

# FORCE

## Tension and Compression Sensor Type 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:

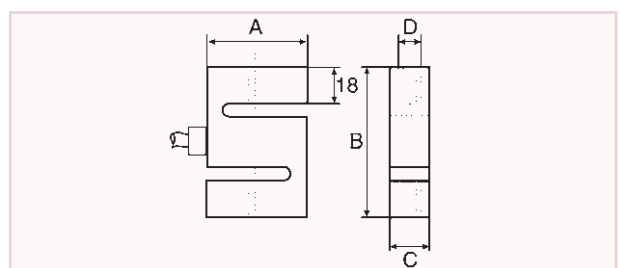
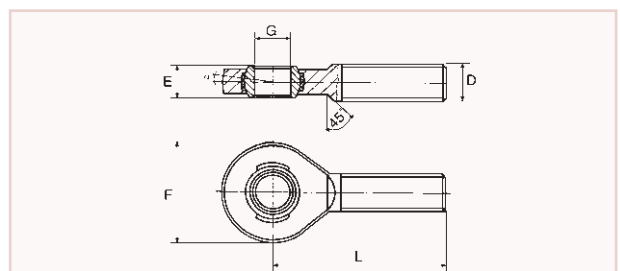
Indication of measured values with ALMEMO® devices in kg      Order No. OK9000K

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



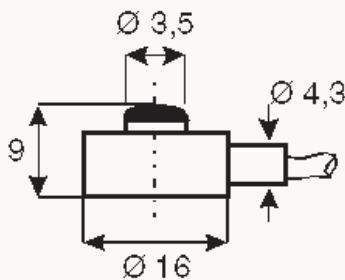
01/2005 We reserve the right to make technical changes.

# FORCE

## Compression Sensor Type K22



- ▶ 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.



### 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.

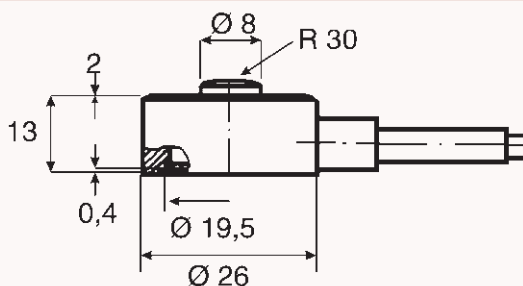
### Technical Data:

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 Type K1613



- ▶ 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.



### 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.

### 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

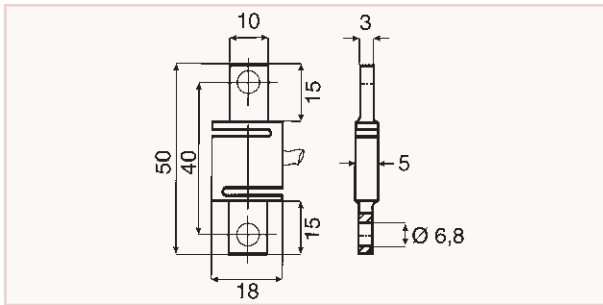
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# FORCE

## Tension Sensor Type K1368



- ▶ 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.



### Type (including test certificate)

Measuring range  
10N, 20N, 50N  
please specify

**Order No. FKA368**



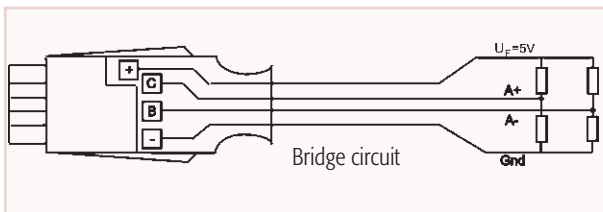
All ALMEMO® devices provide easy push-button adjustment of no-load and final value.

### Technical Data:

Max. load limit:	150% of final value
Maximum dynamic load:	70% of final value
Reference temperature:	23°C
Cable:	3m long, with ALMEMO® connector
Accuracy for tension:	<±0.2% of final value
Nominal measuring path:	<0.15mm
Operative range:	+5 to +45°C
Drift error at permanent load:	<0.1% per 30min
Permissible lateral forces:	not allowed
Protection system:	IP60
Material:	aluminium

## ALMEMO® input connectors for existing force transducers with a differential amplifier Difference millivolt / volt

for measuring bridges, Supply, 5V stabilized,  
from the ALMEMO® device



### Technical Data:

<b>Sensor supply:</b>	
Voltage UF:	5V ± 0,05V
Temperature coefficient:	<50ppm / °C
Output current:	max. 100mA
<b>Amplifier:</b>	
Input voltage range (common mode)	-3.0V to +3.5V
Offset voltage:	400µV (V=1), 225µV (V=10)
Offset voltage drift:	max. 1µV / °C
Input current:	0,5 nA
Current consumption :	approx. 2 mA

### Types:

Model	Measuring range	Resolution
55mV DC	-10.0 to +55.0	1 µV
26mV DC (V=10)	-26.0 to +26.0	1 µV
260mV DC (V=10)	-260.0 to +260.0*	10 µV
2.6V DC	-2.6 to +2.6*	0.1 mV

**Order No. ZA9650FS0**  
**Order No. ZA9650FS1V**  
**Order No. ZA9650FS2V**  
**Order No. ZA9650FS3**

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

# ROTATIONAL SPEED

## Rotational Speed Sensor Type FUA9192



- ▶ 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

### Types:

For rotational speeds up to 30000rpm max.,  
incl. 5 reflective adhesive tapes  
Connecting cable 2m long  
with ALMEMO® connector

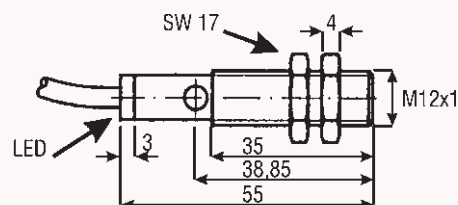
**Order No. FUA9192**

### Accessories:

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

### 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
Material:	housing: brass, nickel plated, lens opening: PMMA
Dimensions:	diameter: M12 x 1mm, length: 55mm
Weight:	15g
Meets standards:	EN 60 947-5-2



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# DISPLACEMENT

## Displacement Sensor, Potentiometric Type FWAxxxT



- ▶ 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  $100 \times 10^6$  strokes, extraordinary linearity up to  $\pm 0.075\%$ , 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.

### Option:

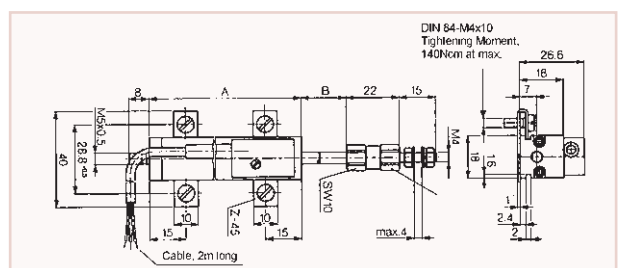
Plug connection (instead of fixed connected cable), including 3m cable with screwed round socket and ALMEMO® connector

### 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 Z-45 including 4 cap screws M4x10,  
 1 ball-shaped coupling

### Technical Data:

Independent linearity:	T25: $\pm 0.2\%$ ; T50: $\pm 0.15\%$ T75: $\pm 0.1\%$ ; T100: $\pm 0.075\%$ T150: $\pm 0.075\%$
Housing length (meas. A+1mm):	T25: 63mm; T50: 88mm T75: 113mm; T100: 138mm T150: 188mm
Mech. stroke (meas. B $\pm 1.5$ mm):	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	$\pm 1$ mm parallel displacement, $\pm 2.5^\circ$ angular displacement
Operating force (horizontal):	$\leq 0.30$ N
Reproducibility:	0.002mm
Insulation resistance:	$\geq 10$ M $\Omega$ (500VDC, 1 bar, 2s)
Dielectric strength:	$\leq 1$ mA (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:	$> 100 \times 10^6$ strokes
Protection system:	IP 40



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# DISPLACEMENT

## Displacement Tracer, Potentiometric Type FWAxxxTR



- ▶ 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  $100 \times 10^6$  strokes, extraordinary linearity up to  $\pm 0.075\%$ , 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.

### Option:

Plug connection  
(instead of fixed connected cable),  
including 3m cable  
with screwed round socket  
and ALMEMO® connector

Order No. OWA071AK

### Types:

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

25mm/0.001mm

50mm/0.01mm

75mm/0.01mm

100mm/0.01mm

included with delivery

2 tensioning clamps Z-45 including 4 cap screws M4x10,  
1 probe tip with hard-metal ball

**Order No. FWA025TR**

**Order No. FWA050TR**

**Order No. FWA075TR**

**Order No. FWA100TR**

### Technical Data:

Independent linearity:	TR25: $\pm 0.2\%$ ; TR50: $\pm 0.15\%$
	TR75: $\pm 0.1\%$ ;
	TR100: $\pm 0.075\%$

Housing length (meas. A+1mm):	TR25: 63mm;
	TR50: 94.4mm;
	TR75: 134.4mm;
	TR100: 166mm

Mech. stroke (meas. B $\pm 1.5$ mm):	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):	$\leq 5$ N
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Reproducibility:	0.002mm
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Insulation resistance:	$\geq 10M\Omega$
	(500VDC, 1 bar, 2s)

Dielectric strength:	$\leq 1$ mA
	(50Hz, 2s, 1 bar, 500VAC)

Max. permissible torque:	140Ncm
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Temperature range:	$-30$ to $+100^\circ\text{C}$
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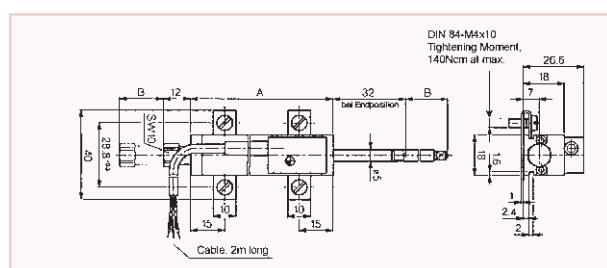
Temperature coefficient:	typ. 5ppm/ $^\circ\text{C}$
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Vibrations:	5 to 2000Hz/Amax =
	0.75mm/amax = 20g

Shock:	50g/11ms
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Life span:	$> 100 \times 10^6$ strokes
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Protection system:	IP 40
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**AHLBORN**  
www.ahlborn.com

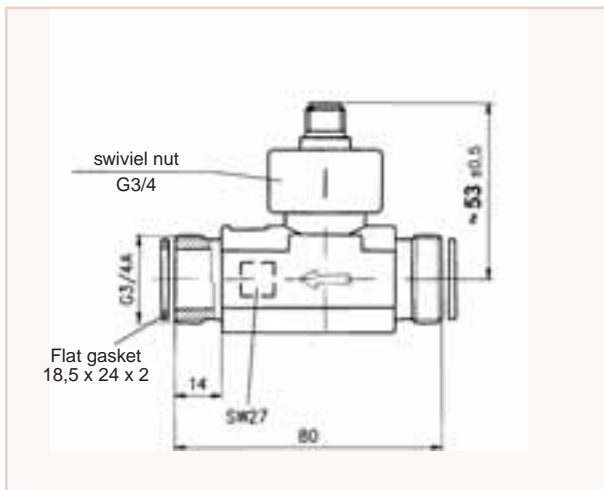


# FLOW

## Axial turbine flowmeter for liquids Type FVA915VTH



- ▶ 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 3/4" 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	855 pulses / liter
Resolution	1.2 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 <sub>max</sub> =70 °C) with ALMEMO® connector

### Materials

pipe section	
FV A915 VTH M	brass
FV A915 VTH K	plastic PPO Noryl 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 sapphire 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

## Axial turbine flowmeter for liquids Type FVA915VTH25



- ▶ 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

### Types:

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

Turbine body made of brass

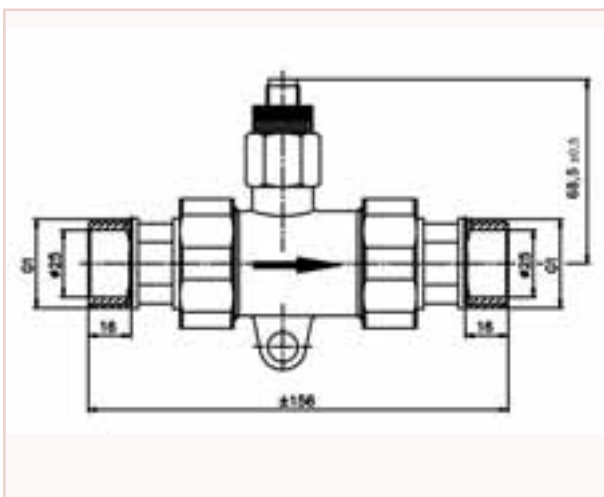
**Order no. FVA915VTH25M**

### 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	0.5 mm
maximum temperature of medium	85°C
Nominal pressure	PN10
Process connection FVA915VTH25M	G 1 1/4" external thread including adapter for G 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	67 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 <sub>max</sub> = 70 °C) with ALMEMO® connector

### Materials

Pipe section	
FV A915 VTH25M	brass
Flat gasket	Centelen
Turbine cage	PA Grivory HTV4X1
Rotation vane	PP
Rotor complements	permanent magnets, Recona 28nickel-plated
Axle / bearing	special steel 1.4436 / sapphire, PA
Sensor socket	POM Delin 100P
O-ring	72 NBR 872



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