

Portable Ultrasonic Flow Measurement of Liquids in Hazardous Areas

Portable instrument for non-intrusive, quick ultrasonic flow measurement with clamp-on technology for all types of piping

Features

- Precise bi-directional and highly dynamic flow measurement with the non-intrusive clamp-on technology
- High precision at fast and slow flow rates, high temperature and zero point stability
- Portable, easy-to-use flow transmitter with 2 flow channels, multiple inputs, an integrated data logger with a serial interface
- Extremely resistant carbon fiber housing
- Covered by FM class I Div. 2 certification
- Compact and very lightweight, allowing the measuring system to be easily carried as personal luggage, e.g. for offshore visits
- Water tight; resistant against oil, many liquids and dirt
- Li-Ion battery provides up to 14 hours of measurement operation
- Automatic loading of calibration data and transducer detection for a fast and easy set-up (less than 5 min), providing precise and long-term stable results
- User-friendly design
- Transducers available for a wide range of inner pipe diameters (0.25 to 256 i) and fluid temperatures (-40 to +752 °F)
- Rugged transducers (FM Class 1 Div. 2, resistant to rough environments and humidity)
- Robust, water-tight (NEMA 4) transport case with comprehensive accessories
- HybridTrek automatically switches between transit time and NoiseTrek mode of measurement when high particulate flows are encountered
- QuickFix for fast mounting of the flow transmitter in difficult conditions

Applications

Designed for the following industries:

- Upstream (on- and offshore)
- Midstream and downstream (pipelines and refineries)
- Chemical industry
- Energy sector (e.g. HVAC, geothermal, power plants)



FLUXUS F608 supported by handle



Measurement with transducers mounted by the portable Variofix VP



Measurement with the flow transmitter fixed to the pipe by the QuickFix pipe mounting fixture

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Function

Measurement Principle

Transit Time Difference Principle

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

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

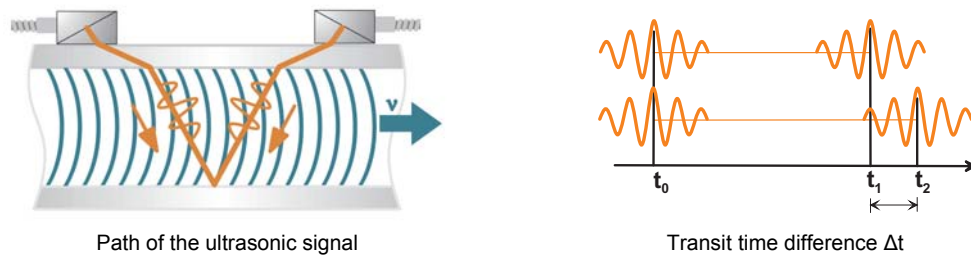
The transit time difference, Δt , is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow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

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

HybridTrek

If the gaseous or solid content in the medium 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

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

where

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

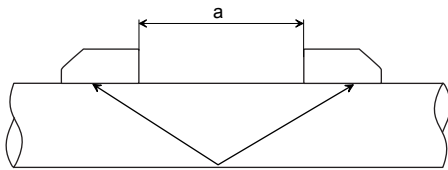
Number of Sound Paths

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

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

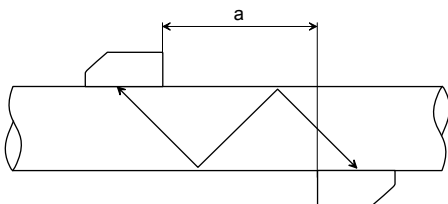
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the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

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

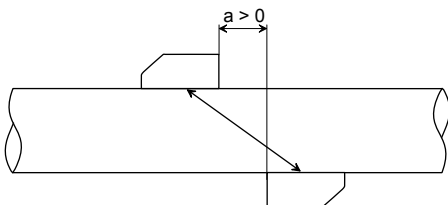


Reflect arrangement, number of sound paths: 2

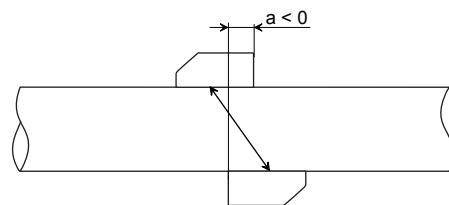
a = transducer distance



Diagonal arrangement, number of sound paths: 3

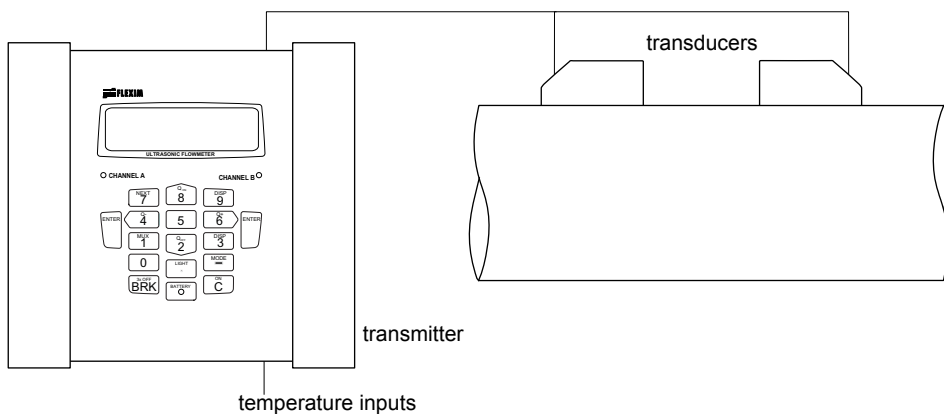


Direct mode, number of sound paths: 1



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



Typical Measurement Setup



Example of a measurement setup in reflect arrangement

Flow Transmitter

Technical Data

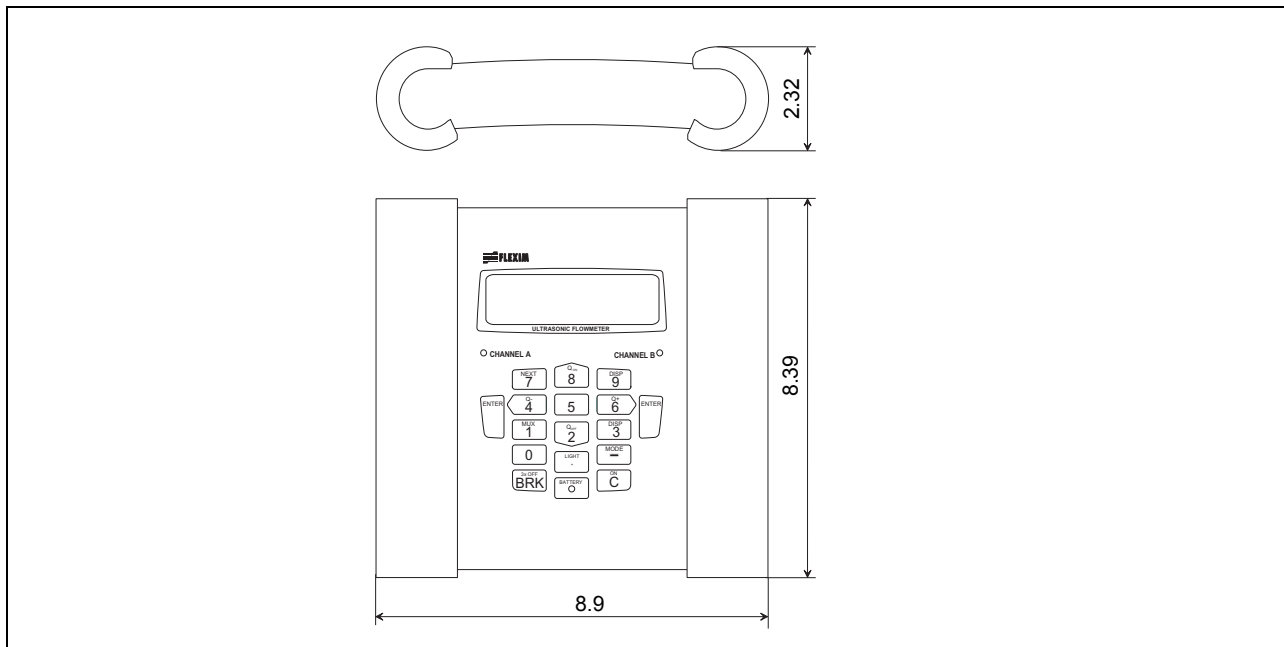
| | |
|--------------------------------------|---|
| FLUXUS | F608**-F2 |
| design | portable, FM class I Div. 2 |
| |  |
| measurement | |
| measurement principle | transit time difference correlation principle, automatic NoiseTrek selection for measurements with high gaseous or solid content |
| flow velocity | 0.03 to 82 ft/s |
| repeatability | 0.15 % of reading ±0.03 ft/s |
| medium | 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 |
| accuracy¹ | |
| with standard calibration | ±1.6 % of reading ±0.03 ft/s |
| with advanced calibration (optional) | ±1.2 % of reading ±0.03 ft/s |
| with field calibration ² | ±0.5 % of reading ±0.03 ft/s |
| flow transmitter | |
| power supply | 100 to 240 V/50 to 60 Hz (power supply unit, outside of explosive atmosphere), 10.5 to 15 V DC (socket at transmitter, with power adapter (optional)), integrated battery |
| battery | Li-Ion, 7.2 V/4.5 Ah operating time (without inputs and backlight): > 14 h |
| power consumption | < 6 W |
| number of flow measuring channels | 2 |
| signal attenuation | 0 to 100 s, adjustable |
| measuring cycle (1 channel) | 100 to 1000 Hz |
| response time | 1 s (1 channel), option: 70 ms |
| housing material | PA, TPS, PC, Polyester, stainless steel |
| degree of protection | NEMA 4 |
| dimensions | see dimensional drawing |
| weight | 4.2 lb |
| fixation | QuickFix pipe mounting fixture |
| ambient temperature | 14 to 140 °F |
| display | 2 x 16 characters, dot matrix, backlight |
| menu language | English, German, French, Dutch, Spanish |
| explosion protection | |
| F M marking | NI/Cl. I /Div. 2/  GP. A,B,C,D / T5 Ta = 60 °C |
| 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 |
| data logger | |
| loggable values | all physical quantities, totalized values and diagnostic values |
| capacity | > 100 000 measured values |
| communication | |
| interface | RS232/USB |

¹ for transit time difference principle, reference conditions and v > 0.49 ft/s

² reference uncertainty < 0.2 %

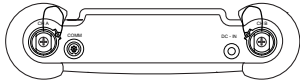
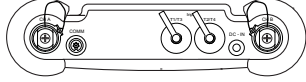
| FLUXUS | F608**-F2 |
|----------------------------------|---|
| serial data kit | |
| software (all Windows™ versions) | - FluxData: download of measurement data, graphical presentation, conversion to other formats (e.g. for Excel™) - FluxKoef: creating medium data sets - FluxSubstanceLoader: upload of medium data sets |
| cable | RS232 |
| adapter | RS232 - USB |
| transport case | |
| dimensions | 19.7 x 15.7 x 7.5 in |
| inputs | |
| | The inputs are galvanically isolated from the transmitter. |
| number | max. 4 |
| accessories | input adapter (if number of inputs > 2) |
| temperature input | |
| type | Pt100/Pt1000 |
| connection | 4-wire |
| range | -238 to +1040 °F |
| resolution | 0.01 K |
| accuracy | ±0.01 % of reading ±0.03 K |

Dimensions

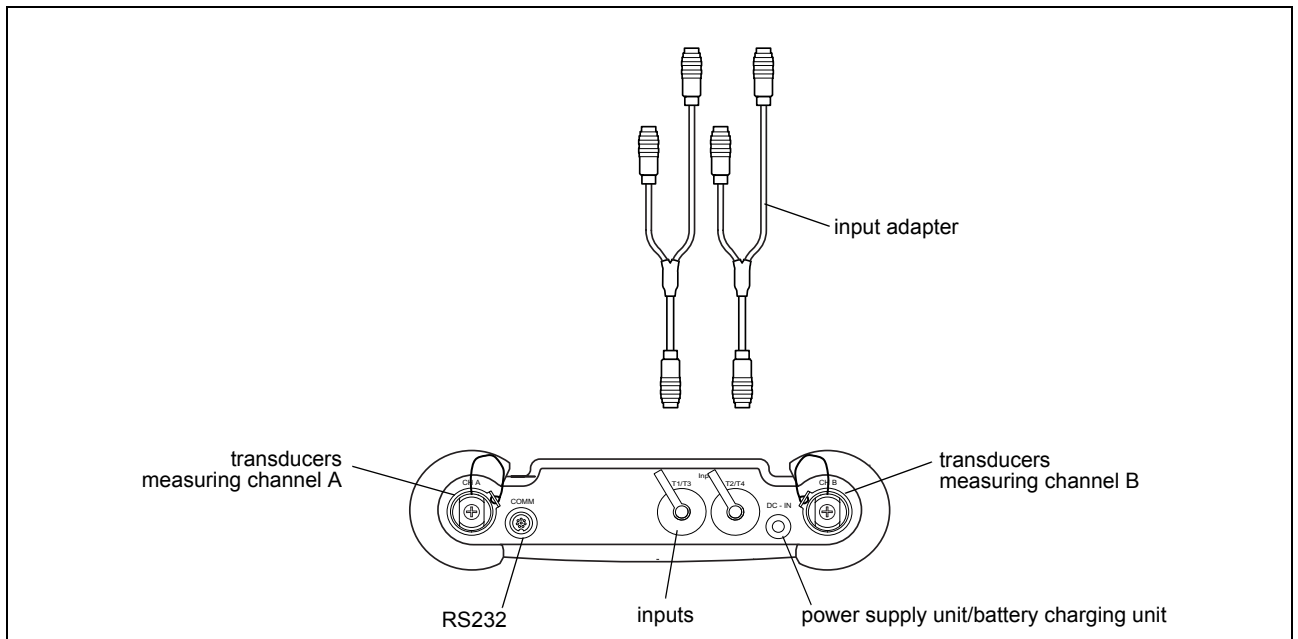


in inch

Standard Scope of Supply

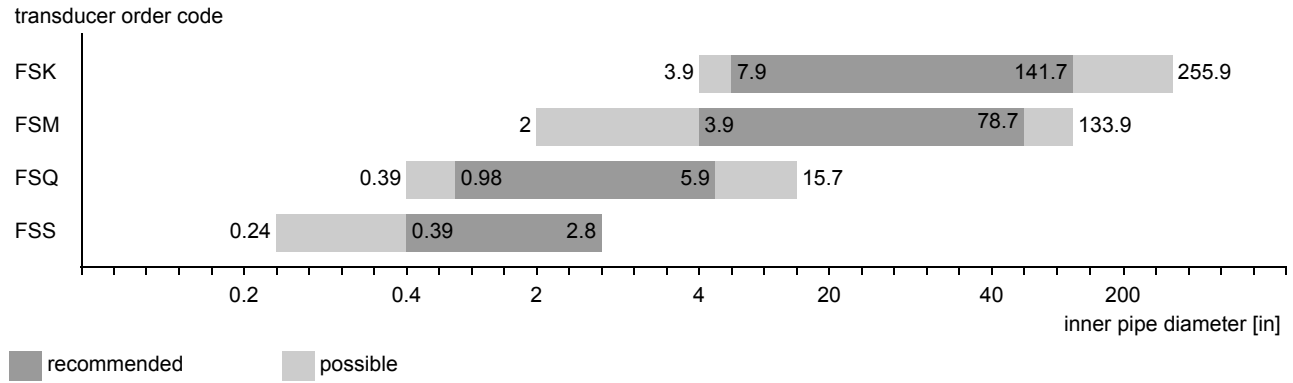
| | F608 Standard | F608 Energy |
|--|---|---|
| order code | FLUXUS F608ST-F22-3N-NN-NN-NN-NN-NN | FLUXUS F608ST-F22-3N-TT-NN-NN-NN-NN |
| application | flow measurement on liquids | |
| | 2 independent measuring channels | |
| | temperature-compensated calculation of mass flow rate | |
| | integrated heat flow computer for monitoring of energy flows | |
| | | including energy calculator for BTU and heat measurements |
| inputs | | |
| temperature input | - | 2 |
| accessories | | |
| transport case | x | x |
| power supply unit, mains cable | x | x |
| battery | x | x |
| QuickFix pipe mounting fixture for transmitter | x | x |
| serial data kit | x | x |
| measuring tape | x | x |
| user manual, safety instructions, Quick Start Guide | x | x |
| connector board at the upper side of the transmitter |  |  |

Adapters (optional)



Transducers

Transducer Selection

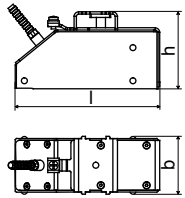
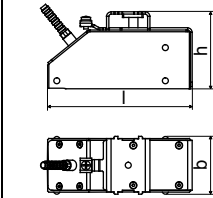



Transducer Order Code

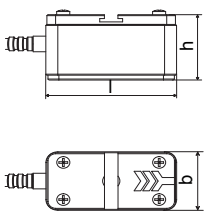
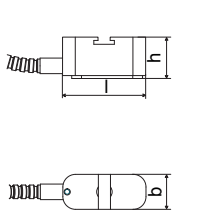
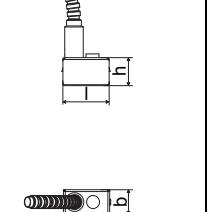


| 1, 2 | 3 | 4 | 5, 6 | 7, 8 | 9 to 11 | 12, 13 | no. of character | | | | |
|------------|----------------------|---|---------------------|----------------------|-------------------|--------|------------------|---|--|---|--|
| transducer | transducer frequency | - | ambient temperature | explosion protection | connection system | - | extension cable | / | option | description | |
| FS | | | | | | | | | set of ultrasonic flow transducers for liquids measurement, shear wave | | |
| | K | | | | | | | | | 0.5 MHz | |
| | M | | | | | | | | | 1 MHz | |
| | Q | | | | | | | | | 4 MHz | |
| | S | | | | | | | | | 8 MHz | |
| | | N | | | | | | | | | normal temperature range |
| | | E | | | | | | | | | extended temperature range (shear wave transducers with transducer frequency M, Q) |
| | | | F2 | | | | | | | | FM Class I Div. 2 |
| | | | | NL | | | | | | with Lemo connector | |
| | | | | | | XXX | | | | cable length in m, for max. length of extension cable see page 16 | |
| | | | | | | | LC | | | long transducer cable (only FSK) | |
| example | | | | | | | | | | | |
| FS | M | - | N | F2 | NL | - | 010 | / | | shear wave transducer 1 MHz, normal temperature range, FM Class I Div. 2, connection system NL with Lemo connector and extension cable 10 m | |
| | | - | | | | - | | / | | | |

Technical Data

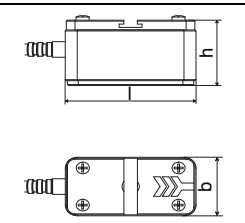
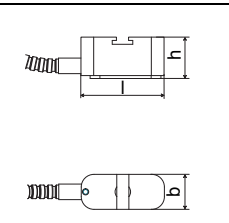

Shear Wave Transducers

| | | | |
|---|---------|--|---|
| technical type | | CDK1N51 | CLK1N51 |
| order code | | FSK-NF2NL | FSK-NF2NL/LC |
| transducer frequency | MHz | 0.5 | 0.5 |
| inner pipe diameter d | | | |
| min. extended | in | 3.9 | 3.9 |
| min. recommended | in | 7.9 | 7.9 |
| max. recommended | in | 141.7 | 141.7 |
| max. extended | in | 255.9 | 255.9 |
| pipe wall thickness | | | |
| min. | in | - | - |
| max. | in | - | - |
| material | | | |
| housing | | PEEK with stainless steel cap 304 | PEEK with stainless steel cap 304 |
| contact surface | | PEEK | PEEK |
| degree of protection | | NEMA 6 | NEMA 6 |
| transducer cable | | | |
| type | | 1699 | 1699 |
| length | ft | 16 | 29 |
| dimensions | | | |
| length l | in | 4.98 | 4.98 |
| width b | in | 2.01 | 2.01 |
| height h | in | 2.66 | 2.66 |
| dimensional drawing | |  |  |
| ambient temperature | | | |
| min. | °F | -40 | -40 |
| max. | °F | +266 | +266 |
| temperature compensation | | x | x |
| explosion protection | | | |
| explosion protection temperature | | | |
| F M | min. | °F | -40 |
| | max. | °F | +257 |
| | marking | |  NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 |
| type of protection | | non incendive | |

Shear Wave Transducers

| technical type | | CDM1N51 | CDQ1N51 | CDS1N51 |
|------------------------------|---|--|---|---|
| order code | | FSM-NF2NL | FSQ-NF2NL | FSS-NF2NL |
| transducer frequency | | MHz 1 | 4 | 8 |
| inner pipe diameter d | | | | |
| min. extended | in | 2 | 0.39 | 0.24 |
| min. recommended | in | 3.9 | 0.98 | 0.39 |
| max. recommended | in | 78.7 | 5.9 | 2.8 |
| max. extended | in | 133.9 | 15.7 | 2.8 |
| pipe wall thickness | | | | |
| min. | in | - | - | - |
| max. | in | - | - | - |
| material | | | | |
| housing | | stainless steel 304 | stainless steel 304 | stainless steel 304 |
| contact surface | | PEEK | PEEK | PEI |
| degree of protection | | NEMA 6 | NEMA 6 | NEMA 6 |
| transducer cable | | | | |
| type | | 1699 | 1699 | 1699 |
| length | ft | 13 | 9 | 6 |
| dimensions | | | | |
| length l | in | 2.36 | 1.67 | 0.98 |
| width b | in | 1.18 | 0.71 | 0.51 |
| height h | in | 1.32 | 0.85 | 0.67 |
| dimensional drawing | |  |  |  |
| ambient temperature | | | | |
| min. | °F | -40 | -40 | -22 |
| max. | °F | +266 | +266 | +266 |
| temperature compensation | | x | x | x |
| explosion protection | | | | |
| F M | explosion protection temperature | | | |
| | min. | °F | -40 | -40 |
| | max. | °F | +257 | +257 |
| | marking | |  NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 |  NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 |
| type of protection | | non incendive | non incendive | non incendive |

Shear Wave Transducers (extended temperature range)

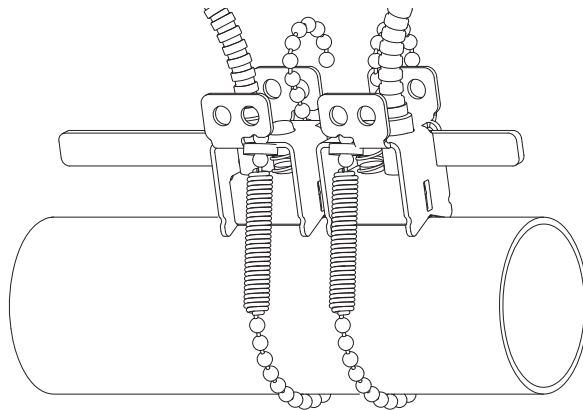
| | | | |
|---|--------------------|--|---|
| technical type | | CDM1E51 | CDQ1E51 |
| order code | | FSM-EF2NL | FSQ-EF2NL |
| transducer frequency | MHz | 1 | 4 |
| inner pipe diameter d | | | |
| min. extended | in | 2 | 0.39 |
| min. recommended | in | 3.9 | 0.98 |
| max. recommended | in | 78.7 | 5.9 |
| max. extended | in | 133.9 | 15.7 |
| pipe wall thickness | | | |
| min. | in | - | - |
| max. | in | - | - |
| material | | | |
| housing | | stainless steel 304 | stainless steel 304 |
| contact surface | | Sintimid | Sintimid |
| degree of protection | | NEMA 4 | NEMA 4 |
| transducer cable | | | |
| type | | 1699 | 1699 |
| length | ft | 13 | 9 |
| dimensions | | | |
| length l | in | 2.36 | 1.67 |
| width b | in | 1.18 | 0.71 |
| height h | in | 1.32 | 0.85 |
| dimensional drawing | |  |  |
| ambient temperature | | | |
| min. | °F | -22 | -22 |
| max. | °F | +392 | +392 |
| temperature compensation | | x | x |
| explosion protection | | | |
| explosion protection temperature | | | |
| F M | min. | °F | -40 |
| | max. | °F | +374 |
| | marking | |  NI/Cl. I,II,III/Div. 2 / GP A,B,C,D,E,F,G/ Temp. Codes dwg 3860 |
| | type of protection | | non incendive |

Transducer Mounting Fixture

Order Code

| 1, 2 | 3 | 4 | 5 | 6 | 7 to 9 | no. of character | | |
|-----------------------------|------------|---|-------------------------|------|--------|------------------|---------------------|---|
| transducer mounting fixture | transducer | - | measurement arrangement | size | - | fixation | outer pipe diameter | description |
| FS | | | | | | | | mounting frames (transducers with transducer frequency S) |
| LM | | | | | | | | ladder chain mounting accessory |
| VP | | | | | | | | portable Variofix |
| WL | | | | | | | | transducer box for WaveInjector |
| | A | | | | | | | all transducers |
| | K | | | | | | | transducers with transducer frequency K |
| | M | | | | | | | transducers with transducer frequency M |
| | Q | | | | | | | transducers with transducer frequency Q |
| | S | | | | | | | transducers with transducer frequency S |
| | | | D | | | | | reflect arrangement or diagonal arrangement/direct mode |
| | | | R | | | | | reflect arrangement |
| | | | | S | | | | small |
| | | | | M | | | | medium |
| | | | | | | C | | chains |
| | | | | | | N | | without fixation |
| | | | | | | | L08 | 0.5 to 8 in |
| | | | | | | | L22 | 0.5 to 22 in |
| | | | | | | | 010 | 0.39 to 3.9 in |
| | | | | | | | 025 | 0.39 to 9.8 in |
| | | | | | | | 055 | 0.39 to 21.7 in |
| example | | | | | | | | |
| VP | A | - | D | M | - | C | 055 | portable Variofix and chains |
| | | - | | | - | | | |

mounting frames FS and chains



transducer frequency: S

material: stainless steel 304, 301, 303

dimensions: 8.27 x 1.26 x 1.73 in

chain length: 1 ft

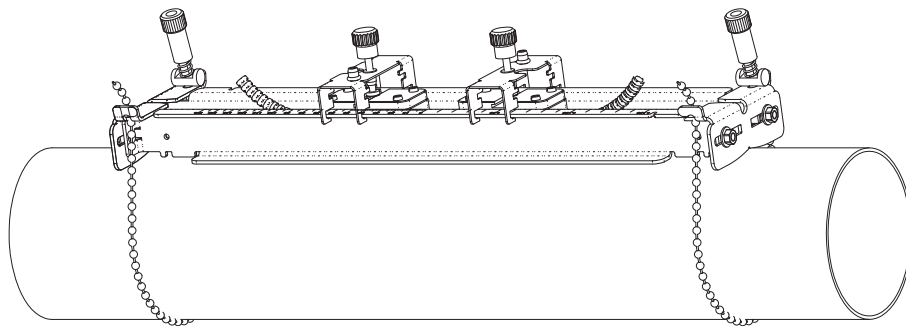
outer pipe diameter: max. 5.9 in

ladder chain mounting accessory LM



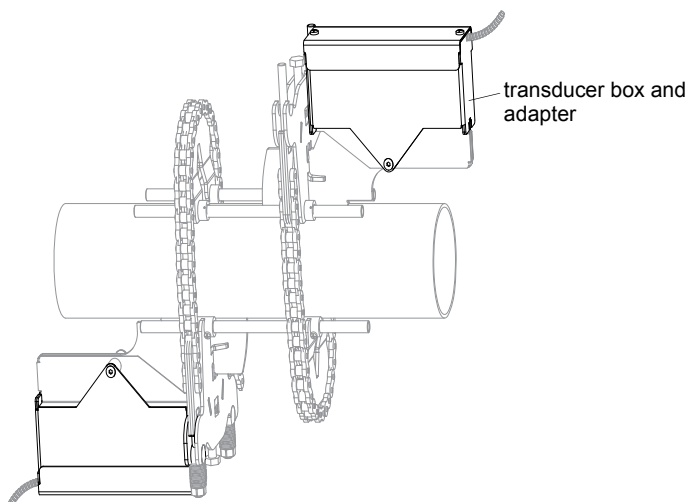
transducer frequency: M, Q
chain length: 30/78 in
outer pipe diameter:
max. 24 in

portable Variofix VP and chains (optional)



material: stainless steel 304,
301, 303
dimensions:
16.3 x 3.7 x 2.99 in
chain length: 6 ft

transducer box WL for Wavelnjector



see Technical Specification
TSWavelnjectorVx-x

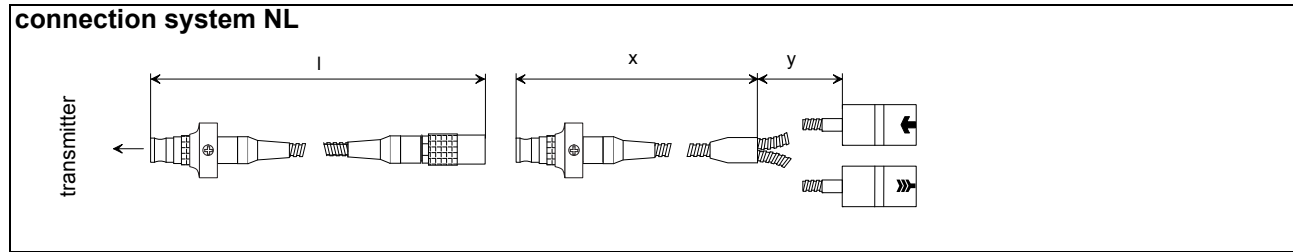
Coupling Materials for Transducers

| normal temperature range (4th character of transducer order code = N) | | extended temperature range (4th character of transducer order code = E) | | WaveInjector WI-400 | |
|--|--------------------------|--|-------------------------------|--|--|
| < 212 °F | < 338 °F | < 302 °F | < 392 °F | < 536 °F | 536 to 752 °F |
| 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 | order code | ambient temperature °F | material | remark |
|--------------------------|------------|------------------------|----------------------|---|
| coupling compound type N | 990739-1 | -22...+266 | mineral grease paste | |
| coupling compound type E | 990739-2 | -22...+392 | silicone paste | |
| coupling compound type H | 990739-3 | -22...+482 | fluoropolymer paste | |
| coupling foil type VT | 990739-0 | 14...+392 | fluoroelastomer | for transducers with transducer frequency G, H, K |
| | 990739-6 | | | for shear wave transducers with transducer frequency M, P |
| | 990739-14 | | | for shear wave transducers IP68 and Lambwave transducers with transducer frequency M, P |
| | 990739-5 | | | for transducers with transducer frequency Q |

Connection Systems



| transducer frequency (3d character of transducer order code) | | G, H, K | | | M, P | | | Q | | | S | | | |
|--|--------------------------|---------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|--------|--------|-----------|
| N L | cable length | ft | x 6 | y 9 | l ≤ 32 | x 6 | y 6 | l ≤ 32 | x 6 | y 3 | l ≤ 32 | x 3 | y 3 | l ≤ 32 |
| | cable length (option LC) | ft | 6 | 22 | ≤ 32 | 22 | 6 | ≤ 32 | 26 | 3 | ≤ 32 | - | - | - |

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

Transducer Cable

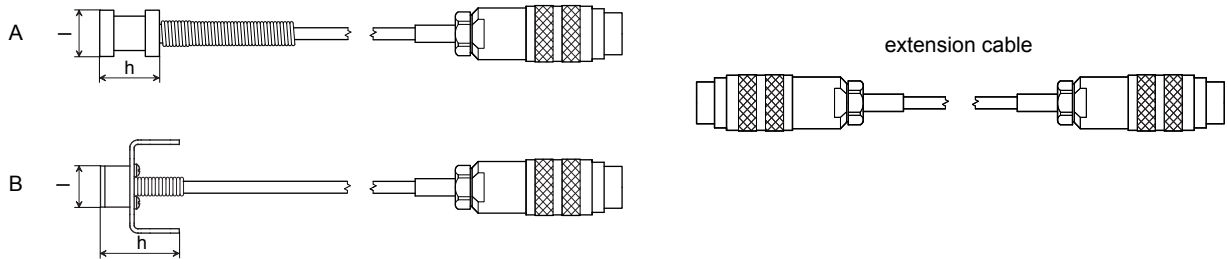
Technical Data

| | | transducer cable | | extension cable | |
|---------------------|----|---------------------|--|---------------------|--|
| type | | 1699 | | 1750 | |
| standard length | ft | see table above | | 16 32 | |
| ambient temperature | °F | -67 to +392 | | < 144 | |
| sheath | | | | | |
| material | | stainless steel 304 | | stainless steel 304 | |
| outer diameter | in | 0.31 | | 0.35 | |
| cable jacket | | | | | |
| material | | PTFE | | PE | |
| outer diameter | in | 0.11 | | 0.24 | |
| thickness | in | 0.01 | | 0.02 | |
| color | | brown | | black | |
| shield | | x | | x | |

Clamp-on Temperature Probe (optional)

Technical Data

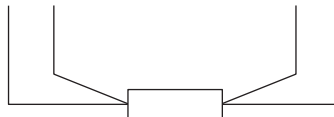
| | | | | | |
|---|----|---|--|---|--|
| technical type | | PT13N | PT13N | PT13F | PT13F |
| order code | | 670413-1 | 670412-1 | 670413-2 | 670412-2 |
| design | | | | short response time | |
| type | | Pt1000 | 2x Pt1000 matched according to EN 1434-1 | Pt1000 | 2x Pt1000 matched according to EN 1434-1 |
| connection | | 4-wire | | 4-wire | |
| measuring range | °F | -22 to +482 | | -58 to +482 | |
| accuracy T | | $\pm(0.27 \text{ }^\circ\text{F} + 2 \cdot 10^{-3} \cdot (T \text{ [}^\circ\text{F]} - 32 \text{ }^\circ\text{F}))$, class A | | $\pm(0.27 \text{ }^\circ\text{F} + 2 \cdot 10^{-3} \cdot (T \text{ [}^\circ\text{F]} - 32 \text{ }^\circ\text{F}))$, class A | |
| accuracy ΔT | | - | $\leq 0.1 \text{ K}$ ($3 \text{ K} < \Delta T < 6 \text{ K}$), more corresponding to EN 1434-1 | - | $\leq 0.1 \text{ K}$ ($3 \text{ K} < \Delta T < 6 \text{ K}$), more corresponding to EN 1434-1 |
| response time | s | 50 | | 8 | |
| housing | | aluminum | | PEEK, stainless steel 304, copper | |
| degree of protection | | NEMA 4 | | NEMA 4 | |
| weight (without connector) | lb | 0.6 | 1.1 | 0.7 | 1.4 |
| fixation | | clamp-on | | clamp-on | |
| accessories | | | | | |
| thermal conductivity paste 392 °F | | x | | x | |
| thermal conductivity foil 482 °F | | x | | x | |
| plastic protection plate, insulation foam | | - | | x | |
| dimensions | | | | | |
| length l | in | 0.59 | | 0.55 | |
| width b | in | 0.59 | | 1.18 | |
| height h | in | 0.79 | | 1.06 | |
| dimensional drawing | | A | | B | |



Connection

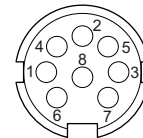
Temperature Probe

red/blue red white/blue white



Connector

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



Cable

| | | 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 | ft | 9 | 16/32/82 |
| max. length | ft | - | 328 |
| cable jacket | | PTFE | PVC |

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.

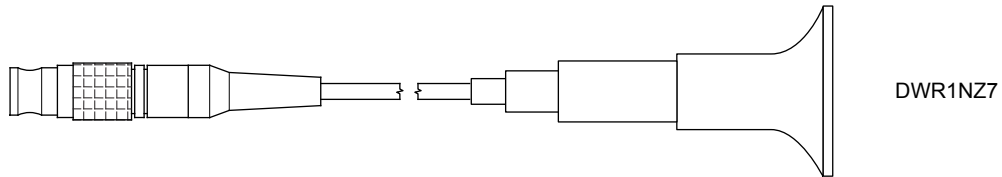
Technical Data

| | | |
|------------------------------|----|---|
| technical type | | DWR1NZ7 |
| measuring range ¹ | in | 0.04 to 9.8 |
| resolution | in | 0.0004 |
| accuracy | | 1 % ± 0.004 in |
| medium temperature | °F | -4 to +392, short-time peak max. 932 |
| explosion protection | | - |
| cable | | |
| type | | 2616 |
| length | ft | 4 |

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

| | | |
|---------------------|----|-------|
| type | | 2616 |
| ambient temperature | °F | <392 |
| cable jacket | | |
| material | | FEP |
| outer diameter | in | 0.2 |
| color | | black |
| shield | | x |





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