



Industrial Oils.
Mechanical Engineering.



Industrial Oils.
Mechanical Engineering.



Industrial Oils.
Mechanical Engineering.

Utilising synergies

With the merger of companies, we have greatly expanded our competence and can thus also offer optimal assistance and consultation in all matters relating to measuring, control, and closed-loop control technologies.

We are capable of offering a comprehensive product portfolio for requirements in the broadest range of segments:



Process measurement technology

Laboratory measurement technology

Industrial electronics / closed-loop control technology

Industrial measurement technology

Test stand measurement technology

Customer-specific developments

Quality from Germany

All products from GHM Messtechnik are developed and produced in Germany. Through the consolidation of companies, the product range has been expanded significantly. Renowned companies value the "Quality from Germany".

Our claim – Your benefit

As a specialist and complete measurement technology provider, we develop solutions tailored to our customers and markets which meet the highest demands in the industry.

Our locations



GREISINGER



HONSBERG



Martens



IMTRON



DeltaGHM



VAL.CO

Flexibility and Innovation

These two terms are an inseparable part of the success of GHM Messtechnik.
In addition to the extensive standard programme, tailored solutions are developed according to customer needs.



Altium 3D circuit board layout



Pressure testing up to 1000 bar



EMC cabins

GHM stands for ...

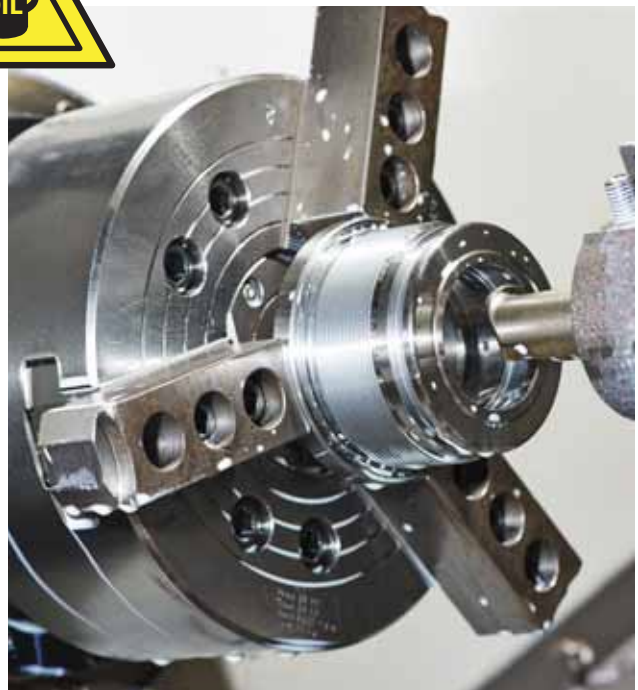
- Competence
- Quality
- Service

GHM devices for Oil Applications



Content

Flow	4
Temperature	7
Pressure	7
Fill level	8
Flow Measuring and Monitoring Devices for Oil Applications ..	10
Fill Level Measuring and Monitoring Equipment for Oil	13
Pressure Measuring and Monitoring Equipment for Oil	16
Temperature Switches and Meters for Oil Applications	18
Temperature Sensor for Oil Applications	19



GHM devices for oil applications

Oils are an important, precious and widely used medium in the fields of technology and chemistry. Consequently there are many different requirements in the metrological detection of variables such as flow rate, temperature, pressure and fill level in existence. The GHM Messtechnik GmbH produces sensors and transmitters for oil monitoring and measurement in various locations and advises clients with their measurement or monitoring requirements.

This brochure introduces most of our equipment for various oil applications, although other devices of the GHM portfolio can be deployed with equal success. Enquire at our offices, we advise you with pleasure.

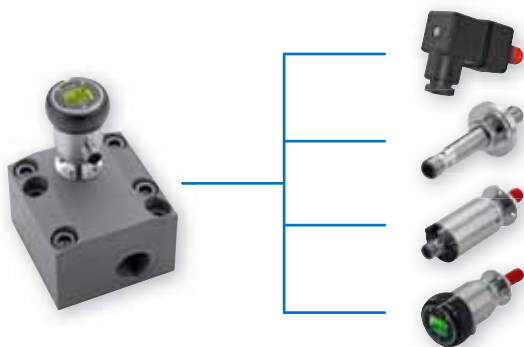
What is important for the different measured variables in regards of the medium oil?

Flow rate

With regard to oil, the viscosity of the medium must be taken into account first and foremost. When plants are operated with oils at different temperatures, the result is different viscosities of the same oil measured by the sensor. GHM offers different devices to take these variable requirements into account.

Volumetric Measuring Instruments (Gearwheel- or Screw measurement)

are primarily producing a pulse signal each time a specific volume has passed the instrument. It is easy to understand that these systems work nearly independently of viscosity. But you should keep an eye on the pressure losses at different viscosities.



*Gear sensor VHZ
with different transmitter electronics*



*Screw volume meter VHS
with different transmitter electronics*

The quoted volumetric devices of GHM are very precise mechanical systems with a system accuracy from 0.25 to 3% of the measured value. These devices are among the most accurate mechanical measuring systems for oil applications. High operating pressures (up to 350 bar) and large flow ranges from 0.04 to 2000 l/min allow use in a multitude of applications like:

- Central oil lubrication systems can be found at mills, paper machines, stone mills, etc.
- Central oil-cooling systems can be found in machine tool manufacturing
- Gear lubrication for harbor cranes, wind turbines, etc.
- Hydraulic actuators or workpiece holder
- Oil circulation in hardening systems
- Test stands for transmissions, engines



*Central lubrication system with GHM Honsberg flow meter,
Pressure sensors and temperature sensors.*



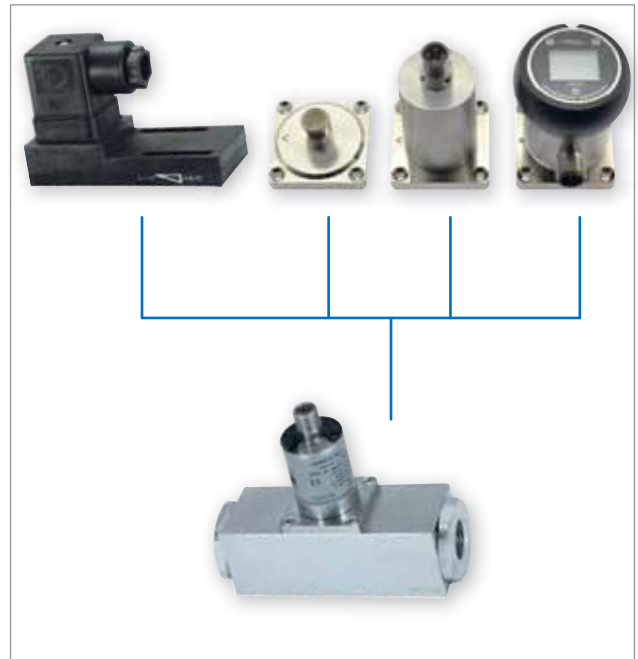
Stone mill in South Africa with large bearing operated via a central lubrication system. The oil volume is measured with VHS equipment of GHM.



Armature cylinder of a dredger. The extension path of the telescopic device is detected with a VHZ of GHM.

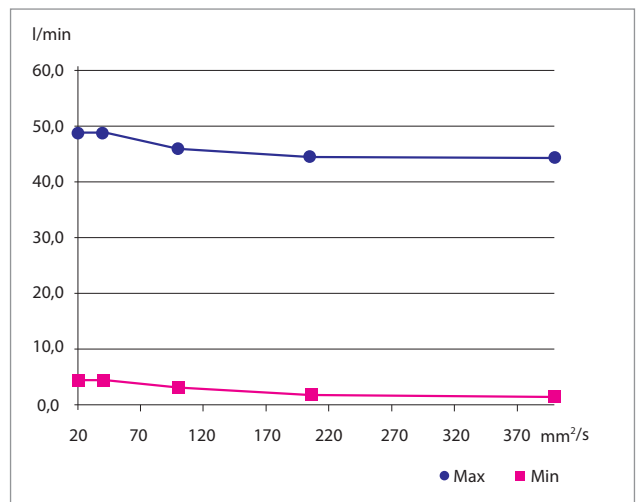
Viscosity-compensated piston devices(HD2 /HR2V /FW4V)

are part of the class of the spring-loaded float devices. These structurally modified devices are suitable for the oil monitoring. By utilising special pistons in the device, the friction effect of oil is almost completely eliminated.



Viscosity-compensated piston flow switch and piston meters, available with limit switches and microswitch heads (with ATEX approval) as well as different transmitters.

Viscosity compensation HD2K-025GM040



All of our systems are characterized by a high degree of robustness and long-term stability. The compact design allows installation in a variety of applications:

- Oil cooling of machine manufacturing tools
- Use in the agriculture area
- Flow monitoring in hydraulic systems

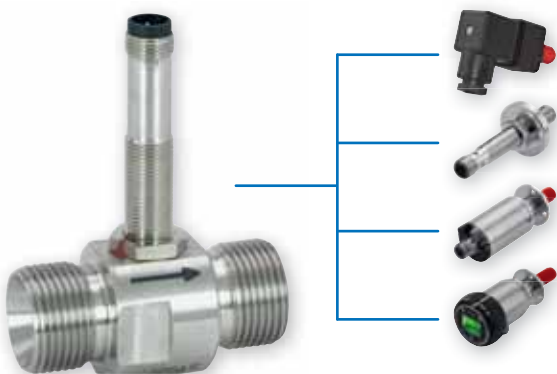


Piston flow switch FW4V for monitoring two flow direction; used in agriculture.

Turbines (RT)

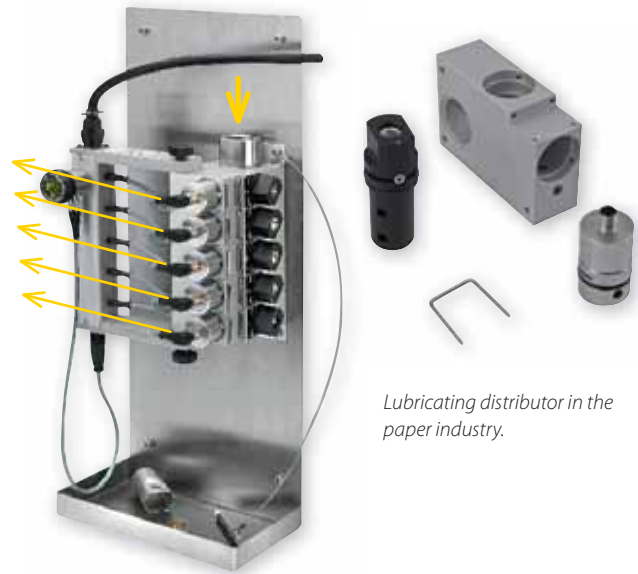
can also be used for oil flow measurements if the shift frequency characteristic in the measured value recording is taken into account. In this case the operating temperatures are recorded and the corresponding frequency conversion factors (K values) for calculation are used.

Since the characteristic of the turbine in the specified measuring range at different viscosities remains linear, the factor is constant in each case. However, the shifts of the minimum measured values (starting values) in their use in different viscosities have to be taken into account.



Oil distribution systems

As examples, oil distributors offer the possibility of operating a central line, multiple lubrication points and cooling conduits. We provide the necessary possibilities for many application requirements. Our experts will advise you.



Lubricating distributor in the paper industry.

Modular distribution panels (Type DIS)

enable up to 10 distribution channels, which is not uncommon for applications such as large paper machines. The individual strands can be set up and measured individually using a multiple coaxial valve. In bypass mode, the medium is deflected around the device in order to simplify the periodic service on the machine. The measurement device can be removed and checked without interrupting the necessary oil lubrication. The service can therefore be carried out during operation and avoids the stoppage of the machine.

Most significant sources of interference in the flow measurement of oils:

Ferritic abrasions are an undesirable component in the lubrication circuit and must be filtered out in the best possible manner.

Air penetration:

Good ventilation during commissioning without sack constructions, an airtight overall system and slow filling during commissioning are some of the most important preconditions for trouble-free operation.

Oil shocks:

Slow filling at the time of commissioning or after service tasks can prevent these dynamic forces on the sensor system.

Temperature

Different temperature sensors and -transmitters called PT100 or PT1000 sensors with corresponding transmitter electronics are available. A wide range of different versions with different pipe lengths, process adaption and protection fittings are tailor-made to satisfy the customer's specific application requirements.

The fact that reaction times for oil are slower than for water have to be taken into account. Measurements in flowing media can lead to a more rapid heat transfer, requiring an improvement of response times.



Various temperature transmitter designs

Temperature sensors in hydraulic applications up to 600 bar are not uncommon and can be offered in different versions.



Pressure

Pressure switches and transmitters

are utilised in oils with various technologies.

Mechanical switch systems:

spring-assisted

Mechanical pressure switches with pistons

are in use in all applications, where a break point is to be monitored. These devices do not require a power supply. The mechanical switches are capable of directly shifting higher currents and voltages.

The switching point is adjusted by the tensioning of a screw on a spring, which acts on the pressure piston or a membrane. In some devices the hysteresis can also be adjusted with an adjustment screw.

Mechanical pressure switch PH1. Setting of point and hysteresis.



Electronic switches and transmitter systems:

A thin film bridge is located on the pressure membrane or on a silicon substrate with capillary drill holes and oil reservoir to a flush stainless steel diaphragm.

The sensors can be subdivided into absolute pressure sensors, relative pressure sensors and differential pressure sensors. All of these sensors are available with a display and programmable switches.

Electronic pressure switches or transmitters

are installed where exact values are to be recorded and where a smaller hysteresis is desired, like in mechanical switches. Proportional output signals such as 4-20 mA or 0..10 V can be electronically selected.

The transducers are temperature-compensated and work very quickly because of their small mass. Thanks to their rugged construction, vibrations and rapid pressure changes do not have a significant negative influence on the sensors.



Pressure sensors in different designs

Fill levels

Different viscosities and densities of different oils must be taken into account. For level measurement of oil, in oil, and in lubrication and cooling systems, ferritic abrasion deposits often accumulate in the tanks and must be reduced with filtering systems using devices with magnets (e.g. by magnetic separator).

In bearing lubrication, temperatures of up to 100 °C or higher can be reached, which restricts the choice of the level switch or measurement systems. GHM offers various fill level switches and fill level measurement systems.

Please contact us for further information.

Float transducers

are installed from above or from the side of the tank. They are designed as a bent lever version or straight version. Float systems are available with fixed or programmable switch points or as continuous level transmitters. Special versions can be equipped with filling pipes, or with an additional temperature sensor. Bent lever versions can also be installed to measure highly viscous media if the pivot point is not placed in the liquid.



Level float systems in bent lever version or straight version.

Capacitive systems

4..20 mA or 0..10 V transmitters with a programmable switch with temperature monitoring at GDM are designed so that extremely precise fill level readings are achieved, even with changing oil qualities (capacitive absolute values change with different permeability in new and used oils).

The transducers have no moving parts. Version LCC1 is a measuring device that can be used in shallow oil pans where small losses must be detected. Large fluctuations on the oil surface are taken into account with a high, programmable mean average value, or with cushioning pipes (surge pipes).



A special kind of capacitive limit detection

The MLC switch family works with a particularly high frequency method and enables absolute measurement of the dielectric constant. As a result, a distinction between air and liquid and between aggregate states is possible. The type of liquid can also be determined.

High-quality materials enable the operation in aggressive oils or emulsions. Different designs allow for special requirements with regard to mounting, wiring or signal output. These instruments are sealed directly at the top without additional sealant.

Contact our specialists for advice.



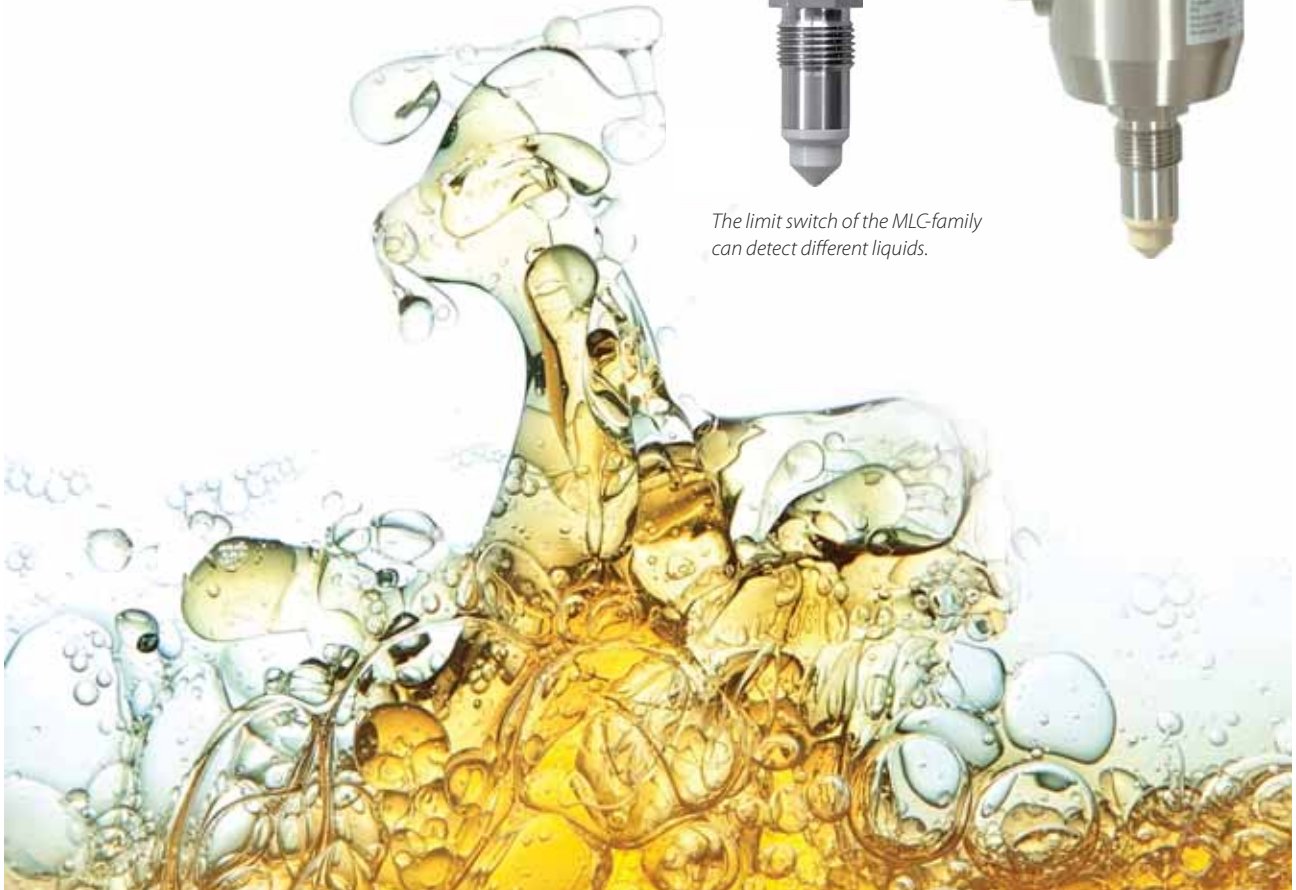
Capacitive level System LLC

Application examples:




- Oil level measurement in compressors, motors or transmissions
- Oil pans with sharp fluctuations of oil



The limit switch of the MLC-family can detect different liquids.



Flow Measuring and Monitoring Devices for Oil Applications




			
Type	HD2	HR2V	NJV
Principle	Piston	Piston	Piston
Connection diameter	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1	G 1 ¹ / ₄ G1 ¹ / ₂ G2	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1
Pressure resistance	200 bar	200 bar	100 bar
Materials	Brass/stainless steel	Brass/steel on demand	Brass/steel
Area	Switching 0.5..60 l/min Measure 0.1..80 l/min	Switching 10..120 l/min Measure 5..160 l/min	Switching and display 2..60 l/min
Switches & probes	Reed switch 250 VAC 1.5 A 50 VA Microswitch 250 VAC 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 1.5 A 50 VA OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 0.5 A 10 VA K1: changer with red LED display K2: switch without LED display K3: changer with red/green LED display
Applications	Measurement and monitoring in mechanical engineering and plant manufacturing, e.g. cooling of machine tools.		Monitoring and display in lubrication systems.
Additional notes	All versions with analog flow indicators of type 01 or Z1 are optionally available; lower pressure drop as volumetric measurement.		Adaptable on manifold block VB









Type	VHZ	VHS
Principle	Gear	Screws
Connection diameter	G 1/4 G 3/8 G 3/4 G1	G1 G1 1/4 G1 1/2 G2 G2 1/2
Pressure resistance	100/160/200 bar	160/350 bar
Fluid temperature	-25 °C...+80 °C	-25 °C...+80 °C (150 °C)
Materials	Steel/aluminium	Steel/aluminium
Measuring range	0.02..150 l/min	1.5..2500 l/min
Switches & probes	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>
Applications	Tool cooling (with oil), oil lubrication, hydraulic tensioners, hydraulic position measurements, chuck monitoring, position control, lubricant monitoring	Central lubrication systems, test stands, lubricant monitoring
Additional notes	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) 3 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) <1 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear

Flow Measurement and Monitoring Devices for Oil Applications

			
Type	VB	VB2	DIS
Principle	Oil distributor for piston devices with control valve	Oil / water distribution for piston devices with control valve	Oil distributor (<math><100\text{ mm}^2/\text{s}</math>) with integrated flow sensor (dynamic diaphragm)
Connection diameter	Intake: Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Intake G2 Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Expiration: G $\frac{3}{8}$
Pressure resistance	25 bar	16 bar	16 bar
Fluid temperature	-20 °C..+110 °C	-20 °C..+110 °C	-20 °C..+80 °C
Materials	Aluminium & brass/stainless steel	Aluminium & brass/stainless steel	Aluminium & stainless steel
Area	Switching and displays 2..60 l/min	Switching 10..120 l/min Measuring 5..160 l/min	Switching and displays 2..60 l/min
Switches & probes	Reed switch 250 VAC, 0.5 A, 10 VA K1: changer with red LED display K2: changer without LED display K3: changer with red/green LED display	Reed switch 250 VAC, 1.5 A, 50 VA Microswitch 250 VAC, 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	Monitoring and distribution used in mechanical and plant engineering e.g. of lubricant	Measurement and monitoring used in mechanical and plant engineering e.g. cooling of machine	Measurement and monitoring of highly viscous media, for example for printing machines
Additional notes	Combined with NJV and other inline piston devices, optionally 1-8 measurement points	Combined with HD2, HR2V and other inline piston devices 8 measurement points	Bypass valve allows maintenance without downtime, optionally 1-10 measurement points, no RoHS

For further information, please refer to our brochures or visit www.ghm-messtechnik.de

Level Measurement and Monitoring Equipment for Oil

				
Type	RW	RWI	NM	SB
Principle	Float lever - Articulated lever	Float lever - Articulated lever	Float lever	Float lever
Mounting	Horizontal mounting 1/2" 13UNC or NPT 1/2"	Horizontal mounting M 16 x 1.5	Vertical mounting G 1/8 A or G 1/4 A from above or from below	Vertical mounting G 1 A Cover mounting
Fluid temperature	-20 °C..+70 °C	-20 °C..+70 °C	-20 °C..+55 °C	-20 °C..+105 °C
Pressure resistance	5/6 bar	PP: 3 bar, PVDF: 6 bar	30/40 bar	12 bar
Materials	Stainless steel	PP or PVDF	Stainless steel	Brass NBR
Area	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact 100..500 mm
Switches & probes	Reed switch 300 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 70 VA	Reed switch 250 VAC 1 A 80 VA
Applications	Lateral monitoring in reservoirs e.g. as minimum and maximum monitoring in e.g. refrigeration systems		Vessel monitoring e.g. lubrication systems	
Additional notes	Density from 0.7 g/cm ³ , no ferritic particles	Density: PP from 0.6 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.7 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.35 g/cm ³ , no ferritic particles



Level Measurement and Monitoring Equipment for Oil

			
Type	MLC422	MLC430 / MLC433 / MLC437	LCC1
Principle	Capacitive	Capacitive	Capacitive
Mounting	G 1/2	G 1/2	Horizontal 3-hole flange D 54
Fluid temperature	-20 °C..+100 °C	-20 °C..+100 °C	-20 °C..+85 °C
Pressure resistance	10 bar	10 bar	5 bar
Materials	Stainless steel/PEEK	Stainless steel/PEEK	Brass/FR4
Area	1..175 Dk	1..175 Dk	0..18 mm
Switches & probes	1 transistor switching output	MLC430: 2 transistor switching output MLC433: 2 transistor switching output, 4..20 mA analogous output MLC437: Display, 2 transistor switching output, 4..20 mA analogous output	
Applications	Level detection with no moving parts	Level detection with no moving parts, detecting of oil and water phases	e.g. for oil reservoir in lubrication systems, motor oil monitoring
Additional notes	Plug M12	Plug M12	For shallow containers with overheating warning, oil level check and with restless filling levels by programmable attenuation



			
Type	LCC2	Vectis	LC
Principle	Capacitive	Float - hinged lever	Float - reed chain
Mounting	Vertical 4 hole flange D 75 or thread G1A	Horizontal 3 hole flansch D54	Vertical thread G1A G1 1/2A G2A
Fluid temperature	-20 °C..+85 °C (100 °C)	-20 °C..+85 °C (150 °C)	-20 °C..+105 °C
Pressure resistance	5 bar	3 bar	10 bar
Materials	Brass/FR4	Brass/NBR	Brass/NBR
Area	0..600 mm	0..1000 mm	0..2000 mm
Switches & probes	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	e.g. for oil tank in lubrication systems, motor monitoring		
Additional notes	Optional stillpipe	Suitable for flat containers, no ferritic particles	For low viscous, no ferritic particles



Pressure – Measurement and Monitoring Equipment for Oil




				
Type	FLEX-P/OMNI-P	PM1	PH1	PAS
Principle	Thin film sensor with transmitter	Diaphragm/piston	Diaphragm/piston	Piston
Pressure resistance	G 1/2 A	G 1/8 A R 1/8 A G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/8 A R 1/4 G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/2 A R 1/4 M10x1 NPT 1/4" G 1/4 Flansch ISO 163873
Fluid temperature	-20 °C..70 °C (120 °C)	-10 °C..+80 °C (100 °C)	-20 °C..+80 °C (100 °C)	-10 °C..+80 °C (100 °C)
Pressure resistance	4..600 bar	60/350 bar	60/350 bar	350 bar
Materials	Stainless steel	Galvanised steel or stainless steel	Galvanised steel or stainless steel	Die-cast zinc/aluminium
Messbereich	0..400 bar	-0.85..320 bar	-0.85..320 bar	10..320 bar
Switches & probes	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency	Mechanical changer 2A (1A) 250 VAC	Mechanical changer 4A (2A) 250 VAC	Mechanical changer 6A (2A) 250 VAC
Applications	Hydraulics, pneumatics, e.g. clamping devices	Pressure monitoring in hydraulic applications such as testing		
Additional notes	Programmable parameter plug M12 x 1	Switching point is adjustable. Sealing materials: NBR or FKM or EPDM	Switching point and hysteresis are adjustable. Sealing materials: NBR or FKM or EPDM	The switching point can be easily adjusted via a thumbscrew. Seal materials: NBR or FKM or EPDM



				
Type	EPS2	EDP1	EPS	S10 / S11
Principle	Thin film sensor with transmitter	Ceramic thick film sensor with transmitter	Thin film sensor with transmitter	Piezoresistive (< 25 bar) thin film cell (≥ 25 bar)
Pressure resistance	G 1/4 A	G 1/8	G 1/2 A	G 1/2 B
Fluid temperature	-40 °C..+125 °C	-20 °C..70 °C	-20 °C..70 °C	-30 °C..+100 °C
Pressure resistance	2..3000 bar	4..280 bar	4..600 bar	1..1500 bar
Materials	Stainless steel	Stainless steel/Al ₂ O ₃	Stainless steel flush	Stainless steel
Messbereich	0..2000 bar	0..100 bar	0..400 bar	0..1500 bar
Switches & probes	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA
Applications	Hydraulics, pneumatics, e.g. industrial robots	Differential pressure measurement, e.g. chemical applications	Hydraulics, pneumatics, e.g. clamping devices	Hydraulics, pneumatics, e.g. machine tools
Additional notes	Plug M12x1 or DIN 43650A	Plug M12 x 1	Plug M12 x 1 or DIN 43650A	DIN EN 175301-803/A

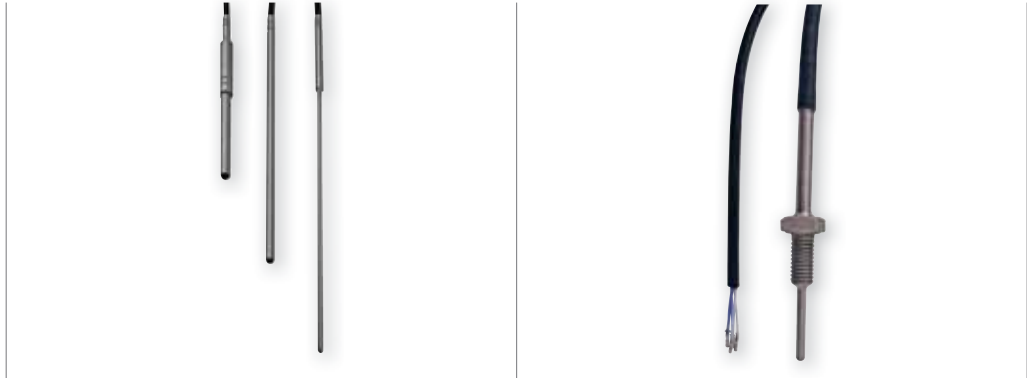


Temperature Switches and Temperature Meters for Oil Applications

				
Type	TF1	TR	ETS	FLEX-T/ OMNI-T
Principle	Bimetal switch	Membrane	PT 1000	PT 1000
Pressure resistance	G 1/2 A (G3/4A)	R 1/2"	G 1/2 A	G 1/4A G 1/2A T-Stück Lebensmittelfl. ISO 2852
Fluid temperature	-20 °C..+140 °C	-20 °C..+145 °C	0 °C..+100 °C/200 °C	0 °C..+100 °C/200 °C
Pressure resistance	100 bar	16 bar	25/100 bar	25/100 bar
Materials	Brass	Brass (stainless steel)	Stainless steel	Stainless steel
Switches/measurement area	40 °C..120 °C in 10°-steps	50 °C..130 °C adjustable via knob	0 °C..100 °C/200 °C	0 °C..100 °C/200 °C
Switches & probes	Bimetallic thermo switch Max. 250 VAC; max. 10 A	Microswitch 24..250 VAC; max. 8 A	Platinen Widerstandsfühler Output: 4..20 mA	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency
Applications	Temperature monitoring in machines and equipment		Temperature measurement e.g. container plant	
Additional notes	Normally open or normally closed contact Plug DIN 43650A or cable connection	Changer cable connection	Two conductors Plug M12 x 1 or DIN 43650A	programmable parameter Gooseneck design for difficult to reach places, Plug M12x1



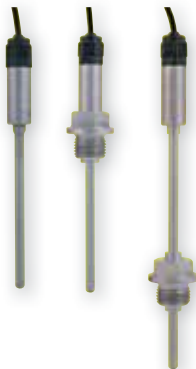
Temperature Sensor for Oil Applications



Type	GTF 101	GTF 102
Principle	Pt 100 / Pt 1000	Pt 100 / Pt 1000
Pressure resistance	Durchmesser: 3, 4, 5, 6, 8 mm	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1
Fluid temperature	-50 °C..+400 °C	-50 °C..+400 °C
Pressure resistance	-	10 - 200
Materials	Stainless steel	Stainless steel
Switches & probes	RTF Pt 100 / Pt 1000	RZF Pt 100 / Pt 1000
Applications	Temperature measurement: e.g. machinery, facilities, container, almost all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized Ex approval available 	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized neck tube optional Ex approval available



Temperature sensor for oil applications

		
Type	GTF 103	GTMU-IF 1 / -2 / -3
Principle	Pt 100 / Pt 1000	Pt 1000
Pressure resistance	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1	1/2", 1/4", 3/4", 1/8", 3/8", M8 x 1, M10 x 1, M14 x 1,5
Fluid temperature	-50 °C..+400 °C	-70 °C..+400 °C
Pressure resistance	10 - 200 bar	10 - 200 bar
Materials	Stainless steel	Stainless steel
Switches & probes	RTD Pt 100 / Pt 1000 Optional: Output: 4-20 mA or 0-10 V	Pt 1000 Output: 4-20 mA
Applications	Temperature measurement: e.g. machinery, equipment, container, all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ 2-, 3- or 4-wire possible ▪ cable length freely selectable ▪ neck tube optional ▪ exchangeable measuring insert optional ▪ double PT100 optional ▪ with Ex approval 	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ neck tube optional ▪ electrical connection M12 optional



Our International Area Sales Management Team



Mina Kamal
Teamleader Export

GHM GROUP – Headquarter
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 176 47626790
m.kamal@ghm-messtechnik.de

Area:
Africa, Arabic States, Israel,
Turkey, Greece, Switzerland,
Spain, Portugal

Language:
English, Arabic



Feifan Jin
Area Sales Manager

GHM GROUP – Martens
Kiebitzhörn 18
22885 Barsbüttel
GERMANY

Phone +49 172 8460512
fjin@ghm-messtechnik.de

Area:
China, Japan, South Korea,
South-East Asia, Australia

Language:
Chinese, German, English



Parimal Sharma
Area Sales Manager

GHM GROUP – Headquarter
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 151 112702283
p.sharma@ghm-messtechnik.de

Area:
Russia, East Europe, USA,
New Zealand

Language:
English, Hindi, German



Peter Wüster
Area Sales Manager

GHM GROUP – Headquarter
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 2191 9672-35
p.wuester@ghm-messtechnik.de

Area:
Scandinavia, UK, Ireland,
Belgium

Language:
German, English



Andrea Casati
Office Italy / Delta OHM S.r.l.

GHM Messtechnik GmbH
Via G. Marconi 5
35030 Caselle di Selvazzano
ITALY

Phone +39 049 8977150
a.casati@ghm-messtechnik.de

Area:
Italy

Language:
Italian, English

GHM Sales Subsidiaries & GHM Foreign Sales



Occo Andriessen
Managing Director



Netherlands

GHM Meettechniek BV
Zeeltweg 30
3755 KA Eemnes
NETHERLANDS

Phone +31 35 53805-40
Fax +31 35 53805-41
info@ghm-nl.com
www.ghm-nl.com



Michal Doubek
Managing Director



Czech Republic / Slovakia

GHM Greisinger s.r.o.
Ovci hájek 2 / 2153
158 00 Prague 5
Nove Butovice
CZECH REPUBLIC

Phone +420 251 613-828
Fax +420 251 612-607
info@greisinger.cz
www.greisinger.cz



Erling Mathiesen
Managing Director



Denmark

GHM Maaleteknik ApS
Maarslet Byvej 2
8320 Maarslet
DENMARK

Phone +45 646492-00
Fax +45 646492-01
info@ghm.dk
www.ghm.dk



Jan Grobler
Managing Director



South Africa

GHM Messtechnik
SA (PTY) Ltd
8320 Olivier Street
Verwoerdpark, Alberton 1453
SOUTH AFRICA

Phone +27 74 4590040
j.grobler@ghm-sa.co.za
www.ghm-sa.co.za



Alban Jouanillou
Managing Director



France

GHM GROUP France SAS
Parc des Pivoles,
9 Rue de Catalogne
69150 Décines-Charpieu (Lyon)
FRANCE

Phone +33 4 72 37 45 30
contact@ghm-group.fr
www.ghm-group.fr



Rafael Molina
Managing Director



Brazil

GHM Do Brasil Ltda
R. Comendador Tórlago
Dauntre, 74, cj 06
Cambuí, Campinas
SP, 13025-270
BRAZIL

Phone / Fax +55 19 3304 3408
r.molina@ghm-messtechnik.de
www.grupoghm.com.br



Mahendra Sule
Managing Director



India

GHM Messtechnik India Pvt Ltd.
209, Udyog Bhavan
Sonowala Road
Gregoaon (E)
Mumbai - 400 063
INDIA

Phone +91 22 40236235
info@ghmgroup.in
www.ghmgroup.in



Michaela Zavan
Site Manager



Italy

Delta OHM S.r.l.
Via Marconi 5
35030 Caselle di Selvazzano
Padova (PD)
ITALY

Phone +39 049 8977150
Fax +39 049 635596
info@deltaohm.com
www.deltaohm.com



Alessandro Perego
Managing Director



Italy

Valco srl
Via Rovereto 9/11
20014 S. Ilario di Nerviano
Milano (MI)
ITALY

Phone +39 0331 535920
Fax +39 0331 535442
valco@valco.it
www.valco.it



Alfred Fröstl
Area Sales Manager Austria

Austria

GHM Messtechnik GmbH
Breitenseer Straße 76/1/36
1140 Wien
AUSTRIA

Phone +43 660 7335603
a.froestl@ghm-messtechnik.de

Sales Germany



Sales Director
Germany & Austria

Thomas Stumpe

Mobile +49 172 4346882



Branch sales
Electronic & Automation Technology

Torsten Obermann

Mobile +49 172 4343551
t.obermann@ghm-messtechnik.de



Branch sales
Measurement Data Acquisition & Industrial electronics

Sebastian Behnke

Phone +49 40 67073-211
Mobile +49 151 12097947
s.behnke@ghm-messtechnik.de



Branch sales
Measurement Data Acquisition & Industrial electronics

Dieter Schubert

Mobile +49 151 12097415
d.schubert@ghm-messtechnik.de



NORTH Regional Sales Manager
17000 - 25999

Hans-Joachim Petermann

Phone +49 40 67998410
Mobile +49 172 4346881
h.petermann@ghm-messtechnik.de



WEST Regional Sales Manager
40000 - 41999
45000 - 50999
52000 - 52999

Jürgen Kersten

Phone +49 2152 8090795
Mobile +49 172 5298587
j.kersten@ghm-messtechnik.de



SOUTH Regional Sales Manager
70000 - 79999
88000 - 89999

Thomas Stumpe

Mobile +49 172 4346882
t.stumpe@ghm-messtechnik.de



NORTH Regional Sales Manager
29000 - 34999
37000 - 39999

Jörg Winter

Mobile +49 172 4346880
j.winter@ghm-messtechnik.de



WEST Regional Sales Manager
35000 - 36999 53000 - 53999
42000 - 42999 57000 - 59999
44000 - 44999
51000 - 51999

Stefan Müller

Phone +49 202 6093374
Mobile +49 171 4108173
s.mueller@ghm-messtechnik.de



SOUTH Junior Regional Sales Manager
80000 - 89000
94000 - 94999

Fabian Graf

Mobile +49 157 87131381
f.graf@ghm-messtechnik.de



NORTH Regional Sales Manager
00000-16999
98000-99999

Sebastian Behnke

Phone +49 40 67073-211
Mobile +49 151 12097947
s.behnke@ghm-messtechnik.de



WEST Regional Sales Manager
54000 - 56999
60000 - 60999
63000 - 69999

Christian Rösner

Mobile +49 151 12098192
c.roesner@ghm-messtechnik.de



SOUTH Regional Sales Manager
90000 - 93999
95000 - 97999

Dieter Schubert

Mobile +49 151 12097415
d.schubert@ghm-messtechnik.de

Our International Area Sales Management Team



Mina Kamal
Teamleader Export

GHM GROUP – Headquarter
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 176 47626790
m.kamal@ghm-messtechnik.de

Area:
Africa, Arabic States, Israel,
Turkey, Greece, Switzerland,
Spain, Portugal

Language:
English, Arabic



Feifan Jin
Area Sales Manager

GHM GROUP – Martens
Kiebitzhörn 18
22885 Barsbüttel
GERMANY

Phone +49 172 8460512
fjin@ghm-messtechnik.de

Area:
China, Japan, South Korea,
South-East Asia, Australia

Language:
Chinese, German, English



Parimal Sharma
Area Sales Manager

GHM GROUP – Headquarter
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 151 112702283
p.sharma@ghm-messtechnik.de

Area:
Russia, East Europe, USA,
New Zealand

Language:
English, Hindi, German



Peter Wüster
Area Sales Manager

GHM GROUP – Headquarter
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 2191 9672-35
p.wuester@ghm-messtechnik.de

Area:
Scandinavia, UK, Ireland,
Belgium

Language:
German, English



Andrea Casati
Office Italy / Delta OHM S.r.l.

GHM Messtechnik GmbH
Via G. Marconi 5
35030 Caselle di Selvazzano
ITALY

Phone +39 049 8977150
a.casati@ghm-messtechnik.de

Area:
Italy

Language:
Italian, English

GHM Sales Subsidiaries & GHM Foreign Sales



Occo Andriessen
Managing Director



Netherlands

GHM Meettechnik BV
Zeeltweg 30
3755 KA Eemnes
NETHERLANDS

Phone +31 35 53805-40
Fax +31 35 53805-41
info@ghm-nl.com
www.ghm-nl.com



Michal Doubek
Managing Director



Czech Republic / Slovakia

GHM Greisinger s.r.o.
Ovci hájek 2 / 2153
158 00 Prague 5
Nove Butovice
CZECH REPUBLIC

Phone +420 251 613-828
Fax +420 251 612-607
info@greisinger.cz
www.greisinger.cz



Erling Mathiesen
Managing Director



Denmark

GHM Maaleteknik ApS
Maarslet Byvej 2
8320 Maarslet
DENMARK

Phone +45 646492-00
Fax +45 646492-01
info@ghm.dk
www.ghm.dk



Jan Grobler
Managing Director



South Africa

GHM Messtechnik
SA (PTY) Ltd
16 Olivier Street
Verwoerdpark, Alberton 1453
SOUTH AFRICA

Phone +27 74 4590040
j.grobler@ghm-sa.co.za
www.ghm-sa.co.za



Alban Jouanillou
Managing Director



France

GHM GROUP France SAS
Parc des Pivoilles,
9 Rue de Catalogne
69150 Décines-Charpieu (Lyon)
FRANCE

Phone +33 4 72 37 45 30
contact@ghm-group.fr
www.ghm-group.fr



Rafael Molina
Managing Director



Brazil

GHM Do Brasil Ltda
R. Comendador Tórlago
Dauntre, 74, cj 06
Cambuí, Campinas
SP, 13025-270
BRAZIL

Phone / Fax +55 19 3304 3408
r.molina@ghm-messtechnik.de
www.grupoghm.com.br



Mahendra Sule
Managing Director



India

GHM Messtechnik India Pvt Ltd.
209, Udyog Bhavan
Sonowala Road
Gregaon (E)
Mumbai - 400 063
INDIA

Phone +91 22 40236235
info@ghmgroup.in
www.ghmgroup.in



Michaela Zavan
Site Manager



Italy

Delta OHM S.r.l.
Via Marconi 5
35030 Caselle di Selvazzano
Padova (PD)
ITALY

Phone +39 049 8977150
Fax +39 049 635596
info@deltaohm.com
www.deltaohm.com



Alessandro Perego
Managing Director



Italy

Valco srl
Via Rovereto 9/11
20014 S. Ilario di Nerviano
Milano (MI)
ITALY

Phone +39 0331 535920
Fax +39 0331 535442
valco@valco.it
www.valco.it



Alfred Fröstl
Area Sales Manager Austria

Sales

Austria

GHM Messtechnik GmbH
Breitenseer Straße 76/1/36
1140 Wien
AUSTRIA

Phone +43 660 7335603
a.froestl@ghm-messtechnik.de

contact us



Headquarter

GHM Messtechnik GmbH
GHM GROUP CORPORATE
 Tenter Weg 2-8
 42897 Remscheid | GERMANY
 Phone +49 2191 9672-0
 info@ghm-group.de
 www.ghm-group.de

Centers of Competences

GHM Messtechnik GmbH
GHM GROUP – Greisinger
 Hans-Sachs-Straße 26
 93128 Regenstein | GERMANY
 Phone +49 9402 9383-0
 info@greisinger.de | www.greisinger.de

GHM Messtechnik GmbH
GHM GROUP – Honsberg
 Tenter Weg 2-8
 42897 Remscheid | GERMANY

GHM Messtechnik GmbH
GHM GROUP – Martens
 Kiebitzhörn 18
 22885 Barsbüttel | GERMANY

GHM Messtechnik GmbH
GHM GROUP – Imtron
 Carl-Benz-Straße 11
 88696 Owingen | GERMANY

Delta OHM S.r.l. a socio unico
GHM GROUP – Delta OHM
 Via Marconi 5
 35030 Caselle di Selvazzano
 Padova (PD) | ITALY
 Phone +39 049 8977150
 info@deltaohm.com
 www.deltaohm.com

Valco srl
GHM GROUP – VAL.CO
 Via Rovereto 9/11
 20014 S. Ilario di Nerviano
 Milano (MI) | ITALY
 Phone +39 0331 53 59 20
 valco@valco.it
 www.valco.it

GHM GROUP International

Austria
 GHM Messtechnik GmbH
 Office Austria
 Breitenseer Str. 76/1/36
 1140 Vienna | AUSTRIA
 Phone +43 660 7335603
 a.froestl@ghm-messtechnik.de

Brazil & Latin America
 GHM Messtechnik do Brasil Ltda
 Av. José de Souza Campos, 1073, cj 06
 Campinas, SP
 13025 320 | BRAZIL
 Phone +55 19 3304 3408
 info@grupoghm.com.br

Czech Republic/Slovakia
 GHM Greisinger s.r.o.
 Ovcí hájek 2/2153
 158 00 Prague 5
 Nove Butovice | CZECH REPUBLIC
 Phone +420 251 613828
 Fax +420 251 612607
 info@greisinger.cz | www.greisinger.cz

Denmark
 GHM Maaleteknik ApS
 Maarslet Byvej 2
 8320 Maarslet | DENMARK
 Phone +45 646492-00
 Fax +45 646492-01
 info@ghm.dk | www.ghm.dk

France
 GHM GROUP France SAS
 Parc des Pivoles
 9 Rue de Catalogne
 69150 Décines-Charpieu (Lyon) | FRANCE
 Phone +33 4 72 37 45 30
 contact@ghm-group.fr

India
 GHM Messtechnik India Pvt Ltd.
 209 | Udyog Bhavan | Sonowala Road
 Gregaon (E) | Mumbai - 400 063
 INDIA
 Phone +91 22 40236235
 info@ghmgroup.in | www.ghmgroup.in

Italy for Greisinger & Delta OHM
 GHM GROUP – Delta OHM
 Via Marconi 5
 35030 Caselle di Selvazzano
 Padova (PD) | ITALY
 Phone +39 049 8977150
 a.casati@ghm-messtechnik.de

Italy for Honsberg, Martens, Valco
 GHM GROUP – Valco
 Via Rovereto 9/11
 20014 S. Ilario di Nerviano
 Milano (MI) | ITALY
 Phone +39 0331 53 59 20
 alessandro.perego@valco.it

Netherlands
 GHM Meettechnik BV
 Zeeltweg 30
 3755 KA Eemnes | NETHERLANDS
 Phone +31 35 53805-40
 Fax +31 35 53805-41
 info@ghm-nl.com | www.ghm-nl.com

South Africa
 GHM Messtechnik SA (Pty) Ltd
 16 Olivier Street
 Verwoerdpark, Alberton 1453
 SOUTH AFRICA
 Phone +27 74 4590040
 j.grobler@ghm-sa.co.za

**...and more than
 100 qualified distributors!**



Visit us at: www.ghm-group.de

Utilising synergies

With the merger of companies, we have greatly expanded our competence and can thus also offer optimal assistance and consultation in all matters relating to measuring, control, and closed-loop control technologies.

We are capable of offering a comprehensive product portfolio for requirements in the broadest range of segments:



Process measurement technology

Laboratory measurement technology

Industrial electronics / closed-loop control technology

Industrial measurement technology

Test stand measurement technology

Customer-specific developments

Quality from Germany

All products from GHM Messtechnik are developed and produced in Germany. Through the consolidation of companies, the product range has been expanded significantly. Renowned companies value the "Quality from Germany".

Our claim – Your benefit

As a specialist and complete measurement technology provider, we develop solutions tailored to our customers and markets which meet the highest demands in the industry.

Our locations



GREISINGER



HONSBERG



Martens



IMTRON



DeltaGHM



VAL.CO

Flexibility and Innovation

These two terms are an inseparable part of the success of GHM Messtechnik.
In addition to the extensive standard programme, tailored solutions are developed according to customer needs.



Altium 3D circuit board layout



Pressure testing up to 1000 bar



EMC cabins

GHM stands for ...

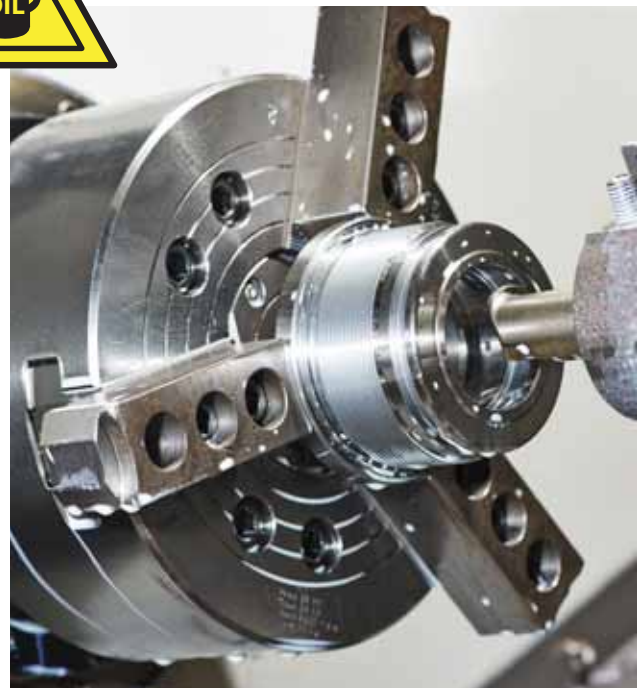
- Competence
- Quality
- Service

GHM devices for Oil Applications



Content

Flow	4
Temperature	7
Pressure	7
Fill level	8
Flow Measuring and Monitoring Devices for Oil Applications ..	10
Fill Level Measuring and Monitoring Equipment for Oil	13
Pressure Measuring and Monitoring Equipment for Oil	16
Temperature Switches and Meters for Oil Applications	18
Temperature Sensor for Oil Applications	19



GHM devices for oil applications

Oils are an important, precious and widely used medium in the fields of technology and chemistry. Consequently there are many different requirements in the metrological detection of variables such as flow rate, temperature, pressure and fill level in existence. The GHM Messtechnik GmbH produces sensors and transmitters for oil monitoring and measurement in various locations and advises clients with their measurement or monitoring requirements.

This brochure introduces most of our equipment for various oil applications, although other devices of the GHM portfolio can be deployed with equal success. Enquire at our offices, we advise you with pleasure.

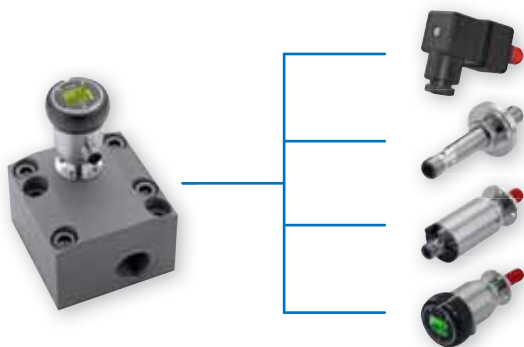
What is important for the different measured variables in regards of the medium oil?

Flow rate

With regard to oil, the viscosity of the medium must be taken into account first and foremost. When plants are operated with oils at different temperatures, the result is different viscosities of the same oil measured by the sensor. GHM offers different devices to take these variable requirements into account.

Volumetric Measuring Instruments (Gearwheel- or Screw measurement)

are primarily producing a pulse signal each time a specific volume has passed the instrument. It is easy to understand that these systems work nearly independently of viscosity. But you should keep an eye on the pressure losses at different viscosities.



*Gear sensor VHZ
with different transmitter electronics*



*Screw volume meter VHS
with different transmitter electronics*

The quoted volumetric devices of GHM are very precise mechanical systems with a system accuracy from 0.25 to 3% of the measured value. These devices are among the most accurate mechanical measuring systems for oil applications. High operating pressures (up to 350 bar) and large flow ranges from 0.04 to 2000 l/min allow use in a multitude of applications like:

- Central oil lubrication systems can be found at mills, paper machines, stone mills, etc.
- Central oil-cooling systems can be found in machine tool manufacturing
- Gear lubrication for harbor cranes, wind turbines, etc.
- Hydraulic actuators or workpiece holder
- Oil circulation in hardening systems
- Test stands for transmissions, engines



*Central lubrication system with GHM Honsberg flow meter,
Pressure sensors and temperature sensors.*



Stone mill in South Africa with large bearing operated via a central lubrication system. The oil volume is measured with VHS equipment of GHM.



Armature cylinder of a dredger. The extension path of the telescopic device is detected with a VHZ of GHM.

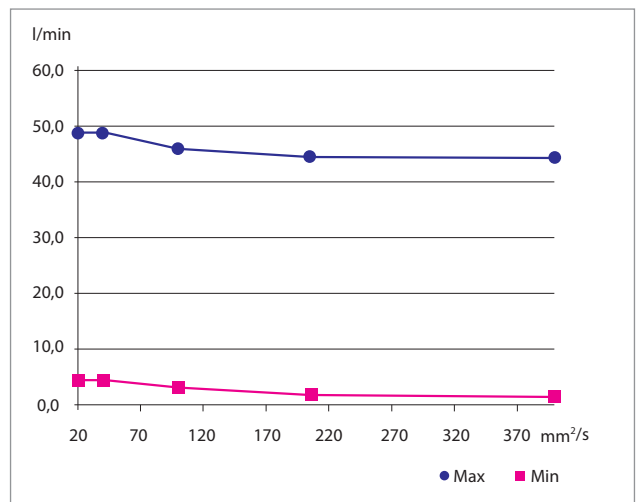
Viscosity-compensated piston devices(HD2 /HR2V /FW4V)

are part of the class of the spring-loaded float devices. These structurally modified devices are suitable for the oil monitoring. By utilising special pistons in the device, the friction effect of oil is almost completely eliminated.



Viscosity-compensated piston flow switch and piston meters, available with limit switches and microswitch heads (with ATEX approval) as well as different transmitters.

Viscosity compensation HD2K-025GM040



All of our systems are characterized by a high degree of robustness and long-term stability. The compact design allows installation in a variety of applications:

- Oil cooling of machine manufacturing tools
- Use in the agriculture area
- Flow monitoring in hydraulic systems

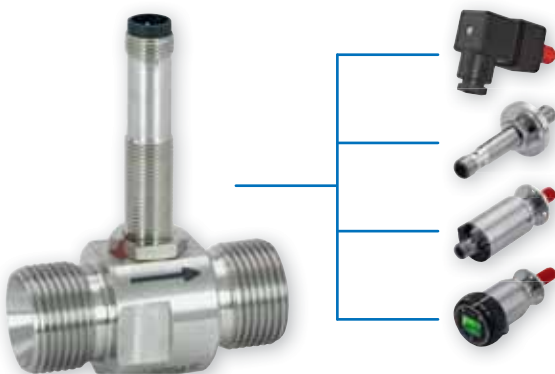


Piston flow switch FW4V for monitoring two flow direction; used in agriculture.

Turbines (RT)

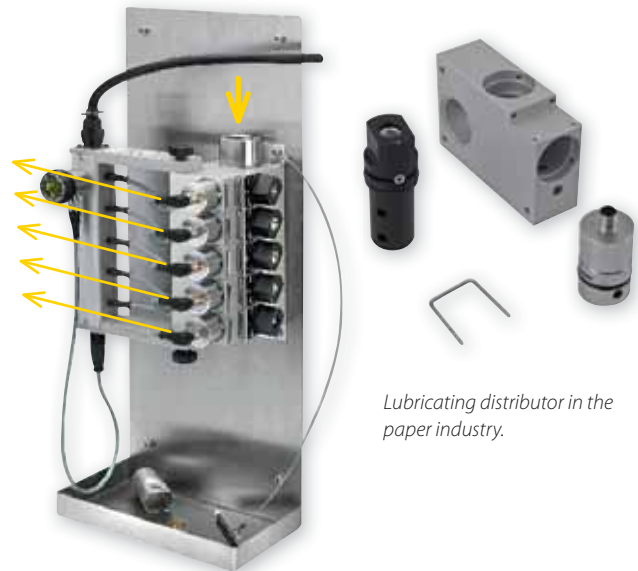
can also be used for oil flow measurements if the shift frequency characteristic in the measured value recording is taken into account. In this case the operating temperatures are recorded and the corresponding frequency conversion factors (K values) for calculation are used.

Since the characteristic of the turbine in the specified measuring range at different viscosities remains linear, the factor is constant in each case. However, the shifts of the minimum measured values (starting values) in their use in different viscosities have to be taken into account.



Oil distribution systems

As examples, oil distributors offer the possibility of operating a central line, multiple lubrication points and cooling conduits. We provide the necessary possibilities for many application requirements. Our experts will advise you.



Lubricating distributor in the paper industry.

Modular distribution panels (Type DIS)

enable up to 10 distribution channels, which is not uncommon for applications such as large paper machines. The individual strands can be set up and measured individually using a multiple coaxial valve. In bypass mode, the medium is deflected around the device in order to simplify the periodic service on the machine. The measurement device can be removed and checked without interrupting the necessary oil lubrication. The service can therefore be carried out during operation and avoids the stoppage of the machine.

Most significant sources of interference in the flow measurement of oils:

Ferritic abrasions are an undesirable component in the lubrication circuit and must be filtered out in the best possible manner.

Air penetration:

Good ventilation during commissioning without sack constructions, an airtight overall system and slow filling during commissioning are some of the most important preconditions for trouble-free operation.

Oil shocks:

Slow filling at the time of commissioning or after service tasks can prevent these dynamic forces on the sensor system.

Temperature

Different temperature sensors and -transmitters called PT100 or PT1000 sensors with corresponding transmitter electronics are available. A wide range of different versions with different pipe lengths, process adaption and protection fittings are tailor-made to satisfy the customer's specific application requirements.

The fact that reaction times for oil are slower than for water have to be taken into account. Measurements in flowing media can lead to a more rapid heat transfer, requiring an improvement of response times.



Various temperature transmitter designs

Temperature sensors in hydraulic applications up to 600 bar are not uncommon and can be offered in different versions.



Pressure

Pressure switches and transmitters

are utilised in oils with various technologies.

Mechanical switch systems:

spring-assisted

Mechanical pressure switches with pistons

are in use in all applications, where a break point is to be monitored. These devices do not require a power supply. The mechanical switches are capable of directly shifting higher currents and voltages.

The switching point is adjusted by the tensioning of a screw on a spring, which acts on the pressure piston or a membrane. In some devices the hysteresis can also be adjusted with an adjustment screw.

Mechanical pressure switch PH1. Setting of point and hysteresis.



Electronic switches and transmitter systems:

A thin film bridge is located on the pressure membrane or on a silicon substrate with capillary drill holes and oil reservoir to a flush stainless steel diaphragm.

The sensors can be subdivided into absolute pressure sensors, relative pressure sensors and differential pressure sensors. All of these sensors are available with a display and programmable switches.

Electronic pressure switches or transmitters

are installed where exact values are to be recorded and where a smaller hysteresis is desired, like in mechanical switches. Proportional output signals such as 4-20 mA or 0..10 V can be electronically selected.

The transducers are temperature-compensated and work very quickly because of their small mass. Thanks to their rugged construction, vibrations and rapid pressure changes do not have a significant negative influence on the sensors.



Pressure sensors in different designs

Fill levels

Different viscosities and densities of different oils must be taken into account. For level measurement of oil, in oil, and in lubrication and cooling systems, ferritic abrasion deposits often accumulate in the tanks and must be reduced with filtering systems using devices with magnets (e.g. by magnetic separator).

In bearing lubrication, temperatures of up to 100 °C or higher can be reached, which restricts the choice of the level switch or measurement systems. GHM offers various fill level switches and fill level measurement systems.

Please contact us for further information.

Float transducers

are installed from above or from the side of the tank. They are designed as a bent lever version or straight version. Float systems are available with fixed or programmable switch points or as continuous level transmitters. Special versions can be equipped with filling pipes, or with an additional temperature sensor. Bent lever versions can also be installed to measure highly viscous media if the pivot point is not placed in the liquid.



Level float systems in bent lever version or straight version.

Capacitive systems

4..20 mA or 0..10 V transmitters with a programmable switch with temperature monitoring at GDM are designed so that extremely precise fill level readings are achieved, even with changing oil qualities (capacitive absolute values change with different permeability in new and used oils).

The transducers have no moving parts. Version LCC1 is a measuring device that can be used in shallow oil pans where small losses must be detected. Large fluctuations on the oil surface are taken into account with a high, programmable mean average value, or with cushioning pipes (surge pipes).



A special kind of capacitive limit detection

The MLC switch family works with a particularly high frequency method and enables absolute measurement of the dielectric constant. As a result, a distinction between air and liquid and between aggregate states is possible. The type of liquid can also be determined.

High-quality materials enable the operation in aggressive oils or emulsions. Different designs allow for special requirements with regard to mounting, wiring or signal output. These instruments are sealed directly at the top without additional sealant.

Contact our specialists for advice.



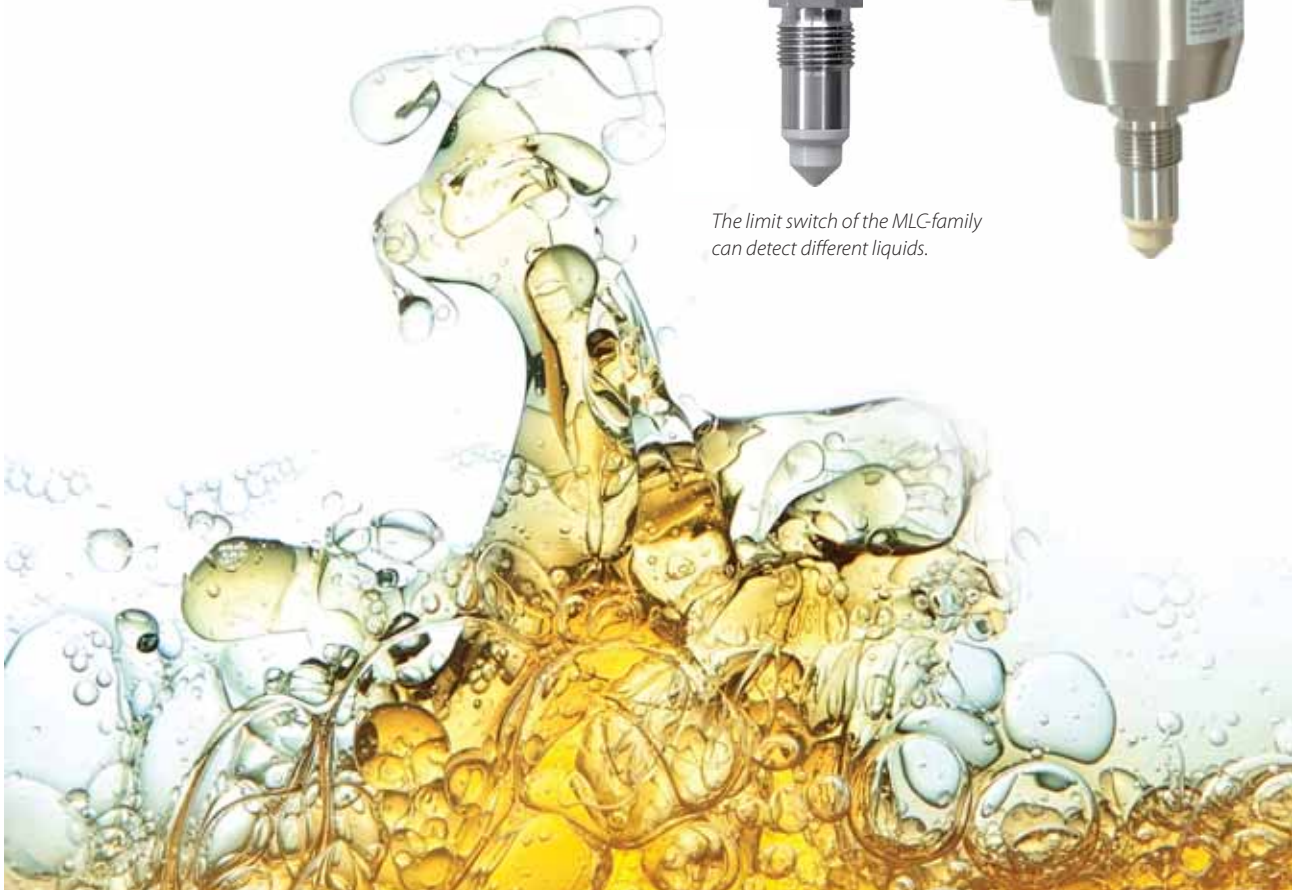
Capacitive level System LLC

Application examples:




- Oil level measurement in compressors, motors or transmissions
- Oil pans with sharp fluctuations of oil



The limit switch of the MLC-family can detect different liquids.



Flow Measuring and Monitoring Devices for Oil Applications




			
Type	HD2	HR2V	NJV
Principle	Piston	Piston	Piston
Connection diameter	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1	G 1 ¹ / ₄ G1 ¹ / ₂ G2	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1
Pressure resistance	200 bar	200 bar	100 bar
Materials	Brass/stainless steel	Brass/steel on demand	Brass/steel
Area	Switching 0.5..60 l/min Measure 0.1..80 l/min	Switching 10..120 l/min Measure 5..160 l/min	Switching and display 2..60 l/min
Switches & probes	Reed switch 250 VAC 1.5 A 50 VA Microswitch 250 VAC 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 1.5 A 50 VA OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 0.5 A 10 VA K1: changer with red LED display K2: switch without LED display K3: changer with red/green LED display
Applications	Measurement and monitoring in mechanical engineering and plant manufacturing, e.g. cooling of machine tools.		Monitoring and display in lubrication systems.
Additional notes	All versions with analog flow indicators of type 01 or Z1 are optionally available; lower pressure drop as volumetric measurement.		Adaptable on manifold block VB









		
Type	VHZ	VHS
Principle	Gear	Screws
Connection diameter	G 1/4 G 3/8 G 3/4 G1	G1 G1 1/4 G1 1/2 G2 G2 1/2
Pressure resistance	100/160/200 bar	160/350 bar
Fluid temperature	-25 °C...+80 °C	-25 °C...+80 °C (150 °C)
Materials	Steel/aluminium	Steel/aluminium
Measuring range	0.02..150 l/min	1.5..2500 l/min
Switches & probes	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>
Applications	Tool cooling (with oil), oil lubrication, hydraulic tensioners, hydraulic position measurements, chuck monitoring, position control, lubricant monitoring	Central lubrication systems, test stands, lubricant monitoring
Additional notes	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) 3 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) <1 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear

Flow Measurement and Monitoring Devices for Oil Applications

			
Type	VB	VB2	DIS
Principle	Oil distributor for piston devices with control valve	Oil / water distribution for piston devices with control valve	Oil distributor (<math><100\text{ mm}^2/\text{s}</math>) with integrated flow sensor (dynamic diaphragm)
Connection diameter	Intake: Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Intake G2 Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Expiration: G $\frac{3}{8}$
Pressure resistance	25 bar	16 bar	16 bar
Fluid temperature	-20 °C..+110 °C	-20 °C..+110 °C	-20 °C..+80 °C
Materials	Aluminium & brass/stainless steel	Aluminium & brass/stainless steel	Aluminium & stainless steel
Area	Switching and displays 2..60 l/min	Switching 10..120 l/min Measuring 5..160 l/min	Switching and displays 2..60 l/min
Switches & probes	Reed switch 250 VAC, 0.5 A, 10 VA K1: changer with red LED display K2: changer without LED display K3: changer with red/green LED display	Reed switch 250 VAC, 1.5 A, 50 VA Microswitch 250 VAC, 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	Monitoring and distribution used in mechanical and plant engineering e.g. of lubricant	Measurement and monitoring used in mechanical and plant engineering e.g. cooling of machine	Measurement and monitoring of highly viscous media, for example for printing machines
Additional notes	Combined with NJV and other inline piston devices, optionally 1-8 measurement points	Combined with HD2, HR2V and other inline piston devices 8 measurement points	Bypass valve allows maintenance without downtime, optionally 1-10 measurement points, no RoHS

For further information, please refer to our brochures or visit www.ghm-messtechnik.de

Level Measurement and Monitoring Equipment for Oil

				
Type	RW	RWI	NM	SB
Principle	Float lever - Articulated lever	Float lever - Articulated lever	Float lever	Float lever
Mounting	Horizontal mounting 1/2" 13UNC or NPT 1/2"	Horizontal mounting M 16 x 1.5	Vertical mounting G 1/8 A or G 1/4 A from above or from below	Vertical mounting G 1 A Cover mounting
Fluid temperature	-20 °C..+70 °C	-20 °C..+70 °C	-20 °C..+55 °C	-20 °C..+105 °C
Pressure resistance	5/6 bar	PP: 3 bar, PVDF: 6 bar	30/40 bar	12 bar
Materials	Stainless steel	PP or PVDF	Stainless steel	Brass NBR
Area	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact 100..500 mm
Switches & probes	Reed switch 300 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 70 VA	Reed switch 250 VAC 1 A 80 VA
Applications	Lateral monitoring in reservoirs e.g. as minimum and maximum monitoring in e.g. refrigeration systems		Vessel monitoring e.g. lubrication systems	
Additional notes	Density from 0.7 g/cm ³ , no ferritic particles	Density: PP from 0.6 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.7 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.35 g/cm ³ , no ferritic particles



Level Measurement and Monitoring Equipment for Oil

			
Type	MLC422	MLC430 / MLC433 / MLC437	LCC1
Principle	Capacitive	Capacitive	Capacitive
Mounting	G 1/2	G 1/2	Horizontal 3-hole flange D 54
Fluid temperature	-20 °C..+100 °C	-20 °C..+100 °C	-20 °C..+85 °C
Pressure resistance	10 bar	10 bar	5 bar
Materials	Stainless steel/PEEK	Stainless steel/PEEK	Brass/FR4
Area	1..175 Dk	1..175 Dk	0..18 mm
Switches & probes	1 transistor switching output	MLC430: 2 transistor switching output MLC433: 2 transistor switching output, 4..20 mA analogous output MLC437: Display, 2 transistor switching output, 4..20 mA analogous output	
Applications	Level detection with no moving parts	Level detection with no moving parts, detecting of oil and water phases	e.g. for oil reservoir in lubrication systems, motor oil monitoring
Additional notes	Plug M12	Plug M12	For shallow containers with overheating warning, oil level check and with restless filling levels by programmable attenuation



			
Type	LCC2	Vectis	LC
Principle	Capacitive	Float - hinged lever	Float - reed chain
Mounting	Vertical 4 hole flange D 75 or thread G1A	Horizontal 3 hole flansch D54	Vertical thread G1A G1 1/2A G2A
Fluid temperature	-20 °C..+85 °C (100 °C)	-20 °C..+85 °C (150 °C)	-20 °C..+105 °C
Pressure resistance	5 bar	3 bar	10 bar
Materials	Brass/FR4	Brass/NBR	Brass/NBR
Area	0..600 mm	0..1000 mm	0..2000 mm
Switches & probes	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	e.g. for oil tank in lubrication systems, motor monitoring		
Additional notes	Optional stillpipe	Suitable for flat containers, no ferritic particles	For low viscous, no ferritic particles



Pressure – Measurement and Monitoring Equipment for Oil


				
Type	FLEX-P/OMNI-P	PM1	PH1	PAS
Principle	Thin film sensor with transmitter	Diaphragm/piston	Diaphragm/piston	Piston
Pressure resistance	G 1/2 A	G 1/8 A R 1/8 A G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/8 A R 1/4 G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/2 A R 1/4 M10x1 NPT 1/4" G 1/4 Flansch ISO 163873
Fluid temperature	-20 °C..70 °C (120 °C)	-10 °C..+80 °C (100 °C)	-20 °C..+80 °C (100 °C)	-10 °C..+80 °C (100 °C)
Pressure resistance	4..600 bar	60/350 bar	60/350 bar	350 bar
Materials	Stainless steel	Galvanised steel or stainless steel	Galvanised steel or stainless steel	Die-cast zinc/aluminium
Messbereich	0..400 bar	-0.85..320 bar	-0.85..320 bar	10..320 bar
Switches & probes	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency	Mechanical changer 2A (1A) 250 VAC	Mechanical changer 4A (2A) 250 VAC	Mechanical changer 6A (2A) 250 VAC
Applications	Hydraulics, pneumatics, e.g. clamping devices	Pressure monitoring in hydraulic applications such as testing		
Additional notes	Programmable parameter plug M12 x 1	Switching point is adjustable. Sealing materials: NBR or FKM or EPDM	Switching point and hysteresis are adjustable. Sealing materials: NBR or FKM or EPDM	The switching point can be easily adjusted via a thumbscrew. Seal materials: NBR or FKM or EPDM



				
Type	EPS2	EDP1	EPS	S10 / S11
Principle	Thin film sensor with transmitter	Ceramic thick film sensor with transmitter	Thin film sensor with transmitter	Piezoresistive (< 25 bar) thin film cell (>= 25 bar)
Pressure resistance	G 1/4 A	G 1/8	G 1/2 A	G 1/2B
Fluid temperature	-40 °C..+125 °C	-20 °C..70 °C	-20 °C..70 °C	-30 °C..+100 °C
Pressure resistance	2,4..3000 bar	4..280 bar	4..600 bar	1..1500 bar
Materials	Stainless steel	Stainless steel/Al ₂ O ₃	Stainless steel flush	Stainless steel
Messbereich	0..2000 bar	0..100 bar	0..400 bar	0..1500 bar
Switches & probes	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA
Applications	Hydraulics, pneumatics, e.g. industrial robots	Differential pressure measurement, e.g. chemical applications	Hydraulics, pneumatics, e.g. clamping devices	Hydraulics, pneumatics, e.g. machine tools
Additional notes	Plug M12x1 or DIN 43650A	Plug M12 x 1	Plug M12 x 1 or DIN 43650A	DIN EN 175301-803/A

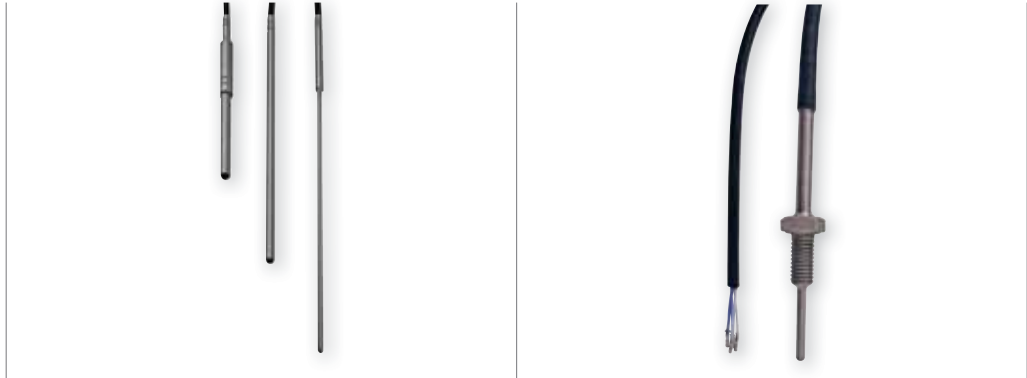


Temperature Switches and Temperature Meters for Oil Applications

				
Type	TF1	TR	ETS	FLEX-T/ OMNI-T
Principle	Bimetal switch	Membrane	PT 1000	PT 1000
Pressure resistance	G 1/2 A (G3/4A)	R 1/2"	G 1/2 A	G 1/4A G 1/2A T-Stück Lebensmittelfl. ISO 2852
Fluid temperature	-20 °C..+140 °C	-20 °C..+145 °C	0 °C..+100 °C/200 °C	0 °C..+100 °C/200 °C
Pressure resistance	100 bar	16 bar	25/100 bar	25/100 bar
Materials	Brass	Brass (stainless steel)	Stainless steel	Stainless steel
Switches/measurement area	40 °C..120 °C in 10°-steps	50 °C..130 °C adjustable via knob	0 °C..100 °C/200 °C	0 °C..100 °C/200 °C
Switches & probes	Bimetallic thermo switch Max. 250 VAC; max. 10 A	Microswitch 24..250 VAC; max. 8 A	Platinen Widerstandsfühler Output: 4..20 mA	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency
Applications	Temperature monitoring in machines and equipment		Temperature measurement e.g. container plant	
Additional notes	Normally open or normally closed contact Plug DIN 43650A or cable connection	Changer cable connection	Two conductors Plug M12 x 1 or DIN 43650A	programmable parameter Gooseneck design for difficult to reach places, Plug M12x1



Temperature Sensor for Oil Applications



Type	GTF 101	GTF 102
Principle	Pt 100 / Pt 1000	Pt 100 / Pt 1000
Pressure resistance	Durchmesser: 3, 4, 5, 6, 8 mm	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1
Fluid temperature	-50 °C..+400 °C	-50 °C..+400 °C
Pressure resistance	-	10 - 200
Materials	Stainless steel	Stainless steel
Switches & probes	RTF Pt 100 / Pt 1000	RZF Pt 100 / Pt 1000
Applications	Temperature measurement: e.g. machinery, facilities, container, almost all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized Ex approval available 	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized neck tube optional Ex approval available



Temperature sensor for oil applications

		
Type	GTF 103	GTMU-IF 1 / -2 / -3
Principle	Pt 100 / Pt 1000	Pt 1000
Pressure resistance	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1	1/2", 1/4", 3/4", 1/8", 3/8", M8 x 1, M10 x 1, M14 x 1,5
Fluid temperature	-50 °C..+400 °C	-70 °C..+400 °C
Pressure resistance	10 - 200 bar	10 - 200 bar
Materials	Stainless steel	Stainless steel
Switches & probes	RTD Pt 100 / Pt 1000 Optional: Output: 4-20 mA or 0-10 V	Pt 1000 Output: 4-20 mA
Applications	Temperature measurement: e.g. machinery, equipment, container, all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ 2-, 3- or 4-wire possible ▪ cable length freely selectable ▪ neck tube optional ▪ exchangeable measuring insert optional ▪ double PT100 optional ▪ with Ex approval 	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ neck tube optional ▪ electrical connection M12 optional



Sales Germany



Sales Director
Germany & Austria

Thomas Stumpe

Mobile +49 172 4346882



Branch sales
Electronic & Automation Technology

Torsten Obermann

Mobile +49 172 4343551
t.obermann@ghm-messtechnik.de



Branch sales
Measurement Data Acquisition & Industrial electronics

Sebastian Behnke

Phone +49 40 67073-211
Mobile +49 151 12097947
s.behnke@ghm-messtechnik.de



Branch sales
Measurement Data Acquisition & Industrial electronics

Dieter Schubert

Mobile +49 151 12097415
d.schubert@ghm-messtechnik.de



NORTH Regional Sales Manager
17000 - 25999

Hans-Joachim Petermann

Phone +49 40 67998410
Mobile +49 172 4346881
h.petermann@ghm-messtechnik.de



WEST Regional Sales Manager
40000 - 41999
45000 - 50999
52000 - 52999

Jürgen Kersten

Phone +49 2152 8090795
Mobile +49 172 5298587
j.kersten@ghm-messtechnik.de



SOUTH Regional Sales Manager
70000 - 79999
88000 - 89999

Thomas Stumpe

Mobile +49 172 4346882
t.stumpe@ghm-messtechnik.de



NORTH Regional Sales Manager
29000 - 34999
37000 - 39999

Jörg Winter

Mobile +49 172 4346880
j.winter@ghm-messtechnik.de



WEST Regional Sales Manager
35000 - 36999 53000 - 53999
42000 - 42999 57000 - 59999
44000 - 44999
51000 - 51999

Stefan Müller

Phone +49 202 6093374
Mobile +49 171 4108173
s.mueller@ghm-messtechnik.de



SOUTH Junior Regional Sales Manager
80000 - 89000
94000 - 94999

Fabian Graf

Mobile +49 157 87131381
f.graf@ghm-messtechnik.de



NORTH Regional Sales Manager
00000-16999
98000-99999

Sebastian Behnke

Phone +49 40 67073-211
Mobile +49 151 12097947
s.behnke@ghm-messtechnik.de



WEST Regional Sales Manager
54000 - 56999
60000 - 60999
63000 - 69999

Christian Rösner

Mobile +49 151 12098192
c.roesner@ghm-messtechnik.de



SOUTH Regional Sales Manager
90000 - 93999
95000 - 97999

Dieter Schubert

Mobile +49 151 12097415
d.schubert@ghm-messtechnik.de

contact us



Headquarter

GHM Messtechnik GmbH
GHM GROUP CORPORATE
 Tenter Weg 2-8
 42897 Remscheid | GERMANY
 Phone +49 2191 9672-0
 info@ghm-group.de
 www.ghm-group.de

Centers of Competences

GHM Messtechnik GmbH
GHM GROUP – Greisinger
 Hans-Sachs-Straße 26
 93128 Regensburg | GERMANY
 Phone +49 9402 9383-0
 info@greisinger.de | www.greisinger.de

GHM Messtechnik GmbH
GHM GROUP – Honsberg
 Tenter Weg 2-8
 42897 Remscheid | GERMANY

GHM Messtechnik GmbH
GHM GROUP – Martens
 Kiebitzhörn 18
 22885 Barsbüttel | GERMANY

GHM Messtechnik GmbH
GHM GROUP – Imtron
 Carl-Benz-Straße 11
 88696 Owingen | GERMANY

Delta OHM S.r.l. a socio unico
GHM GROUP – Delta OHM
 Via Marconi 5
 35030 Caselle di Selvazzano
 Padova (PD) | ITALY
 Phone +39 049 8977150
 info@deltaohm.com
 www.deltaohm.com

Valco srl
GHM GROUP – VAL.CO
 Via Rovereto 9/11
 20014 S. Ilario di Nerviano
 Milano (MI) | ITALY
 Phone +39 0331 53 59 20
 valco@valco.it
 www.valco.it

GHM GROUP International

Austria
 GHM Messtechnik GmbH
 Office Austria
 Breitenseer Str. 76/1/36
 1140 Vienna | AUSTRIA
 Phone +43 660 7335603
 a.froestl@ghm-messtechnik.de

Brazil & Latin America
 GHM Messtechnik do Brasil Ltda
 Av. José de Souza Campos, 1073, cj 06
 Campinas, SP
 13025 320 | BRAZIL
 Phone +55 19 3304 3408
 info@grupoghm.com.br

Czech Republic/Slovakia
 GHM Greisinger s.r.o.
 Ovcí hájek 2/2153
 158 00 Prague 5
 Nove Butovice | CZECH REPUBLIC
 Phone +420 251 613828
 Fax +420 251 612607
 info@greisinger.cz | www.greisinger.cz

Denmark
 GHM Maaleteknik ApS
 Maarslet Byvej 2
 8320 Maarslet | DENMARK
 Phone +45 646492-00
 Fax +45 646492-01
 info@ghm.dk | www.ghm.dk

France
 GHM GROUP France SAS
 Parc des Pivoles
 9 Rue de Catalogne
 69150 Décines-Charpieu (Lyon) | FRANCE
 Phone +33 4 72 37 45 30
 contact@ghm-group.fr

India
 GHM Messtechnik India Pvt Ltd.
 209 | Udyog Bhavan | Sonowala Road
 Gregaon (E) | Mumbai - 400 063
 INDIA
 Phone +91 22 40236235
 info@ghmgroup.in | www.ghmgroup.in

Italy for Greisinger & Delta OHM
 GHM GROUP – Delta OHM
 Via Marconi 5
 35030 Caselle di Selvazzano
 Padova (PD) | ITALY
 Phone +39 049 8977150
 a.casati@ghm-messtechnik.de

Italy for Honsberg, Martens, Valco
 GHM GROUP – Valco
 Via Rovereto 9/11
 20014 S. Ilario di Nerviano
 Milano (MI) | ITALY
 Phone +39 0331 53 59 20
 alessandro.perego@valco.it

Netherlands
 GHM Meettechnik BV
 Zeeltweg 30
 3755 KA Eemnes | NETHERLANDS
 Phone +31 35 53805-40
 Fax +31 35 53805-41
 info@ghm-nl.com | www.ghm-nl.com

South Africa
 GHM Messtechnik SA (Pty) Ltd
 16 Olivier Street
 Verwoerdpark, Alberton 1453
 SOUTH AFRICA
 Phone +27 74 4590040
 j.grobler@ghm-sa.co.za

**...and more than
 100 qualified distributors!**



Visit us at: www.ghm-group.de

Utilising synergies

With the merger of companies, we have greatly expanded our competence and can thus also offer optimal assistance and consultation in all matters relating to measuring, control, and closed-loop control technologies.

We are capable of offering a comprehensive product portfolio for requirements in the broadest range of segments:



Process measurement technology

Laboratory measurement technology

Industrial electronics / closed-loop control technology

Industrial measurement technology

Test stand measurement technology

Customer-specific developments

Quality from Germany

All products from GHM Messtechnik are developed and produced in Germany. Through the consolidation of companies, the product range has been expanded significantly. Renowned companies value the "Quality from Germany".

Our claim – Your benefit

As a specialist and complete measurement technology provider, we develop solutions tailored to our customers and markets which meet the highest demands in the industry.

Our locations



GREISINGER



HONSBERG



Martens



IMTRON



DeltaGHM



VAL.CO

Flexibility and Innovation

These two terms are an inseparable part of the success of GHM Messtechnik.
In addition to the extensive standard programme, tailored solutions are developed according to customer needs.



Altium 3D circuit board layout



Pressure testing up to 1000 bar



EMC cabins

GHM stands for ...

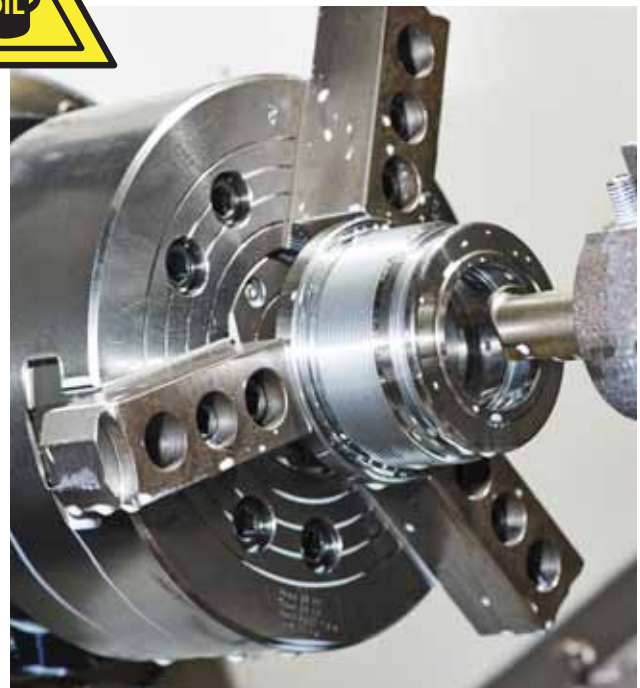
- Competence
- Quality
- Service

GHM devices for Oil Applications



Content

Flow	4
Temperature	7
Pressure	7
Fill level	8
Flow Measuring and Monitoring Devices for Oil Applications ..	10
Fill Level Measuring and Monitoring Equipment for Oil	13
Pressure Measuring and Monitoring Equipment for Oil	16
Temperature Switches and Meters for Oil Applications	18
Temperature Sensor for Oil Applications	19



GHM devices for oil applications

Oils are an important, precious and widely used medium in the fields of technology and chemistry. Consequently there are many different requirements in the metrological detection of variables such as flow rate, temperature, pressure and fill level in existence. The GHM Messtechnik GmbH produces sensors and transmitters for oil monitoring and measurement in various locations and advises clients with their measurement or monitoring requirements.

This brochure introduces most of our equipment for various oil applications, although other devices of the GHM portfolio can be deployed with equal success. Enquire at our offices, we advise you with pleasure.

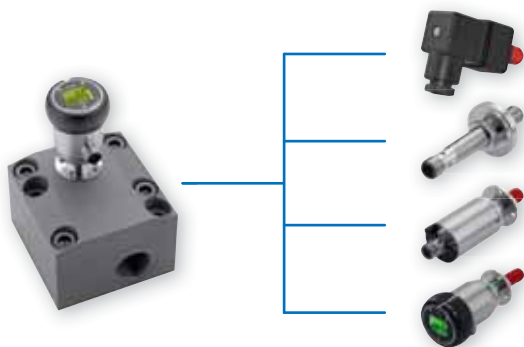
What is important for the different measured variables in regards of the medium oil?

Flow rate

With regard to oil, the viscosity of the medium must be taken into account first and foremost. When plants are operated with oils at different temperatures, the result is different viscosities of the same oil measured by the sensor. GHM offers different devices to take these variable requirements into account.

Volumetric Measuring Instruments (Gearwheel- or Screw measurement)

are primarily producing a pulse signal each time a specific volume has passed the instrument. It is easy to understand that these systems work nearly independently of viscosity. But you should keep an eye on the pressure losses at different viscosities.



*Gear sensor VHZ
with different transmitter electronics*



*Screw volume meter VHS
with different transmitter electronics*

The quoted volumetric devices of GHM are very precise mechanical systems with a system accuracy from 0.25 to 3% of the measured value. These devices are among the most accurate mechanical measuring systems for oil applications. High operating pressures (up to 350 bar) and large flow ranges from 0.04 to 2000 l/min allow use in a multitude of applications like:

- Central oil lubrication systems can be found at mills, paper machines, stone mills, etc.
- Central oil-cooling systems can be found in machine tool manufacturing
- Gear lubrication for harbor cranes, wind turbines, etc.
- Hydraulic actuators or workpiece holder
- Oil circulation in hardening systems
- Test stands for transmissions, engines



*Central lubrication system with GHM Honsberg flow meter,
Pressure sensors and temperature sensors.*



Stone mill in South Africa with large bearing operated via a central lubrication system. The oil volume is measured with VHS equipment of GHM.



Armature cylinder of a dredger. The extension path of the telescopic device is detected with a VHZ of GHM.

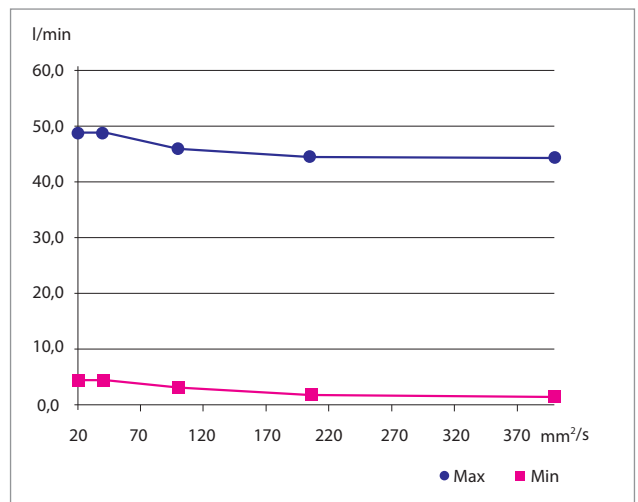
Viscosity-compensated piston devices(HD2 /HR2V /FW4V)

are part of the class of the spring-loaded float devices. These structurally modified devices are suitable for the oil monitoring. By utilising special pistons in the device, the friction effect of oil is almost completely eliminated.



Viscosity-compensated piston flow switch and piston meters, available with limit switches and microswitch heads (with ATEX approval) as well as different transmitters.

Viscosity compensation HD2K-025GM040



All of our systems are characterized by a high degree of robustness and long-term stability. The compact design allows installation in a variety of applications:

- Oil cooling of machine manufacturing tools
- Use in the agriculture area
- Flow monitoring in hydraulic systems

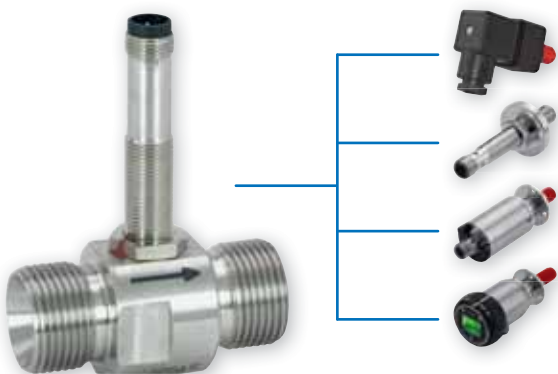


Piston flow switch FW4V for monitoring two flow direction; used in agriculture.

Turbines (RT)

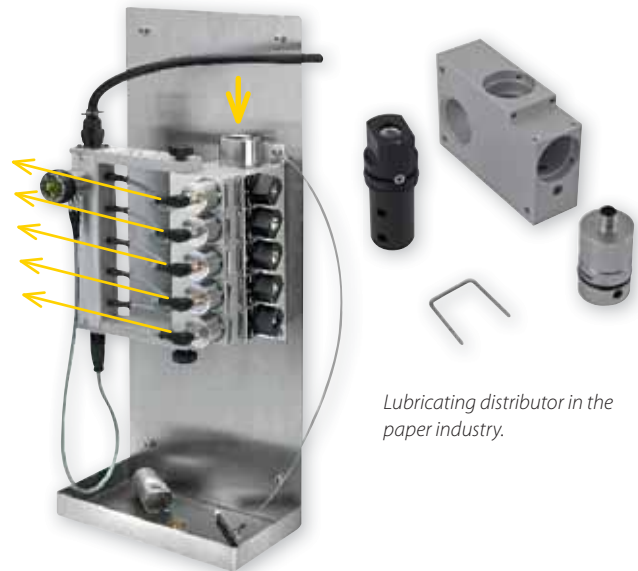
can also be used for oil flow measurements if the shift frequency characteristic in the measured value recording is taken into account. In this case the operating temperatures are recorded and the corresponding frequency conversion factors (K values) for calculation are used.

Since the characteristic of the turbine in the specified measuring range at different viscosities remains linear, the factor is constant in each case. However, the shifts of the minimum measured values (starting values) in their use in different viscosities have to be taken into account.



Oil distribution systems

As examples, oil distributors offer the possibility of operating a central line, multiple lubrication points and cooling conduits. We provide the necessary possibilities for many application requirements. Our experts will advise you.



Lubricating distributor in the paper industry.

Modular distribution panels (Type DIS)

enable up to 10 distribution channels, which is not uncommon for applications such as large paper machines. The individual strands can be set up and measured individually using a multiple coaxial valve. In bypass mode, the medium is deflected around the device in order to simplify the periodic service on the machine. The measurement device can be removed and checked without interrupting the necessary oil lubrication. The service can therefore be carried out during operation and avoids the stoppage of the machine.

Most significant sources of interference in the flow measurement of oils:

Ferritic abrasions are an undesirable component in the lubrication circuit and must be filtered out in the best possible manner.

Air penetration:

Good ventilation during commissioning without sack constructions, an airtight overall system and slow filling during commissioning are some of the most important preconditions for trouble-free operation.

Oil shocks:

Slow filling at the time of commissioning or after service tasks can prevent these dynamic forces on the sensor system.

Temperature

Different temperature sensors and -transmitters called PT100 or PT1000 sensors with corresponding transmitter electronics are available. A wide range of different versions with different pipe lengths, process adaption and protection fittings are tailor-made to satisfy the customer's specific application requirements.

The fact that reaction times for oil are slower than for water have to be taken into account. Measurements in flowing media can lead to a more rapid heat transfer, requiring an improvement of response times.



Various temperature transmitter designs

Temperature sensors in hydraulic applications up to 600 bar are not uncommon and can be offered in different versions.



Pressure

Pressure switches and transmitters

are utilised in oils with various technologies.

Mechanical switch systems:

spring-assisted

Mechanical pressure switches with pistons

are in use in all applications, where a break point is to be monitored. These devices do not require a power supply. The mechanical switches are capable of directly shifting higher currents and voltages.

The switching point is adjusted by the tensioning of a screw on a spring, which acts on the pressure piston or a membrane. In some devices the hysteresis can also be adjusted with an adjustment screw.

Mechanical pressure switch PH1. Setting of point and hysteresis.



Electronic switches and transmitter systems:

A thin film bridge is located on the pressure membrane or on a silicon substrate with capillary drill holes and oil reservoir to a flush stainless steel diaphragm.

The sensors can be subdivided into absolute pressure sensors, relative pressure sensors and differential pressure sensors. All of these sensors are available with a display and programmable switches.

Electronic pressure switches or transmitters

are installed where exact values are to be recorded and where a smaller hysteresis is desired, like in mechanical switches. Proportional output signals such as 4-20 mA or 0..10 V can be electronically selected.

The transducers are temperature-compensated and work very quickly because of their small mass. Thanks to their rugged construction, vibrations and rapid pressure changes do not have a significant negative influence on the sensors.



Pressure sensors in different designs

Fill levels

Different viscosities and densities of different oils must be taken into account. For level measurement of oil, in oil, and in lubrication and cooling systems, ferritic abrasion deposits often accumulate in the tanks and must be reduced with filtering systems using devices with magnets (e.g. by magnetic separator).

In bearing lubrication, temperatures of up to 100 °C or higher can be reached, which restricts the choice of the level switch or measurement systems. GHM offers various fill level switches and fill level measurement systems.

Please contact us for further information.

Float transducers

are installed from above or from the side of the tank. They are designed as a bent lever version or straight version. Float systems are available with fixed or programmable switch points or as continuous level transmitters. Special versions can be equipped with filling pipes, or with an additional temperature sensor. Bent lever versions can also be installed to measure highly viscous media if the pivot point is not placed in the liquid.



Level float systems in bent lever version or straight version.

Capacitive systems

4..20 mA or 0..10 V transmitters with a programmable switch with temperature monitoring at GDM are designed so that extremely precise fill level readings are achieved, even with changing oil qualities (capacitive absolute values change with different permeability in new and used oils).

The transducers have no moving parts. Version LCC1 is a measuring device that can be used in shallow oil pans where small losses must be detected. Large fluctuations on the oil surface are taken into account with a high, programmable mean average value, or with cushioning pipes (surge pipes).



A special kind of capacitive limit detection

The MLC switch family works with a particularly high frequency method and enables absolute measurement of the dielectric constant. As a result, a distinction between air and liquid and between aggregate states is possible. The type of liquid can also be determined.

High-quality materials enable the operation in aggressive oils or emulsions. Different designs allow for special requirements with regard to mounting, wiring or signal output. These instruments are sealed directly at the top without additional sealant.

Contact our specialists for advice.



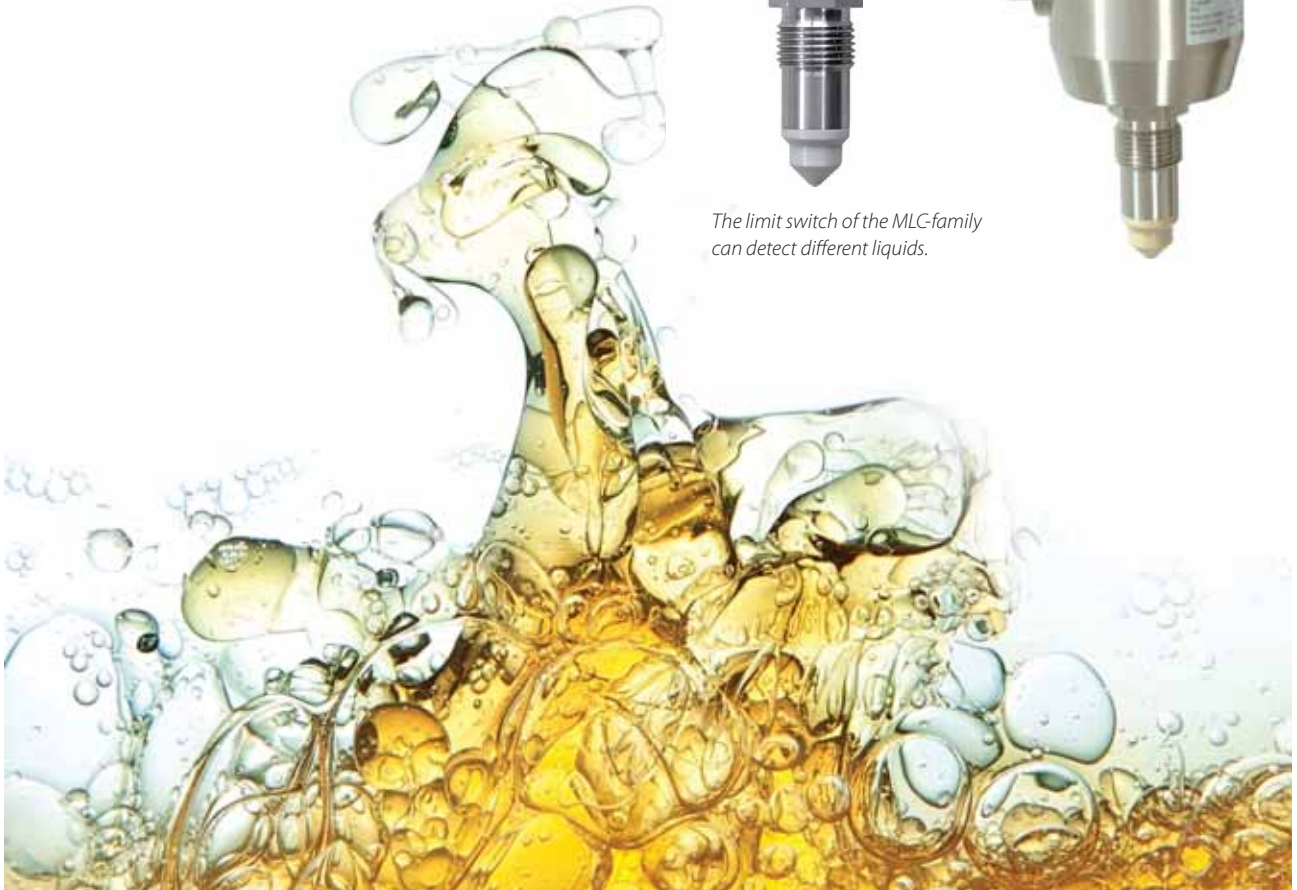
Capacitive level System LLC

Application examples:




- Oil level measurement in compressors, motors or transmissions
- Oil pans with sharp fluctuations of oil



The limit switch of the MLC-family can detect different liquids.



Flow Measuring and Monitoring Devices for Oil Applications




			
Type	HD2	HR2V	NJV
Principle	Piston	Piston	Piston
Connection diameter	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1	G 1 ¹ / ₄ G1 ¹ / ₂ G2	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1
Pressure resistance	200 bar	200 bar	100 bar
Materials	Brass/stainless steel	Brass/steel on demand	Brass/steel
Area	Switching 0.5..60 l/min Measure 0.1..80 l/min	Switching 10..120 l/min Measure 5..160 l/min	Switching and display 2..60 l/min
Switches & probes	Reed switch 250 VAC 1.5 A 50 VA Microswitch 250 VAC 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 1.5 A 50 VA OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 0.5 A 10 VA K1: changer with red LED display K2: switch without LED display K3: changer with red/green LED display
Applications	Measurement and monitoring in mechanical engineering and plant manufacturing, e.g. cooling of machine tools.		Monitoring and display in lubrication systems.
Additional notes	All versions with analog flow indicators of type 01 or Z1 are optionally available; lower pressure drop as volumetric measurement.		Adaptable on manifold block VB









Type	VHZ	VHS
Principle	Gear	Screws
Connection diameter	G 1/4 G 3/8 G 3/4 G1	G1 G1 1/4 G1 1/2 G2 G2 1/2
Pressure resistance	100/160/200 bar	160/350 bar
Fluid temperature	-25 °C...+80 °C	-25 °C...+80 °C (150 °C)
Materials	Steel/aluminium	Steel/aluminium
Measuring range	0.02..150 l/min	1.5..2500 l/min
Switches & probes	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>
Applications	Tool cooling (with oil), oil lubrication, hydraulic tensioners, hydraulic position measurements, chuck monitoring, position control, lubricant monitoring	Central lubrication systems, test stands, lubricant monitoring
Additional notes	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) 3 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) <1 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear

Flow Measurement and Monitoring Devices for Oil Applications

			
Type	VB	VB2	DIS
Principle	Oil distributor for piston devices with control valve	Oil / water distribution for piston devices with control valve	Oil distributor (<math><100\text{ mm}^2/\text{s}</math>) with integrated flow sensor (dynamic diaphragm)
Connection diameter	Intake: Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Intake G2 Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Expiration: G $\frac{3}{8}$
Pressure resistance	25 bar	16 bar	16 bar
Fluid temperature	-20 °C..+110 °C	-20 °C..+110 °C	-20 °C..+80 °C
Materials	Aluminium & brass/stainless steel	Aluminium & brass/stainless steel	Aluminium & stainless steel
Area	Switching and displays 2..60 l/min	Switching 10..120 l/min Measuring 5..160 l/min	Switching and displays 2..60 l/min
Switches & probes	Reed switch 250 VAC, 0.5 A, 10 VA K1: changer with red LED display K2: changer without LED display K3: changer with red/green LED display	Reed switch 250 VAC, 1.5 A, 50 VA Microswitch 250 VAC, 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	Monitoring and distribution used in mechanical and plant engineering e.g. of lubricant	Measurement and monitoring used in mechanical and plant engineering e.g. cooling of machine	Measurement and monitoring of highly viscous media, for example for printing machines
Additional notes	Combined with NJV and other inline piston devices, optionally 1-8 measurement points	Combined with HD2, HR2V and other inline piston devices 8 measurement points	Bypass valve allows maintenance without downtime, optionally 1-10 measurement points, no RoHS

For further information, please refer to our brochures or visit www.ghm-messtechnik.de

Level Measurement and Monitoring Equipment for Oil

				
Type	RW	RWI	NM	SB
Principle	Float lever - Articulated lever	Float lever - Articulated lever	Float lever	Float lever
Mounting	Horizontal mounting 1/2" 13UNC or NPT 1/2"	Horizontal mounting M 16 x 1.5	Vertical mounting G 1/8 A or G 1/4 A from above or from below	Vertical mounting G 1 A Cover mounting
Fluid temperature	-20 °C..+70 °C	-20 °C..+70 °C	-20 °C..+55 °C	-20 °C..+105 °C
Pressure resistance	5/6 bar	PP: 3 bar, PVDF: 6 bar	30/40 bar	12 bar
Materials	Stainless steel	PP or PVDF	Stainless steel	Brass NBR
Area	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact 100..500 mm
Switches & probes	Reed switch 300 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 70 VA	Reed switch 250 VAC 1 A 80 VA
Applications	Lateral monitoring in reservoirs e.g. as minimum and maximum monitoring in e.g. refrigeration systems		Vessel monitoring e.g. lubrication systems	
Additional notes	Density from 0.7 g/cm ³ , no ferritic particles	Density: PP from 0.6 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.7 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.35 g/cm ³ , no ferritic particles



Level Measurement and Monitoring Equipment for Oil

			
Type	MLC422	MLC430 / MLC433 / MLC437	LCC1
Principle	Capacitive	Capacitive	Capacitive
Mounting	G 1/2	G 1/2	Horizontal 3-hole flange D 54
Fluid temperature	-20 °C..+100 °C	-20 °C..+100 °C	-20 °C..+85 °C
Pressure resistance	10 bar	10 bar	5 bar
Materials	Stainless steel/PEEK	Stainless steel/PEEK	Brass/FR4
Area	1..175 Dk	1..175 Dk	0..18 mm
Switches & probes	1 transistor switching output	MLC430: 2 transistor switching output MLC433: 2 transistor switching output, 4..20 mA analogous output MLC437: Display, 2 transistor switching output, 4..20 mA analogous output	
Applications	Level detection with no moving parts	Level detection with no moving parts, detecting of oil and water phases	e.g. for oil reservoir in lubrication systems, motor oil monitoring
Additional notes	Plug M12	Plug M12	For shallow containers with overheating warning, oil level check and with restless filling levels by programmable attenuation



			
Type	LCC2	Vectis	LC
Principle	Capacitive	Float - hinged lever	Float - reed chain
Mounting	Vertical 4 hole flange D 75 or thread G1A	Horizontal 3 hole flansch D54	Vertical thread G1A G1 1/2A G2A
Fluid temperature	-20 °C..+85 °C (100 °C)	-20 °C..+85 °C (150 °C)	-20 °C..+105 °C
Pressure resistance	5 bar	3 bar	10 bar
Materials	Brass/FR4	Brass/NBR	Brass/NBR
Area	0..600 mm	0..1000 mm	0..2000 mm
Switches & probes	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	e.g. for oil tank in lubrication systems, motor monitoring		
Additional notes	Optional stillpipe	Suitable for flat containers, no ferritic particles	For low viscous, no ferritic particles



Pressure – Measurement and Monitoring Equipment for Oil

				
Type	FLEX-P/OMNI-P	PM1	PH1	PAS
Principle	Thin film sensor with transmitter	Diaphragm/piston	Diaphragm/piston	Piston
Pressure resistance	G 1/2 A	G 1/8 A R 1/8 A G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/8 A R 1/4 G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/2 A R 1/4 M10x1 NPT 1/4" G 1/4 Flansch ISO 163873
Fluid temperature	-20 °C..70 °C (120 °C)	-10 °C..+80 °C (100 °C)	-20 °C..+80 °C (100 °C)	-10 °C..+80 °C (100 °C)
Pressure resistance	4..600 bar	60/350 bar	60/350 bar	350 bar
Materials	Stainless steel	Galvanised steel or stainless steel	Galvanised steel or stainless steel	Die-cast zinc/aluminium
Messbereich	0..400 bar	-0.85..320 bar	-0.85..320 bar	10..320 bar
Switches & probes	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency	Mechanical changer 2A (1A) 250 VAC	Mechanical changer 4A (2A) 250 VAC	Mechanical changer 6A (2A) 250 VAC
Applications	Hydraulics, pneumatics, e.g. clamping devices	Pressure monitoring in hydraulic applications such as testing		
Additional notes	Programmable parameter plug M12 x 1	Switching point is adjustable. Sealing materials: NBR or FKM or EPDM	Switching point and hysteresis are adjustable. Sealing materials: NBR or FKM or EPDM	The switching point can be easily adjusted via a thumbscrew. Seal materials: NBR or FKM or EPDM



				
Type	EPS2	EDP1	EPS	S10 / S11
Principle	Thin film sensor with transmitter	Ceramic thick film sensor with transmitter	Thin film sensor with transmitter	Piezoresistive (< 25 bar) thin film cell (>= 25 bar)
Pressure resistance	G 1/4 A	G 1/8	G 1/2 A	G 1/2B
Fluid temperature	-40 °C..+125 °C	-20 °C..70 °C	-20 °C..70 °C	-30 °C..+100 °C
Pressure resistance	2,4..3000 bar	4..280 bar	4..600 bar	1..1500 bar
Materials	Stainless steel	Stainless steel/Al ₂ O ₃	Stainless steel flush	Stainless steel
Messbereich	0..2000 bar	0..100 bar	0..400 bar	0..1500 bar
Switches & probes	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA
Applications	Hydraulics, pneumatics, e.g. industrial robots	Differential pressure measurement, e.g. chemical applications	Hydraulics, pneumatics, e.g. clamping devices	Hydraulics, pneumatics, e.g. machine tools
Additional notes	Plug M12x1 or DIN 43650A	Plug M12 x 1	Plug M12 x 1 or DIN 43650A	DIN EN 175301-803/A

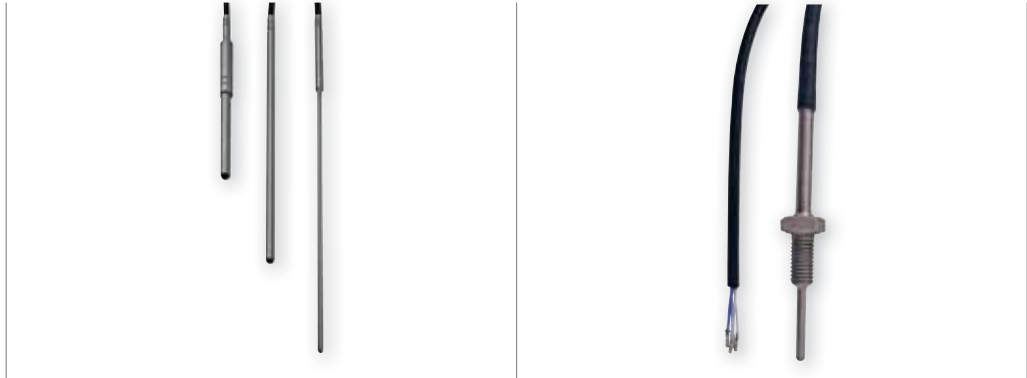


Temperature Switches and Temperature Meters for Oil Applications

				
Type	TF1	TR	ETS	FLEX-T/ OMNI-T
Principle	Bimetal switch	Membrane	PT 1000	PT 1000
Pressure resistance	G 1/2 A (G3/4A)	R 1/2"	G 1/2 A	G 1/4A G 1/2A T-Stück Lebensmittelfl. ISO 2852
Fluid temperature	-20 °C..+140 °C	-20 °C..+145 °C	0 °C..+100 °C/200 °C	0 °C..+100 °C/200 °C
Pressure resistance	100 bar	16 bar	25/100 bar	25/100 bar
Materials	Brass	Brass (stainless steel)	Stainless steel	Stainless steel
Switches/measurement area	40 °C..120 °C in 10°-steps	50 °C..130 °C adjustable via knob	0 °C..100 °C/200 °C	0 °C..100 °C/200 °C
Switches & probes	Bimetallic thermo switch Max. 250 VAC; max. 10 A	Microswitch 24..250 VAC; max. 8 A	Platinen Widerstandsfühler Output: 4..20 mA	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency
Applications	Temperature monitoring in machines and equipment		Temperature measurement e.g. container plant	
Additional notes	Normally open or normally closed contact Plug DIN 43650A or cable connection	Changer cable connection	Two conductors Plug M12 x 1 or DIN 43650A	programmable parameter Gooseneck design for difficult to reach places, Plug M12x1



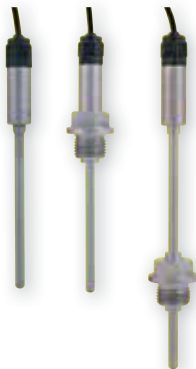
Temperature Sensor for Oil Applications



Type	GTF 101	GTF 102
Principle	Pt 100 / Pt 1000	Pt 100 / Pt 1000
Pressure resistance	Durchmesser: 3, 4, 5, 6, 8 mm	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1
Fluid temperature	-50 °C..+400 °C	-50 °C..+400 °C
Pressure resistance	-	10 - 200
Materials	Stainless steel	Stainless steel
Switches & probes	RTF Pt 100 / Pt 1000	RZF Pt 100 / Pt 1000
Applications	Temperature measurement: e.g. machinery, facilities, container, almost all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized Ex approval available 	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized neck tube optional Ex approval available



Temperature sensor for oil applications

		
Type	GTF 103	GTMU-IF 1 / -2 / -3
Principle	Pt 100 / Pt 1000	Pt 1000
Pressure resistance	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1	1/2", 1/4", 3/4", 1/8", 3/8", M8 x 1, M10 x 1, M14 x 1,5
Fluid temperature	-50 °C..+400 °C	-70 °C..+400 °C
Pressure resistance	10 - 200 bar	10 - 200 bar
Materials	Stainless steel	Stainless steel
Switches & probes	RTD Pt 100 / Pt 1000 Optional: Output: 4-20 mA or 0-10 V	Pt 1000 Output: 4-20 mA
Applications	Temperature measurement: e.g. machinery, equipment, container, all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ 2-, 3- or 4-wire possible ▪ cable length freely selectable ▪ neck tube optional ▪ exchangeable measuring insert optional ▪ double PT100 optional ▪ with Ex approval 	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ neck tube optional ▪ electrical connection M12 optional



Sales Germany



Sales Director
Germany & Austria

Thomas Stumpe

Mobile +49 172 4346882



Branch sales
Electronic & Automation Technology

Torsten Obermann

Mobile +49 172 4343551
t.obermann@ghm-messtechnik.de



Branch sales
Measurement Data Acquisition & Industrial electronics

Sebastian Behnke

Phone +49 40 67073-211
Mobile +49 151 12097947
s.behnke@ghm-messtechnik.de



Branch sales
Measurement Data Acquisition & Industrial electronics

Dieter Schubert

Mobile +49 151 12097415
d.schubert@ghm-messtechnik.de



NORTH Regional Sales Manager
17000 - 25999

Hans-Joachim Petermann

Phone +49 40 67998410
Mobile +49 172 4346881
h.petermann@ghm-messtechnik.de



WEST Regional Sales Manager
40000 - 41999
45000 - 50999
52000 - 52999

Jürgen Kersten

Phone +49 2152 8090795
Mobile +49 172 5298587
j.kersten@ghm-messtechnik.de



SOUTH Regional Sales Manager
70000 - 79999
88000 - 89999

Thomas Stumpe

Mobile +49 172 4346882
t.stumpe@ghm-messtechnik.de



NORTH Regional Sales Manager
29000 - 34999
37000 - 39999

Jörg Winter

Mobile +49 172 4346880
j.winter@ghm-messtechnik.de



WEST Regional Sales Manager
35000 - 36999 53000 - 53999
42000 - 42999 57000 - 59999
44000 - 44999
51000 - 51999

Stefan Müller

Phone +49 202 6093374
Mobile +49 171 4108173
s.mueller@ghm-messtechnik.de



SOUTH Junior Regional Sales Manager
80000 - 89000
94000 - 94999

Fabian Graf

Mobile +49 157 87131381
f.graf@ghm-messtechnik.de



NORTH Regional Sales Manager
00000-16999
98000-99999

Sebastian Behnke

Phone +49 40 67073-211
Mobile +49 151 12097947
s.behnke@ghm-messtechnik.de



WEST Regional Sales Manager
54000 - 56999
60000 - 60999
63000 - 69999

Christian Rösner

Mobile +49 151 12098192
c.roesner@ghm-messtechnik.de



SOUTH Regional Sales Manager
90000 - 93999
95000 - 97999

Dieter Schubert

Mobile +49 151 12097415
d.schubert@ghm-messtechnik.de

contact us



Headquarter

GHM Messtechnik GmbH
GHM GROUP CORPORATE
 Tenter Weg 2-8
 42897 Remscheid | GERMANY
 Phone +49 2191 9672-0
 info@ghm-group.de
 www.ghm-group.de

Centers of Competences

GHM Messtechnik GmbH
GHM GROUP – Greisinger
 Hans-Sachs-Straße 26
 93128 Regenstein | GERMANY
 Phone +49 9402 9383-0
 info@greisinger.de | www.greisinger.de

GHM Messtechnik GmbH
GHM GROUP – Honsberg
 Tenter Weg 2-8
 42897 Remscheid | GERMANY

GHM Messtechnik GmbH
GHM GROUP – Martens
 Kiebitzhörn 18
 22885 Barsbüttel | GERMANY

GHM Messtechnik GmbH
GHM GROUP – Imtron
 Carl-Benz-Straße 11
 88696 Owingen | GERMANY

Delta OHM S.r.l. a socio unico
GHM GROUP – Delta OHM
 Via Marconi 5
 35030 Caselle di Selvazzano
 Padova (PD) | ITALY
 Phone +39 049 8977150
 info@deltaohm.com
 www.deltaohm.com

Valco srl
GHM GROUP – VAL.CO
 Via Rovereto 9/11
 20014 S. Ilario di Nerviano
 Milano (MI) | ITALY
 Phone +39 0331 53 59 20
 valco@valco.it
 www.valco.it

GHM GROUP International

Austria
 GHM Messtechnik GmbH
 Office Austria
 Breitenseer Str. 76/1/36
 1140 Vienna | AUSTRIA
 Phone +43 660 7335603
 a.froestl@ghm-messtechnik.de

Brazil & Latin America
 GHM Messtechnik do Brasil Ltda
 Av. José de Souza Campos, 1073, cj 06
 Campinas, SP
 13025 320 | BRAZIL
 Phone +55 19 3304 3408
 info@grupoghm.com.br

Czech Republic/Slovakia
 GHM Greisinger s.r.o.
 Ovcí hajek 2/2153
 158 00 Prague 5
 Nove Butovice | CZECH REPUBLIC
 Phone +420 251 613828
 Fax +420 251 612607
 info@greisinger.cz | www.greisinger.cz

Denmark
 GHM Maaleteknik ApS
 Maarslet Byvej 2
 8320 Maarslet | DENMARK
 Phone +45 646492-00
 Fax +45 646492-01
 info@ghm.dk | www.ghm.dk

France
 GHM GROUP France SAS
 Parc des Pivoles
 9 Rue de Catalogne
 69150 Décines-Charpieu (Lyon) | FRANCE
 Phone +33 4 72 37 45 30
 contact@ghm-group.fr

India
 GHM Messtechnik India Pvt Ltd.
 209 | Udyog Bhavan | Sonowala Road
 Gregaon (E) | Mumbai - 400 063
 INDIA
 Phone +91 22 40236235
 info@ghmgroup.in | www.ghmgroup.in

Italy for Greisinger & Delta OHM
 GHM GROUP – Delta OHM
 Via Marconi 5
 35030 Caselle di Selvazzano
 Padova (PD) | ITALY
 Phone +39 049 8977150
 a.casati@ghm-messtechnik.de

Italy for Honsberg, Martens, Valco
 GHM GROUP – Valco
 Via Rovereto 9/11
 20014 S. Ilario di Nerviano
 Milano (MI) | ITALY
 Phone +39 0331 53 59 20
 alessandro.perego@valco.it

Netherlands
 GHM Meettechnik BV
 Zeeltweg 30
 3755 KA Eemnes | NETHERLANDS
 Phone +31 35 53805-40
 Fax +31 35 53805-41
 info@ghm-nl.com | www.ghm-nl.com

South Africa
 GHM Messtechnik SA (Pty) Ltd
 16 Olivier Street
 Verwoerdpark, Alberton 1453
 SOUTH AFRICA
 Phone +27 74 4590040
 j.grobler@ghm-sa.co.za

**...and more than
 100 qualified distributors!**



Visit us at: www.ghm-group.de

Utilising synergies

With the merger of companies, we have greatly expanded our competence and can thus also offer optimal assistance and consultation in all matters relating to measuring, control, and closed-loop control technologies.

We are capable of offering a comprehensive product portfolio for requirements in the broadest range of segments:



Process measurement technology

Laboratory measurement technology

Industrial electronics / closed-loop control technology

Industrial measurement technology

Test stand measurement technology

Customer-specific developments

Quality from Germany

All products from GHM Messtechnik are developed and produced in Germany. Through the consolidation of companies, the product range has been expanded significantly. Renowned companies value the "Quality from Germany".

Our claim – Your benefit

As a specialist and complete measurement technology provider, we develop solutions tailored to our customers and markets which meet the highest demands in the industry.

Our locations



GREISINGER



HONSBERG



Martens



IMTRON



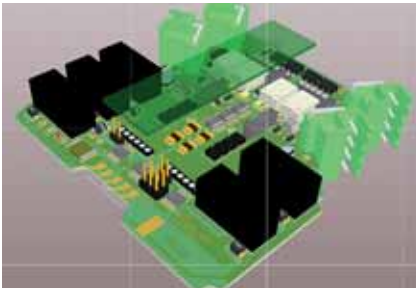
DeltaGHM



VAL.CO

Flexibility and Innovation

These two terms are an inseparable part of the success of GHM Messtechnik.
In addition to the extensive standard programme, tailored solutions are developed according to customer needs.



Altium 3D circuit board layout



Pressure testing up to 1000 bar



EMC cabins

GHM stands for ...

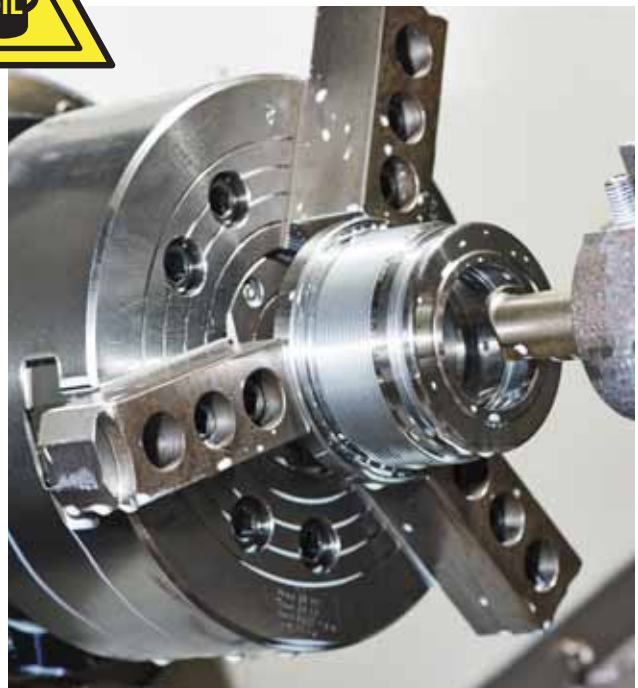
- Competence
- Quality
- Service

GHM devices for Oil Applications



Content

Flow	4
Temperature	7
Pressure	7
Fill level	8
Flow Measuring and Monitoring Devices for Oil Applications ..	10
Fill Level Measuring and Monitoring Equipment for Oil	13
Pressure Measuring and Monitoring Equipment for Oil	16
Temperature Switches and Meters for Oil Applications	18
Temperature Sensor for Oil Applications	19



GHM devices for oil applications

Oils are an important, precious and widely used medium in the fields of technology and chemistry. Consequently there are many different requirements in the metrological detection of variables such as flow rate, temperature, pressure and fill level in existence. The GHM Messtechnik GmbH produces sensors and transmitters for oil monitoring and measurement in various locations and advises clients with their measurement or monitoring requirements.

This brochure introduces most of our equipment for various oil applications, although other devices of the GHM portfolio can be deployed with equal success. Enquire at our offices, we advise you with pleasure.

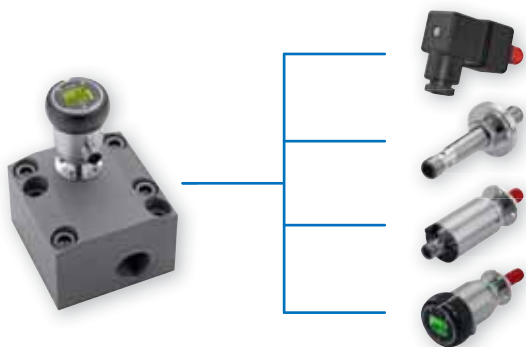
What is important for the different measured variables in regards of the medium oil?

Flow rate

With regard to oil, the viscosity of the medium must be taken into account first and foremost. When plants are operated with oils at different temperatures, the result is different viscosities of the same oil measured by the sensor. GHM offers different devices to take these variable requirements into account.

Volumetric Measuring Instruments (Gearwheel- or Screw measurement)

are primarily producing a pulse signal each time a specific volume has passed the instrument. It is easy to understand that these systems work nearly independently of viscosity. But you should keep an eye on the pressure losses at different viscosities.



*Gear sensor VHZ
with different transmitter electronics*



*Screw volume meter VHS
with different transmitter electronics*

The quoted volumetric devices of GHM are very precise mechanical systems with a system accuracy from 0.25 to 3% of the measured value. These devices are among the most accurate mechanical measuring systems for oil applications. High operating pressures (up to 350 bar) and large flow ranges from 0.04 to 2000 l/min allow use in a multitude of applications like:

- Central oil lubrication systems can be found at mills, paper machines, stone mills, etc.
- Central oil-cooling systems can be found in machine tool manufacturing
- Gear lubrication for harbor cranes, wind turbines, etc.
- Hydraulic actuators or workpiece holder
- Oil circulation in hardening systems
- Test stands for transmissions, engines



*Central lubrication system with GHM Honsberg flow meter,
Pressure sensors and temperature sensors.*



Stone mill in South Africa with large bearing operated via a central lubrication system. The oil volume is measured with VHS equipment of GHM.



Armature cylinder of a dredger. The extension path of the telescopic device is detected with a VHZ of GHM.

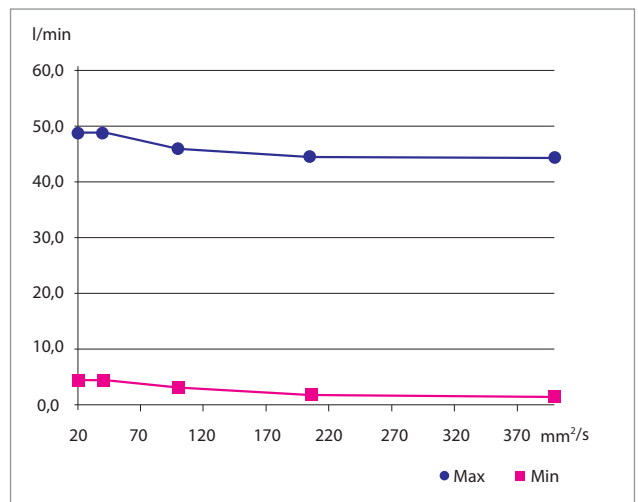
Viscosity-compensated piston devices(HD2 /HR2V /FW4V)

are part of the class of the spring-loaded float devices. These structurally modified devices are suitable for the oil monitoring. By utilising special pistons in the device, the friction effect of oil is almost completely eliminated.



Viscosity-compensated piston flow switch and piston meters, available with limit switches and microswitch heads (with ATEX approval) as well as different transmitters.

Viscosity compensation HD2K-025GM040



All of our systems are characterized by a high degree of robustness and long-term stability. The compact design allows installation in a variety of applications:

- Oil cooling of machine manufacturing tools
- Use in the agriculture area
- Flow monitoring in hydraulic systems

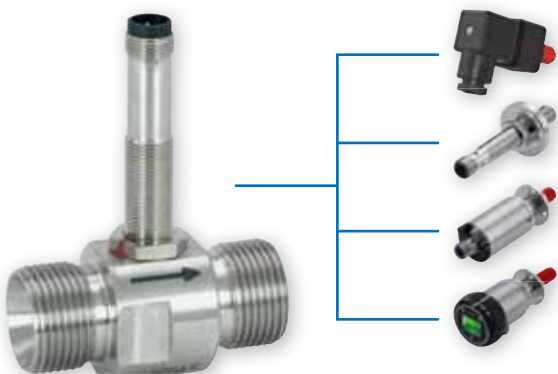


Piston flow switch FW4V for monitoring two flow direction; used in agriculture.

Turbines (RT)

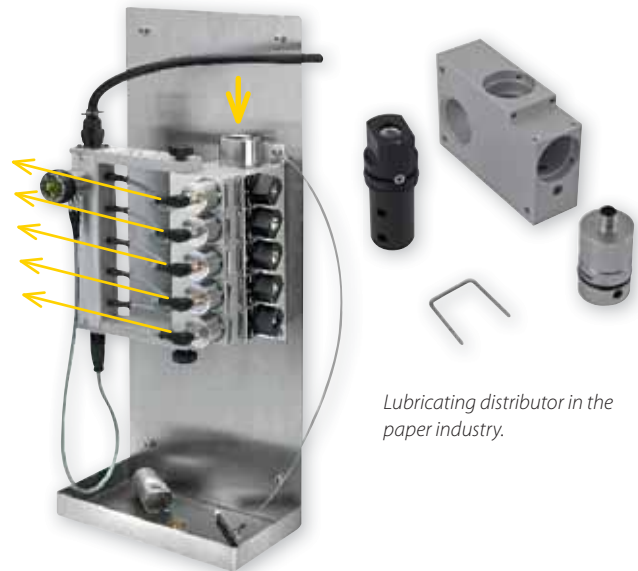
can also be used for oil flow measurements if the shift frequency characteristic in the measured value recording is taken into account. In this case the operating temperatures are recorded and the corresponding frequency conversion factors (K values) for calculation are used.

Since the characteristic of the turbine in the specified measuring range at different viscosities remains linear, the factor is constant in each case. However, the shifts of the minimum measured values (starting values) in their use in different viscosities have to be taken into account.



Oil distribution systems

As examples, oil distributors offer the possibility of operating a central line, multiple lubrication points and cooling conduits. We provide the necessary possibilities for many application requirements. Our experts will advise you.



Lubricating distributor in the paper industry.

Modular distribution panels (Type DIS)

enable up to 10 distribution channels, which is not uncommon for applications such as large paper machines. The individual strands can be set up and measured individually using a multiple coaxial valve. In bypass mode, the medium is deflected around the device in order to simplify the periodic service on the machine. The measurement device can be removed and checked without interrupting the necessary oil lubrication. The service can therefore be carried out during operation and avoids the stoppage of the machine.

Most significant sources of interference in the flow measurement of oils:

Ferritic abrasions are an undesirable component in the lubrication circuit and must be filtered out in the best possible manner.

Air penetration:

Good ventilation during commissioning without sack constructions, an airtight overall system and slow filling during commissioning are some of the most important preconditions for trouble-free operation.

Oil shocks:

Slow filling at the time of commissioning or after service tasks can prevent these dynamic forces on the sensor system.

Temperature

Different temperature sensors and -transmitters called PT100 or PT1000 sensors with corresponding transmitter electronics are available. A wide range of different versions with different pipe lengths, process adaption and protection fittings are tailor-made to satisfy the customer's specific application requirements.

The fact that reaction times for oil are slower than for water have to be taken into account. Measurements in flowing media can lead to a more rapid heat transfer, requiring an improvement of response times.



Various temperature transmitter designs

Temperature sensors in hydraulic applications up to 600 bar are not uncommon and can be offered in different versions.



Pressure

Pressure switches and transmitters

are utilised in oils with various technologies.

Mechanical switch systems:

spring-assisted

Mechanical pressure switches with pistons

are in use in all applications, where a break point is to be monitored. These devices do not require a power supply. The mechanical switches are capable of directly shifting higher currents and voltages.

The switching point is adjusted by the tensioning of a screw on a spring, which acts on the pressure piston or a membrane. In some devices the hysteresis can also be adjusted with an adjustment screw.

Mechanical pressure switch PH1. Setting of point and hysteresis.



Electronic switches and transmitter systems:

A thin film bridge is located on the pressure membrane or on a silicon substrate with capillary drill holes and oil reservoir to a flush stainless steel diaphragm.

The sensors can be subdivided into absolute pressure sensors, relative pressure sensors and differential pressure sensors. All of these sensors are available with a display and programmable switches.

Electronic pressure switches or transmitters

are installed where exact values are to be recorded and where a smaller hysteresis is desired, like in mechanical switches. Proportional output signals such as 4-20 mA or 0..10 V can be electronically selected.

The transducers are temperature-compensated and work very quickly because of their small mass. Thanks to their rugged construction, vibrations and rapid pressure changes do not have a significant negative influence on the sensors.



Pressure sensors in different designs

Fill levels

Different viscosities and densities of different oils must be taken into account. For level measurement of oil, in oil, and in lubrication and cooling systems, ferritic abrasion deposits often accumulate in the tanks and must be reduced with filtering systems using devices with magnets (e.g. by magnetic separator).

In bearing lubrication, temperatures of up to 100 °C or higher can be reached, which restricts the choice of the level switch or measurement systems. GHM offers various fill level switches and fill level measurement systems.

Please contact us for further information.

Float transducers

are installed from above or from the side of the tank. They are designed as a bent lever version or straight version. Float systems are available with fixed or programmable switch points or as continuous level transmitters. Special versions can be equipped with filling pipes, or with an additional temperature sensor. Bent lever versions can also be installed to measure highly viscous media if the pivot point is not placed in the liquid.



Level float systems in bent lever version or straight version.

Capacitive systems

4..20 mA or 0..10 V transmitters with a programmable switch with temperature monitoring at GDM are designed so that extremely precise fill level readings are achieved, even with changing oil qualities (capacitive absolute values change with different permeability in new and used oils).

The transducers have no moving parts. Version LCC1 is a measuring device that can be used in shallow oil pans where small losses must be detected. Large fluctuations on the oil surface are taken into account with a high, programmable mean average value, or with cushioning pipes (surge pipes).



A special kind of capacitive limit detection

The MLC switch family works with a particularly high frequency method and enables absolute measurement of the dielectric constant. As a result, a distinction between air and liquid and between aggregate states is possible. The type of liquid can also be determined.

High-quality materials enable the operation in aggressive oils or emulsions. Different designs allow for special requirements with regard to mounting, wiring or signal output. These instruments are sealed directly at the top without additional sealant.

Contact our specialists for advice.



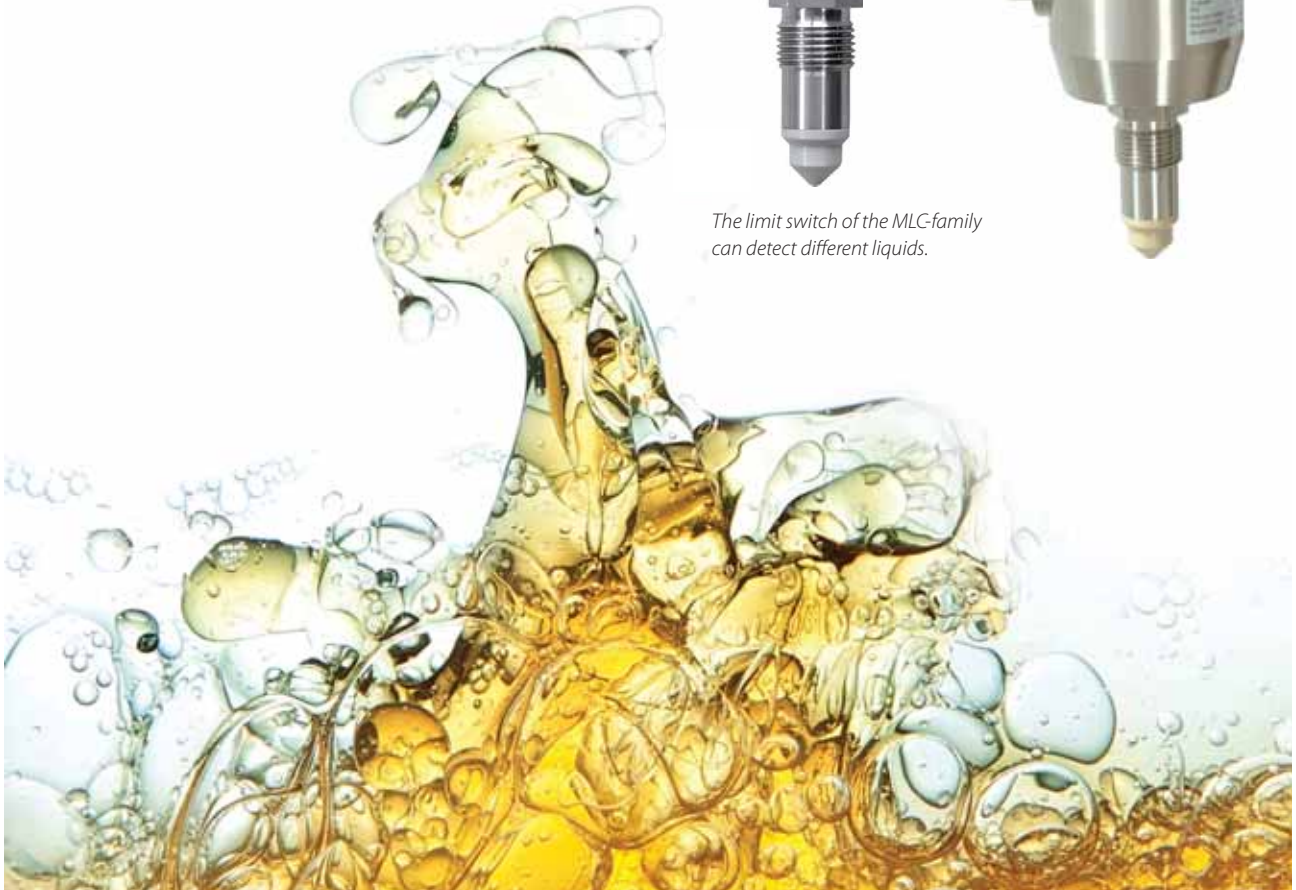
Capacitive level System LLC

Application examples:




- Oil level measurement in compressors, motors or transmissions
- Oil pans with sharp fluctuations of oil



The limit switch of the MLC-family can detect different liquids.



Flow Measuring and Monitoring Devices for Oil Applications




			
Type	HD2	HR2V	NJV
Principle	Piston	Piston	Piston
Connection diameter	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1	G 1 ¹ / ₄ G1 ¹ / ₂ G2	G ¹ / ₄ G ³ / ₈ G ¹ / ₂ G ³ / ₄ G1
Pressure resistance	200 bar	200 bar	100 bar
Materials	Brass/stainless steel	Brass/steel on demand	Brass/steel
Area	Switching 0.5..60 l/min Measure 0.1..80 l/min	Switching 10..120 l/min Measure 5..160 l/min	Switching and display 2..60 l/min
Switches & probes	Reed switch 250 VAC 1.5 A 50 VA Microswitch 250 VAC 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 1.5 A 50 VA OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	Reed switch 250 VAC 0.5 A 10 VA K1: changer with red LED display K2: switch without LED display K3: changer with red/green LED display
Applications	Measurement and monitoring in mechanical engineering and plant manufacturing, e.g. cooling of machine tools.		Monitoring and display in lubrication systems.
Additional notes	All versions with analog flow indicators of type 01 or Z1 are optionally available; lower pressure drop as volumetric measurement.		Adaptable on manifold block VB









Type	VHZ	VHS
Principle	Gear	Screws
Connection diameter	G 1/4 G 3/8 G 3/4 G1	G1 G1 1/4 G1 1/2 G2 G2 1/2
Pressure resistance	100/160/200 bar	160/350 bar
Fluid temperature	-25 °C...+80 °C	-25 °C...+80 °C (150 °C)
Materials	Steel/aluminium	Steel/aluminium
Measuring range	0.02..150 l/min	1.5..2500 l/min
Switches & probes	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>	<p>OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter</p> <p>FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p> <p>LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter</p>
Applications	Tool cooling (with oil), oil lubrication, hydraulic tensioners, hydraulic position measurements, chuck monitoring, position control, lubricant monitoring	Central lubrication systems, test stands, lubricant monitoring
Additional notes	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) 3 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear	Volumetric measurement and monitoring with changing viscosity (to 10,000 mm ² /s) <1 % accuracy (of reading) instantaneous value and counter possible, lower pressure drop than gear

Flow Measurement and Monitoring Devices for Oil Applications

			
Type	VB	VB2	DIS
Principle	Oil distributor for piston devices with control valve	Oil / water distribution for piston devices with control valve	Oil distributor (<math><100\text{ mm}^2/\text{s}</math>) with integrated flow sensor (dynamic diaphragm)
Connection diameter	Intake: Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Intake G2 Expiration: G $\frac{1}{4}$ G $\frac{3}{8}$ G $\frac{1}{2}$ G $\frac{3}{4}$ G1	Expiration: G $\frac{3}{8}$
Pressure resistance	25 bar	16 bar	16 bar
Fluid temperature	-20 °C..+110 °C	-20 °C..+110 °C	-20 °C..+80 °C
Materials	Aluminium & brass/stainless steel	Aluminium & brass/stainless steel	Aluminium & stainless steel
Area	Switching and displays 2..60 l/min	Switching 10..120 l/min Measuring 5..160 l/min	Switching and displays 2..60 l/min
Switches & probes	Reed switch 250 VAC, 0.5 A, 10 VA K1: changer with red LED display K2: changer without LED display K3: changer with red/green LED display	Reed switch 250 VAC, 1.5 A, 50 VA Microswitch 250 VAC, 5 A OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	Monitoring and distribution used in mechanical and plant engineering e.g. of lubricant	Measurement and monitoring used in mechanical and plant engineering e.g. cooling of machine	Measurement and monitoring of highly viscous media, for example for printing machines
Additional notes	Combined with NJV and other inline piston devices, optionally 1-8 measurement points	Combined with HD2, HR2V and other inline piston devices 8 measurement points	Bypass valve allows maintenance without downtime, optionally 1-10 measurement points, no RoHS

For further information, please refer to our brochures or visit www.ghm-messtechnik.de

Level Measurement and Monitoring Equipment for Oil

				
Type	RW	RWI	NM	SB
Principle	Float lever - Articulated lever	Float lever - Articulated lever	Float lever	Float lever
Mounting	Horizontal mounting 1/2" 13UNC or NPT 1/2"	Horizontal mounting M 16 x 1.5	Vertical mounting G 1/8 A or G 1/4 A from above or from below	Vertical mounting G 1 A Cover mounting
Fluid temperature	-20 °C..+70 °C	-20 °C..+70 °C	-20 °C..+55 °C	-20 °C..+105 °C
Pressure resistance	5/6 bar	PP: 3 bar, PVDF: 6 bar	30/40 bar	12 bar
Materials	Stainless steel	PP or PVDF	Stainless steel	Brass NBR
Area	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact	Normally open or normally closed contact 100..500 mm
Switches & probes	Reed switch 300 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 50 VA	Reed switch 250 VAC 0.5 A 70 VA	Reed switch 250 VAC 1 A 80 VA
Applications	Lateral monitoring in reservoirs e.g. as minimum and maximum monitoring in e.g. refrigeration systems		Vessel monitoring e.g. lubrication systems	
Additional notes	Density from 0.7 g/cm ³ , no ferritic particles	Density: PP from 0.6 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.7 g/cm ³ , no ferritic particles	For low-viscosity media, density from 0.35 g/cm ³ , no ferritic particles



Level Measurement and Monitoring Equipment for Oil

			
Type	MLC422	MLC430 / MLC433 / MLC437	LCC1
Principle	Capacitive	Capacitive	Capacitive
Mounting	G 1/2	G 1/2	Horizontal 3-hole flange D 54
Fluid temperature	-20 °C..+100 °C	-20 °C..+100 °C	-20 °C..+85 °C
Pressure resistance	10 bar	10 bar	5 bar
Materials	Stainless steel/PEEK	Stainless steel/PEEK	Brass/FR4
Area	1..175 Dk	1..175 Dk	0..18 mm
Switches & probes	1 transistor switching output	MLC430: 2 transistor switching output MLC433: 2 transistor switching output, 4..20 mA analogous output MLC437: Display, 2 transistor switching output, 4..20 mA analogous output	
Applications	Level detection with no moving parts	Level detection with no moving parts, detecting of oil and water phases	e.g. for oil reservoir in lubrication systems, motor oil monitoring
Additional notes	Plug M12	Plug M12	For shallow containers with overheating warning, oil level check and with restless filling levels by programmable attenuation



			
Type	LCC2	Vectis	LC
Principle	Capacitive	Float - hinged lever	Float - reed chain
Mounting	Vertical 4 hole flange D 75 or thread G1A	Horizontal 3 hole flansch D54	Vertical thread G1A G1 1/2A G2A
Fluid temperature	-20 °C..+85 °C (100 °C)	-20 °C..+85 °C (150 °C)	-20 °C..+105 °C
Pressure resistance	5 bar	3 bar	10 bar
Materials	Brass/FR4	Brass/NBR	Brass/NBR
Area	0..600 mm	0..1000 mm	0..2000 mm
Switches & probes	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter	OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V, programmable parameter FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter LABO: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency, programmable parameter
Applications	e.g. for oil tank in lubrication systems, motor monitoring		
Additional notes	Optional stillpipe	Suitable for flat containers, no ferritic particles	For low viscous, no ferritic particles



Pressure – Measurement and Monitoring Equipment for Oil


				
Type	FLEX-P/OMNI-P	PM1	PH1	PAS
Principle	Thin film sensor with transmitter	Diaphragm/piston	Diaphragm/piston	Piston
Pressure resistance	G 1/2 A	G 1/8 A R 1/8 A G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/8 A R 1/4 G 1/4 A NPT 1/8 M10x1 NPT 1/4	G 1/2 A R 1/4 M10x1 NPT 1/4" G 1/4 Flansch ISO 163873
Fluid temperature	-20 °C..70 °C (120 °C)	-10 °C..+80 °C (100 °C)	-20 °C..+80 °C (100 °C)	-10 °C..+80 °C (100 °C)
Pressure resistance	4..600 bar	60/350 bar	60/350 bar	350 bar
Materials	Stainless steel	Galvanised steel or stainless steel	Galvanised steel or stainless steel	Die-cast zinc/aluminium
Messbereich	0..400 bar	-0.85..320 bar	-0.85..320 bar	10..320 bar
Switches & probes	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency	Mechanical changer 2A (1A) 250 VAC	Mechanical changer 4A (2A) 250 VAC	Mechanical changer 6A (2A) 250 VAC
Applications	Hydraulics, pneumatics, e.g. clamping devices	Pressure monitoring in hydraulic applications such as testing		
Additional notes	Programmable parameter plug M12 x 1	Switching point is adjustable. Sealing materials: NBR or FKM or EPDM	Switching point and hysteresis are adjustable. Sealing materials: NBR or FKM or EPDM	The switching point can be easily adjusted via a thumbscrew. Seal materials: NBR or FKM or EPDM



				
Type	EPS2	EDP1	EPS	S10 / S11
Principle	Thin film sensor with transmitter	Ceramic thick film sensor with transmitter	Thin film sensor with transmitter	Piezoresistive (< 25 bar) thin film cell (>= 25 bar)
Pressure resistance	G 1/4 A	G 1/8	G 1/2 A	G 1/2 B
Fluid temperature	-40 °C..+125 °C	-20 °C..70 °C	-20 °C..70 °C	-30 °C..+100 °C
Pressure resistance	2,4..3000 bar	4..280 bar	4..600 bar	1..1500 bar
Materials	Stainless steel	Stainless steel/Al ₂ O ₃	Stainless steel flush	Stainless steel
Messbereich	0..2000 bar	0..100 bar	0..400 bar	0..1500 bar
Switches & probes	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA	Two conductors: Output: 4..20 mA
Applications	Hydraulics, pneumatics, e.g. industrial robots	Differential pressure measurement, e.g. chemical applications	Hydraulics, pneumatics, e.g. clamping devices	Hydraulics, pneumatics, e.g. machine tools
Additional notes	Plug M12x1 or DIN 43650A	Plug M12 x 1	Plug M12 x 1 or DIN 43650A	DIN EN 175301-803/A

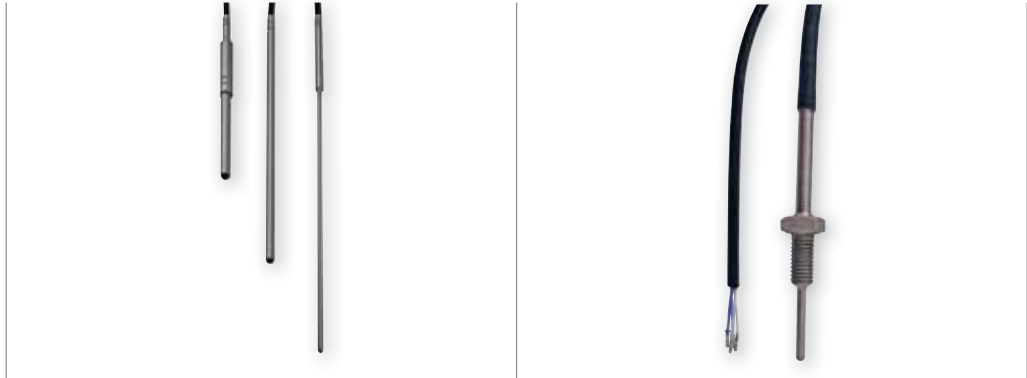


Temperature Switches and Temperature Meters for Oil Applications

				
Type	TF1	TR	ETS	FLEX-T/ OMNI-T
Principle	Bimetal switch	Membrane	PT 1000	PT 1000
Pressure resistance	G 1/2 A (G3/4A)	R 1/2"	G 1/2 A	G 1/4A G 1/2A T-Stück Lebensmittelfl. ISO 2852
Fluid temperature	-20 °C..+140 °C	-20 °C..+145 °C	0 °C..+100 °C/200 °C	0 °C..+100 °C/200 °C
Pressure resistance	100 bar	16 bar	25/100 bar	25/100 bar
Materials	Brass	Brass (stainless steel)	Stainless steel	Stainless steel
Switches/measurement area	40 °C..120 °C in 10°-steps	50 °C..130 °C adjustable via knob	0 °C..100 °C/200 °C	0 °C..100 °C/200 °C
Switches & probes	Bimetallic thermo switch Max. 250 VAC; max. 10 A	Microswitch 24..250 VAC; max. 8 A	Platinen Widerstandsfühler Output: 4..20 mA	Transmitter/switch OMNI: Display, 2 x switching (push pull), 4-20 mA or 0-10 V FLEX: 1 x switching (push pull), 4-20 mA or 0-10 V or frequency
Applications	Temperature monitoring in machines and equipment		Temperature measurement e.g. container plant	
Additional notes	Normally open or normally closed contact Plug DIN 43650A or cable connection	Changer cable connection	Two conductors Plug M12 x 1 or DIN 43650A	programmable parameter Gooseneck design for difficult to reach places, Plug M12x1



Temperature Sensor for Oil Applications



Type	GTF 101	GTF 102
Principle	Pt 100 / Pt 1000	Pt 100 / Pt 1000
Pressure resistance	Durchmesser: 3, 4, 5, 6, 8 mm	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1
Fluid temperature	-50 °C..+400 °C	-50 °C..+400 °C
Pressure resistance	-	10 - 200
Materials	Stainless steel	Stainless steel
Switches & probes	RTF Pt 100 / Pt 1000	RZF Pt 100 / Pt 1000
Applications	Temperature measurement: e.g. machinery, facilities, container, almost all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized Ex approval available 	<ul style="list-style-type: none"> any probe diameter and length sensor 2-, 3- or 4-wire possible cable length customized neck tube optional Ex approval available



Temperature sensor for oil applications

		
Type	GTF 103	GTMU-IF 1 / -2 / -3
Principle	Pt 100 / Pt 1000	Pt 1000
Pressure resistance	1/8", 1/4", 3/8", 1/2", 3/4", M8 x 1, M10 x 1, M14 x 1	1/2", 1/4", 3/4", 1/8", 3/8", M8 x 1, M10 x 1, M14 x 1,5
Fluid temperature	-50 °C..+400 °C	-70 °C..+400 °C
Pressure resistance	10 - 200 bar	10 - 200 bar
Materials	Stainless steel	Stainless steel
Switches & probes	RTD Pt 100 / Pt 1000 Optional: Output: 4-20 mA or 0-10 V	Pt 1000 Output: 4-20 mA
Applications	Temperature measurement: e.g. machinery, equipment, container, all locations where exact temperature measurement is required.	
Additional notes	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ 2-, 3- or 4-wire possible ▪ cable length freely selectable ▪ neck tube optional ▪ exchangeable measuring insert optional ▪ double PT100 optional ▪ with Ex approval 	<ul style="list-style-type: none"> ▪ various probe diameters and lengths ▪ neck tube optional ▪ electrical connection M12 optional

