INTRA-AUTOMATION

MESS- UND REGELINSTRUMENTE / MEASUREMENT AND CONTROL

TÜVRheinland® CERT ISO 9001

ULTRASONIC-FLOWMETER
NON-INVASIV / CLAMP-ON-SENSORS

Type: IS210-S

Technical Information

2013

FLOW

THE EXPERT IN LEVEL AND FLOW

Ultrasonic-Flowmeter – Principle of Measurement

IS210 transit time flow meter utilizes two transducers that function as both ultrasonic transmitters and receivers. The transducers are clamped on the outside of a closed pipe at a specific distance from each other. The transducers can be mounted in V-method in which case the ultra sound transverses the pipe twice, or W-method in which case the ultra sound transverses the pipe four times, or in Z-method in which case the transducers are mounted on opposite sides of the pipe and the ultra sound transverses the pipe only once. The selection of mounting method depends on pipe and liquid characteristics. When the flow meter works, the two transducers transmits and receives ultrasonic signals amplified by multi beam which travels firstly downstream and then upstream (Figure 1). Because ultra sound travels faster downstream than upstream, there will be a difference of time of flight(Δ t). When the flow is still, the time difference (Δ t) is zero. Therefore, as long as know the time of flight both downstream and upstream, we can work out the time difference, and then the flow velocity (V) and flow volume (Q) via the following formula.

$$V = K \, x \, D \, x \, \Delta t$$

$$Q = S \, x \, V$$

Whereas:

K = Constant
D = Distance between the two transducers
S = pipe cross section
V = Liquid velocity
Δ t = Difference in time of flight
Q = flow rate

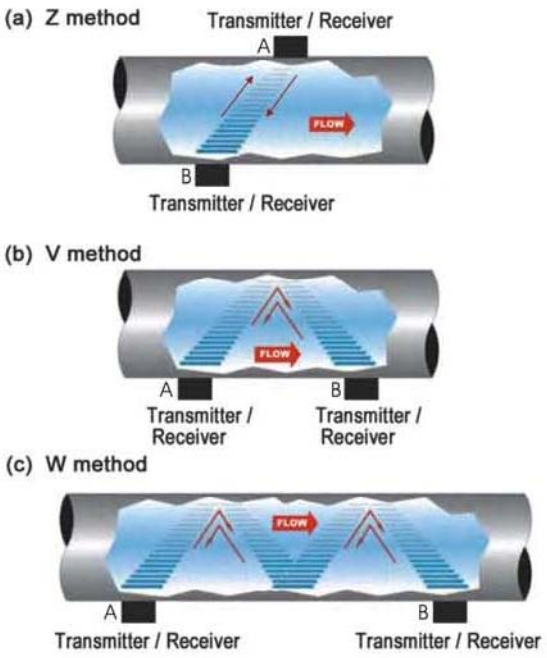


Figure 1

Clamp-on Ultrasonic-Flowmeter Series IS210-S

Series IS210-S wall-mount Clamp-on Transit Time Ultrasonic Flow Meters provide abundant capabilities for accurate liquid flow measurement from outside of a pipe. It utilizes state-of-the-art technologies in ultrasonic transmission receiving, digital signal processing and transit-time measurement. The proprietary signal quality tracking and self-adapting technologies allow the system to optimally adapt to different pipe materials automatically.
The flow meters of the IS210 family are carefully designed with their user-interfaces self-explanatory and their operation simple, requiring no special skills or tools.
Due to the non-invasive nature of clamp-on transducers, there is no pressure drop, no moving part, no leaks, and no risk of contamination or corrosion.

Features:

- ♦ Non-invasive clamp-on style transducers
- ♦ Bi-directional flow measurement
- ♦ Able to measure positive, negative and net total flow
- ♦ Standard type and Explosion-Proof type are available
- ♦ Can measure pipe sizes from 12 mm to 4570 mm
- ♦ Measurable temperature range: -40°C ~ 250°C
- ♦ Up to 8GB SD card data logger optional
- ♦ Easy operation and quick installation

Applications:

- ♦ Water (hot water, cooling water, De-ionized water, potable water)
- ♦ Petroleum products
- ♦ Chemicals, including alcohol, acids, etc.
- ♦ HVAC, energy measurement system
- ♦ Beverage, food and pharmaceutical processors

Clamp-on Ultrasonic-Flowmeter / Order information

Code	Description
IS210-S	Clamp-on Transit Time Ultrasonic Flow Meter (fixed installation)
	Approvals
	N n/a
	Ex ATEX (Exd IIB T6)
	Power Supply
	A 110 V AC
	B 220 V AC
	E 24 V DC
	S Solar supply (incl. solar panel)
	Output Selection 1
	N n/a
	0 Data storage function
	1 4…20 mA
	2 Frequency output (flow rate or totalizer)
	3 Relay output (totalizer or alarm)
	4 RS485 output (Modbus-RTU protocol)
	5 Wireless handheld operator
	6 GPRS wireless module (excl. software fee)
	Output Selection 2
	N n/a
	0 Data storage function
	1 4…20 mA
	2 Frequency output (flow rate or totalizer)
	3 Relay output (totalizer or alarm)
	4 RS485 output (Modbus-RTU protocol)
	5 Wireless handheld operator
	6 GPRS wireless module (excl. software fee)
	Output Selection 3
	N n/a
	0 Data storage function
	1 4…20 mA
	2 Frequency output (flow rate or totalizer)
	3 Relay output (totalizer or alarm)
	4 RS485 output (Modbus-RTU protocol)
	5 Wireless handheld operator
	6 GPRS wireless module (excl. software fee)
	Output Selection 4
	N n/a
	0 Data storage function
	1 4…20 mA
	2 Frequency output (flow rate or totalizer)
	3 Relay output (totalizer or alarm)
	4 RS485 output (Modbus-RTU protocol)
	5 Wireless handheld operator
	6 GPRS wireless module (excl. software fee)

IS210-S							/ (Transducer coding)

Transducer Coding:

Code	Description
DB	Transducer for fixed installation
	Transducer type
	S Small (DN20…DN50)
	M Medium (DN40…DN1000)
	ExM Ex-proof Medium (DN40…DN1000)
	L Large (DN1000…DN4500)
	Kxx Small pipe round clamp-on (DN20…DN50) xx is inside diameter
	Transducer mounting frame (only for mounting type "Common")
	N none
	FS DN20…DN50
	FM DN40…DN600 (for larger diameters, please contact us)
	Transducer temperature
	N -40°C…+121°C
	H -40°C…+250°C (only for S, M transducer. For larger transducers, please contact us)
	Mounting type
	N Common
	M Magnetic[1)] (suitable for pipes above DN80)
	Pipeline diameter
	DNX DN20…DN4500
	Cable length
	Xm Common cable max. 300 m (standard 6 m)
	XmH High temperature cable max. 300 m

DB						

*1) For Magnetic force transducer, M type fit to DN80 - 1000 mm pipe line.

Transducer Type „K“

K mode transducers utilize the Round-Clamp method, and the transducers' transmitting and receiving sides are connected with the pipe surface thoroughly, so that this series have the features of

- Reliability
- Enough coupling area
- Excellent stability.

Pipe-∅	Mat.	A	B	C	D	Measuring Range
½“ (12-15 mm)	PTFE	50	42	44	18	2-100 LPM
¾“-1“ (20-25 mm)	PTFE	50	53	44	28	4-375 LPM
1 ¼“ (32 mm)	PTFE	50	63	44	35	15-570 LPM
1 ¾“ (40 mm)	PTFE	66	71	44	45	18-830 LPM
2“ (50 mm)	PTFE	74	92	66	56	30-1500 LPM

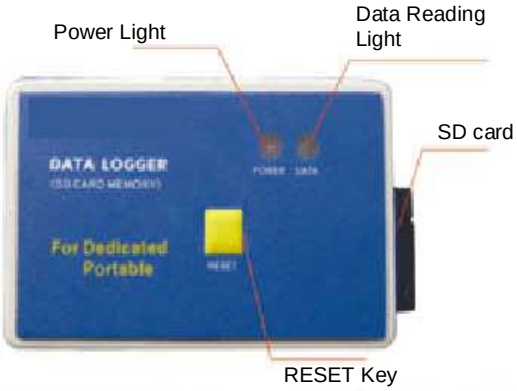
Technical Specifications:

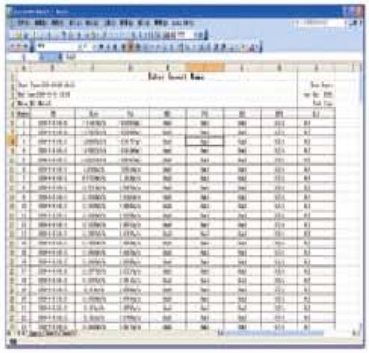
Transmitter	Power Supply	Standard: 10…28 V DC / 2,5 VA max.; 115/230 V AC 50/60 Hz ± 15 % / 5 VA max.; Solar energy: 12 V DC
	Velocity	-12…12 m/s (-40…40 ft/s), bi-directional
	Display	4 line x 16 English letters LCD back lit, can display total flow, flow rate, velocity and meter running status etc.
	Units Rate Totalized	User Configured (English and Metric) Rate and Velocity Display (FWD, NET, REV or BATCH) gallons, ft³, barrels, lbs, Liters, m³, kg
	Output	4…20 mA, OCT Pulse, Relay, RS232C or RS485, options: Up to 8 GB Data logger, Hart+(4…20 mA), MODBUS Protocol etc.
	Accuracy	± 1,0 % of reading at rates > 0,5 m/s ± 0,005 m/s of reading at rates < 0,5 m/s
	Sensitivity	Flow Rate: 0,0003 m/s (0,001 ft/s)
	Repeatability	0,2 % of reading
	Dimensions And Weight	Standard: 241 x 193 x 76,5 mm, Weight: < 2,5 kg Ex-Version: 255 x 220 x 110 mm, Weight: < 5,0 kg
	Security	Keypad lockout, access code enable
Transducer	Liquid Types Supported	Virtually most any liquid containing less than 2 % total Suspended solids (TSS) or aeration
	Suited Liquid Temperature	Std. Temp. Transducer: -40…+121 °C High Temp. Transducer: -40…+250 °C
	Cable Length	Standard: 6 m (20 ft); Opt: max. 300 m (990 ft)
	Pipe-∅	Sensor Type S: 12…50 mm Sensor Type M: 40…1000 mm (Standard) Sensor Type L: 1000…4570 mm Sensor Type K: 12…50 mm
	Dimensions and weight	Type S: 42 x 25 x 25 mm; weight < 0,2 kg Type M: 60 x 43 x 43 mm; weight < 0,5 kg Type L: 80 x 53 x 53 mm; weight < 1,0 kg
Accessories	Couplant	Dow Corning 111 or 732 (112 for high temp.)
	Data Logger	Optional: 512 MB to 8 GB SD card
	S-S Belt	According to the pipe line size

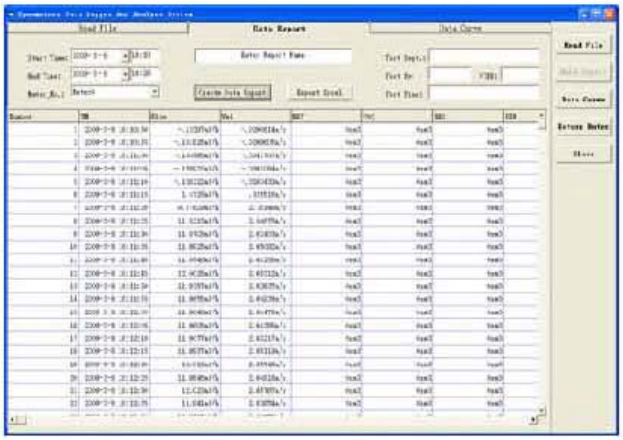
Data Logger and Software Utility

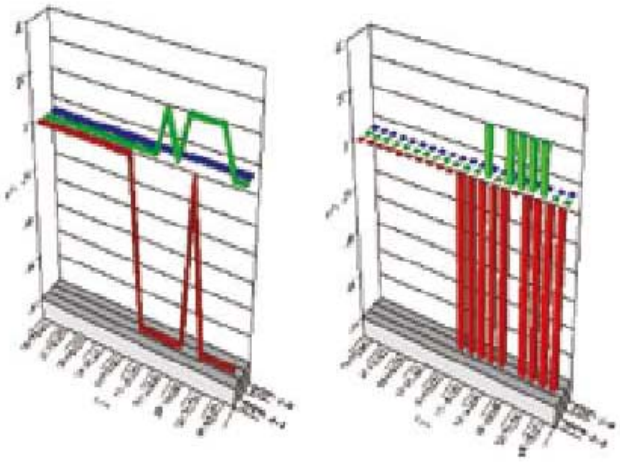
Features:

1.) Provides data logging, based on SD card data memory capacity can be 512MB, 1GB, 2GB, 4GB, 8GB. Normally, 1GB can store 5 year data with 5 minutes logging interval.
2.) Very easy to read data from SD card (just plug it out from Data Logger, and run Data Logging and Analyze software, browse the SD card file).
3.) Data report and Data Curve functions (showed in the right).
4.) User can edit and Excel report and print it on PC (showed in the right).
5.) Analyze Functions Included (showed in the right).
6.) Logging Parameters: Flow Rate, Velocity, Positive total flow, Negative total flow, Net total flow, Total Heat flow, and Heat flow rate. If user is interested in other parameters, please consult us. Users can delete the unnecessary parameters from Excel Table and then print the data table.
7.) We have two types of data logger, one for dedicated and Portable Series, the other for Handheld Series.









Parts and Dimensions

Standard Transmitter

Explosion-proof

Transducer Type L

Transducer Type S

Transducer Type M
(Standard)

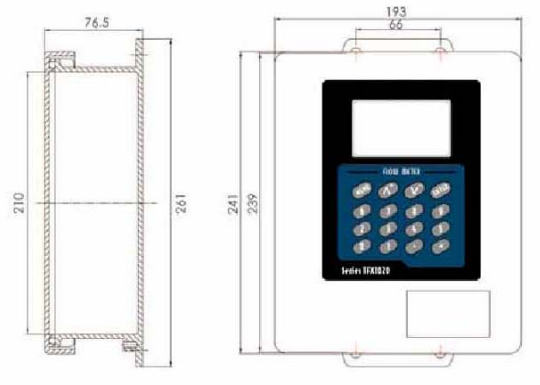
Transducer Type K

S-S Belts

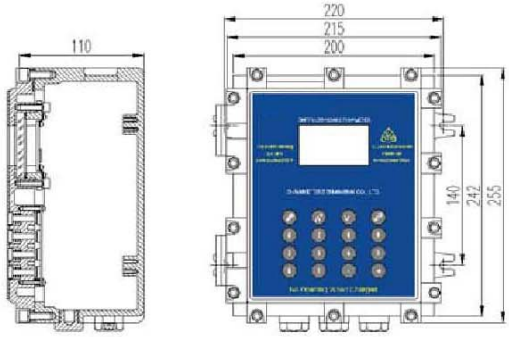
Couplant

Elastic Belts

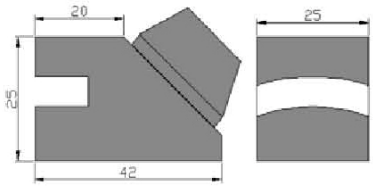
Parts and Dimensions / Continuation



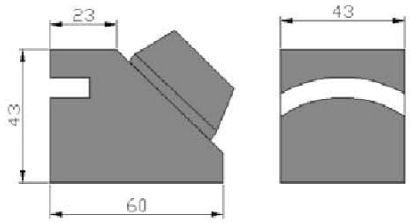
Standard Transmitter



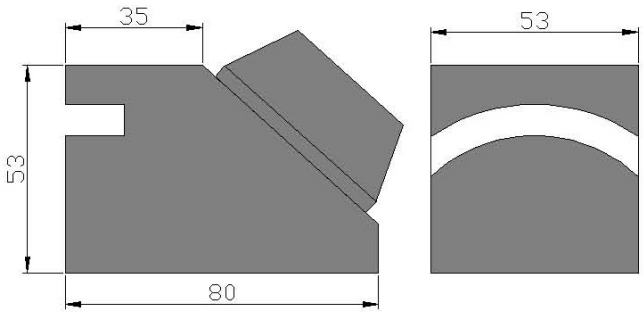
Explosion-proof Transmitter



Transducer Type S



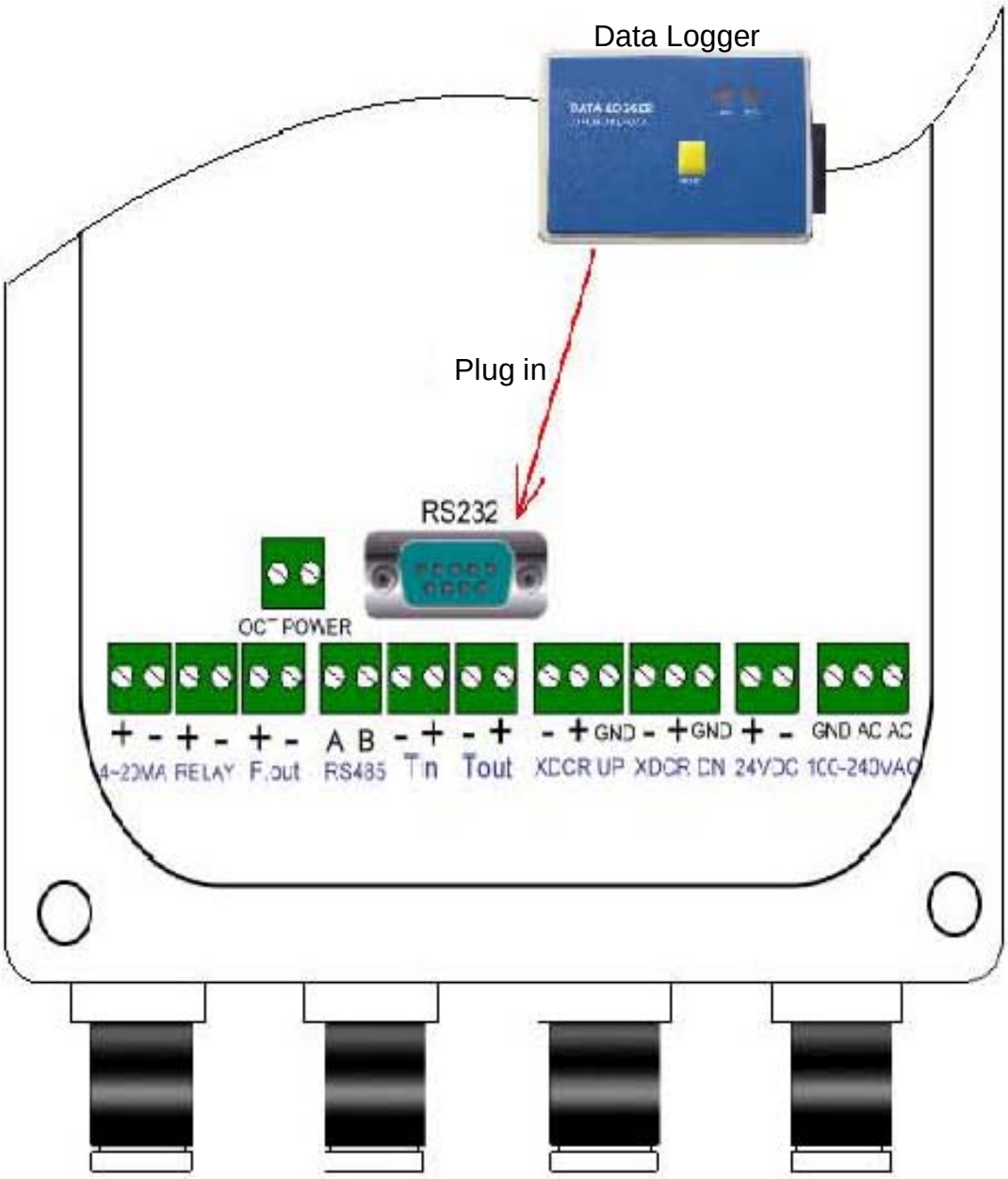
Transducer Type M



Transducer Type L

Wiring Terminals

Conduit holes: ½“ NPT or ¾“ NPT can been selected.
Housing: IP 65; NEMA4X, aluminium alley casting.



Besides the products covered by this brochure, Intra-Automation GmbH also manufactures other high-quality and high precision instruments for industrial measurement tasks. For more information, please contact us (contact details on the backside of this brochure).

Flow Measurement

Itabar®-Flow-Sensor

Level Measurement

ITA-mag. level gauges

MAGLINK level indicators

Other measurement tasks:

DigiFlow Flow and Level Computers

IntraCont digital Controllers

IntraDigit digital indicators

INTRA-AUTOMATION

MESS- UND REGELINSTRUMENTE / MEASUREMENT AND CONTROL

TÜVRheinland® CERT ISO 9001

Otto-Hahn-Str. 20
41515 Grevenbroich
GERMANY

Telefon: 0 21 81 – 75 66 5 – 0
Fax: 0 21 81 – 6 44 92

e-Mail: info@intra-automation.de

Internet: www.intra-automation.de