PRESSURE

The Right Pressure Sensor For Any Measuring Task

Different methods are usually used for manufacturing pressure sensors that have been adapted to the corresponding application.

- Thick-Film Sensors
- Thin-Film Sensors
- Piezo-Resistive Sensors

Pressure transducers are principally available with 4 pressure calibrations:

- Relative pressure: pressure related to the environmental pressure
- Absolute pressure: pressure related to vacuum (0bar)
- Overpressure: pressure related to atm. pressure at manufacturing (approx. 1bar)
- Differential press.: pressure related to a second, variable pressure

Thick-Film Sensors

The expansion-sensitive elements are applied to a special steel membrane by screen printing technology.

Advantage:
Compact design, particularly suitable for use in simple monitoring and control circuits.

Disadvantage:
Limited operating temperature range, measured values are subject to a long-term variation.

Thin-Film Sensors

In a demanding manufacturing process, the wire strain gauges are directly formed on a passivated special steel membrane by a chemical vapour deposition process.

Advantage:
Very compact and homogeneous design, high long-term stability and dynamic load capacity, particularly suitable for operation in harsh industrial environments in the range of medium and high relative pressures.

Disadvantage:
Very expensive manufacturing process.

Piezo-Resistive Sensors

A silicone membrane with 'diffused in' expansion-sensitive resistors is used as the pressure-sensitive element. Due to its compatibility with many substances silicone would limit the use of the sensor. Therefore, a pressure transmission system, consisting of a filling liquid and a special steel membrane has been integrated. The pressure measuring cell is temperature-compensated and is manufactured in demanding vacuum processes.

Advantage:
High accuracy within a wide temperature range, particularly suitable for use in high sophisticated measurement and control tasks, especially for measurement of absolute pressure and low to medium relative pressure.

Disadvantage:
Generally, an expensive manufacturing process, however, cost-efficient when produced in large quantities.

Two mechanical designs are available in the ALMEMO® sensor range:

- Pressure sensors for hose connection:
  The measuring cell is housed in a compact plastic housing with two connecting fittings.
  The pressure sensors are available for wall mounting or as pressure modules that can be directly plugged into measuring instruments, with measuring ranges for relative or differential pressure measurement in gases, and also for atmospheric pressure measurements.
- Built-In Pressure Transducers:
  The measuring cell is suspended in an oil-filled, all-welded special steel enclosure.
  All parts that come into contact with a substance are made from special steel. Therefore, these transducers are also suitable for use in chemically aggressive substances in various industrial applications.

Temperature Measurement with Pressure Sensors for Refrigerants R22, R134a and R404a

Option SB 0000 R

All ALMEMO® Version V5/V6 devices, including ALMEMO® data loggers and data acquisition systems, can be used a for continuous temperature measurement (resolution 0.1K) with absolute pressure sensors (resolution 0.001 bar compulsory !). Both, pressure and temperature can be selected or continuously indicated and recorded. (cf. page 11.08)

Technical Features of Force Transducers

The technical features of the force transducers are substantially fixed by VDI/VDE guideline 2637.
The most important terms are described below:

Measuring range:	The load range, for which the guaranteed error limits will not be exceeded.
Nominal load:	The nominal load is the upper limit of the measuring range. Depending on the sensor, the nominal load can be a tension or compression load.
Working load:	The working load is the load that can be applied to the sensor, as well as the nominal load, without affecting the specified characteristics. The working load range should only be used in exceptional cases.
Load limit:	The load limit is the maximum permissible load that can be applied to the measuring cell without expecting a destruction of the measuring system. At this load the specific error limits are no longer applicable.
Breaking load:	The breaking load is the load where a permanent change or destruction occurs.
Maximum dynamic load:	Rated force related oscillation amplitude of a sinusoidally changing force in direction of the measuring axis of the sensor. At a load of 10^7 cycles the sensor, when being repeatedly used up to the rated force, is not subject to significant changes regarding the metrology characteristics.
Drift error:	The drift error is the maximum permissible change of the output signal of the sensor over the specified time at constant load and stable environmental conditions.

ALMEMO® Force Measurement:

ALMEMO® force transducers allow to adjust the constant load (tare) to zero and to enter the final value as nominal value. The correction value will be automatically calculated from this by the measuring instrument. An ALMEMO® connector that switches on this resistor for the adjustment is available for force transducers with integrated reference resistor.

The Right Displacement Sensor For Any Measuring Task

Different methods can be used depending on the limiting and environmental conditions involved with the measuring task:

Linear inductive displacement transducers and tracers:	absolutely accurate, high resolution, robust, acceleration resistant, cost-efficient, noise resistant, good long term stability, environmentally stable (contamination, humidity/moisture), point-shaped, almost contactless measurement, easy mounting and handling
Non-contacting displacement measuring systems based on eddy current:	very accurate, very fast, high resolution, environmentally stable (contamination, moisture/humidity), noise resistant regarding EMI, temperature stable, long term stability, for devices under test made of all types of electrically conducting materials, nonmagnetic and ferromagnetic, compact sensor designs, extensive application temperature range
Non-contacting inductive displacement measuring systems:	accurate, temperature stable, fast, cost-efficient, particularly for ferromagnetic test objects
Long-travel sensors based on eddy current:	large measuring paths, robust and compact, no mechanical wear, easy handling, compression-proof
Non-contacting inductive optical displacement measuring systems:	point-shaped measurement, accurate, fast, large base distance, material independent
Cable line displacement sensors:	very accurate, large measuring paths, easy mounting, cost-efficient
Non-contacting capacitive displacement measuring systems:	extraordinary accurate, very temperature stable, fast, high resolution, very good long term stability, material independent for metal objects under test, also suitable for insulating materials, easy to handle, extensive operating temperature range
Conductive plastic potentiometer:	high resolution, good linearity, cost-efficient, good temperature and humidity coefficients, extensive operating temperature range

ALMEMO® Displacement Measurement:

Our Potentiometric displacement sensors have been pre-aligned in the factory by storing the correction values in the ALMEMO® connector before delivery. The precise adjustment can be locally performed by the user with final measures after the installation.

PRESSURE

Measurement of Rotational Speed in Various Applications

For measurements of rotational speed the ALMEMO® sensor range provides several sensors.

- Turbine Flowmeters
- Optical Rotational Speed Meters

Turbine Flowmeters

The sensor contains a vane or paddle that starts rotating when a flow is present. Unlike the optical method, this method also allows for measurements in cloudy and non-transparent liquids. The rotational speed is proportional to the corresponding quantity of flow. The electrical output signal can be generated by two different methods:

- Inductive Proximity Switch:
  The rotor blades are provided with special steel caps, therefore, the rotor blades approaching the transducer cause a change of the inductance and the generation of a pulse type output signal.
- Hall Sensor:
  The rotor is provided with permanent magnets that affect a Hall sensor, which is located on the transducer. The transducer electronics transforms the Hall signal into a pulse type electronical output signal.

For measuring the volume flow rate or for dosing tasks, the ALMEMO® sensor range includes turbine flowmeters for different measuring ranges and operating conditions:

- Radial turbine flowmeters for large flow quantities.
- Axial turbine flowmeters with rotating vane for small flow quantities.

Optical Rotational Speed Meters

The optical reflection method has become the most accepted method for the measurement of revolutions of shafts, wheels, fans etc. With single unit retroreflective photoelectric sensors the transmitters and receivers form one single unit. The light sent by the transmitter is, by an opposite located object, reflected to the receiver. The sensor performs a switch when the reflected amount of light exceeds a specific, adjustable limit value at the receiver. This quantity of light depends on the size and the reflection properties of the object. Special reflective tapes are used to increase the sensing range and to improve the signal-to-noise ratio.

ALMEMO® rotational speed sensors can be used in two measurement setups:

- Retroreflective photoelectric sensor (DIN EN 60947: Type D)
  Detects only opaque objects.
  The sensing range depends on the reflectivity of the object, i.e. on the surface quality and colour.
  Sensitive with regard to contamination and against changes of the reflective properties of the object
  These influences can (within limits) be compensated by means of a sensitivity adjustment control
  Only small mounting efforts are required as the sensor is a single unit device and a rough alignment is sufficient in most cases.
- Retroreflective light barrier (DIN EN 60947: Type R)
  Retroreflectors allow for long sensing ranges and an improved signal-to-noise ratio. Low susceptance to interferences, therefore, highly suitable for use under harsh conditions, e.g. outdoor applications or dirty environments.

PRESSURE

Pressure Transducer FDA 602 L

- Compact pressure sensors for industrial applications in liquid and gaseous substances.
- Piezo-resistive, flexibly suspended silicone measuring cell in an oil-filled, all-welded special steel enclosure.
- The stable mechanical construction provides a reliable protection for the measuring cell against the test substance and immunes it against pressure peaks and vibrations.
- Available with three calibrations.
  Relative pressure: pressure related to the environmental press.
  Absolute pressure: pressure related to vacuum (0 bar)
  Overpressure: pressure related to atm. pressure at manufacturing (approx. 1bar).

Accessories:

PTFE sealing tape, -200 to +260 °C, width 10 mm, thickness 0.1 mm, roll of 12 meters Order no. ZB9000TB

Quick-release coupling, nominal width 5, up to 35 bar
Connection internal thread G1/4", brass Order no. ZB9602N5

Quick-release coupling, nominal width 7.2, up to 35 bar
Connection internal thread G1/4", brass Order no. ZB9602N7

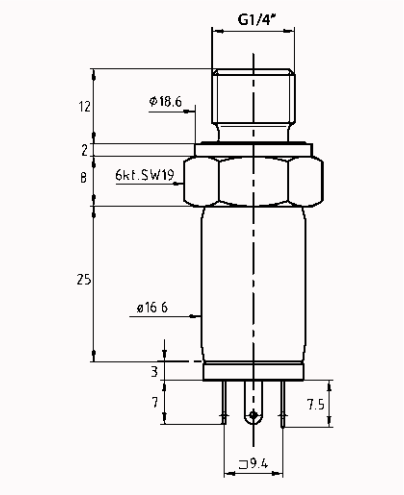
Quick-release coupling

nominal width 5	nominal width 7,2
internal thread G1/4"	internal thread G1/4"

Pressure transducer for measuring the temperature of refrigerants see page 11.08.

Technical Data:

Overload	Two times final value
Output signal	0.2 to 2.2 V
Accuracy class (linearity + hysteresis + reproducibility)	±0.5 % of final value
Total error range 0 to +50 °C -10 to +80 °C (linearity + hysteresis + reproducibility + temperature coefficients + zero-point + range tolerance)	 ±1.0 % of final value ±1.5 % of final value
Response time (0 to 99 %)	<5 ms
Nominal conditions	22°C ±2 K, 10 to 90 % RH, non-condensing
Power supply	6.5 to 15 VDC, consumption <4 mA
Operating temperature	-40 to +100 °C
Pressure terminal	male thread G1/4" membrane not flush with front
Material in contact with medium	Stainless steel DIN 1.4404/1.1135 External seal, Viton
Weight	approx. 50 g
Protective class	IP 65



Types:

including ALMEMO® cable 1.5m long

Measuring ranges relative pressure:

up to 2.5 bar	**Order no. FDA602L3R**
up to 10 bar	**Order no. FDA602L5R**

Measuring ranges absolute pressure:

up to 5 bar	**Order no. FDA602L4A**
up to 10 bar	**Order no. FDA602L5A**

Measuring ranges excess pressure:

up to 25 bar	**Order no. FDA602L2U**
up to 50 bar	**Order no. FDA602L3U**
up to 100 bar	**Order no. FDA602L4U**

PRESSURE

Temperature-Compensated Pressure Sensors FD 8214

- Compact pressure sensors for liquid and gaseous substances.
- Piezo-resistive measuring cell with temperature compensation.
- Pressure membrane and enclosure made from special steel.
- Available with three calibrations.
  Relative pressure:
  Pressure related to the environmental pressure.
  Absolute pressure:
  Pressure related to vacuum (0bar).
  Overpressure:
  Pressure related to atm. pressure at manufacturing (approx. 1bar).

As the pressure is transmitted to the pressure membrane through a small hole in the thread part, the liquids should not be prone to crystallise and gases should not be heavily contaminated with dust.

Option:

Linearity 0.1% (for ranges >0.1 bar to >600 bar)	Order no. OR8214G1
Linearity 0.25%	Order no. OR8214G
Substance temperature –25 to +100°C	Order no. OR8214T1
Substance temperature –25 to +150°C (version with cooling fins)	Order no. OR8214T2
Process connection, small flange (for FD8214xxA absolute pressure)	
KF16	Order no. OR8214KF16
KF25	Order no. OR8214KF25
Food compliant version with vegetable oil ASEOL Food	Order no. OR8214ML
Throttle against excess pressure	Order no. OR8214DS
Output 0 to 10V	Order no. OR8214V
Output 0 to 20mA	Order no. OR8214A
Output 4 to 20mA	Order no. OR8214R4

Types:

FD 8214:
Standard version with G¼" internal thread
Other threads available on request

FD 8214 M:
Membrane (welded with end of thread) flush with front, external thread G½", can be sterilised (important for food and pharmaceutical industry)
Other threads available on request

	G¼" internal thread	G½" external thread
Measuring ranges relative pressure:		
0 to 100 mbar	**FD821401R**	**FD8214M01R**
0 to 160 mbar	**FD821402R**	**FD8214M02R**
0 to 250 mbar	**FD821403R**	**FD8214M03R**
0 to 400 mbar	**FD821404R**	**FD8214M04R**
0 to 600 mbar	**FD821405R**	**FD8214M05R**
0 to 800 mbar	**FD821406R**	**FD8214M06R**
0 to 1 bar	**FD821407R**	**FD8214M07R**
0 to 1.6 bar	**FD821408R**	**FD8214M08R**
0 to 2.5 bar	**FD821409R**	**FD8214M09R**
0 to 4 bar	**FD821410R**	**FD8214M10R**
0 to 6 bar	**FD821411R**	**FD8214M11R**
0 to 10 bar	**FD821412R**	**FD8214M12R**
Measuring ranges absolute pressure:		
Option: Process connection, small flange (see under Options)		
0 to 1 bar	**FD821407A**	**FD8214M07A**
0 to 1.6 bar	**FD821408A**	**FD8214M08A**
0 to 2.5 bar	**FD821409A**	**FD8214M09A**
0 to 4 bar	**FD821410A**	**FD8214M10A**
0 to 6 bar	**FD821411A**	**FD8214M11A**
0 to 10 bar	**FD821412A**	**FD8214M12A**
Measuring ranges overpressure:		
0 to 10 bar	**FD821412U**	**FD8214M12U**
0 to 16 bar	**FD821413U**	**FD8214M13U**
0 to 25 bar	**FD821414U**	**FD8214M14U**
0 to 40 bar	**FD821415U**	**FD8214M15U**
0 to 60 bar	**FD821416U**	**FD8214M16U**
0 to 100 bar	**FD821417U**	**FD8214M17U**
0 to 160 bar	**FD821418U**	**FD8214M18U**
0 to 250 bar	**FD821419U**	**FD8214M19U**
0 to 400 bar	**FD821420U**	**FD8214M20U**
0 to 600 bar	**FD821421U**	**FD8214M21U**
0 to 1000 bar	**FD821422U**	**FD8214M22U**

other measuring ranges on request

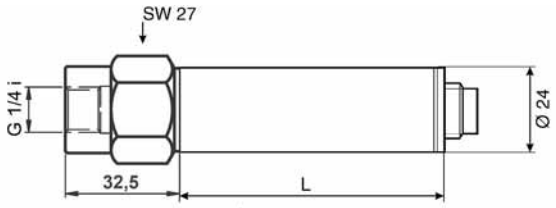
Accessories:

Coupler socket with 2m cable and ALMEMO® connector	Order no. ZA8214AK
Coupler socket 6-pin Straight version	Order no. ZB9030RB
Coupler socket 6-pin Angled version	Order no. ZB9030RBW

PRESSURE

Technical Data:

Measuring cell:	piezo-resistive
Overload	Ranges 600 bar, i.e. 1.5 times the final value (minimum 3 bar, maximum 850 bar) Ranges >600 bar, 1500 bar
Output signal:	Standard 0 to 2 volts, feed 6.5 to 13 volts (from ALMEMO device), current <4 mA Option : 0 to 10 volts, feed 15 to 30 volts, load >10 kilohms, current <4 mA Option : 0 to 20 mA, feed 9 to 33 volts, (>18 volts at load 500 ohms), current <25 mA Option : 4 to 20 mA, 2 conductors, feed 9 to 33 volts, (>18 volts at load 500 ohms), current <25 mA
Response time:	<1.5 ms / 10 to 90 % nominal pressure
Linearity:	Standard ±0.5 % of final value Option : ±0.25 % of final value for all ranges Option : ±0.1 % of final value for ranges >0.1 bar and up to 600 bar
Media temperature:	0 to +80°C, temperature comp.: 0 to +70°C option: –25 to +100°C, temperature comp.: –25 to +85°C –25 to +150°C, temperature comp.: –25 to +85°C
Temperature drift:	Zero-point <±0.04 % of final value / °C for ranges >0.5 bar Range <±0.02 % of final value / °C for all ranges
Nominal temperature:	22°C ±2 K, 10 to 90% rH non-condensing
Material:	housing, pressure connector, membrane: special steel 1.4435
Operat. environment/Sealing:	IP 67
Dimensions:	see drawing
Connecting threads:	Type 8214: internal thread G1/4", wrench SW 27 Option for absolute pressure: small flange KF16 or KF21 Type 8214 M: external thread G1/2", wrench SW 27 Other threads are available on request
Electrical connection	Flush-mounting connector, binder coupling 723, 5-pin
Weight:	approx. 180 g



Type **FD 8214** standard version with internal thread G1/4"
L = 45 mm (L = 72 mm with option of medium temperature up to 150 °C with cooling ribs)

Accessories:

Longer cable, please specify length (L) Order no. ZB9060K(L)

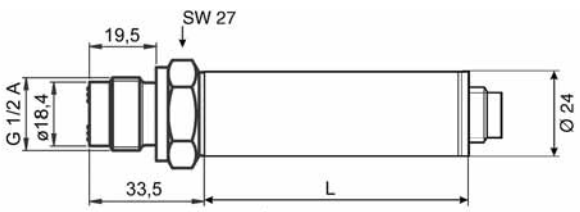
PTFE sealing tape, -200 to +260 °C, width 10 mm, thickness 0.1 mm, roll of 12 meters Order no. ZB9000TB

Quick-release coupling, nominal width 5, up to 35 bar
Connection G1/4" external thread, brass Order no. ZB8214N5

Quick-release coupling, nominal width 7.2, up to 35 bar
Connection 1/4" external thread, brass Order no. ZB8214N7

Quick-release coupling

nominal width 5	nominal width 7,2
external thread G1/4"	external thread G1/4"

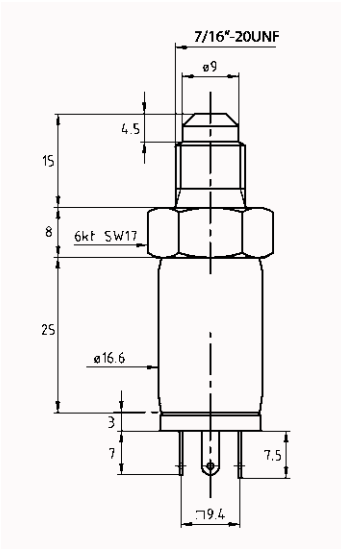


Type **FD 8214M**, membrane flush with front (welded with end of thread), internal thread G1/2" can be easily sterilized
L = 45mm
(L = 72 mm with option of medium temperature up to 150 °C with cooling ribs)

PRESSURE

Pressure transducer for measuring the temperature of refrigerants, absolute pressure FDA 602 LxAK

- Compact pressure sensors for industrial applications in liquid and gaseous substances.
- Piezo-resistive, flexibly suspended silicone measuring cell in an oil-filled, all-welded special steel enclosure.
- The stable mechanical construction provides a reliable protection for the measuring cell against the test substance and immunes it against pressure peaks and vibrations.
- Absolute pressure: pressure related to vacuum (0 bar).



Technical Data:

Overload	Two times final value
Output signal	0.2 to 2.2 V
Accuracy class (linearity + hysteresis + reproducibility)	±0.5 % of final value
Total error range 0 to +50 °C -10 to +80 °C (linearity + hysteresis + reproducibility + temperature coefficients + zero-point + range tolerance)	 ±1.0 % of final value ±1.5 % of final value
Response time (0 to 99 %)	<5 ms
Nominal conditions	22°C ±2 K, 10 to 90 % RH, non-condensing
Power supply	6.5 to 15 VDC, consumption <4 mA
Operating temperature	-40 to +100 °C
Pressure terminal	male thread G1/4" membrane not flush with front
Material in contact with medium	Stainless steel DIN 1.4404/1.1135 External seal, Viton
Weight	approx. 50 g
Protective class	IP 65

Types:

including ALMEMO® connecting cable, 1.5 m,
and programming of a refrigerant measuring channel
Measuring ranges Absolute pressure (resolution 0.001 bar)

up to 10bar	**Order no. FDA602L5AK**
up to 30bar	**Order no. FDA602L6AK**
up to 50bar	**Order no. FDA602L7AK**

Option SB 0000 R2

The ALMEMO® Version V6 devices, (2590, 2690, 2890 8590, 8690, 5690) can be used a for continuous temperature measurement (resolution 0.1K) with absolute pressure sensors (resolution 0.001 bar compulsory !). Both, pressure and temperature can be selected or continuously indicated and recorded.

Technical data for ALMEMO® option SB0000R2:

Refigerant:	**R22**	**R23**	**R134a**	**R404a**	**R404a**
Pressure Range:	0 to 36 bar	0 to 49 bar	0 to 40,5 bar	0 to 32 bar	0 to 32 bar
Temperature Range:	–90°C to +79°C *	–100°C to +26°C *	–75°C to +101°C *	–60°C to +65°C *	–60°C to +65°C *
Operation point	dew-point	dew-point	dew-point	dew-point	boiling point
Refigerant:	**R407C**	**R407C**	**R410**	**R417A**	**R507**
Pressure Range:	0 to 46 bar	0 to 46 bar	0 to 49 bar	0 to 27 bar	0 bis 37 bar
Temperature Range:	–50°C to +86°C *	–50°C to +86°C *	–70°C to +70°C *	–50°C to +70°C *	–70°C to +70°C *
Operating point	dew-point	boiling point	dew-point	dew-point	dew-point

*) The final temperature range results from the refrigerant data of the corresponding refrigerants. For pressure sensors with small pressure ranges the specified final temperature will only change. (linearisations for other refrigerants are available on request)

Order no. SB0000R2

PRESSURE

Differential pressure transmitter FDA 602 D

- This measures the differential pressure in liquid and gaseous media indirectly using two absolute pressure sensors.
- This makes it less expensive but more robust with respect to asymmetrical overload.
- The differential pressure range should be at least 5% of the standard pressure range.
- Each side of the sensor incorporates two pressure connections. The transmitters can thus be used easily and conveniently in pressure pipes.
- It incorporates a high-speed, high-precision microprocessor.
- All reproducible errors affecting the pressure sensors, i.e. involving non-linearity and temperature dependency, can be completely eliminated by means of mathematical error compensation.

Accessories:

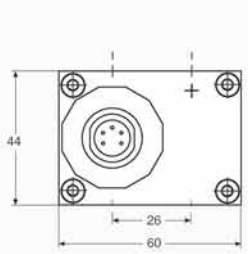
Longer cable, price per meter	Order no.	ZB9060K

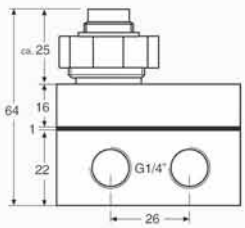
Technical Data:

Standard pressure range (maximum measurable pressure per pressure connection), overload, differential pressure range.
See versions listed below.

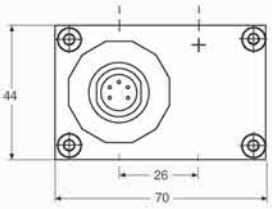
Storage / operating temperature	-40 to +100 °C
Compensated standard range	-10 to +80 °C
Error margin	≤0.05% of final value, typical ≤0.1% of final value, max.
with respect to standard pressure range (linearity + hysteresis + reproducibility + temperature error)	
Pressure connections	G1/4" thread, female (2 per side)
Material in contact with medium	Stainless steel, 316L, DIN 1.4435
Power supply	6 to 15 VDC via ALMEMO® connector
Output	0 to 2 V
Electrical connection	Binder plug, including ALMEMO® connecting cable, 2 meters
CE conformance	EN61000-6-1 to 4 with shielded cable
Protective class	IP 65
Weight	
Low-pressure version	475 grams
Medium-pressure version	750 grams

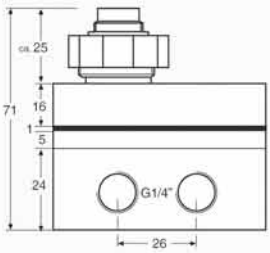
Low-pressure version





Medium-pressure version





Types:
Differential pressure transmitter, including ALMEMO® cable, 2 meters

Standard pressure range Absolute pressure	Overload	Differential pressure range Please indicate final value	Order no.
Low-pressure version			
0 to 3 bar	10 bar	0 to 0.2 to 3 bar	**FDA602D01**
0 to 10 bar	20 bar	0 to 0.5 to 10 bar	**FDA602D02**
0 to 25 bar	40 bar	0 to 1.25 to 25 bar	**FDA602D03**
Medium-pressure version			
0 to 100 bar	200 bar	0 to 5 to 100 bar	**FDA602D10**
0 to 300 bar	450 bar	0 to 15 to 300 bar	**FDA602D20**

PRESSURE

Pressure Sensors for Wall Mounting FD 8612 DPS / APS

- Suitable for use in the laboratory, as well as for use in harsh industrial environments, e.g. HEVAC applications, clean room technology, medical technology, filter technology and finishing pass technology.
- The robust mechanics guarantees long term stability, linearity and good reproducibility.
- Temperature drift reduced to a minimum by specific compensation of the sensors.
- Operation is almost maintenance-free, as a result of the free-from-wear inductive measuring system.
- As standard, the integrated electronics provide a pressure proportional voltage signal from 0 to 2V as output.

Options:

Linearity 0.2% (DPS from final value / APS from range) with DPS only in ranges ≥ 2.5 mbar with APS only in range ≤ 100 mbar	Order no. OD8612L2
Linearity 0.5% (DPS from final value / APS from range) with DPS only in ranges ≥ 1 mbar with APS only in range ≤ 200 mbar	Order no. OD8612L5
Power supply : 230 V	Order no. OD8612N
Output 0 to 10 V (voltage supply 19 to 31 V DC)	Order no. OD8612R2
Output 4 to 20 mA (voltage supply 19 to 31 V DC)	Order no. OD8612R3

Accessories:

Connecting cable 2m long mounted with connector for connection to ALMEMO® devices	Order no. ZA8612AK2
1 set silicone hoses 2m long black/colourless	Order no. ZB2295S
Silicone hose black per m	Order no. ZB2295SSL
Silicone hose colourless per m	Order no. ZB2295SFL

Types:

Measuring ranges relative and differential pressure:

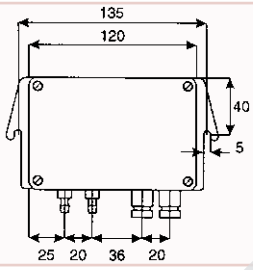
Pressure transducer type DPS
0 to 2.5 mbar ... 1000 mbar
Please specify measuring range **Order no. FD8612DPS**
Measuring range 1 mbar (100 Pa), additional charge **Order no. OD8612P10**
Measuring range 0.5 mbar (50 Pa), additional charge **Order no. OD8612P05**

Measuring ranges absolute pressure:

Pressure transducer type APS
0 to 1000 mbar, 900 to 1100 mbar, 800 to 1200 mbar
Please specify measuring range **Order no. FD8612APS**

Technical Data:

Linearity:	±1% of final value, option: ±0.2% or ±0.5%
Hysteresis:	±0.1% of final value
Nominal temperature:	23°C
Overload capacity:	up to 400 mb: 5-fold, from 500 mb: 2-fold
Max. common mode pressure:	1 bar (at differential measurement)
Power supply:	6VDC, option: 230V 50/60Hz
Power consumption:	approx. 3.5mA
Output:	0 to 2V, option: 0 to 10V/0(4) to 20mA
Connection:	electrical: screw terminals, screwed cable gland PG 7, pressure: 6.5mm hose connection
Rise time:	T_{90} approx. 0.02s
Temperature drift: Zero point range	 0.03% of final value / K, 0.03% of final value / K
Operative range:	+10 to +50°C , air humidity 10 to 90% non-condensing
Storage temperature:	–10 to +70°C
Housing:	material ABS 120 x 80 x 55mm (L x H x D)
Safety class:	0
Protection system:	IP 54
Weight:	approx. 300g
Sensor capacity:	approx. 3ml
Volume increase:	approx. 0.2ml at nom. press.



PRESSURE

new!

Differential pressure transmitter for smallest pressure with automatic zero-point correction, FD 8612 DPT25R8AZ
For air and non-aggressive gases

- Adjustable differential pressure measuring transducer for the purposes of monitoring the differential pressure in air and in other non-combustible and non-aggressive gases
- Possible uses include : Monitoring of air filters, of forced-air fans and blowers, of industrial air-cooling circuits, of air flows in ventilation conduits, prevention of overheating in air heaters, regulation of airflow valves and fire protection valves, protection against frost in heat exchangers.

Technical data

Measuring element	Piezoelectronic measuring cell
Measuring range	(can be selected via jumper) -100 to +100 Pa 0 to +100 Pa 0 to +250 Pa 0 to +500 Pa 0 to +1000 Pa 0 to +1500 Pa 0 to +2000 Pa 0 to +2500 Pa
Measuring accuracy	±1,5 % of the measuring range selected
Long-term stability	0.1 % per year (typical)
Reaction time (can be selected via jumper)	0.8 or 4.0 seconds
Maximum pressure	25 kPa
Bursting pressure	50 kPa
Medium	Air and non-aggressive gases
Operating temperature	-5 to +50 °C
Storage temperature	-20 to +70 °C
Ambient humidity	0 to 95 % RH, non-condensing
Housing, housing cover, connecting muff, conduit muff :	ABS (acrylonitrile butadiene styrene)
Protection	IP54
Dimensions	(LxWxH) 90 x 71.5 x 36 mm
Weight	150 g
Pressure connection	2 hose muffs Diameter = 5 / 6.3 mm
Electrical connections	Screw terminals, maximum 1.5 mm2
Cable entry	M16
Supply voltage	24 VAC or 24 VDC, ±10 % Power <1 W
Output signal (can be selected via jumper)	0 to 10 V Load 1 kohm minimum 4 to 20 mA, 3 conductors Load 500 ohms maximum

Accessories

ALMEMO® connecting cable for FD 8612 DPT, differential pressure, 2 cables connected in the transmitter housing

1. ALMEMO® connecting cable, PVC, length = 2 meters, with ALMEMO® connector

2. Power supply via mains unit ZB1024NA1, 230 VAC / 24 VDC

Order no. ZA8612DPTAK

Variants

Differential pressure transmitter type DPT, for air and non-aggressive gases, with automatic zero-point correction
8 measuring ranges (can be selected via jumper)
including standard accessories:
2 fastening screws, 2 plastic conduit muffs, 2-meter plastic hose,

Order no. FD8612DPT25R8AZ

PRESSURE

Pressure measuring connector for barometric pressure FDA 612 SA, FDAD 12 SA

FDA 612 SA

- Compact design - can be plugged directly onto measuring instrument.
- Piezo-resistive pressure sensor - ensures high measuring accuracy.

Accessories

Connecting cable, 0.2 meters	Order no. ZA9060AK1
Extension cable, 4 meters	Order no. ZA9060VK2
Extension cable, 4 meters	Order no. ZA9060VK4

Variants (including manufacturer's test certificate)
Pressure measuring connector for barometric pressure

with pressure terminal sleeve **Order no FDA612SA**
New without press. terminal sleeve* **Order no FDAD12SA**
* Factory calibration only possible for 1 point (current ambient pressure)

Technical data

Pressure meas. connector FDA612SA with pressures terminal	
Measuring range	700 to 1050 mbar (total range 0 to 1050 mbar)
Overload capacity	Maximum - 1.5 times final value
Accuracy	±0.5 % of final value
Nominal temperature	25 °C
Temperature drift	<±1 % final value at 0 to +70 °C
Hose terminals	Ø 5 mm, 12 mm long
Sensor material	aluminum, nylon, silicone, silica gel, brass
Pressure measuring connector FDAD12SA	
Measuring range	700 to 1100 mbar (total range 300 to 1100 mbar)
Accuracy	±2.5 mbar at 0 to 65 °C
Common technical data	
Operating range	-10 to +60 °C, 10 to 90% RH, non-condensing
Dimensions	90 x 20 x 7.6 mm

Pressure measuring connector for differential pressure FDA 612 SR, FDA 602 S2K

- New compact design - can be plugged directly onto measuring instrument.
- Piezo-resistive pressure sensor - ensures high meas. accuracy.

Advisory note when used in conjunction with ALMEMO® 2890, 5690, 5790, 8590, 8690 : The new ALMEMO® pressure measuring connector is very slightly higher (8.8 mm). As a result adjacent input sockets on the ALMEMO® device may be partly covered. However, the 1st input socket can always be used without restriction. Or, alternatively, the ALMEMO® pressure measuring connector can be plugged in at any input socket using connecting cable ZA9060AK1.

Accessories

Connecting cable, 0.2 meters	Order no. ZA9060AK1
Extension cable, 2 meters	Order no. ZA9060VK2
Extension cable, 4 meters	Order no. ZA9060VK4

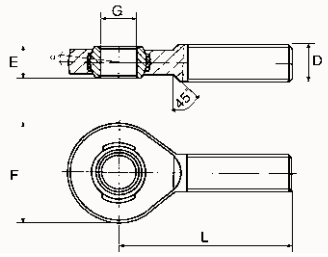
Variants (including manufacturer's test certificate)
(including one set of silicone hoses, 2 meters)
Pressure measuring connector for differential pressure
Range ±1000 mbar Order no. FDA612SR
Range ±250Pa (independent of position) Order no. FDA602S2K
Range ±1250 Pa or ±6800 Pa see page 10.06

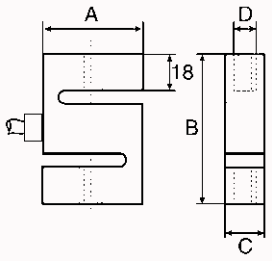
Technical data

Overload capacity		
FDA612SR		max.- 1.5 times final value
FDA602S2K		maximum 250 mbar
Accuracy (zero-pt adjusted)		±0.5% of final value in range 0 to positive final value
Common mode pressure		FDA602S2K max. 700 mbar
Nominal temperature		25 °C
Temperature drift		
FDA612SR		< ±1.5 % of final value
compensated temperature range		0 to +70 °C
FDA602S2K		< ±2 % of final value
compensated temperature range		-25 to +85 °C
Operating range		-10 to +60 °C, 10 to 90% RH, non-condensing
Dimensions	*New*	74 x 20 x 8.8 mm
Hose terminals		Ø 5 mm, 12 mm long
Sensor material		aluminum, nylon, silicone, silica gel, brass

Tension and Compression Sensor K25

- Wire strain gauges in four-conductor full-bridge circuit.
- Control resistance for final adjustment of the measuring range.
- All measuring ranges that are specified in Newton can also be supplied in kg ranges.





Types (including test certificate)

Measuring range 0.02kN 0.05kN, 0.1kN, 0.2kN, 0.5kN, 1kN, 2kN, 5kN or 10kN please specify **Order no. FKA0251**

Measuring range 20kN **Order no. FKA0252**

Measuring range 50kN **Order no. FKA0255**

All ALMEMO® devices provide easy push-button adjustment of no-load and final value.

Technical Data:

Max. load limit:	150% of final value
Maximum dynamic load:	70% of final value
Reference temperature:	23°C
Cable:	3m long, with axial ALMEMO® connector
Accuracy for tension:	<±0.1% of fin. val.
Accuracy for tension and compression:	<±0.2% of fin. val.
Nominal measuring path:	<0.15mm
Operative range:	–10 to +70°C
Drift error at permanent load:	<0.07% per 30min
Permissible lateral forces:	±60% of fin. val.
Protection system:	up to 1kN: IP 65, from 2kN: IP 67
Material:	up to 1kN: aluminium 2 to 50kN: stainless steel
Dimensions in mm	up to 10kN: A=50, B=75, C=20, D=M12 20kN, 50kN: A=65, B=85, C=40, D=M24 x2

Options for all Force Transducers:

Indication of measured values with ALMEMO® devices in kg Order no. OK9000K

Indication of measured values with ALMEMO® devices in N and kg Order no. OK9000NK

Accessories:

Knuckle eyes with external thread M 12 (2 pcs) (dimensions in mm: D = M 12, E = 16, F = 32, G = 12, L = 54) Order no. ZB902512

Knuckle eyes with external thread M 24 x 2 (2 pcs) (dimensions in mm: D = M 24 x 2, E = 26, F = 62, G = 25, L = 94) Order no. ZB902524

Other designs are available on request

Tension and compression sensor FKA 012 with male thread terminal up to 1000 kN

Tension and compression sensor FKA 1563 low height, with male thread terminal up to 2 kN

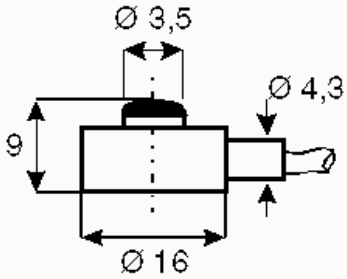
FORCE

Compression Sensor K22

Type (including test certificate)
Measuring range
100 N, 200N, 500N, 1000N or 2000N
please specify **Order no. FKA022**

All ALMEMO® devices provide easy push-button adjustment of no-load and final value.

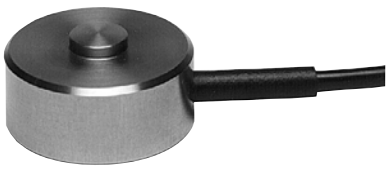
- Wire strain gauges in four-conductor full-bridge circuit.
- Control resistance for final adjustment of the measuring range.
- All measuring ranges that are specified in Newton can also be supplied in kg ranges.



Technical Data:

Max. load limit:	150% of final value
Maximum dynamic load:	70% of final value
Reference temperature:	23°C
Cable:	radial, 3m long with ALMEMO® connector
Accuracy:	<±0.5% of final value
Nominal measuring path:	<0.2mm
Operative range:	–10 to +50°C
Drift error at permanent load:	0.1% per 30min
Protection system:	IP 65
Material:	stainless steel

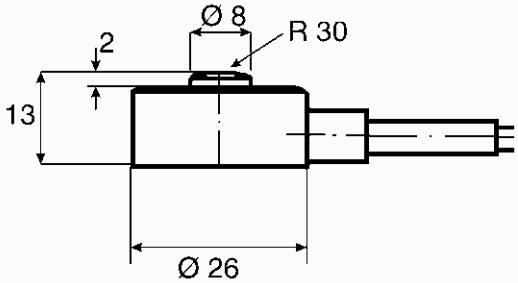
Compression Sensor K1613



Type (including test certificate)
Measuring range
0.5kN, 1kN, 2kN, 5kN, 10kN or 20kN
(50 kN on request)
please specify **Order no. FKA613**

All ALMEMO® devices provide easy push-button adjustment of no-load and final value.

- Wire strain gauges in 4-conductor full-bridge circuit.
- Control resistance for final adjustment of the measuring range.
- All measuring ranges that are specified in Newton can also be supplied in kg ranges.



Technical Data:

Max. load limit:	150% of final value
Maximum dynamic load:	70% of final value
Reference temperature:	23°C
Cable:	radial, 3m long with ALMEMO® connector
Accuracy:	<±0.5% of final value
Nominal measuring path:	<0.2mm
Operative range:	–10 to +50°C
Drift error at permanent load:	0.1% per 30min
Protection system:	IP 65
Material:	stainless steel

FORCE

Compression sensor
Other designs are available on request

Compression sensor FKA 2528
inexpensive Protective class IP60
0.2 to 10 kN

Compression sensor FKA 013
other measuring ranges
from 10 N up to 100 kN

Torque sensor
Other designs are available on request

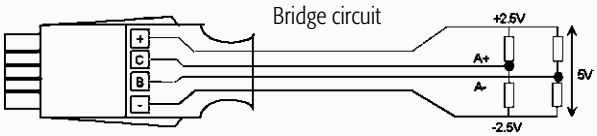
Static torque sensor
e.g. with square terminal 2 to 5000 Nm

Rotating torque sensor (slip ring)
e.g. with square terminal 1 to 5000 Nm

ALMEMO® input connector for measuring bridges, millivolt / volt differential

new!

With zero-symmetrical voltage supply of ±2.5 V stabilized from the ALMEMO® device



Technical Data:

Sensor supply:	
Voltage U_F:	5V ± 0.05V
Temperature coefficient:	<50ppm/°C
Output current:	max. 100mA
Quiescent current	approx. 3 mA
New Energy saving	So long as the measuring point is not selected, the bridge voltage remains switched OFF.

Types:

Model	Meas. Range	Resolution	
55mV DC	–10,0 to +55,0	1 µV	**Order no. ZA9105FS0**
26mV DC	–26,0 to +26,0	1 µV	**Order no. ZA9105FS1**
260mV DC	–260,0 to +260,0	10 µV	**Order no. ZA9105FS2**
2.6V DC	–2,6 to +2,6*	0,1 mV	**Order no. ZA9105FS3**

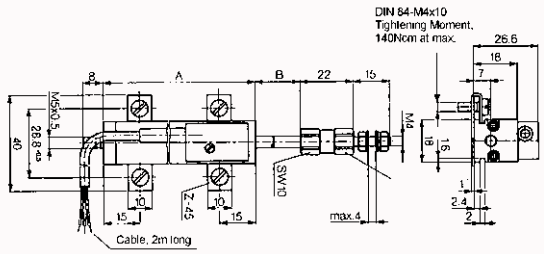
*Data may vary depending on device; (see data sheet per device)

DISPLACEMENT

Displacement Sensor, Potentiometric FWA xxx T

- Displacement transducers are suitable for direct, accurate measurement of displacements in automatic control and metrology.
- The pickup of the displacement is performed by using a pull rod with a universal joint. This allows for an actuation that is free from backlash and transverse forces, even in case of parallel and angular displacements of transducer and measuring direction.
- Elastomer-damped, independently resilient multi-finger noble metal sliding contact for reliable contact, even at high adjustment speed, shock or vibration.
- Long life span of 100 x 10^6 strokes, extraordinary linearity up to ±0.075%, pull rod running on two exact bearings, very high adjustment speed of up to 10m/s, shock and vibration resistant.

Pre-adjusted in the factory by storing the correction values in the ALMEMO® connector.
The precise adjustment can be locally performed by the user with final measures after the installation.



Other designs are available on request

Displacement transducers FWA xxx TEX
with pivot joint Protective class IP54, 10 to 300 mm

Displacement transducers FWA xxx TX2
Protective class IP67 with pivot joint, 25 to 300 mm

Types:
Working length/resolution, incl. ALMEMO® cable 2m long

25mm/0.001mm	**Order no. FWA025T**
50mm/0.01mm	**Order no. FWA050T**
75mm/0.01mm	**Order no. FWA075T**
100mm/0.01mm	**Order no. FWA100T**
150mm/0.01mm	**Order no. FWA150T**
up to 3000mm working length	on request

included with delivery
2 tensioning clamps Z3-31 including 4 cap screws M4x10,
1 ball-shaped coupling

Option:

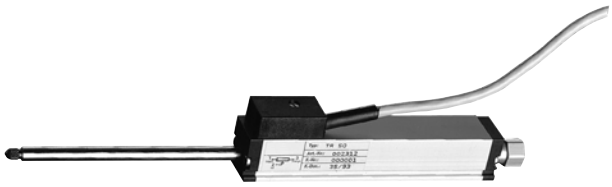
Plug connection
(instead of fixed connected cable),
including 3m cable
with screwed round socket
and ALMEMO® connector — Order no. OWA071AK

Technical Data:

Independent linearity:	T25: ±0.2%; T50: ±0.15% T75: ±0.1%; T100: ±0.075% T150: ±0.075%
Housing length (meas. A+1mm):	T25: 63mm; T50: 88mm T75: 113mm; T100: 138mm T150: 188mm
Mech. stroke (meas. B ±1.5mm):	T25: 30mm; T50: 55mm T75: 80mm; T100: 105mm T150: 155mm
Total weight (with 2m cable):	T25: 140g; T50: 160g T75: 170g; T100: 190g T150: 220g
Weight of the pull rod incl. coupling and sliding contact block:	T25: 35g; T50: 43g T75: 52g; T100: 58g T150: 74g
Movability, ball-shaped coupling	±1mm parallel displacement, ±2.5° angular displacement
Operating force (horizontal):	≤ 0.30N
Reproducibility:	0.002mm
Insulation resistance:	≥ 10MΩ (500VDC, 1 bar, 2s)
Dielectric strength:	≤ 1mA (50Hz, 2s, 1 bar, 500VAC)
Max. permissible torque:	140Ncm
Temperature range:	–30 to +100°C
Temperature coefficient:	typ. 5ppm/°C
Vibrations:	5 to 2000Hz/Amax = 0.75mm/amax = 20g
Shock:	50g/11ms
Life span:	> 100 x 10^6 strokes
Protection system:	IP 40

DISPLACEMENT

Displacement Tracer, Potentiometric
FWA xxx TR



Types:
Working length/resolution, incl. ALMEMO® cable 2m long

25mm/0.001mm	**Order no. FWA025TR**
50mm/0.01mm	**Order no. FWA050TR**
75mm/0.01mm	**Order no. FWA075TR**
100mm/0.01mm	**Order no. FWA100TR**

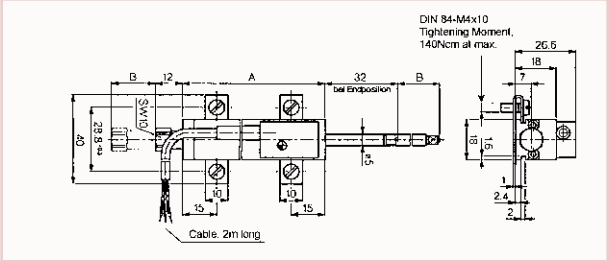
included with delivery
2 tensioning clamps Z3-31 including 4 cap screws M4x10,
1 probe tip with hard-metal ball

Option:

Plug connection
(instead of fixed connected cable),
including 3m cable
with screwed round socket
and ALMEMO® connector — Order no. OWA071AK

- Resistor and collector paths made from conducting plastic.
- Suitable for direct measurements of displacement without a form-locking connection, position detection at stationary measuring objects, tolerance measurements and for continuous contour measurement.
- The pull rod, which is supported on both sides, allows for accepting transverse forces that, for example, occur during a continuous scan of curves or spline parts.
- Rear limit stop is used to provide a simple mechanical coupling of automatic retraction systems, such as pneumatic cylinders or electromagnets.
- Long life span of 100 x 10^6 strokes, extraordinary linearity up to ±0.075%, tracer pin running on two exact bearings, DIN compliant standard measuring inserts can be used, shock and vibration resistant.

Pre-adjusted in the factory by storing the correction values in the ALMEMO® connector.
The precise adjustment can be locally performed by the user with final measures after the installation.



Technical Data:

Independent linearity:	TR25: ±0.2%; TR50: ±0.15% TR75: ±0.1%; TR100: ±0.075%
Housing length (meas. A+1mm):	TR25: 63mm; TR50: 94.4mm; TR75: 134.4mm; TR100: 166mm
Mech. stroke (meas. B ±1.5mm):	TR25: 30mm; TR50: 55mm TR75: 80mm; TR100: 105mm
Total weight (with 2m cable):	TR25: 120g; TR50: 150g TR75: 180g; TR100: 200g
Weight of the pull rod incl. coupling and sliding contact block:	TR25: 25g; TR50: 36g TR75: 48g; TR100: 57g
Max. operating frequency: (for most critical application ´probe tip upright´)	TR25: 18Hz; TR50: 14 TR75: 11Hz; TR100: 10Hz
Operating force (horizontal):	≤ 5 N
Reproducibility:	0.002mm
Insulation resistance:	≥ 10MΩ (500VDC, 1 bar, 2s)
Dielectric strength:	≤ 1mA (50Hz, 2s, 1 bar, 500VAC)
Max. permissible torque:	140Ncm
Temperature range:	–30 to +100°C
Temperature coefficient:	typ. 5ppm/°C
Vibrations:	5 to 2000Hz/Amax = 0.75mm/amax = 20g
Shock:	50g/11ms
Life span:	> 100 x 10^6 strokes
Protection system:	IP 40

ROTATIONAL SPEED

Rotational Speed Sensor FUA 9192

Types:

For rotational speeds up to 30000rpm max.,
incl. 5 reflective adhesive tapes
Connecting cable 1.5m long
with ALMEMO® connector **Order no. FUA9192**

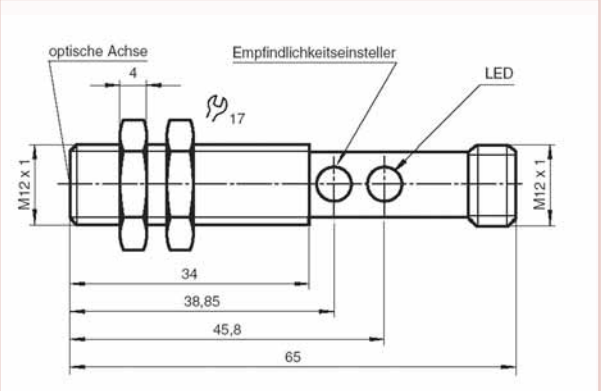
Accessories:

Extension cable, 1 meter long	Order no. ZA9060VK1
Extension cable, 2 meters long	Order no. ZA9060VK2

- Optical probe for measurements of rotational speed, designed as retroreflective photoelectric sensor for photoelectric detection of rotational speeds or events.
- For evaluation of the pulses, the tachometer probe is equipped with a specific frequency meter module that calculates the number of revolutions per minute from the time period between two pulses. A stable read-out is achieved by averaging over a minimum of 500 ms.
- Easy application:
  A reflective adhesive tape is attached to the moving part and the probe is aligned with it. For function control purposes a yellow signal lamp at the rear side of the probe will be on when the reflective adhesive tape is recognised.
- To increase the operation reliability the sensitivity can be adjusted through a potentiometer.

Note:

1. Further accessories for measuring rotational speeds ALMEMO® adapter cables for frequency, pulses and rotational speed, see page 12.10
2. Measurement of the rotational speed of a current meter disc see page 12.07



Technical Data:

Measuring range:	8 to 30000rpm (maximum)
Bright-up pulse time:	> 1ms
Resolution:	1rpm
Accuracy:	up to 15000rpm: ± 0.02% of m.v. ± 1 digit up to 30000rpm: ± 0.05% of m.v. ± 1 digit
Detection range:	20 to 200mm (depending on the reflector)
Sensitivity:	adjustable with potentiometers
Detectable object:	opaque or reflector
Distance hysteresis:	≤ 10%
Indication of switching status:	LED yellow
Type of light:	red light 660nm
Limit for foreign light:	sun light: ≤ 20000lux halogen light: ≤ 5000lux
Ambient/storage temperature:	–25/–40°C to +55/+70°C
Protection system:	IP 67 (accord. to EN 60529)
Optics:	2-lens system PC
Permissible shock load:	b ≤ 30g, T ≤ 1ms
Permissible vibrational load:	f ≤ 55Hz, a ≤ 1mm
No-load current:	≤ 20mA
Supply voltage:	> 8.5VDC via instrument, mains adapter recommended
Connection:	Device connector M12x1 including socket M12x1, angled, with 1.5 meters cable and ALMEMO® connector
Material:	housing: brass, nickel plated, lens opening: PMMA
Dimensions:	diameter: M12 x 1mm length: 55mm
Weight:	15g
Meets standards:	EN 60 947-5-2

FLOW

new!

Flow sensors for liquids FVA 645 GVx
Variant in stainless steel
without any moving parts
With integrated temperature measuring

- Measuring section in robust, industry-quality stainless steel
- Without any moving parts, no wear and tear
- Integrated temperature measuring
- Low pressure loss
- Wide temperature range
- High-speed reaction time
- Using with water and water-glycol mixture
- For heat output measurement in heating systems and cooling plant

Technical data

Flow	
Measuring principle	Pressure pulsation Kármán vortex street
Measuring range	see variants
Accuracy FVA645GV12QT/40QT:	±1.5 % of final value at 0 to +100 °C Using water as medium by water-glycol (glycol content approx. 40 %) and Viscosity approx. 4 mm²/s (at approx. 30°C): ±5 % of final value
Resolution	see variants
Reaction time (63 %)	< 1 s (< 3 s for FVA645GV12QT)
Temperature	
Measuring range	0 to +100 °C
Accuracy	±1 K at +25 to +80 °C ±2 K at 0 to +100 °C
Resolution	0.5 K
Reaction time (63 %)	<1 second under flow conditions 50% of final value
Process connection	2x male thread see variants
Pressure	10 bar (bursting pressure >16 bar)
Pressure loss	0.1 bar, typical under flow conditions, 50 % of final value
Suitable conditions	
Media	Liquids (FVA645GV12QT/40QT < 4 mm²/s, FVA645GV100QT/200QT < 2 mm²/s)
Temp. of medium	0 to +100 °C
Ambient temperature	-25 to +60 °C
Ambient humidity	up to 95 % RH, non-condensing
Electrical connections	
Output signal	2x 0.5 to 3.5 V
Power supply	5 VDC (±5 %), <10 mA via ALMEMO® connector
Connection	Sensor with 2.9-meter connecting cable and ALMEMO® connector
Fitting length	see variants
Materials (in contact with media) Corrosion-resistant coating EPDM, PPS, PPA 40-GF	
Pipe piece	Stainless steel 1.4408; (inside pipe PPA 40-GF)

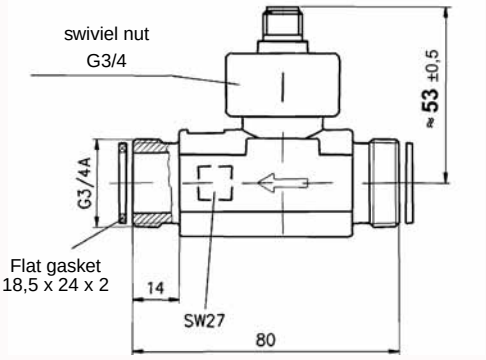
Variants

Sensor for flow rate and temperature over a measured section, including ALMEMO® connecting cable, 2.9 meters

Measuring range	Resolution	Process connection	Fitting length	Order no.
1 to 12 l/min	0,06 l/min	G 3/4" male thread	approx. 110 mm	**FVA645GV12QT**
2 to 40 l/min	0,2 l/min	G 3/4" male thread	approx. 110 mm	**FVA645GV40QT**
5 to 100 l/min	0,5 l/min	G 1" male thread	approx. 129 mm	**FVA645GV100QT**
10 to 200 l/min	1,0 l/min	G 1 1/4" male thread	approx. 137,5 mm	**FVA645GV200QT**

FLOW

Axial turbine flowmeter for liquids FVA 915 VTH



- For measuring the volume flow rate or for dosing tasks with small flow rates.
- Extraordinary compact design.
- Wide, usable measuring range.
- Various options for operation:
  Cooling water flow, medical technology, plastics industry, solar systems, baker's equipment, machine tools, catering equipment, photographic laboratory equipment, dispensers, dosing equipment, cooling equipment, heating applications, calorimetry.

Types:

incl. connecting cable, 6m long with ALMEMO® connector

Turbine body made of plastic	**Order no. FVA915VTHK**
Turbine body made of brass	**Order no. FVA915VTHM**

Technical Data:

Nominal diameter	DN 15
Measuring range	2 to 40 l / min continuous load max. 20 l/min
Measuring accuracy	±1% of finale value
Reproducibility :	± 0,2 %
Signal output	from 0.3 l/min
maximum size of particles in medium	0.5 mm
maximum temperature of medium	85°C
Nominal pressure	PN10
Process connection	G ¾" external thread and union nuts
Pressure loss in bar	$\Delta p = 0.00145 \times Q^2$ (Q in l/min) approx. 0.6 bar at 20 l / min approx. 2.3 bar at 40 l / min
Protection system	IP 54
Output signal Pulse rate / K factor Resolution	 940 pulses / liter 1.1 ml / pulse
Signal form	rectangular signal, NPN, open collector
Measuring transducer	Hall sensor
Supply voltage	4,5 ... 24 V DC (from ALMEMO® device)
Electrical connection	4-pin connector M12x1 including PVC line (T_{max} =70 °C) with ALMEMO® connector
Materials	
pipe section FV A915 VTH M FV A915 VTH K	 brass CuZn36Pb2As plastic PPONoryl GFN3
Flat gasket	NBR
Turbine cage	PEI ULTEM
Rotating vane	PEI ULTEM
Rotor complements	hard ferrite magnets
Axle / bearing	axle Arcap AP1D with hard metal pins in saphire bearings
Bearing support	Arcap AP1D
Sensor	PPO Noryl GFN3
O-ring	NBR
Knurled swivel nut*	PA GF 30

* not coming into contact with the medium

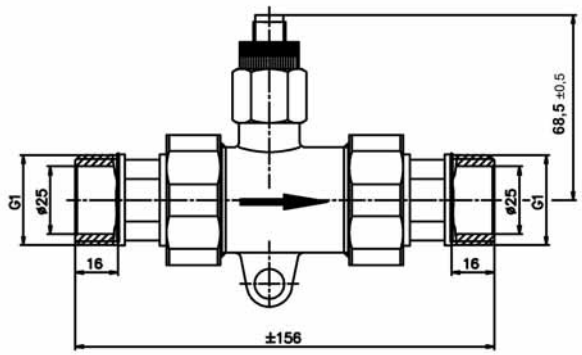
Other designs are available on request

Axial turbine flowmeters FVA 915 VTWx
for water-glycol mixture up to 150 °C, 25 bar, 2 to 30 l/min
Figure - similar to above

Axial turbine flowmeters FVA915VTPx
for water up to 150 °C, 300 bar, 2 to 40 l/min
Figure - similar to above

Radial turbine flowmeters
FVA 915 VR10x
for small flow rates
0.5 to 1.5 l/min or 1 to 4 l/min

Axial turbine flowmeter for liquids
FVA 915 VTH25



- For measuring the volume flow rate or for dosing tasks with large flow rates.
- Compact design.
- Wide useful operating range.
- Wide variety of applications :
  Cooling water flow, medical technology, plastics industry, solar systems, baker's equipment, machine tools, catering equipment, photographic laboratory equipment, dispensers, dosing equipment, cooling equipment, heating applications, calorimetry.

Other designs are available on request

Axial turbine flowmeters FVA 915 VTH40
6.7 to 417 l/min, DN40
Figure - similar to above

Turbine flowmeters FVA 915 VTRx
Stainless steel, up to 120 °C, up to 250 bar for different flow rates from 1.8 l/min to 1133 l/min

Types:
incl. connecting cable, 6 m long, with ALMEMO® connector
Turbine body made of brass **Order no. FVA915VTH25M**

Technical Data:

Nominal diameter	DN 25
Measuring range	4 to 160 l/min
Continuous load	max. 80 l/min
Measuring accuracy	±3% of measured value
Reproducibility :	±0.5%
Signal output	from < 1 l/min
maximum size of particles in medium	0.63 mm
maximum temperature of medium	85°C
Nominal pressure	PN10
Process connection FVA915VTH25M	G 1¼" external thread including adapter for R 1" (absolutely necessary)
Pressure loss	approx. 0.1 bar at 80 l / min approx. 0.45 bar at 160 l / min
Protection system	IP 54
Output signal Pulse rate / K factor	65 pulses / liter
Resolution	15 ml / pulse
Signal form	NPN, open collector
Measuring transducer	Hall sensor
Supply voltage	4,5 ... 24 V DC (from ALMEMO® device)
Electrical connection	4-pin connector M12x1 including PVC line (T_{max} =70 °C) with ALMEMO® connector
Materials	
Pipe section FV A915 VTH25M	brass CuZn36Pb2As CW602N
Turbine cage	PPO Noryl GFN 3V 960
Rotation vane	PPO Noryl GFN 2V 73701
Rotor complements	permanent magnets, Recona 28nickel-plated
Axle / bearing	special steel 1.4436 / saphire, PA
Sensor socket	PPO Noryl GFN 1630V
O-ring	72 NBR 872

SOUND LEVEL

new!

Sound Level Meter MA 86193 with ALMEMO®- cable for measured value recording

- Digital Sound level meter
- Measuring according to IEC651, ANSI S1.4
- Measuring level range: 35 bis 130 dB
- Frequency weighting A or C
- Output maximum measured level
- Analogue output for connection to all ALMEMO® measurement devices for recording

Technical Data:

Standard applied:	IEC651, ANSI S1.4
Microphone:	Condenser microphone 12 mm
Frequency range:	31.5 Hz ... 8 KHz
Measuring range:	low: 35 ... 100 dB high: 65 ... 130 dB
Dynamic range:	65 dB
Frequency weighting:	A or C
Time weighting:	fast (125ms) slow (1 s)
Accuracy:	± 2.0 dB (under reference conditions, 1000 Hz 94 dB)
Digital display:	LCD, 4 digits, resolution 0.1 dB
Display period:	0.5 sec.
Display functions:	Max Hold function alarm function „OVER“ (when input is out of range)
Calibration:	electrical calibration with internal oscillator (1000 Hz sine wave, 94 dB)
Output:	
AC:	0.65 Vrms at FS (full scale) (output impedance approx. 600 Ω)
DC:	10 mV/ dB (output impedance approx. 100 Ω)
Connection:	3.5mm Jack and plug with 2 m ALMEMO® cable
Power supply:	one 9V battery
Power life:	approx. 50 hrs (alkaline cell)
Operating temperature:	0 to 40°C
Operating humidity:	10 to 90% r.H., non-condensing
Sea level:	up to 2000 m
Storage:	-10 to 60°C, 10 to 75 % r.H., non-condensing
Dimensions:	240 (L) x 68 (W) x 25 (H) mm
Mounting:	Threaded for tripod mounting (not included)
Weight:	210 g (including battery)

Product overview
Sound Level Meter inclusive 9V battery and 2 m ALMEMO®-cable, windscreen, screwdriver, carrying case, instruction manual

Order no. MA86193