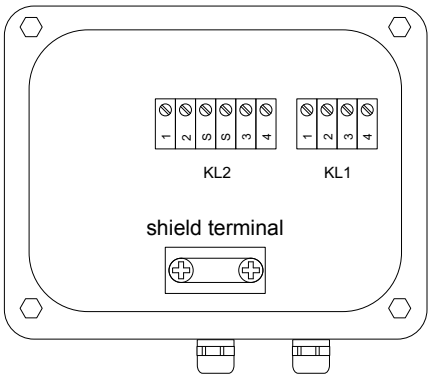

## Cables

| | | cable of temperature probe | extension cable |
|---|---|---|---|
| type | | 4 x 0.25 $mm^2$ black or white | LIYCY 8 x 0.14 $mm^2$ gray |
| standard length | m | 3 | 5/10/25 |
| max. length | m | - | 200 |
| cable jacket | | PTFE | PVC |

## Junction Box

| technical type | | JBT2 | JBT3 |
|---|---|---|---|
| dimensions | | see dimensional drawing | see dimensional drawing |
| fixation | | wall mounting<br>optional: 2 " pipe mounting | wall mounting<br>optional: 2 " pipe mounting |
| **material** | | | |
| housing | | stainless steel 316L (1.4404) | stainless steel 316L (1.4404) |
| gasket | | silicone | silicone |
| degree of protection according to EN 60529 | | IP 67 | IP 67 |
| cable gland | | M12 | M12 |
| **operating temperature** | | | |
| min. | °C | -40 | -40 |
| max. | °C | +80 | +80 |
| **explosion protection** | | | |
| **ATEX** zone | | 2 | - |
| **ATEX** marking | | CE Ex II3G Ex nA II T6...T4<br>$T_a$ -40...+80 °C<br>Ex II3D Ex tD A22 IP67 T 100 °C | - |
| **ATEX** certification | | - | - |
| **ATEX** type of protection | | non sparking, protection by enclosure | - |

## JBT2, JBT3




### Temperature Probe

terminal strip KL1

| terminal con | nection |
|---|---|
| 1 | red |
| 2 | red/blue |
| 3 | white |
| 4 | white/blue |

### Extension Cable

terminal strip KL2

| terminal con | nection |
|---|---|
| 1 | red |
| 2 | gray |
| 3 | white |
| 4 | blue |

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


2010-03-05, TSFLUXUS_G7V1-4EN_Leu