

## Accessories for the gear cooling and lubrication

Monitoring and Switching Elements for  
Temperature · Level · Flow · Pressure



## Monitoring devices

### Monitoring devices

Extruders and injection moulding machines are usually driven in continuous operation. This attaches special importance to the monitoring of the gears, especially for greater performances.

### Oil temperature

The limit monitors of temperature sensors (PT100) serve to ensure the optimal lubrication conditions for the gear teeth and the bearings.

### Oil level

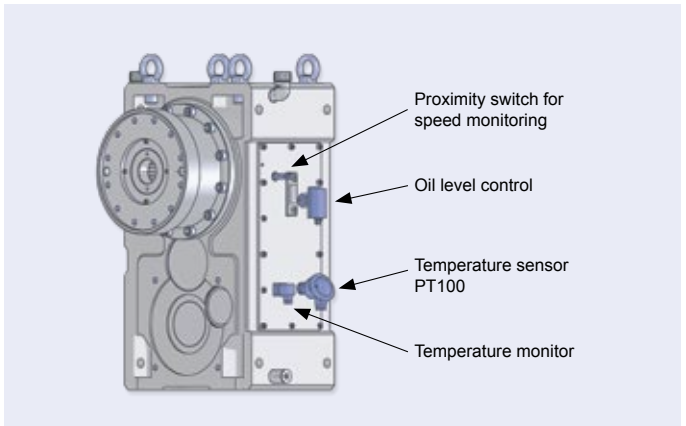
The simplest monitoring is the oil level gauge which can be expanded by the level control.

### Speed monitor

This is given by a proximity switch to evaluate the actual speed.

### Flow and pressure

For measuring and monitoring of flow rates and pressure ranges there are many monitors and switches available.



A large number of monitors, sensors and switches are available.

### Cooling

There are different cooling types due to the high power density which modern gears must withstand. If pump with plate heat exchanger or a complete cooling unit, there are also used monitoring devices such as temperature sensors, level controls, flow monitors, pollution indicators etc. These cooling units are completely equipped with the necessary control equipment.

## Temperature monitoring

### Level and temperature sensor Nivotemp 63



The Nivotemp 63 provides continuous recording of temperature and level. Encoder and transmitter for level and temperature are housed in a compact flange. The electrical connection is effected by a 3-pin plug. This article is including a stilling tube of brass.

#### Technical data

Switching tube	Brass
Length	520 mm
Operating pressure	max. 1 bar
Operating temperature	max. 80°C
Density of fluid	min. 0.8 kg/dm <sup>3</sup>
Electrical connection	M3, 3-pin + PE, DIN 43650
Cable fitting	PG 11

Level signal	
Measuring resistance	Reedchain
Disbandment	4 mm
Supply voltage	10 to 30 V
Output signal	4 to 20 mA

Temperature signal	
Measuring resistance	PT100
Disbandment	± 0.8°C
Supply voltage	10 to 30 V
Output signal	4 to 20 mA

### Screw-in resistance thermometer M-OK/SGH



Application areas of screw-in resistance thermometers are mainly the storage temperature monitoring and temperature measurement in tanks and pipes.

The M-OK/SGH has a sensor housing made of brass with protective tube and a permanently connected, 2 or 10 m long hose line.

#### Technical data

Measuring range	-40 to 260°C
Temperature sensor	1 x PT100 passive resistance sensor
Mode of connection	4-conductor connection
Rated resistance	100 Ω at 0°C
Tolerance class	Class B ± 0.30°C at 0°C according to DIN EN 60751
max. operating current	0.1 to 0.3 mA
Screw-in housing	Thread M6
Installation length	15 mm
Supply line	Permanently connected hose line, isolation PTFE, length 2 or 10 m, Ø 3 mm

### Cable resistance thermometer M-OK/MH-B3



In this cable resistance thermometer the basic measuring resistor PT100 is provided with a metal sleeve.

#### Technical data

Measuring range	-40 to 250°C
Temperature sensor	1 x PT100
Mode of connection	3-conductor connection
Rated resistance	100 Ω at 0°C
Tolerance class	Class B ± 0.30°C at 0°C according to DIN EN 60751
max. operating current	25 mA
Dielectric strength	3 kV AC, 50 Hz/min <sup>-1</sup>
Sensor housing	Stainless steel, metal sleeve with cable clamp (press bead), Ø 4 mm, total length 20 mm
Supply line	Permanently connected hose line, Cu-silver plated, isolation PTFE, length 5 m, Ø 3,1 mm

## Temperature monitoring

### Temperature sensor GTF 103-RT420-Pt100



The GTF 103 is an universal sensor, equipped with a PT100 resistance thermometer and transmitter RT 420.

#### Technical data

Measuring range	0 to 100°C
Probe length	44 mm
Probe diameter	4 mm
Sensor	PT100
Transmitter	RT 420
Output signal	4 to 20 mA, 2-wire technology
Supply voltage	8 to 35 V DC
Process connection	G½"

### Temperature sensor GTF 103-Ex+GITT



The GTF 103-Ex is an universal sensor for all zones of hazardous areas, equipped with a PT100 resistance thermometer and transmitter type GITT 01-Ex.

#### Technical data

Measuring range	0 to 100°C
Probe length	100 mm
Probe diameter	6 mm
Sensor	PT100
Transmitter	GITT 01-Ex
Output signal	4 to 20 mA, 2-wire technology
Supply voltage	8 to 35 V DC
Process connection	G½"

### Electronic temperature sensor ETS 380 + TFP 100



The ETS 380 is a compact electronic temperature sensor with digital display. In this version, it is used with the specially for tank mounting designed external temperature sensor TFP 100 with protection sleeve.

Furthermore in this article there are included two binder connectors M12x1 and a clamp for wall-mounting.

### Temperature sensor TFP 100 with protective sleeve



The designed as 4-wire PT100 resistance measurement is connected directly to the ETS 380.

#### Technical data ETS 380

Measuring range	-30 to 150°C
Connection ext. temperature sensor	Cable bush M12x1, 4-pin
Switching outputs	1 PNP transistor output and 1 analogue output
Signal analogue	4 to 20 mA
Supply voltage	20 to 32 V DC
Current consumption	approx. 100 mA (no switching output)
Switching current	max. 1.2 A per output

#### Technical data TFP 100

Measuring range	-40 to 125°C
Electrical connection	Plug M12x1, 4-pin
Supply voltage	9 to 35 V DC
Compressive strength protective sleeve	10 bar

#### Accessories

##### 2 binder connectors ZBE 06



##### Clamp ZBM 300



## Temperature monitoring

### Electronic temperature switch ETS 3200



The ETS 3200 is a compact electronic temperature switch with 4-digit digital display. Pressure resistant to 600 bar, this model has an integral temperature probe and can be screwed directly into the pipeline.

#### Technical data

Measuring range	- 25 to 100°C
Probe length	18 mm
Switching outputs	2
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Pressure resistance	600 bar
Mechanical connection	G1/2 A DIN 3852
Torque value	45 Nm
Supply voltage	9 to 35 V DC
Current consumption	max. 2.455 A total
Ambient temperature range	-25 to 80°C

### Electronic temperature switch ETS 3200 (tank mounting)



The ETS 3200 is a compact electronic temperature switch with 4-digit digital display. With its integral temperature probe, the ETS 3200 is particularly suitable for direct tank-mounting and is available in different lengths.

#### Technische Daten

Measuring range	- 25 to 100°C
Probe length	100 / 250 / 350 mm depending on version
Switching outputs	2
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Pressure resistance	50 bar
Mechanical connection	G½ A DIN 3852
Torque value	45 Nm
Supply voltage	9 to 35 V DC
Current consumption	max. 2.455 A total
Ambient temperature range	-25 to 80°C

### Electronic temperature switch TDD-153...



The electronic temperature switch of model TDD is suited for applications, where temperature of fluids must be monitored with a high degree of switching accuracy. The current measured value is displayed on a 3-digit LED display.

#### Technical data

Measuring range	-20 to 120°C
max. pressure	80 bar
Process connection	G ¾"
Engaged thread	33.2 mm
Switching output	1 x PNP, max. 300 mA
Switching point adjustment	programmable
Hysteresis	programmable
Accuracy	± 0.5°C (-10 to 85°C) ± 2°C (85 to 125°C) ± 2°C (-50 to -10°C)
Display	3-digit LED
Power supply	24 V DC
Current consumption	approx. 50mA (without switching output)
Electrical connection	Plug M12x1, 4-pin

## Temperature monitoring

### Electronic temperature switch ETS 3800 + TFP 100



The ETS 3800 is a compact electronic temperature switch with a four-digit digital display and external temperature sensor. This is connected directly to the ETS 3800.

A switching output and an analogue signal offer versatile application possibilities. The output signal can be switched between 4 to 20 mA or 0 to 10 V.

#### Temperature sensor TFP 100 with protective sleeve

The designed as 4-wire PT100 resistance measurement is connected directly to the ETS 3800.



#### Technical data ETS 3800

Measuring range	-30 to 150°C
Output signal	4 to 20 mA or 0 to 10 V
Switching current	max. 1.2 A per output
Switching outputs	1 and 1 analogue
Electrical connection	Cable bush M12x1, 4-pin
Supply voltage	18 to 35 V DC
Ambient temperature range	- 25 to 80 °C

#### Technical data TFP 100

Measuring range	-40 to 125°C
Electrical connection	Plug M12x1, 4-pin
Supply voltage	9 to 35 V DC
Compressive strength protective sleeve	10 bar

### Modular resistance thermometer TR 10



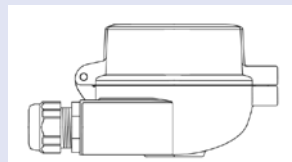
The resistance thermometer is screwed onto the oil tank and has an immersion length of 310 mm.

The neck tube protects the freely programmable head transmitter against heat.

#### Technical data TR 10

Measuring range	-200 to 600°C
max. process pressure	50 bar
Immersion length	310 mm
Neck tube length	80 mm
Protective tube diameter	9 mm

#### Connecting head



#### Technical data connecting head

Type of protection	IP66/68
max. temperature	150°C
Neck tube length	80 mm
Protective tube diameter	9 mm
Cable inlet screw glands	½" NPT and M20 x 1,5
Thread only	G ½"
Plug	M12x1 PA, 7/8" FF
Output	PROFIBUS PA

## Temperature monitoring

### Temperature sensor TT5050 with electronic evaluation TR7432



The temperature sensor TT5050 is based on a PT1000 resistance element. This converts the measured variable temperature by resistance change into an electrical analogue signal. A microprocessor controls the evaluation of the electrical signal. The current system temperature will be displayed with an LED indicator directly at the electronic evaluation TR7432.

### Electronic evaluation TR7432



### Temperature sensor TT5050



### Technical data

Measuring range	-40 to 150°C
Measuring sensor	1 x PT1000 according to DIN EN 60751, Class A
max. pressure	160 bar
Process connection	G 1/2"
Communication interface	IO-Link 1.0 (COM2-Slave, 38.4 kBaud)
Switching outputs	2
Display	4-digit alphanumeric
Supply voltage	18 to 32 V DC
Current consumption	< 50 mA
Electrical connection	M12 plug connection

### Accessories



Cutting ring screw connection  
E 30016



Mounting set E 30017

### Oil level indicator FSA with temperature switch TS 70



The liquid level can be read easily at the outside of the tank by using the oil level indicator. The medium penetrates the device through the lower connection bore and is shown again in the well visible rise tube.

The temperature switch is fitted directly to the oil level indicator. On exceeding the nominal temperature of 70°C, a contact opens and the circuit is broken.

### Technical data

Screw centre spacing FSA	76 / 127 / 176 / 254 / 381 mm depending on version
Nominal pressure	max. 0.5 bar
Temperature switching point (NC)	70°C
Minimum switching current TS	50 mA
Switching tolerance	± 5 K
Ambient temperature	- 20 to 80°C

## Temperature monitoring

### Temperature monitor TWR 3/4 ...



The temperature monitor TWR uses a bimetal switch and is used to monitor liquid temperatures in piping and vessels. The device in brass design is screwed in a welded connection piece onto the line or container neck. The contacts have a fixed temperature set point (contact function NC or NO). The connection is made via a standard plug.

#### Technical data

Switching point	50 / 60 / 80 / 90°C depending on version
Contact function	NC (TWR 3/4 MO...) NO (TWR 3/4 MS...)
Electrical connection	Plug according to DIN 43650
max. switching power	250 VAC; 30 VDC
Switching current	0.1 to 4 A
Housing	Brass
Connection	G $\frac{3}{4}$ external thread
Nominal pressure	PN 64
Temperature max.	150°C
Switching hysteresis max.	20°C
Accuracy	± 3°C
Protection degree	IP 65

### Thermal reed switch TRS-1120-...



The thermal reed switch for temperature monitoring and control is characterized by high durability and operating reliability. Advantages include high repeatability and largely independent of environmental influences.

The contacts have a fixed temperature set point and are designed as an opener.

The thermal reed switch has a solid brass body and comes with a 1.5 m long silicone cable sheath.

#### Technical data

Switching point	80 / 100°C depending on version
Contact function	NC
Contact load	max. 10 W/12 VA
DC voltage	max. 100 V
AC voltage	max. 120 V
Permanent current	max. 1 A
Inrush current	max. 1.5 A
Housing	Brass
Connection	G 3/4 internal thread
Nominal pressure	16 bar
Temperature max.	120°C
Switching hysteresis	< 7°C
Accuracy	± 3°C



## Level monitoring

### Level monitor FTL 51



The FTL51 is a limit switch for use in all liquids in tanks or pipelines. The function is not affected by flow, turbulence, bubbles, foam, vibration, solid particles or sediments.

#### Technical data

Design	Aluminum housing with separate connection compartment and thread
Process connection	G1"
Temperature range	-50 to 150°C
Pressure range	-1 to 100 bar
Viscosity	max. 10,000 mm <sup>2</sup> /s
Density	min. 0.5 g/cm <sup>3</sup>
Supply voltage	19 to 253 V AC or 19 to 55 V DC
Current consumption	max. 1.3 VA
Electrical connection	AC/DC with relay output

### Level monitor FTL 50



The FTL50 is a compact limit switch for use in all liquids in tanks or pipelines. The function is not affected by flow, turbulence, bubbles, foam, vibration, solid particles or sediments.

#### Technical data

Design	Compact housing
Process connection	G $\frac{3}{4}$ "
Temperature range	-50 to 150°C
Pressure range	-1 to 100 bar
Viscosity	max. 10,000 mm <sup>2</sup> /s
Density	min. 0.5 g/cm <sup>3</sup>
Supply voltage	19 to 253 V AC or 19 to 55 V DC
Current consumption	max. 1.3 VA
Electrical connection	AC/DC with relay output

### Electronic level switch ENS 3000



The ENS 3000 is an electronic level switch with integrated display function and built-in temperature sensor. It has a four-digit LED display. The device has 2 freely programmable switching outputs, i.e. the level value or the temperature value can be assigned to the two switching outputs independently of each other.

#### Technical data

Rod length	250 / 410 / 520 / 730 mm depending on version
Measuring range	170 / 290 / 390 / 590 mm depending on version
Temperature measuring range	-25 to 100°C
Switching outputs	2
Electrical connection	Plug M12x1, 4-pin
Output signal	4 to 20 mA or 0 to 10 V
Rating	max. 1.2 A per output
Supply voltage	9 to 35 V DC
Current consumption	max. 2.47 A total

## Level monitoring

### Electronic level sensor LK7024 with mounting adapter



In the continuous measurement, the filling level is detected continuously, converted into an electrical signal and displayed. For further processing there are two freely programmable switching outputs.

#### Technical data

Rod length	728 mm
Setting range switching point	60 to 610 mm
Setting range reset point	50 to 600 mm
Switching steps	10 mm
Electrical connection	Plug M12x1
Electrical version	DC PNP
Switching outputs	2 x closer / opener programmable
Supply voltage	12 to 30 V DC
Current consumption	< 80 mA
Display	Switching status 2 x LED, measured values 7-segment-LED-display

### Level switch VH600M-MS

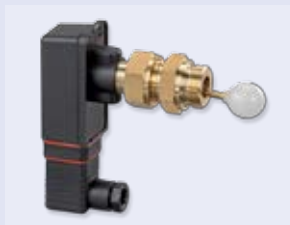


The level switch is designed for minimum or maximum monitoring of fluid levels. Operating principle: as described on the right side at level switch VHS00M-MS.

#### Technical data

Housing material	Brass
Float material	PVDF
Magnet	Hard ferrite
O-ring seal	NBR
Connection	G $\frac{3}{4}$ "
max. overload pressure	25 bar
min. medium density	0.78 kg/dm <sup>3</sup>
max. medium temperature	110°C
max. ambient temperature	110°C
Set point, related to center line (water, 20°C)	-4 to 0 mm
Switch hysteresis	approx. 1 to 4 mm
Switch function	Contact breaks with falling level
Electrical connection	1.5 m PVC cable
Contact capacity	max. 1 A max. 230 V AC or 48 V DC max. 26 VA or 20 W

### Level switch VHS00M-MS

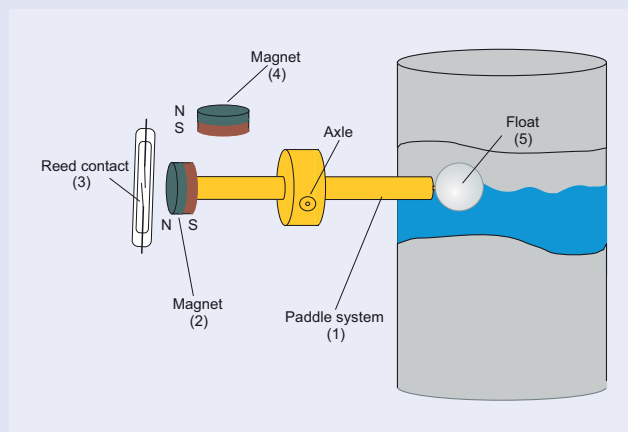


The level switch is designed for minimum or maximum monitoring of fluid levels.

#### Operating principle

The raising level in the tank forces the float (5) up. Via paddle system (1), the magnet (2) changes its position relative to reed contact (3) and actuates it. The repulsion between the homopolar

magnets (2) and (4) supports the buoyancy. As soon as the level sinks again, the float (5) follows also and actuates the reed contact again.



#### Technical data

Housing material	Brass
Float material	PVDF
Magnet	Hard ferrite
O-ring seal	NBR
Connection	G $\frac{3}{4}$ "
max. overload pressure	25 bar
min. medium density	0.78 kg/dm <sup>3</sup>
max. medium temperature	110°C
max. ambient temperature	110°C
Set point, related to center line (water, 20°C)	-4 to 0 mm
Switch hysteresis	approx. 1 to 4 mm
Switch function	Contact breaks with falling level
Electrical connection	Plug M12x1, 4-pin
Contact capacity	max. 1 A max. 230 V AC or 48 V DC max. 26 VA or 20 W

## Level monitoring

### Level switch NW1



The level measurement and monitoring with float provides a reliable method to monitor level stands in vessels and apparatus and to measure. In the NW1 a reed switch is energized by a magnet. Depending on the installation position the switching is effected by opener or closer.

#### Technical data

Housing material	Brass
Float material	Spansil
Magnet	Oxyd 300
O-ring seal	NBR
Mechanical connection	G $\frac{3}{4}$ "
max. pressure	25 bar
Measuring media	Oil / water
Medium temperature	max. 110°C
Media density	≥ 0.7
Switching unit	ATEX A-U1
Electrical data	Reed contact, cable 1.5 m, NC or NO, 230 V AC / 1 A / 50 VA

## Flow monitoring

### Thermostatically valve AVTA 15 R 1/2



Self-acting AVTA cooling water valves are widely used for temperature regulation in many different machines and installations where cooling is a requirement. AVTA always opens to admit flow on rising sensor temperature. The valve can be installed either in the cooling water flow line or return line.

#### Technical data

Controllable temperature range	25 to 65°C
Housing material	Brass
Capillary tube length	2,000 mm
Connection	G $\frac{1}{2}$ "
Cv-value	0.581 l/min
kv-value	1.90 m <sup>3</sup> /h
max. sensor temperature	90°C
max. operating pressure	16 bar
Liquid temperature range	25 to 130°C

### Flow indicator DAK



The flow indicator is used for optical and quantitative monitoring of liquids. The device features two-sided large inspection windows. Located in a flow chamber, polished stainless steel flap is lifted from the media stream and displays the instantaneous flow rate. The DAK can be installed either horizontally or vertically.

#### Technical data

max. temperature	280°C
max. pressure	40 bar
Connection	G $\frac{1}{2}$ "
Flap	Stainless steel 1.4571
Housing	Grey cast iron 0.6025
Sight glass plates	Soda lime glass DIN 8902
Seals	Graphite

## Flow monitoring

### Flow switch VKA ...



The flow switch VKA is responsible for the measurement and monitoring of viscous liquids. It operates on a special float principle with cylindrical measuring tube, pinhole and spring loaded float.

The device works independently of position – but it is recommended the vertical installation with flow from bottom to top.

#### Technical data

Measuring range	1.0 to 3.5 l/min Oil 2 to 6 l/min Oil 10 to 32 l/min Oil (depending on version)
max. pressure	160 bar
Ambient temperature range	-25 to 75°C
Medium temperature range	-25 to 100°C
Viscosity range	30 to 540 cSt
Mechanical connection	G $\frac{3}{4}$ "
Electrical connection	Plug DIN 43650
Contact mounting	reed contact NO 240 V AC / 100 VA / 0.7 A

### Electromechanical flow switch HFS 2100



The electromechanical flow switch is based on a position-independent floating body measuring principle. The measuring medium deflects a spring-loaded floating body in flow direction depending on the volumetric flow. A reed contact is fitted outside the device and thus outside the flow circuit. The reed contact switches when the magnet integrated into the floating body reaches the set position.

It is cast in a continuously adjustable housing to protect it against outside influences.

The device is designed so that reliable limit value monitoring is possible even with viscosity fluctuations.

#### Technical data

Switching range	30 to 90 l/min
Operating pressure	250 bar
Pressure loss	0.02 to 0.4 bar
Switching outputs	2 reed contacts
Electrical connection	Device plug DIN 43650
Rating	max. 250 V / 1.5 A / 50 VA
Operating temperature range	- 20 to 70 °C

## Pressure monitoring

### Electronic pressure switch EDS 3300



The EDS 3300 is a compact, electronic pressure switch with integral digital display. The unit can have one or two switching outputs, and there is the option of an additional analogue output signal (4 to 20 mA or 0 to 10 V can be selected). The main applications of the EDS 3300 are primarily in hydraulic and pneumatic technology.

#### Technical data

Measuring range	10 bar
Overload pressure	30 bar
Burst pressure	50 bar
Supply voltage	18 to 35 V DC
Current consumption	approx. 2.455 A total
Switching output	1 x PNP transistor output
Switching current	max. 1.2 A
Output signal analogue	4 to 20 mA or 0 to 10 V

### Electronic pressure transducer PMP 41



The electronic pressure transducer PMP 41 monitors the pressure in the supply line.

#### Technical data

Measuring range	0 to 40 bar
Measuring accuracy	0.2 %
max. overload pressure	160 bar
Process temperature	-40 to 100°C
Ambient temperature	-40 to 85°C
Power supply	9 to 32 V DC
Electrical connection	M20, IP66
Output	PROFIBUS PA

## Proximity switch

### Inductive proximity switch NBN4



The inductive proximity switch is a sensor that detects safe and non-contact metal objects. The proximity switch NBN4 has an operating distance of 4 mm and is not embedded.

#### Technical data

Switching element function	PNP antivalent
Rated operation distance	4 mm
Installation	not embeddable
Assured operating distance	0 to 3.24 mm
Reduction factor $f_{Al}$	0.45
Reduction factor $f_{Cu}$	0.2
Reduction factor $f_{V2A}$	0.75
Operating voltage	10 to 30 V
Switching frequency	0 to 800 Hz
Hysteresis	typ. 5%
Reverse polarity protection	protected against reverse polarity
Short-circuit protection	pulsing
Operating current	0 to 200 mA
Indication of the switching state	LED yellow
Ambient temperature	-25 to 70°C
Connection type	V1-connector
Protection degree	IP67

## External cooling units

### Pump-transfer cooler filtration unit UKF-3



The UKF unit is a compact, easy-to-install unit for offline filtration cooling circuits, consisting of low-noise feed pump, filter and plate heat exchanger. Installation is simply a matter of pipe mounting to and from the tank and connecting the voltage supply.

This unit can be flexibly configured, in the hydraulic diagram this unit is equipped e.g. with filter pollution indicator, electromechanical flow switch, electronic temperature switch as well as an electronic pressure switch.

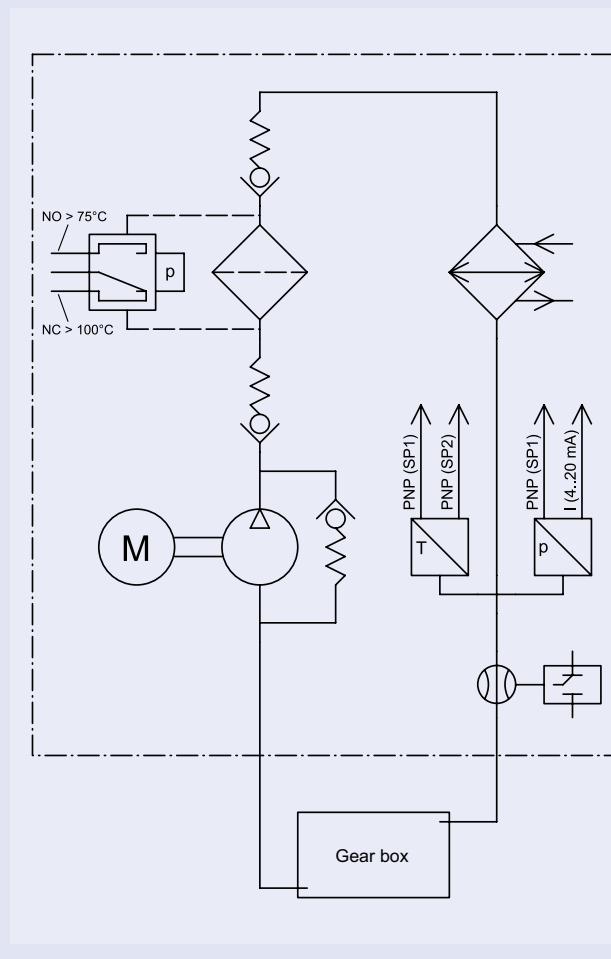
#### Technical data

Motor power	4 kW at 1,000 rpm
Pump flow rate	60 l/min at 1,000 rpm
Plate heat exchanger Number of plates	80
Coolant flow rate	35 l/min at 30°C water inflow temperature
Filter	MF 180
Filtration rating	20 µm
Suction pressure	0.034 bar
Cooling capacity	22 kW

#### Motor data

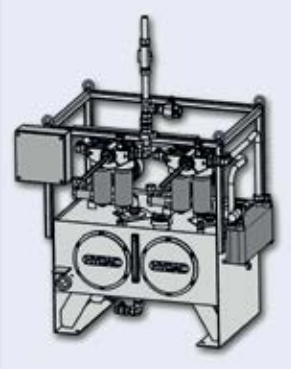
Power	4 kW
Nominal speed	1,000 rpm
Voltage	400 V / 50 Hz
Nominal current	9 A
Temperature monitoring	PTC

### Hydraulic diagram UKF-3



# External cooling units

## Complete cooling unit with tank



The cooler unit is equipped with the following components:

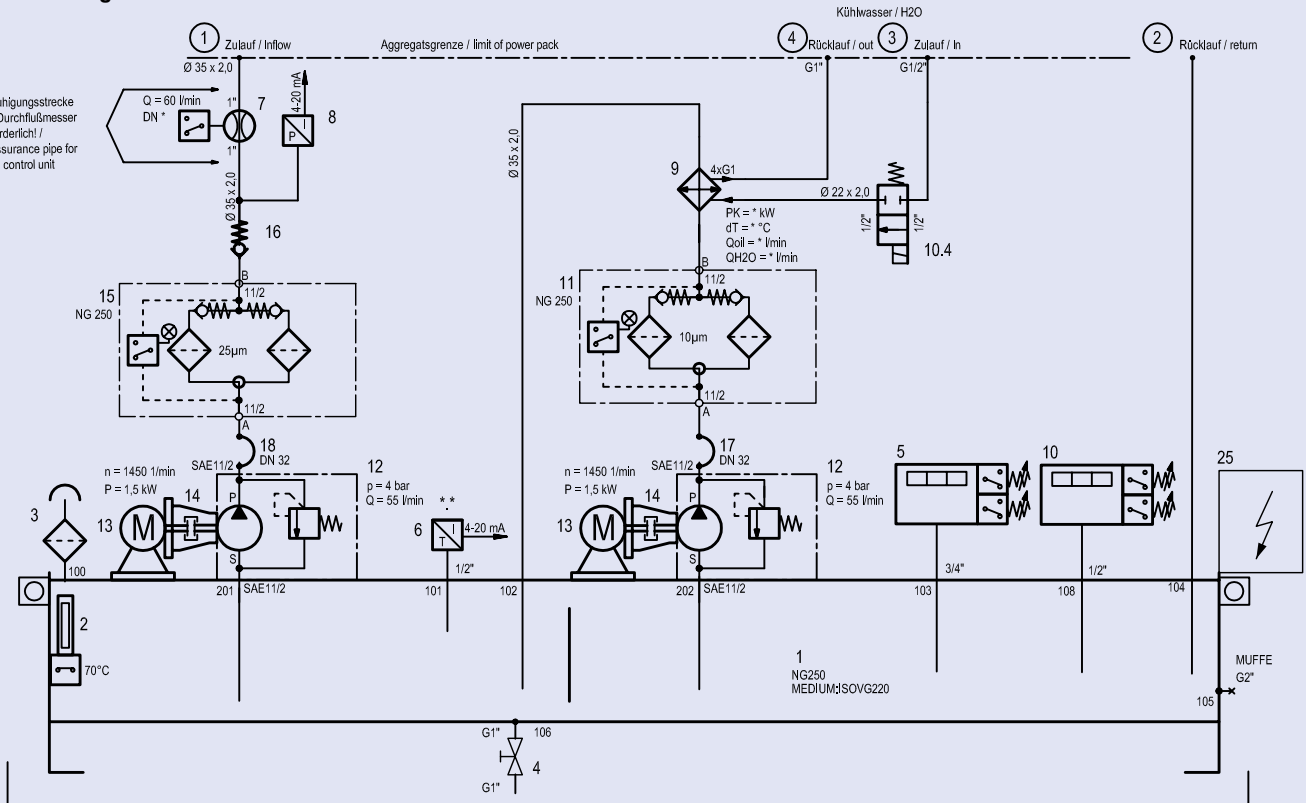
- Oil level indicator with temperature switch
- Electronic level switch
- Modular resistance thermometer
- Electromechanical flow switch
- Electronic pressure transducer
- Electronic temperature switch with external temperature sensor
- Double switching filter

The system is designed for generating, controlling and regulating flows of fluids for hydraulic drives. It consists of a supply pump, plate heat exchanger and various monitoring and control elements.

## Technical data

Motor power	2 x 1.50 kW
Plate heat exchanger Number of plates	120
Oil flow rate	54 l/min
Coolant flow rate	45 l/min at 30°C water inflow temperature
max. pressure	30 bar
Cooling power	30 kW

## Hydraulic diagram



## Further information

### Consulting service

Call us if there is not the suitable monitor device for your application. Our experts will gladly advise you and help you to find the right solution for every technical challenge.



Edition 02/13 · Accessories · Subject to technical modifications

## Further information

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