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 At this load the specific error limits are no longer applicable.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 107 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

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:

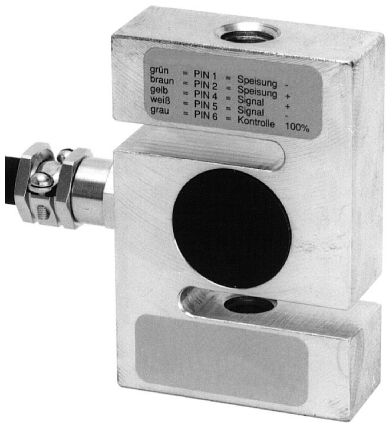
- Radial turbine flowmeters for large flow quantities.
- Axial turbine flowmeters with rotating vane for small flow quantities

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:

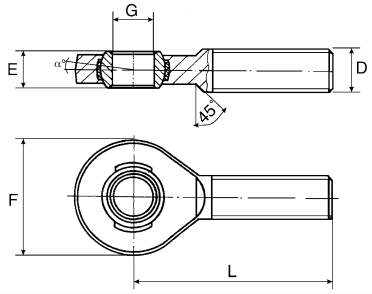
- Retroreflective photoelectric sensor (DIN EN 60947: Type D)
  Detects only opaque objects.
  The sensing range depends on the reflectivity of the object, i.e. on the surface quality and colour.
  Sensitive with regard to contamination and against changes of the reflective properties of the object
  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

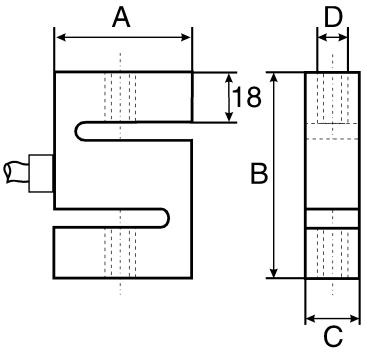
Tension and Compression Sensor K25



- 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

! 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	Order no.		Order no.
Indication of measured values with ALMEMO® devices in kg	OK9000K	Indication of measured values with ALMEMO® devices in N and kg	OK9000NK

Accessories	Order no.		Order no.
Knuckle eyes with external thread M 12 (2 pcs) (dimensions in mm: D = M 12, E = 16, F = 32, G = 12, L = 54)	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)	ZB902524

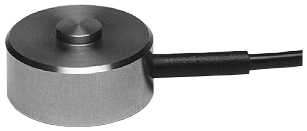
Types (including test certificate)	Order no.
Measuring range 0.02kN 0.05kN, 0.1kN, 0.2kN, 0.5kN, 1kN, 2kN, 5kN or 10kN please specify	**FKA0251**
Measuring range 20kN	**FKA0252**
Measuring range 50kN	**FKA0255**
Factory calibration KK9xxx force (traction / thrust) for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)	

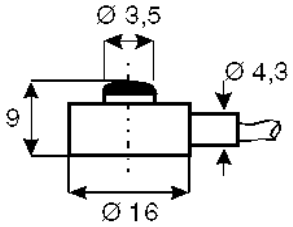
Other designs are available on request

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

Compression Sensor K 22





- 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.

! 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:	radial, 3m long with ALMEMO® connector
Accuracy:	<±0.5% of final value

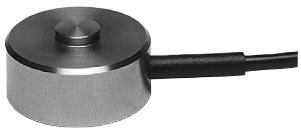
Nominal measuring path:	<0.2mm
Operative range:	–10 to +50°C
Drift error at permanent load:	0.1% per 30min
Protection system:	IP 65
Material:	stainless steel

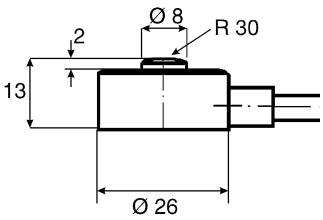
Type (including test certificate) **Order no.**

Measuring range 100 N, 200N, 500N, 1000N or 2000N please specify **Order no. FKA022**

Factory calibration KK9xxx force (tension or compression) for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)

Compression Sensor K 1613





- 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 rangesr.

! 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:	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

Type (including test certificate) **Order no.**

Measuring range 0.5kN, 1kN, 2kN, 5kN, 10kN or 20kN (50 kN on request) please specify **FKA613**

Factory calibration KK9xxx force (tension or compression) for sensor or measuring chain (sensor + device) (see chapter Calibration certificates)

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

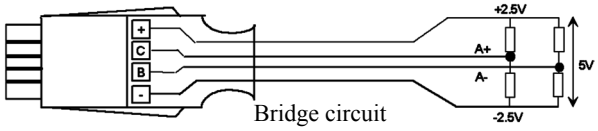
Other designs are available on request

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

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



Bridge circuit

Technical Data:

Sensor supply:	
Voltage UF:	5V ± 0.05V
Temperature coefficient:	<50ppm/°C
Output current:	max. 100mA
Quiescent current	approx. 3 mA

New

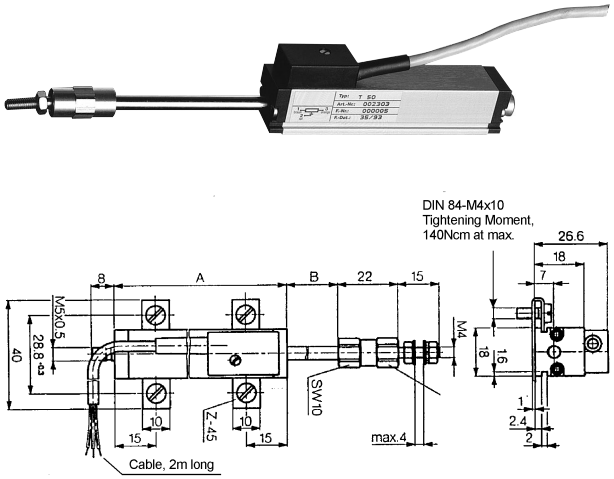
Energy saving	So long as the measuring point is not selected, the bridge voltage remains switched OFF.

Types

Model	Meas. Range	Resolution	Order no.
55mV DC	–10.0 to +55.0	1 µV	**ZA9105FS0**
26mV DC	–26.0 to +26.0	1 µV	**ZA9105FS1**
260mV DC	–260.0 to +260.0	10 µV	**ZA9105FS2**
2.6V DC	–2.6 to +2.6*	0.1 mV	**ZA9105FS3**

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

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 106 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.

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:	≥ 10MW, (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 106 strokes
Protection system:	IP 40

Option

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

Types

Working length/resolution, incl. ALMEMO® cable 2m long	Order no.
25 mm / 0,001 mm	**FWA025T**
50 mm / 0,01 mm	**FWA050T**
75 mm / 0,01 mm	**FWA075T**
100 mm / 0,01 mm	**FWA100T**
150 mm / 0,01 mm	**FWA150T**
up to 3000mm working length	on request

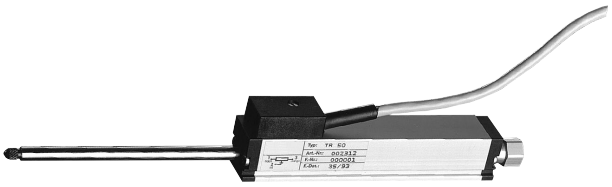
included with delivery 2 tensioning clamps Z3-31
including 4 cap screws M4x10, 1 ball-shaped coupling

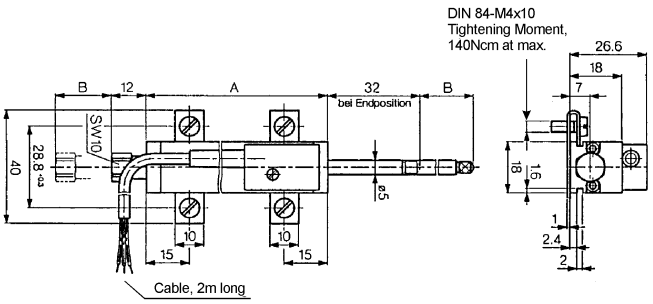
Other designs are available on request

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

Displacement Tracer, Potentiometric FWA xxx TR





- 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 106 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:	≥ 10MW (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 106 strokes
Protection system:	IP 40

Option

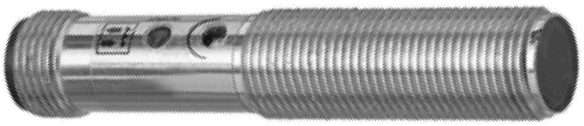
	Order no.
Plug connection (instead of fixed connected cable), including 3m cable with screwed round socket and ALMEMO® connector	OWA071AK

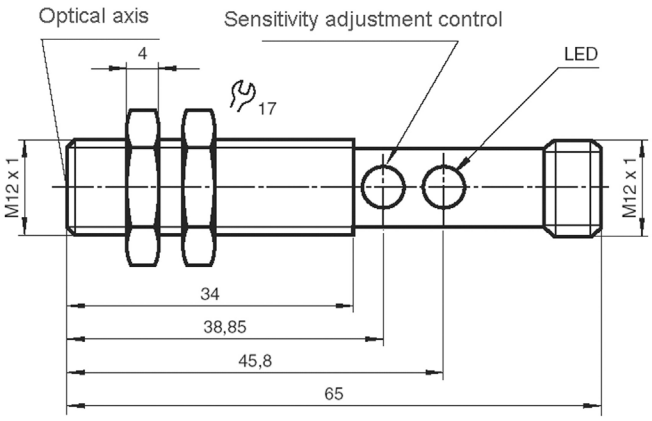
Types

Working length/resolution, incl. ALMEMO® cable 2m long	Order no.
25 mm / 0,001 mm	**FWA025TR**
50 mm / 0,01 mm	**FWA050TR**
75 mm / 0,01 mm	**FWA075TR**
100 mm / 0,01 mm	**FWA100TR**

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

Rotational Speed Sensor FUA 9192





- 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.

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

Accessories

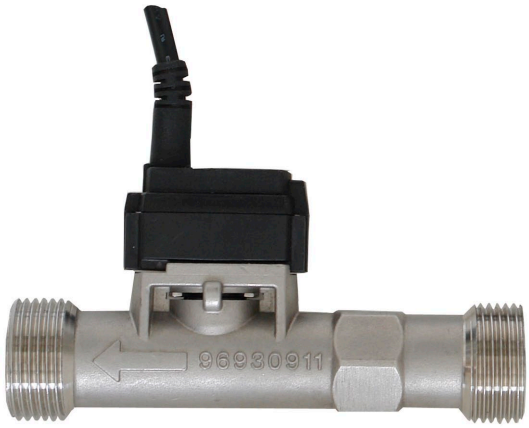
	Order no.
Extension cable, 1 meter long	ZA9060VK1
Extension cable, 2 meters long	ZA9060VK2

Types

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

DAkkS / DKD or factory calibration KU90xx rotational speed for digital sensor (see chapter Calibration certificates)

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	using water as medium at 0 to +100°C ±1.5 % of final value
FVA645GV12QT/40QT:	by water-glycol (42 %) 30 to +100°C (Viscosity < 4 mm²/s) ±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	Water, water-glycol (max. 42 % glycol)
FVA645GV12QT/40QT FVA645GV100QT/200QT	Viscosity < 4 mm²/s, Viscosity < 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)

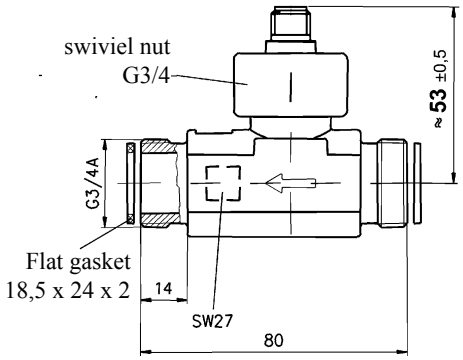
Variants

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	ca. 110 mm	**FVA645GV12QT**
2 to 40 l/min	0.2 l/min	G 3/4“ male thread	ca. 110 mm	**FVA645GV40QT**
5 to 100 l/min	0.5 l/min	G 1“ male thread	ca. 129 mm	**FVA645GV100QT**
10 to 200 l/min	1.0 l/min	G 1 1/4“ male thread	ca. 137.5 mm	**FVA645GV200QT**

Factory calibration KV91xx flow for sensor (see chapter Calibration certificates)

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.

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 (Tmax =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

Types

	Order no.
incl. connecting cable, 6m long with ALMEMO® connector turbine body made of brass	**FVA915VTHM**
Turbine body made of plastic	**FVA915VTHK**

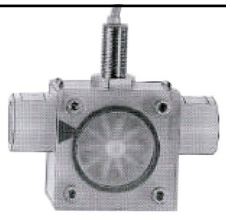
Factory calibration KV91xx flow for digital sensor (see chapter Calibration certificates)

Other designs are available on request

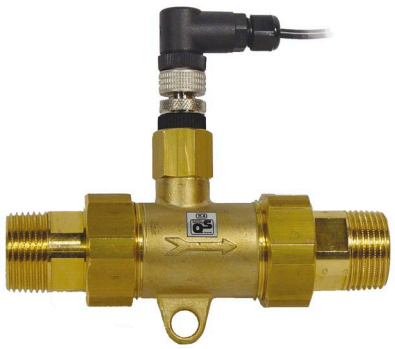
Axial turbine flowmeters FVA 915 VTWx for water-glycol mixture up to 150 °C, 25 bar, 2 to 30 l/min Figure - similar to above

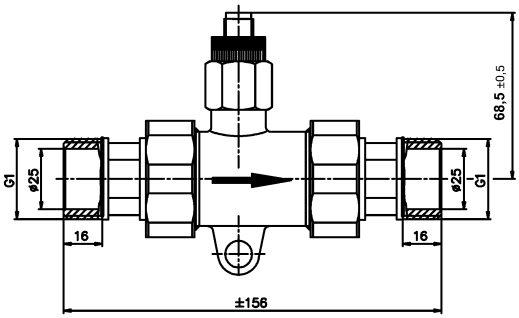
Axial turbine flowmeters FVA915VTPx for water up to 150 °C, 300 bar, 2 to 40 l/min Figure - similar to above

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.

Technical Data

Nominal diameter	DN 25
Measuring range	4 to 160 l/min
Continuous load	max. 80 l/min
Measuring accuracy	±5% of measured value up to 5l/min ±7% 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 (Tmax =70 °C) with ALMEMO® connector
Materials	
Pipe section FV A915 VTH25M	brass, CW602N
Turbine cage	PPO Noryl GFN 1630V
Rotation vane	PPO Noryl GFN 1520V
Rotor complements	Hard Ferrite Magnets
Axle / bearing	stainless steel 1.4539 / saphire, PA
Sensor socket	PPO Noryl GFN 1630V
O-ring	EPDM

Type	**Order no.**
incl. connecting cable, 6 m long, with ALMEMO® connector turbine body made of brass	**FVA915VTH25M**
Factory calibration KV91xx flow for digital sensor (see chapter Calibration certificates)	

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