FLEXIM

# Technical specification

# FLUXUS F601

## Portable ultrasonic flow measurement of liquids

Portable instrument for non-invasive, quick flow and energy measurement with clamp-on technology for all types of piping

### Features

- Transmitterconfigurable for flow and thermal energy measurement
  - Flow measurement for all acoustically penetrable fluids
  - Integrated thermal energy measurement for a typical heat and refrigerating agents
  - Temperature range -40...+200 °C, with WaveInjector max. +400 °C
- Precise bidirectional and highly dynamic flow measurement with the non-invasive clamp-on technology
- Calibrated transducers and transmitters with traceable certificates
- Automatic loading of calibration data and transducer detection for a fast and easy set-up (less than 5 min), providing precise and long-term stable results
- High precision at fast and slow flow rates, high temperature and zero point stability
- Portable, easy-to-use flow transmitter with 2 flow channels, multiple inputs/outputs, an integrated data logger with a serial interface
- Integrated wall thickness measurement with connectable wall thickness probe
- The transmitter is water and dust-tight (IP65), resistant against oil, many liquids and dirt
- Robust, water-tight (IP67) transport case with comprehensive accessories
- Li-Ion battery provides up to 25 hours of measurement operation
- User-friendly design
- QuickFix for a simple and fast transmitter fixation, e.g. on pipes

### Applications

Designed for harsh environments and applicable in all areas such as drinking water and sewerage industry, power plants, producing industry, food industry and many more

Example applications:

- Operation measurements
- Data gathering in energy management and certifications according to ISO 50001
- Survey of pump performances
- Hydraulic balancing
- Verification of installed measuring systems
- Supervision of permanently installed meters, service and maintenance

FLUXUS F601

Measurement with transducers mounted with fastening shoes, and flow transmitter fixed to the pipe with the QuickFix pipe mounting fixture

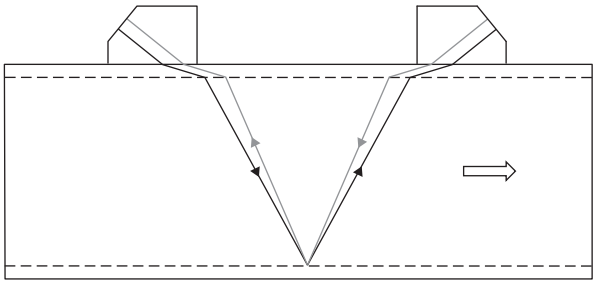
Measurement equipment in transport case

# Function

## Measurement principle

The transducers are mounted on the pipe which is completely filled with the fluid. The ultrasonic signals are emitted alternately by a transducer and received by the other. The physical quantities are determined from the transit times of the ultrasonic signals.

Path of the ultrasonic signal in the flowing fluid



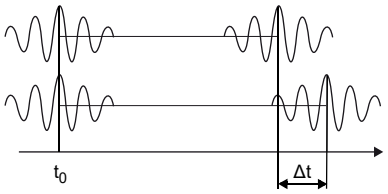
### Transit time difference principle

As the fluid where the ultrasound propagates is flowing, the transit time of the ultrasonic signal in flow direction is shorter than the one against the flow direction.

The transit time difference Δt 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 integrated microprocessors control the entire measuring cycle. The received ultrasonic signals are checked for measurement usability and evaluated for their reliability. Noise signals are eliminated.

Transit time difference Δt




### HybridTrek

If the gaseous or solid content in the fluid increases occasionally during measurement, a measurement with the transit time difference principle is no longer possible. NoiseTrek mode will then be selected by the flowmeter. This measurement method allows the flowmeter to achieve a stable measurement even with high gaseous or solid content.

The transmitter can switch automatically between transit time and NoiseTrek mode without any changes to the measurement setup.

## Calculation of volumetric flow rate

$$\dot{V} = k_{Re} \cdot A \cdot k_a \cdot \frac{\Delta t}{2 \cdot t_\gamma}$$

where

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

## Number of sound paths

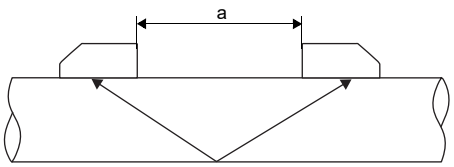
The number of sound paths is the number of transits of the ultrasonic signal through the fluid in the pipe. Depending on the number of sound paths, the following methods of installation exist:

- **reflection arrangement**
  The number of sound paths is even. The transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easier.
- **diagonal arrangement**
  The number of sound paths is odd. The transducers are mounted on opposite sides of the pipe. In the case of a high signal attenuation by the fluid, pipe and coatings, diagonal arrangement with 1 sound path will be used.

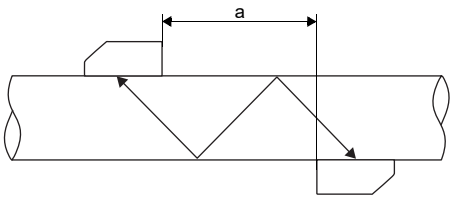
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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

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

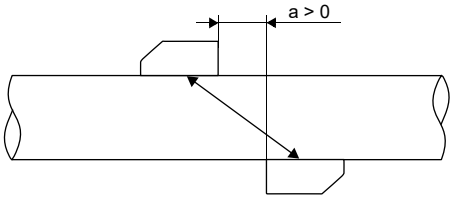
Reflection arrangement, number of sound paths: 2



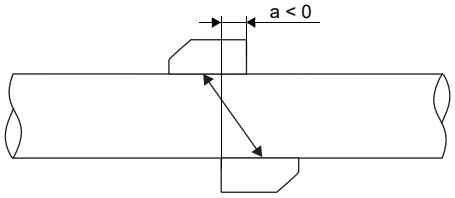

Diagonal arrangement, number of sound paths: 3




Diagonal arrangement, number of sound paths: 1



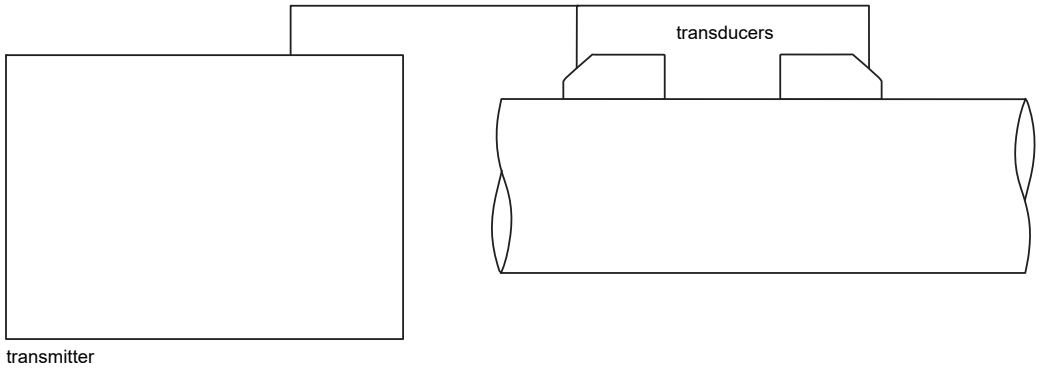

Diagonal arrangement, number of sound paths: 1, negative transducer distance



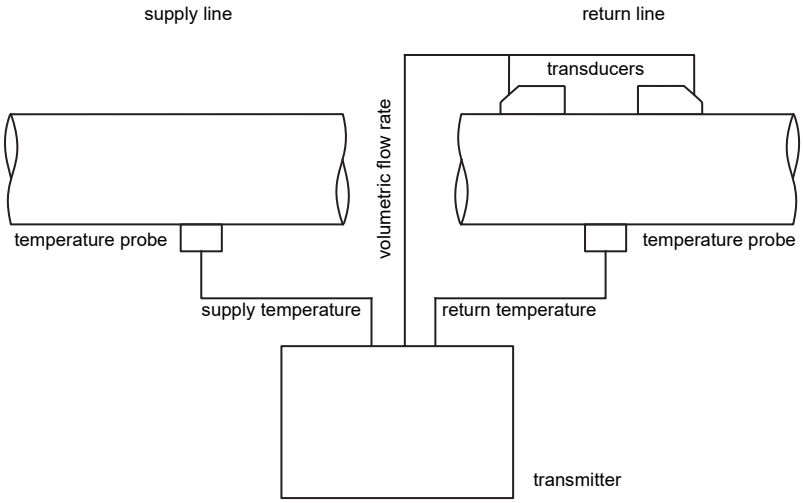

a - transducer distance

## Typical measurement setup

Example of a reflection arrangement




Example of a heat flow measurement measuring the volume flow rate in the return line



# Transmitter

## Technical data

| | | FLUXUS F601 |
|---|---|---|
| | |  |
| design | | portable |
| **measurement** | | |
| measurement principle | | transit time difference correlation principle,<br>automatic NoiseTrek selection for measurements with high gaseous or solid content |
| flow velocity | m/s | 0.01...25 |
| repeatability | | 0.15 % of reading ±0.005 m/s |
| fluid | | all acoustically conductive liquids with < 10 % gaseous or solid content in volume (transit time difference principle) |
| temperature compensation | | corresponding to the recommendations in ANSI/ASME MFC-5.1-2011 |
| **measurement uncertainty (volumetric flow rate)** | | |
| measurement uncertainty of measuring system[1] | | ±0.3 % of reading ±0.005 m/s |
| measurement uncertainty at the measuring point[2] | | ±1 % of reading ±0.005 m/s |
| **transmitter** | | |
| power supply | | • 100...230 V/50...60 Hz (power supply unit: IP40, 0...40 °C)<br>• 10.5...15 V DC (socket at transmitter)<br>• integrated battery |
| integrated battery<br>• operating time | h | Li-Ion, 7.2 V/6.2 Ah<br>• > 14 (without outputs, inputs and backlight)[3]<br>• > 25 (1 measuring channel, ambient temperature > 10 °C, without outputs, inputs and backlight)[3] |
| power consumption | W | < 6 (with outputs, inputs and backlight), charging: 18 |
| number of measuring channels | | 2 |
| damping | s | 0...100 (adjustable) |
| measuring cycle | Hz | 100...1000 (1 channel) |
| response time | s | 1 (1 channel), option: 0.07 |
| housing material | | PA, TPE, AutoTex, stainless steel |
| degree of protection | | IP65 |
| dimensions | mm | see dimensional drawing |
| weight | kg | 2.1 |
| fixation | | QuickFix pipe mounting fixture |
| ambient temperature | °C | -10...+60 |
| display | | 2 x 16 characters, dot matrix, backlight |
| menu language | | English, German, French, Dutch, Spanish |
| **measuring functions** | | |
| physical quantities | | volumetric flow rate, mass flow rate, flow velocity, heat flow (if temperature inputs are installed) |
| totalizer | | volume, mass, optional: heat quantity |
| calculation functions | | average, difference, sum |
| diagnostic functions | | sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times |
| **communication interfaces** | | |
| service interfaces | | • RS232<br>• USB (with adapter) |
| process interfaces | | • Modbus RTU (optional) |
| **accessories** | | |
| serial data kit<br>• cable<br>• adapter | | <br>RS232<br>RS232 - USB |
| software | | • FluxDiagReader: download of measured values and parameters, graphical presentation<br>• FluxDiag (optional): download of measurement data, graphical presentation, report generation |
| adapter | | AO5, AO6, AO7, AO8, AI1, AI2 |
| transport case | | dimensions: 500 x 400 x 190 mm |
| **data logger** | | |
| loggable values | | all physical quantities, totalized values and diagnostic values |
| capacity | | > 100 000 measured values |

[1] with aperture calibration of the transducers

[2] for transit time difference principle and reference conditions

[3] operating time extension using the power pack PP0026NN (optional, order code: ACC-PO-#601-/B6)

| | | FLUXUS F601 |
|---|---|---|
| **outputs** | | |
| | | The outputs are galvanically isolated from the transmitter. |
| number | | see standard scope of supply, max. on request |
| **• switchable current output** | | |
| | | The switchable current outputs are menu selectable all together as passive or active. |
| range | mA | 4...20 (3.2...24) |
| accuracy | | 0.04 % of reading ±3 µA |
| active output | | $U_{int}$ = 24 V, $R_{ext}$ < 500 Ω |
| passive output | | $U_{ext}$ = 8...30 V, depending on $R_{ext}$ ($R_{ext}$ < 900 Ω at 30 V) |
| **• frequency output** | | |
| range | kHz | 0...5 |
| open collector | | 24 V/4 mA |
| **• binary output** | | |
| optorelay | | 26 V/100 mA |
| binary output as alarm output | | |
| • functions | | limit, change of flow direction or error |
| binary output as pulse output | | |
| • functions | | mainly for totalizing |
| • pulse value | units | 0.01...1000 |
| • pulse width | ms | 1...1000 |
| **inputs** | | |
| | | The inputs are galvanically isolated from the transmitter. |
| number | | see standard scope of supply, max. 4 |
| **• temperature input** | | |
| type | | Pt100/Pt1000 |
| connection | | 4-wire |
| range | °C | -150...+560 |
| resolution | K | 0.01 |
| accuracy | | ±0.01 % of reading ±0.03 K |
| **• current input** | | |
| accuracy | | 0.1 % of reading ±10 µA |
| passive input | | $R_{int}$ = 50 Ω, $P_{int}$ < 0.3 W |
| • range | mA | -20...+20 |
| **• voltage input** | | |
| range | V | 0...1 |
| accuracy | | 0.1 % of reading ±1 mV |
| internal resistance | | $R_{int}$ = 1 MΩ |

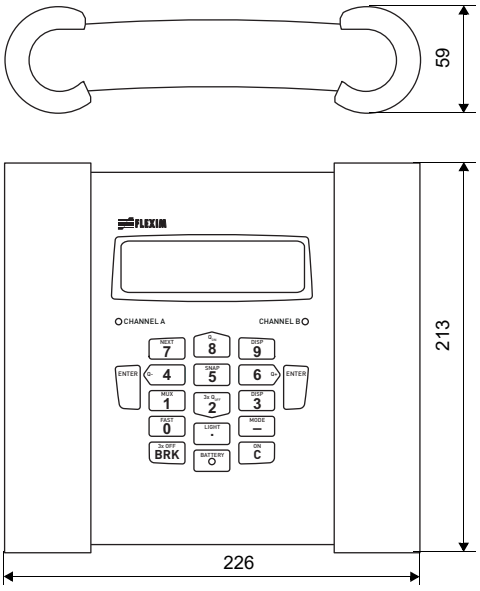
[1] with aperture calibration of the transducers

[2] for transit time difference principle and reference conditions

[3] operating time extension using the power pack PP0026NN (optional, order code: ACC-PO-#601-/B6)

## Dimensions

***60***



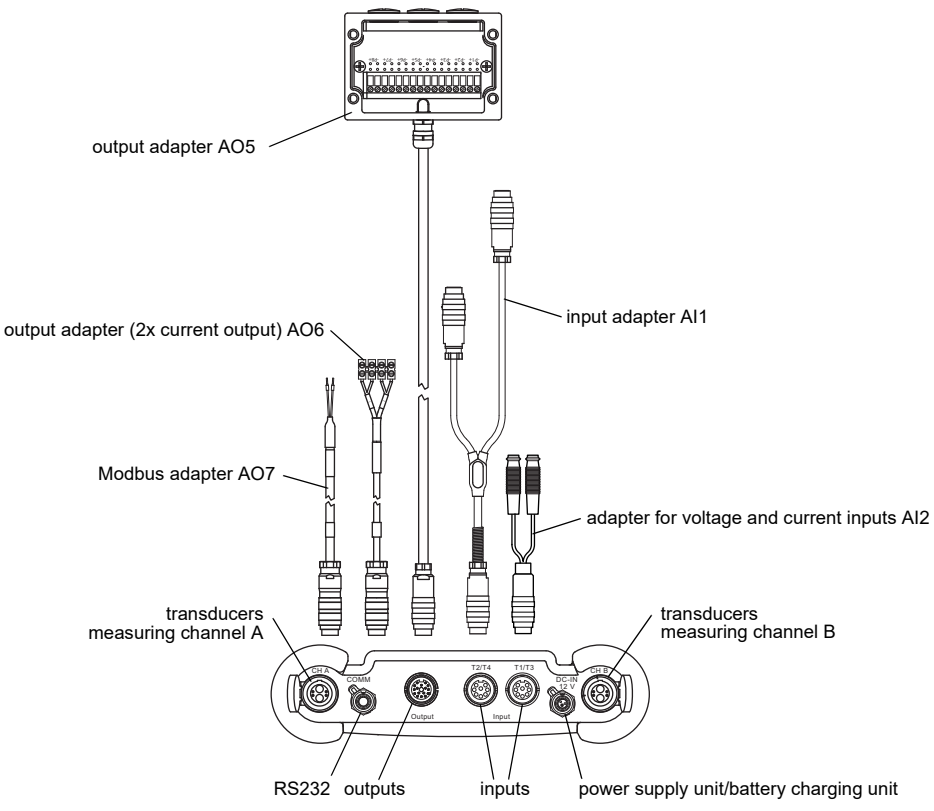

in mm

## Standard scope of supply

| | F601 Basic | F601 Energy |
|---|---|---|
| application | flow measurement of liquids | |
| | 2 independent measuring channels,<br>2 calculation channels | |
| | wall thickness measurement (wall thickness probe to be ordered separately) | |
| | | integrated thermal energy calculator |
| | | simultaneous monitoring of 2 energy flows |
| | | temperature-compensated calculation of mass flow rate |
| **outputs** | | |
| switchable current output | 2 | 2 |
| binary output | 2 | 2 |
| **inputs** | | |
| temperature input | - | 4 |
| **accessories** | | |
| transport case | x | x |
| power supply unit, mains cable | x | x |
| battery | x | x |
| adapter | AO6 | AO6, AI1, AI2 |
| QuickFix pipe mounting fixture for transmitter | x | x |
| serial data kit | x | x |
| measuring tape | x | x |
| user manual,<br>Quick start guide | x | x |

## Adapters

***601**

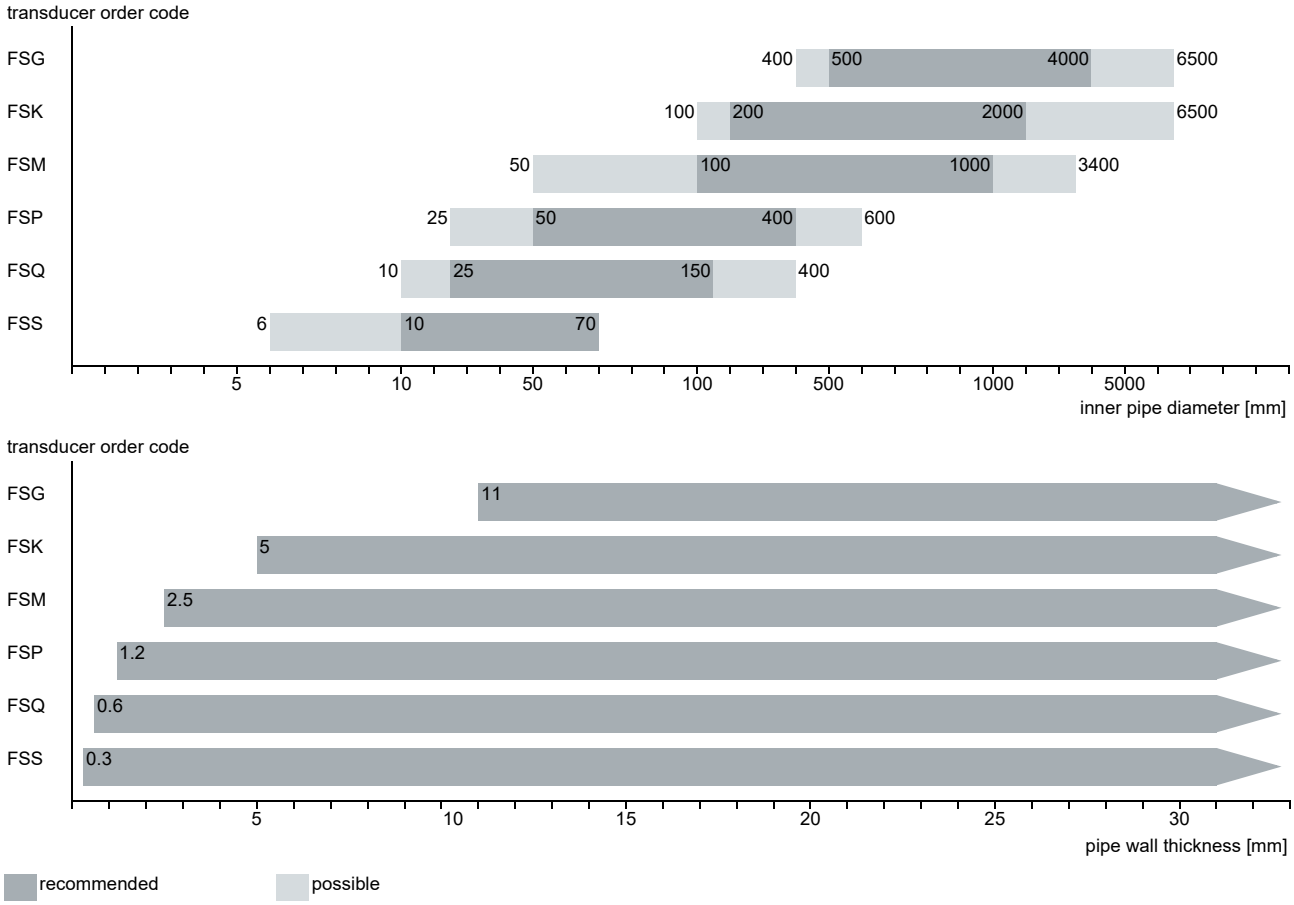


## Example for the equipment of a transport case

**F601**

# Transducers

## Transducer selection

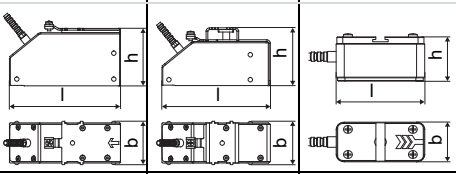
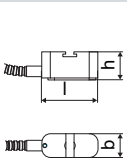
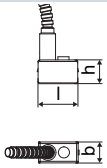


## Transducer order code

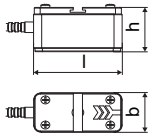
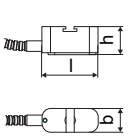
| 1, 2 | 3 | | 4 | 5, 6 | 7, 8 | | 9...11 | | |
|---|---|---|---|---|---|---|---|---|---|
| **transducer** | **transducer frequency** | **-** | **ambient temperature** | **explosion protection** | **connection system** | **-** | **extension cable** | **/** | **option** | **description** |
| FS | | | | | | | | | | set of ultrasonic flow transducers for liquids measurement, shear wave |
| | G | | | | | | | | | 0.2 MHz |
| | K | | | | | | | | | 0.5 MHz |
| | M | | | | | | | | | 1 MHz |
| | P | | | | | | | | | 2 MHz |
| | Q | | | | | | | | | 4 MHz |
| | S | | | | | | | | | 8 MHz |
| | | | N | | | | | | | normal temperature range |
| | | | E | | | | | | | extended temperature range |
| | | | | NN | | | | | | not explosion proof |
| | | | | | NL | | | | | with Lemo connector |
| | | | | | | | XXX | | | 0 m: without extension cable<br>> 0 m: with extension cable |
| | | | | | | | | | LC | long transducer cable |

# Technical data

## Shear wave transducers (nonEx, NL)

| order code | | FSG-NNNNL/** | FSK-NNNNL/** | FSM-NNNNL/** | FSP-NNNNL/** | FSQ-NNNNL/** | FSS-NNNNL/** |
|---|---|---|---|---|---|---|---|
| technical type | | C(DL)G1NZ7 | C(DL)K1NZ7 | C(DL)M1NZ7 | C(DL)P1NZ7 | C(DL)Q1NZ7 | CDS1NZ7 |
| transducer frequency | MHz | 0.2 | 0.5 | 1 | 2 | 4 | 8 |
| **inner pipe diameter d** | | | | | | | |
| min. extended | mm | 400 | 100 | 50 | 25 | 10 | 6 |
| min. recommended | mm | 500 | 200 | 100 | 50 | 25 | 10 |
| max. recommended | mm | 4000 | 2000 | 1000 | 400 | 150 | 70 |
| max. extended | mm | 6500 | 6500 | 3400 | 600 | 400 | 70 |
| **pipe wall thickness** | | | | | | | |
| min. | mm | 11 | 5 | 2.5 | 1.2 | 0.6 | 0.3 |
| **material** | | | | | | | |
| housing | | PEEK with stainless steel cap 304 (1.4301) | | stainless steel 304 (1.4301) | | | stainless steel 304 (1.4301) |
| contact surface | | PEEK | | PEEK | | | PEI |
| degree of protection | | IP67 | | | | | IP65 |
| **transducer cable** | | | | | | | |
| type | | 1699 | | | | | |
| length | m | 5 | | 4 | | 3 | 2 |
| length (***-*****/LC) | m | 9 | | | | | - |
| **dimensions** | | | | | | | |
| length l | mm | 129.5 | 126.5 | 60 | | 42.5 | 25 |
| width b | mm | 51 | 51 | 30 | | 18 | 13 |
| height h | mm | 67 | 67.5 | 33.5 | | 21.5 | 17 |
| dimensional drawing | |  | | | |  |  |
| weight (without cable) | kg | 0.47 | 0.36 | 0.035 | | 0.011 | 0.004 |
| **pipe surface temperature** | | | | | | | |
| min. | °C | -40 | | | | | -30 |
| max. | °C | +130 | | | | | +130 |
| **ambient temperature** | | | | | | | |
| min. | °C | -40 | | | | | -30 |
| max. | °C | +130 | | | | | +130 |
| temperature compensation | | x | | | | | - |

## Shear wave transducers (nonEx, NL, extended temperature range)

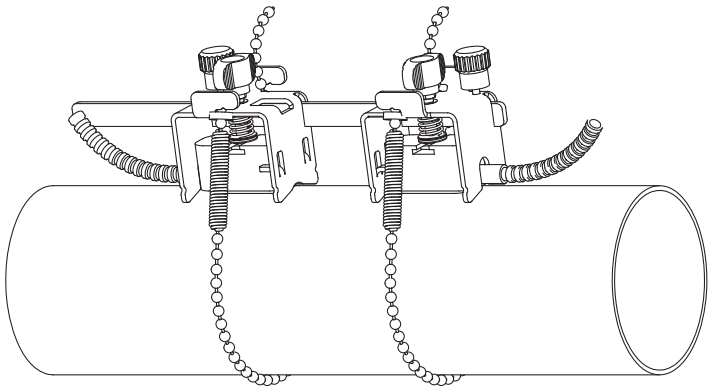
| order code | | FSM-ENNNL/** | FSP-ENNNL/** | FSQ-ENNNL/** |
|---|---|---|---|---|
| technical type | | C(DL)M1EZ7 | C(DL)P1EZ7 | C(DL)Q1EZ7 |
| transducer frequency | MHz | 1 | 2 | 4 |
| **inner pipe diameter d** | | | | |
| min. extended | mm | 50 | 25 | 10 |
| min. recommended | mm | 100 | 50 | 25 |
| max. recommended | mm | 1000 | 400 | 150 |
| max. extended | mm | 3400 | 600 | 400 |
| **pipe wall thickness** | | | | |
| min. | mm | 2.5 | 1.2 | 0.6 |
| **material** | | | | |
| housing | | stainless steel 304 (1.4301) | | |
| contact surface | | Sintimid | | |
| degree of protection | | IP65 | | |
| **transducer cable** | | | | |
| type | | 1699 | | |
| length | m | 4 | | 3 |
| length (***-*****/LC) | m | 9 | | |
| **dimensions** | | | | |
| length l | mm | 60 | | 42.5 |
| width b | mm | 30 | | 18 |
| height h | mm | 33.5 | | 21.5 |
| dimensional drawing | |  | |  |
| weight (without cable) | kg | 0.042 | | 0.011 |
| **pipe surface temperature** | | | | |
| min. | °C | -30 | | |
| max. | °C | +200 | | |
| **ambient temperature** | | | | |
| min. | °C | -30 | | |
| max. | °C | +200 | | |
| temperature compensation | | x | | |

# Transducer mounting fixture

## Order code

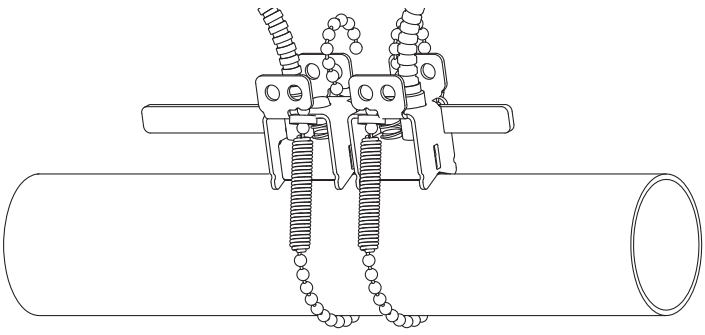
| 1, 2 | 3 | | 4 | 5 | | 6 | 7...9 | no. of character |
|---|---|---|---|---|---|---|---|---|
| **transducer mounting fixture** | **transducer** | **-** | **measurement arrangement** | **size** | **-** | **fixation** | **outer pipe diameter** | **description** |
| FS | | | | | | | | fastening shoes |
| VP | | | | | | | | portable Variofix |
| TB | | | | | | | | tension belts |
| WL | | | | | | | | transducer box for WaveInjector |
| | A | | | | | | | all transducers |
| | K | | | | | | | transducers with transducer frequency G, K |
| | M | | | | | | | transducers with transducer frequency M, P |
| | Q | | | | | | | transducers with transducer frequency Q |
| | S | | | | | | | transducers with transducer frequency S |
| | | | D | | | | | reflection arrangement or diagonal arrangement |
| | | | R | | | | | reflection arrangement |
| | | | | S | | | | small |
| | | | | M | | | | medium |
| | | | | | | C | | chains |
| | | | | | | N | | without fixation |
| | | | | | | | 010 | 10...100 mm |
| | | | | | | | 025 | 10...250 mm |
| | | | | | | | 055 | 10...550 mm |
| | | | | | | | 150 | 50...1500 mm |
| | | | | | | | 210 | 50...2100 mm |

**fastening shoes FS and chains**



transducer frequency: M, P, Q

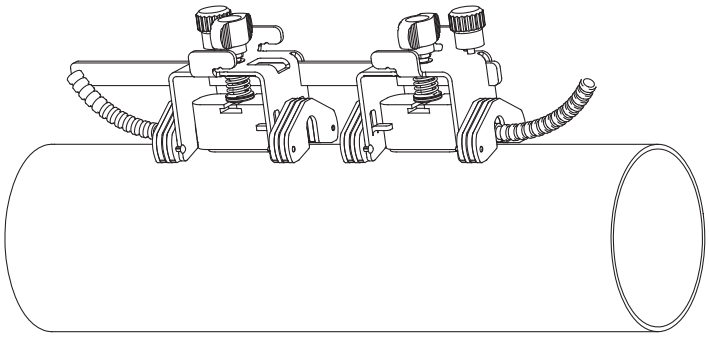
material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
dimensions:
M, P: 420 x 48 x 68 mm
Q: 420 x 43 x 58 mm
chain length: 0.5/1/2 m
outer pipe diameter:
max. 150/310/600 mm



transducer frequency: S

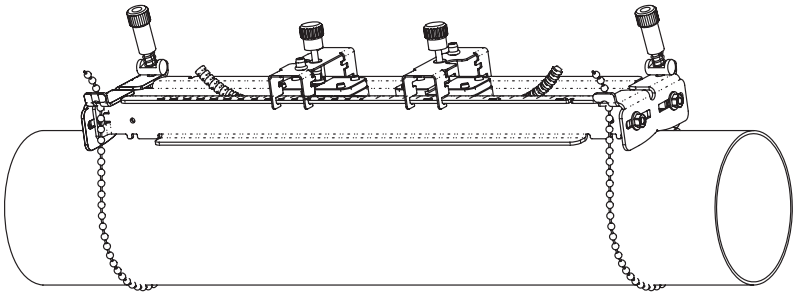
material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
dimensions:
210 x 32 x 44 mm
chain length: 0.5 m
outer pipe diameter:
max. 150 mm

**fastening shoes FS and magnet (optional)**



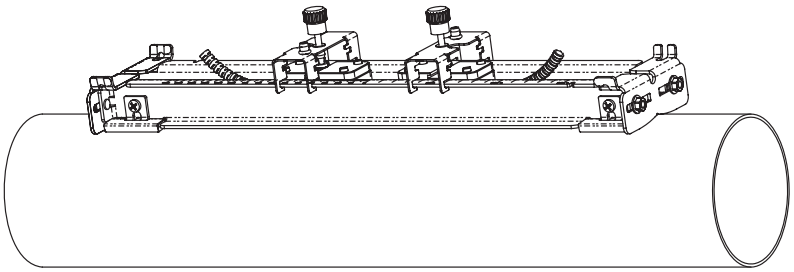
material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
dimensions:
M, P: 420 x 48 x 68 mm
Q: 420 x 43 x 58 mm

**portable Variofix VP and chains**



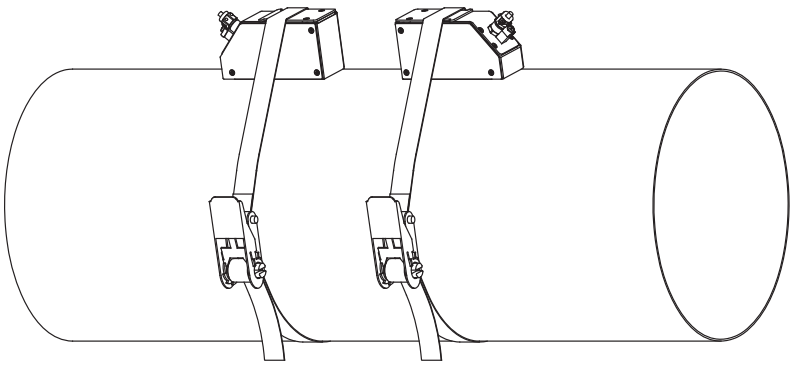
material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
dimensions: 414 x 94 x 76 mm
chain length: 2 m

**portable Variofix VP and magnet (optional)**



material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)
dimensions: 414 x 94 x 40 mm

**tension belts TB**

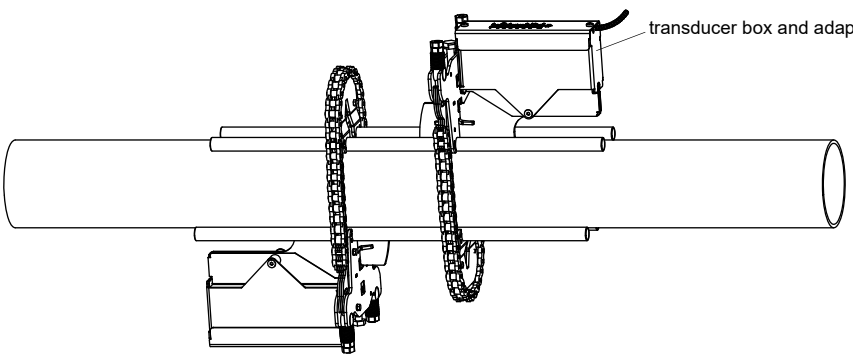


transducer frequency: G, K

material: steel, powder coated and textile tension belt
length: 5/7 m

ambient temperature: max. 60 °C
outer pipe diameter:
max. 1500/2100 mm

**transducer box WL for WaveInjector**




see Technical specification TSWaveInjectorVx-x

# Coupling materials for transducers

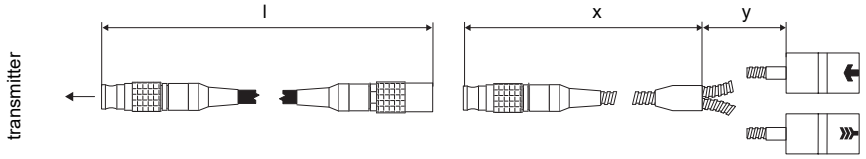
| **normal temperature range (4th character of transducer order code = N)** | | **extended temperature range (4th character of transducer order code = E)** | | **WaveInjector WI-400** | |
|---|---|---|---|---|---|
| < 100 °C | < 170 °C | < 150 °C | < 200 °C | < 280 °C | 280...400 °C |
| coupling compound type N | coupling compound type E | coupling compound type E | coupling compound type E or H | coupling foil type A and coupling foil type VT | coupling foil type B and coupling foil type VT |

## Technical data

| **type** | **ambient temperature** °C |
|---|---|
| coupling compound type N | -30...+130 |
| coupling compound type E | -30...+200 |
| coupling compound type H | -30...+250 |
| coupling foil type A | max. 280 |
| coupling foil type B | 280...400 |
| coupling foil type VT | -10...+200 |

coupling foil not to be used for transducer mounting fixture with magnets

# Connection systems

| connection system NL | |
|---|---|
| direct connection/connection with extension cable | transducers technical type |
|  | *****Z7 |

## Cable

| transducer cable | | |
|---|---|---|
| **type** | | **1699** |
| weight | kg/m | 0.094 |
| ambient temperature | °C | -55...+200 |
| **cable jacket** | | |
| material | | PTFE |
| outer diameter | mm | 2.9 |
| thickness | mm | 0.3 |
| colour | | brown |
| shield | | x |
| **sheath** | | |
| material | | stainless steel 304 (1.4301) |
| outer diameter | mm | 8 |

| extension cable | | | |
|---|---|---|---|
| **type** | | **1750** | **2551** |
| standard length | m | 5<br>10 | - |
| max. length | m | 10 | see table below |
| weight | kg/m | 0.12 | 0.083 |
| ambient temperature | °C | < 80 | -25...+80 |
| **cable jacket** | | | |
| material | | PE | TPE-O |
| outer diameter | mm | 6 | 8 |
| thickness | mm | 0.5 | |
| colour | | black | black |
| shield | | x | x |
| **sheath** | | | |
| material | | stainless steel 304 (1.4301) | - |
| outer diameter | mm | 9 | - |
| remark | | optional | |

## Cable length

| transducer frequency | | F, G, H, K | | | M, P | | | Q | | | S | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **connection system NL** | | | | | | | | | | | | | |
| **transducers technical type** | | x | y | l | x | y | l | x | y | l | x | y | l |
| *D***Z7[1] | m | 2 | 3 | ≤ 25 | 2 | 2 | ≤ 25 | 2 | 1 | ≤ 25 | 1 | 1 | ≤ 20 |
| option LC: *L***Z7[1] | m | 2 | 7 | ≤ 25 | 7 | 2 | ≤ 25 | 8 | 1 | ≤ 25 | - | - | - |

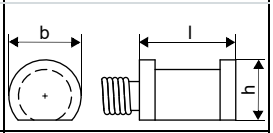
[1] l > 25...100 m on request

x, y - transducer cable length

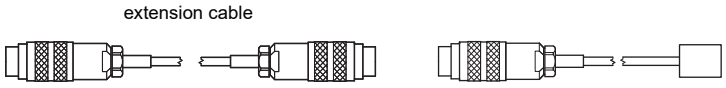
l - max. length of extension cable

# Clamp-on temperature probe (optional)

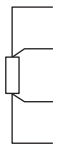
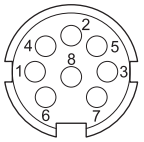
## Technical data

| PT12N | | |
|---|---|---|
| order code | | • ACC-PO-#601-/T103<br>• ACC-PO-#601-/T101 (matched) |
| design | | clamp-on with connector |
| type | | Pt100 |
| connection | | 4-wire |
| measuring range | °C | -30...+250 |
| accuracy T | | ±(0.15 °C + 2 · $10^{-3}$ · \|T [°C]\|) class A |
| accuracy ΔT (2x Pt matched according to EN 1434-1) | | ≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1 |
| response time | s | 50 |
| housing | | aluminum |
| degree of protection | | IP66 |
| **dimensions** | | |
| length l | mm | 20 |
| width b | mm | 15 |
| height h | mm | 13 |
| dimensional drawing | |  |
| weight | kg | 0.25 (without connector) |
| **accessories** | | |
| thermal conductivity paste 200 °C | | x |
| thermal conductivity foil 250 °C | | x |

**Connection system**

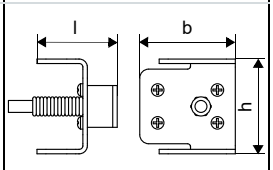
| direct connection/connection with extension cable |
|---|
|  |

**Connection**

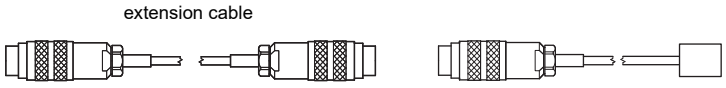
| | temperature probe | extension cable | connector | |
|---|---|---|---|---|
| | | | pin | |
|  | red | grey | 2 |  |
| | red/blue | red | 6 | |
| | white/blue | blue | 1 | |
| | white | white | 7 | |

**Cable**

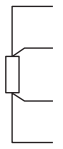
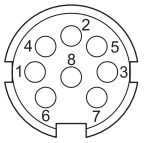
| | | temperature probe | extension cable |
|---|---|---|---|
| type | | 4 x 0.25 mm² black | LIYCY 8 x 0.14 mm² grey |
| standard length | m | 3 | 5/10/25 |
| max. length | m | - | 200 |
| cable jacket | | PTFE | PVC |

| PT12F | | |
|---|---|---|
| order code | | • ACC-PO-#601-/T104<br>• ACC-PO-#601-/T102 (matched) |
| design | | clamp-on short response time, with connector |
| type | | Pt100 |
| connection | | 4-wire |
| measuring range | °C | -50...+250 |
| accuracy T | | ±(0.15 °C + 2 · $10^{-3}$ · \|T [°C]\|) class A |
| accuracy ΔT (2x Pt matched according to EN 1434-1) | | ≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1 |
| response time | s | 8 |
| housing | | PEEK, stainless steel 304 (1.4301), copper |
| degree of protection | | IP66 |
| **dimensions** | | |
| length l | mm | 14 |
| width b | mm | 30 |
| height h | mm | 27 |
| dimensional drawing | |  |
| weight | kg | 0.32 (without connector) |
| **accessories** | | |
| thermal conductivity paste 200 °C | | x |
| thermal conductivity foil 250 °C | | x |
| plastic protection plate, insulation foam | | x |

**Connection system**

| direct connection/connection with extension cable |
|---|
|  |

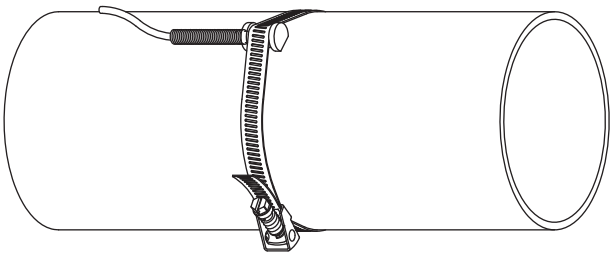
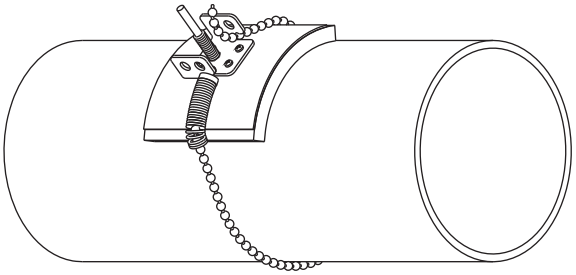
**Connection**

| | temperature probe | extension cable | connector | |
|---|---|---|---|---|
| | | | pin | |
|  | red | grey | 2 |  |
| | red/blue | red | 6 | |
| | white/blue | blue | 1 | |
| | white | white | 7 | |

**Cable**

| | | temperature probe | extension cable |
|---|---|---|---|
| type | | 4 x 0.25 mm² black | LIYCY 8 x 0.14 mm² grey |
| standard length | m | 3 | 5/10/25 |
| max. length | m | - | 200 |
| cable jacket | | PTFE | PVC |

## Fixation

| | |
|---|---|
| **tension strap PT12N**<br>  | material: stainless steel 301 (1.4310), 410 (1.4006)<br>thermal insulation necessary |
| **ball chain PT12F**<br>  | material: stainless steel 316L (1.4404)<br>length: 1 m |

## Wall thickness measurement (optional)

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

The wall thickness probe can be connected to the transmitter instead of the flow transducers and the wall thickness measurement mode is activated automatically.

Acoustic coupling compound is applied to the wall thickness probe which then is placed firmly on the pipe. The wall thickness is displayed and can be stored directly in the transmitter.

## Technical data

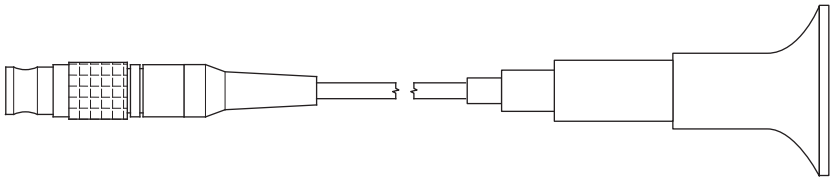
| | | **DWR1NZ7** |
|---|---|---|
| order code | | ACC-PO-G601-/W6 |
| measuring range[1] | mm | 1...250 |
| resolution | mm | 0.01 |
| accuracy | | 1 % ±0.1 mm |
| fluid temperature | °C | -20...+200,<br>short-time peak max. 500 |
| **cable** | | |
| type | | 2616 |
| length | m | 1.5 |

[1] The measuring range depends on the attenuation of the ultrasonic signal in the pipe. For strongly attenuating plastics (e.g. PFA, PTFE, PP) the measuring range is smaller.

### Cable

| | | **2616** |
|---|---|---|
| ambient temperature | °C | <200 |
| **cable jacket** | | |
| material | | FEP |
| outer diameter | mm | 5.1 |
| colour | | black |
| shield | | x |

**DWR1NZ7**



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