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ENERGO FLOW



About the company

Energoflow AG is an ISO 9001 certified Swiss company dedicated to design, engineering and manufacture of flow metering solutions and related products based on the ultrasonic technology.

AIM

We strive to provide state-of-the-art, cost effective turnkey technical solutions to our valued clients throughout the world for fluid measurement and monitoring in related fields across a wide range of industries and applications.

Experience, Expertise & Efficiency !

Our compact team of EXPERIENCED professionals with a vast global exposure is dedicated to provide the best answer to client's requirements based on our EXPERTISE, and our business practices and management concepts are aimed to provide the highest degree of EFFICIENCY.

Energoflow AG can provide the optimal solution to all your flow metering requirements – the wide range of our products covers all the feasible fluid flow situations. And if you have an unusual, out of the way case – just contact us with the details! We love challenges and our team of Engineers will be just too happy to provide the exact flow meter corresponding to your requirements.



Ultrasonic Liquid Flow meters

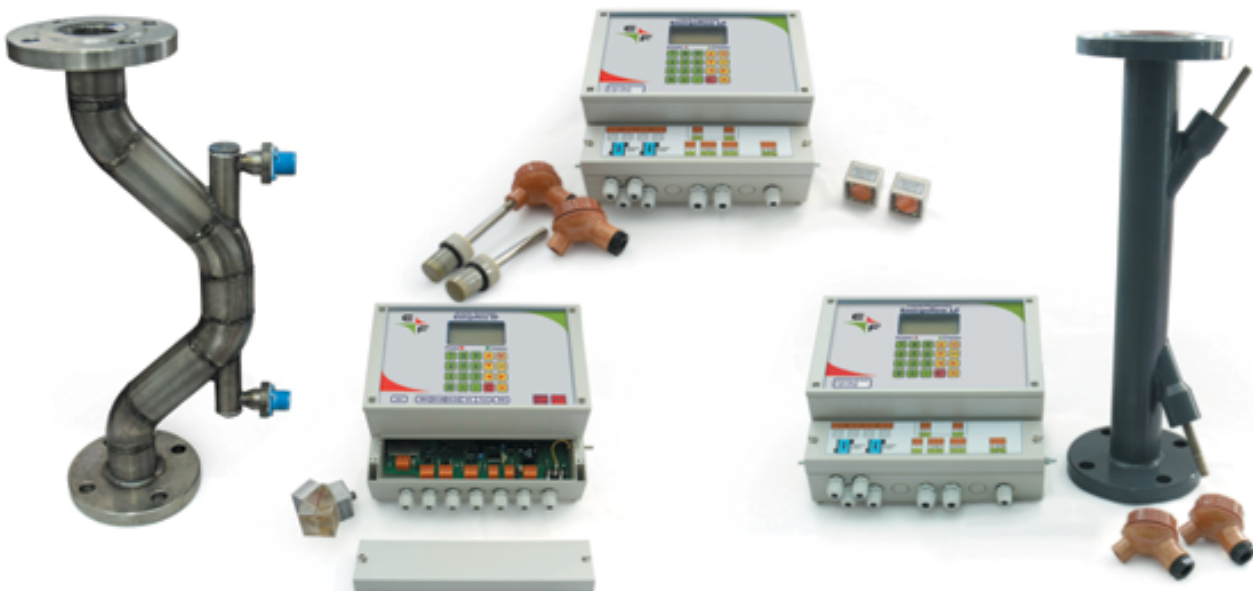
Ultrasonic liquid flow meters ENERGOFLOW LF

The Energoflow LF series of liquid flow meters is designed to perfection for reliable and accurate measurement of liquid flow in filled pipelines using the pulse-time method. These flow meters can be used for flow monitoring and measurement of potable, technical or river water, oil and petroleum products, heat-transfer agent, solutions of alkalis and acids, warmed fuel oil, heavy oil, stable gas condensate and liquified petroleum gas, effluents, etc. at pressures upto 250 bar. A special version capable of working at fluid pressures upto 400 bar is available for applications like measurement of stratal water from oil wells. The flow meters of the series are manufactured in various versions for application over a vast range of process conditions:

- for pipelines from DN25 upto DN7000
- for flow speeds as low as 0.1 m/s and as high as 10 m/s
- for ambient temperatures as low as -65 deg. C and as high as +70 deg. C and at 100% humidity
- for liquid temperatures in the range of -20 deg.C upto 150 deg.C
- in hazardous areas and hard to access locations
- for clamp-on installation, the process pressure is not a consideration, inline versions are available for liquid pressures as high as 400 bar
- for fluids with a considerable amount of suspended solid particles and bubbles (upto 5% by volume)

The major advantages of the Energoflow LF series liquid flow meters are:

1. No obstruction to the flow and zero pressure loss
2. No moving parts and no mechanical wear or tear
3. Easy installation and simplicity of use
4. Easy integration into all kinds of process management systems
5. High accuracy, large turn-down ratio, reliable measurement and fast reaction to changes in process conditions



Ultrasonic Liquid Flow meters



The flow meters of the series are manufactured in various versions – in-line sections, embedded sensors installation and clamp-on type.

ENERGOFLOW LF with clamp-on sensors, embedded sensors and in-line sections are designed for use in field conditions for monitoring and measurement of flow of liquids eg. potable, technical or river water, heat-transfer agent, solutions of alkalis and acids, oil and petroleum products, heated fuel oil, tar, energy oil, coke-chemical raw material, stable gas condensate and liquefied gas, effluents, and also liquid ammonia, saltpeter, etc.

Flow meters are designed for single channel and two-channels(four channels under special order). Each channel can be used independently to account for liquid in different pipelines.

With each channel of flow meter two sensors are used. Sensors are placed in a straight part of pipeline, which is protected from precipitations.

Clamp-on sensors (they are mounted on the surface of the pipe), **embedded sensors** (which are inserted into apertures, made in the pipe wall) can be used for larger pipe diameters (upto pipe DN 4m, larger sizes under special order).

TECHNICAL CHARACTERISTICS		
Parameter	Clamp-on sensors	Embedded sensors
Inner diameter of the pipeline, mm	70...3200	25...4000
Accuracy of flow measurement, %	± 1,0; ± 1,5	±0,5; ± 1
Range of flow velocity measurement, m/s	0,1 -10	0,1 -10
Range of operating temperatures for the sensors, °C	- 20...120(250)	- 20...150(250)
Range of operating temperatures for the electronic unit,°C	- 20...60(75)	- 20...60(75)
Range of operating temperatures for PSU,°C	5... 40(75)	5... 40(75)
Supply voltage, V	»220;10±24	»220; 10±24
Required power is not more, W	10	10

Power supply and connection unit (PSU) is equipped with the interface RS-232/RS-485 for connection with computer. Flow meter forms pulse-frequency signal and signal of direct current 0...5 or 4...20 mA, proportional to volumetric flow rate.



Ultrasonic Liquid Flow meters

In-line sections are intended for medium gauge pressure upto 1,6 MPa, with liquid temperature from 0... 150 deg. C, for inner pipeline diameter (DN) from 200...1600 mm and can be installed in places, exposed to climatic influences (damp basements, wells).

The flow meters are also available with a built in battery on board for installation at sites where power is not available. The lifetime of the battery is more than one year.

TECHNICAL CHARACTERISTICS									
Volume flow rate m ³ /h	Nominal diameter of Pipeline, mm								
	32	40	50	80	100	150	200	250	300
Q _{max}	30	45	75	180	285	640	1130	1770	2550
Q _t	2,0	2,5	3,0	5,0	6,0	9,0	12	15,0	18,0
Q _{min}	0,20	0,35	0,5	1,3	2,0	4,0	8,0	12,4	17,8
Q _{threshold}	0,015	0,025	0,035	0,1	0,15	0,35	0,6	0,9	1,3

ADVANTAGES :

- Simplicity and reliability in the operation;
- Wide range of the measurements of volumetric flow rate (1:150);
- The created archives contained hourly data for past 1024 hours (more than 42 days);
- Adjustment of flow meter in the complete set with in-line section is carried out on manufacturer;
- There is no contraction inside the in-line section; therefore flow meter does not create the resistance to the flow of liquid and does not introduce disturbances into the flow;
- Automatic adjusting of the signal level;
- Flow meter is equipped with pulse-frequency output, analog output (on order), and interface RS 232;
- Flow meter with the autonomous power supply works up to 4 years without the replacement of battery;
- Flow meter can be easily integrated into automated SCADA systems and existing control systems;
- Interval between verification - 2 years.



Ultrasonic Liquid Flow meters



Liquid Flow meter LF 131H for high pressure applications

For applications where the medium pressure is very high, eg. measuring the flow of stratal water, we have developed the model LF 131H. The device can be used for bidirectional measurement of flow of mediums at pressure as high as 40 Mpa. These flow meters are available in two versions - with an integrally mounted Electronics unit having a built-in battery which provides full autonomous functionality for more than four years, or with a standard remotely installed Electronics unit.



The LF 131H flow meters are widely used in the downstream applications in the Oil & Gas industry, eg. at extraction wells since they are rugged and can handle aggressive liquids at such high pressure. They are also used for applications like cementing of wells and measurement of flow of chemicals injected into wells at high pressure.

TECHNICAL CHARACTERISTICS			
Parameters	Nominal inner diameter of the pipeline, DN, mm		
	50	80	100
Liquid temperature, °C	0...150 °C		
Gauge pressure, MPa	16 MPa, 25 MPa		
Maximum flow Q_{max} , m ³ /h	71	180	285
Transitional flow Q_t , m ³ /h	4,2	6,8	8,5
Minimum flow Q_{min} , m ³ /h	0,7	1,8	2,8
Threshold flow $Q_{Threshold}$, m ³ /h	0,15	0,35	0,35
Relative error of measurement of flow and volume, %			
$Q_t \dots Q_{max}$	± 1 %		
$Q_{min} \dots Q_t$	± 4 %		
$Q_{threshold} \dots Q_{min}$	calculation is conducted with non standardized accuracy		
For the flows less $Q_{threshold}$	volume is not accumulated (Flow is taken as equal to zero)		



Ultrasonic Liquid Flow meters

Portable Ultrasonic Liquid Flow meter Energoflow LF 2P2

The portable flow meter ENERGOFLOW LF 2P2 with clamp-on sensors is designed for use in field conditions for monitoring and measurement of flow of liquids eg. water, petroleum and petroleum products, industrial chemicals, solvents, etc. in fully filled pipelines. The set comes in a handy, easy to carry durable case and can be used for:

- single channel (accuracy 1.5%) and twin channel (accuracy 0.5%....1%) flow measurements on a single pipeline
- real-time comparison or summation of flows in two adjacent pipelines (single channel mode per pipeline)

This set is a boon for repair teams and field engineers. The built-in digital oscillograph facility and inline calibration function make installation and commissioning very fast, simple and easy. The flow meter can also be used as a fullfledged stand alone liquid flow meter for in-situ installations in remote places.

The complete set comprises of the following:

1	LF 2P2 – Electronic unit (twin channel) with LCD display and keyboard	1 pc.
2	Electroacoustic transducer	4 pcs.
3	Removable plates (for clamp-on installation)	16 pcs.
4	Power unit / Battery charger 5V, 1A	1 pc.
5	Thickness gauge	1 pc.
6	Water-resistant grease	1 pc.
7	Accumulator charger	1 pc.
8	Tapping hammer with screwdriver	1 pc.
9	Measuring roulette	1 pc.
10	Standards strip for calibration of thickness gauge	1 pc.
11	Connecting cables for transducers with connectors, 2 x 10 m	2 sets
12	Carrying case	1 pc.
13	Accessories for installation on pipes (chains and clamps)	1 set



Manufacturer's warranty certificate, instruction manual and software CD with cable (for connecting the electronic unit to PC for data transfer and configuration) are provided with each set.

TECHNICAL CHARACTERISTICS	
Parameter	Value
Pipe inner diameter, mm	70-3200
Accuracy of flow measurement, %	±1,0 %, ±1,5 %
Range of flow velocity measurement, m/s	0,1-10
Range of operating temperatures for the sensors, °C	-20...+120
Range of operating temperatures for the electronic unit, °C	+5...+45
Relative error of measurement of expenditure and volume, mm	±0,2
Supply voltage, V	220 or 6,5
Required power is not more, W	10

Ultrasonic Liquid Flow meters



Doppler flow meters for liquid

Ultrasonic Flow meters LDF are designed for measuring flow velocity, volumetric flow rate and liquid volume, transported through pipelines in the forward or reverse direction using the Doppler effect. They can be used for measuring acoustically opaque fluids – slurries, liquids with suspended particles and other contamination..

The flow meter comprises of two clamp-on electroacoustic transducers and a remotely installed electronics unit and can be used to measure bidirectional flow of fluids containing not less than 0.1% of suspended particles or gas bubbles.

These flow meters can be installed on pipes having wall thickness of 2 to 20 mm made of various acoustically transparent materials: steel, cast iron, cement, plastic etc.

TECHNICAL CHARACTERISTICS	
Parameter	Value
Inner diameter of the pipeline, mm	40-1600
Range of velocity measurement, m/s	0,1-6
Accuracy of the measurement, %	2
Range of operating temperatures for the sensors, °C	-20...+100
Supply voltage, V	220 or 12
Consumed power, W	12
Distance between sensors and electronic unit, m, not more	70

The major advantages of the Ultrasonic Flow meters LDF are:

- Easy installation and simplicity of use;
- Applicable for measurements in pipelines even if the pipe walls are greatly corroded or have a thick layer of sediment;
- Easy integration into all kinds of process management systems;
- Reliable and accurate measurement.





Ultrasonic Liquid Flow meters

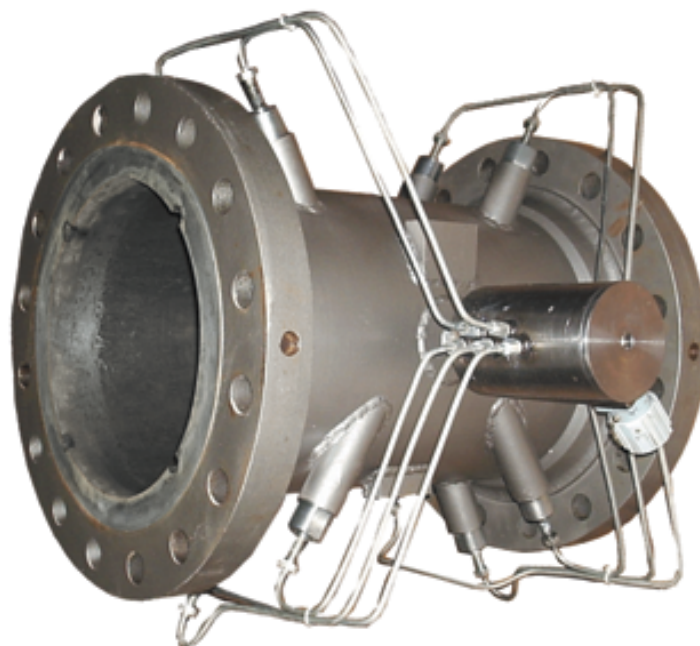
High accuracy 5 channel Liquid flow meter LF 505

For applications requiring very high accuracy, we can offer the LF 505 liquid flow meter. The device can be used for reliable and accurate measurement of speed of the fluid, flow rate and total flow in filled pipelines having a nominal inner diameter in the range of 100 upto 300 mm and at pressure upto 6,3 MPa.

The device is equipped with an RS232 interface for data output as well as pulse output.

The flow meters are precalibrated on water. Under special order, they can be precalibrated on liquid hydrocarbons or other media as per the client's requirement.

TECHNICAL CHARACTERISTICS:					
Parameter	Inner diameter of Pipeline, mm				
	100	150	200	250	300
Accuracy of flow measurement, %, not less than					
+/- 0.15 % for flow range	280-140	600-300	1200-600	1800-900	2500-1250
+/- 0.25 % for flow range	280-28	600-60	1200-120	1800-180	250-250
Repeatability, %	0,04				
Medium temperature, deg. C	-30...+150				
Medium pressure, MPa	1,6				
Supply voltage, V	220				
Distance between electronics unit and Inline section, m,not more than	150				



Ultrasonic Liquid Flow meters



Liquid flow meter selection guide

No. of measurement channels

- x** – number of channels of measurement
 - 0** – Flanged section with Electro Acoustic Transducers
 - 1** – Clamp-on stationary Electro Acoustic Transducers
 - 2** – hot-tapped installation of Electro Acoustic Transducers in pipeline wall
 - 3** – Customer specific applications
 - P** – portable version
- x** – number of EAT pairs

Application

- A** – standard applications
- H** – High pressure applications
- O** – Customer specific applications

Ambient temperature

- L** – Low temperature version (-60 +40 deg. C)
- S** – Standard version (-30 +40 deg. C)
- H** – High temperature version (-30 +70 deg. C)

Installation data

- DNxxxx** – Pipe nominal diameter, mm

Accuracy of measurement

- N** – normal (1,5 % for Qt to Qmax, 3% for Qmin to Qt)
- S** – Standard (1 % for Qt to Qmax, 2% for Qmin to Qt)
- C** – high accuracy measurements upto 0.5%
- O** – Customer specific upto 0.25%

Process connection

- N** – no flanges, hot-tapped sensors
- D** – Flanges DIN
 - xxx** – PN, bar
- A** – Flanges ANSI
 - xxxx** – class
- C** – clamp-on sensors
- O** – Customer specific

Electronics block

- I** – integrally mounted electronics block with display
- R** – Remote mounted electronics block
- W** – Electronic junction box without local display

Hazardous area certification

- I** – Exi certification (ATEX)
- W** – without certification (for non hazardous applications)

Power supply

- A** – 220 VAC power supply system with intrinsic barriers and communication interface
- D** – 24 VDC power supply system with intrinsic barriers and communication interface
- O** – Customer specific
- W** – without power supply, customer to provide required power input
- B** – Power supply from on board battery (battery to be replaced every 3 years)

Accessories (optional)

- F** – Meeting flanges with nuts and studs to be supplied with flow meter
- R** – straight pipe-runs to be supplied with flow meter
- C** – Flow conditioner to be supplied with flow meter
- N** – No additional accessories



Calibration and proving rigs

Calibration and proving rigs for liquid flow meters

The principle of the functioning of the rig is as follows:

By switching on one or more fans a flow of the medium is generated in the piping of the rig. The flowrate and pressure of the medium is regulated by controlling the pump, the fan and a diaphragm valve. The flow thus generated is measured by the reference flow meter as well as the flow meter being verified or calibrated. Reference pressure and temperature transmitters are used for determining the working conditions. The accumulated pulse quantity over a number of cycles is recorded and the total measured volume at standard temperature and pressure is calculated for both the flow meters. The comparison of the results gives a reliable measurement of the accuracy of the meter under verification. Different reference flow meters are used for different ranges of measurement which also improves the accuracy and reliability of the results.

FOR LIQUID FLOW METERS:

Designed for automated testing, grading and calibration of meters, flow meters and mass meters of liquid using two measurement methods:

- method of comparison with standard flow meter (mode 1);
- method of static weighing (mode 2).

In mode 1 counters and flow meters with relative accuracy of volumetric flowrate and volume measurement $\pm 0,3$ % and more are tested or calibrated.

In mode 2 the flow meters including mass meters with relative accuracy $\pm 0,05$ % and more are tested and calibrated.





ULTRASONIC NON-INTRUSIVE PIG DETECTOR ULIS-A

ULIS-A is a non-intrusive ultrasonic pig passage indicator designed for reliable detection of all kinds of pigs used for pigging of filled liquid pipelines. It also provides indication and an estimate of accumulated debris in front of the pig and an estimate of the effectiveness of the pigging procedure. The device is certified as intrinsically safe for use in hazardous areas.

The pig detector comprises of an ultrasonic non-intrusive sensor clamped to the outside of the pipe and a remotely installed electronics unit. The clamp-on design of the sensor allows the device to be used for all pipe sizes. The electronics unit provides visual indication of pig passage as well a dry relay output signal for integration into existing control systems. Besides, the electronics unit provides archiving of up to 120 events of pig detection and automatic reset functions. With the help of specialized software provided, graphical visualization of the approach of the debris plug as well as pig/sphere passage and change in density of the fluid is possible.

The major advantages of the ULIS-A pig detector are:

- The non-intrusive design provides zero pressure drop and no obstruction to the flow or the pig and allows for all kinds of applications - high pressure, sour service etc;
- Any type of pig, sphere etc. can be detected in both directions;
- There are no mechanical moving parts - so no wear or tear, minimum servicing;
- The active nature of the ultrasonic device guarantees reliable pig detection eliminating false alarms due to outside interference.





Additional

Detectors are certified for use in hazardous area and have EC-Type Examination certificate number FTZU 11 ATEX 0144X.

EASY INSTALLATION

1. Transducers of the detector should be installed on the pipelines for detection of the large-size objects (including pigs, separating balls, gauges, diagnostics devices etc.), propelled by the liquid flow in the pipelines under the pressure, for determination of the moment when the object is crossing the pipeline section under control. A corresponding warning signal is sent to the data collection system or to the Advanced Communications System (ACS).
2. Detector also provides the detection of the so-called «paraffin plugs» (referred as plugs) in the oil pipelines.
3. Detector is designed for the pipelines with passage diameter DN from 150 upto 500 mm and from 350 upto 1200 mm, and wall thickness up to 60 mm.
 - a. Detector consists of a system unit (SU) and an electroacoustic active transducer (EAT), attached to the pipeline surface by a mounting tool. EAT is connecting to the SU by a 4-wire cable.
 - b. EAT transmits and receives an ultrasonic signal.
 - c. ULIS-A SU is intended for installation indoor and outdoor of explosion hazard zones.

Parameters of the indicator	Value
Diameter of the pipeline, mm	150 – 1200
Speed of movement of the device of clearing on the pipeline, km/h	1 – 8
Length of the device of clearing, m	1 – 2
Environment temperature	- 40 ... +60 °C
Voltage of device	220 V, 50 Hz
Power consumption, Wt, no more	6
1. "Dry contact" "Event"	30V, 200mA
2. "Dry contact" "Fuse"	30V, 200mA
3. Current output	4 – 20 mA
4. Serial interface	RS-232/RS485
Distance from the gauge up to the electronic block, m, no more	150
Certification	Sensor: II 2G Ex ib IIB T4 Electronics block : II (2)G [Ex ib] IIB

EAT is designed in explosion safe enclosure and can be installed indoors and outdoors in explosion hazard zones according to rules, regulating electrical equipment application in the explosion hazard zones.

Skid design and fabrication

Keeping in line with our principle of 3 E's – Experience, Expertise & Efficiency, Energoflow AG provides its customer's with individually designed, prefabricated and pretested instrumentation skids for various applications.

A typical skid supply project comprises of the following stages:

Design – Our team of engineers provides complete skid design services starting from a conceptual study of the technical assignment and through finished drawings ready for fabrication. The design process includes detailed analysis of electrical, instrumentation, programming and fabrication aspects. In close interaction with the client, we devise optimal solutions for the client's requirements.

Fabrication – At our facilities, our technicians and engineers provide fabrication of skids from a wide range of materials and instruments as per our own design or as per drawings provided by the client. The strict quality control procedures and use of latest technologies guarantees the best results.

Calibration and Controls – Before shipping, our engineers make sure that all the instruments included in the skid are correctly calibrated and properly wired and the control systems are adequately programmed. The client gets a "Plug and Play" module which provides full functionality and best performance.

Testing – All skid systems are vigorously tested at our facilities to ensure proper operation in the field and conformance to the highest international quality standards.

Commissioning – Our team of technicians will assist you with the commissioning of the supplied module at your facility until you are completely satisfied with the skid's operation. We can also provide extensive training of customer's personnel.



Design, Installation and commissioning of flow metering and monitoring systems

Energoflow AG can provide services for turnkey installation of flow metering and flow monitoring systems for various applications. Taking into account the wide range of flow metering solutions developed by us, we can offer the client systems incorporating the latest developments in technologies and data transfer for virtually all types of fluids and process conditions; be it communal water supply systems, leak detection systems for pipelines, custody transfer solutions for hydrocarbons – you name it and we will do it.

Beginning from design, our team works in close collaboration with the client to develop a tailor made solution exactly as per the client's requirements and executes the whole project to the client's utmost satisfaction. We can also provide economically optimized solutions for modernization, development and extension of already existing systems.



Hot-tapping installation and commissioning of ultrasonic flow meters for pipelines upto 6000 mm diameter

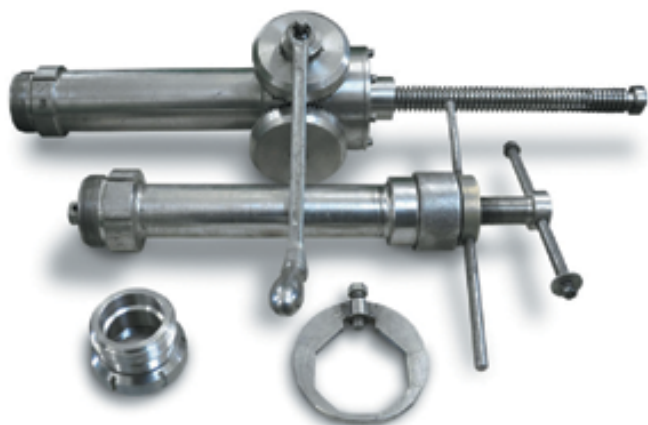
Energoflow AG offers its services for design, installation and commissioning of flow metering units for liquids and gases in-situ on existing pressurized pipelines with diameters as large as 6000mm. The method involves the use of specific techniques and instruments and does not require stopping the fluid flow.

The method is especially effective for large diameter pipelines and in cases where flow metering is required in an existing pipeline while stopping the flow or draining the pipe is not feasible.

The method takes into account the actual geometry of the pipeline at the installation site, process conditions and other local factors, thus providing highly accurate and reliable results.



Hot-tapping device for installation of sensors in pipelines under pressure Energoflow HSID-01



To create metering stations on large diameter pipelines as well as for on-the-site monitoring (eg. during repairs) of flow rate in pipelines in field using standard flow meters, the specialists of Energoflow AG have developed the technology (methodology, tools and gadgets) for installation of insertion-type electroacoustic transducers (EAT) into pipeline walls, which can then be connected to the standard electronics block of the corresponding Energoflow GF or LF series flow meters, thus creating a full fledged flow meter in-situ without stopping the technological process.

HSID-01 is used for high-precision spacing of input/output points of acoustic channels on the surface of the pipeline, for drilling work without depressurization of the pipeline and for hermetic installation and removal of EATs.

The device can be used for installation of sensors in round pipelines as well as those with an expressed ellipticity without stopping the flow or emptying the pipeline.

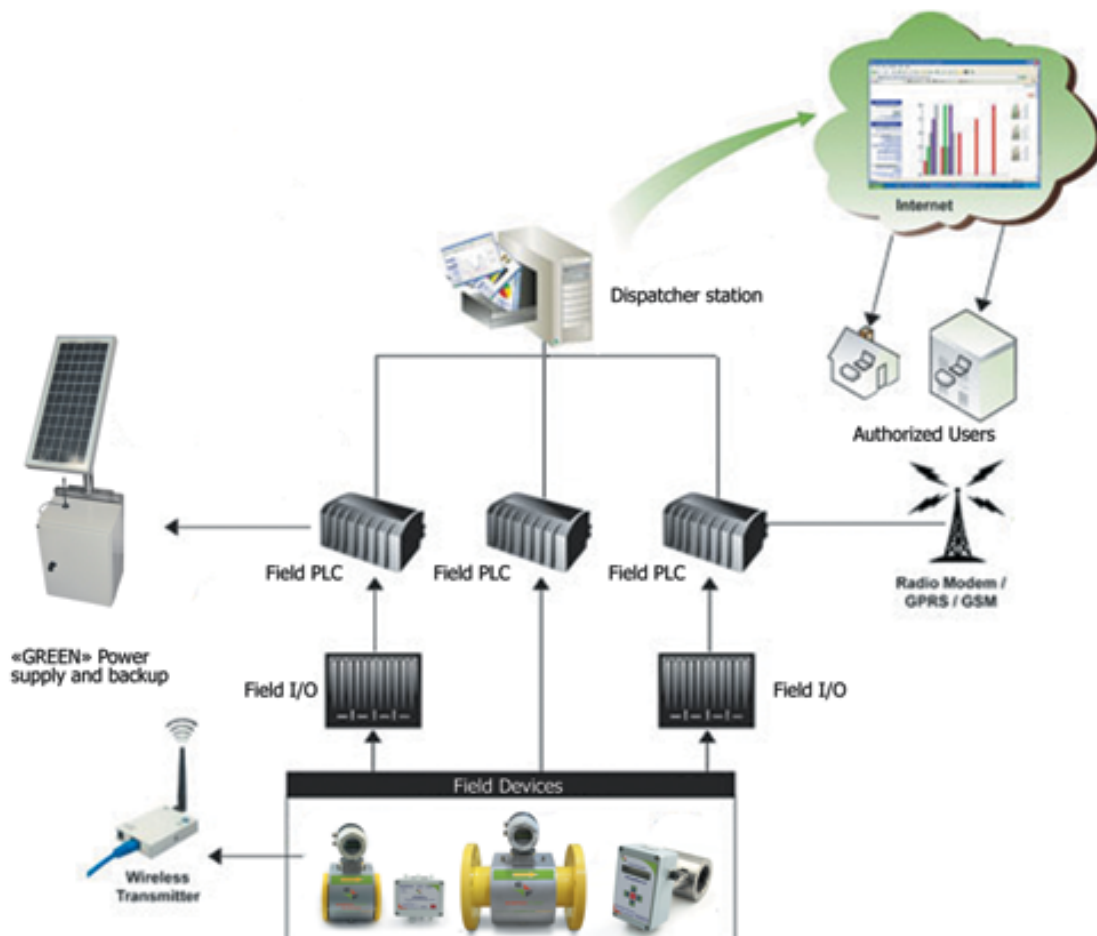
Integrated metering and monitoring systems

Being the supplier of a vast range of fluid monitoring and measurement equipment, Energoflow AG can also design integrated systems tailor-made for your requirements. The purpose of such a system is to collect process data from various remotely located sites and provide access to the consolidated data for analysis to authorized users.

Typically, an integrated system includes:

- field instrumentation for measuring various process parameters at site;
- field PLCs for data accumulation and monitoring of field devices at the site;
- field power supply and backup units;
- site data transmission units;
- dispatcher stations with SCADA system for collecting data from various sites and collating it for user access.

Such systems are indispensable for oil and natural gas pipelines, irrigation systems, municipal water and wastewater networks and other facilities having a number of sites to be monitored spread over relatively large areas.





Additional

Green Power Solutions

Energoflow AG is dedicated to spread the idea of creating a better environment by using ecologically clean solutions.

All our devices can be supplied with " Green Power Solutions" - solar energy based autonomous power supply units capable of providing the full functionality of the equipment. Our engineers can also provide for such solutions for equipment supplied by other manufacturers.

Typically, such a solution would comprise of three major parts:

1. A solar panel of the required size for converting solar energy into the required amount of electrical power.
2. An accumulator battery for storing the generated power.
3. An intelligent controller for smooth operation of the whole system - for regulating the power output and for monitoring the status of the solar panel, the accumulator battery as well as the ambient conditions. The controller can be equipped with a LCD screen for displaying the data. It is also possible to connect to a SCADA system via GPS/GPRS or other networks for remote monitoring of the unit.

In order to design such a solution, the following data would generally be required:

- a detailed specification of the technical characteristics of the equipment to be deployed and powered;
- meteorological data on the site of installation;
- facilities for mounting the solar panel.





Energoflow AG,
Ringstrasse 28, CH-4600 Olten, Switzerland

Tel: +41 62 212 8907
Fax: +41 62 212 8912

www.energoflow.com
sales@energoflow.com