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Каталог продукции Buhler

Level Switch for external Installation NS 1-G1/2-AM

- Visual and electrical level monitoring
- Small, compact design
- Easy installation
- Adjustable contacts
- Connector included
- Rugged design
- Variable mounting dimensions



Technical Data

NS 1-G1/2-AM

Basic unit

Operating pressure max. 1 bar
 Operating temperature -20 °C to +80 °C
 Spec. density of fluid min. 0,8 kg/dm³
 Length 280, 370, 500 (standard), adjustable up to 800 mm
 Weight at length 280 mm approx. 2.75 kg
 additional weight per 100 mm approx. 0.25 kg

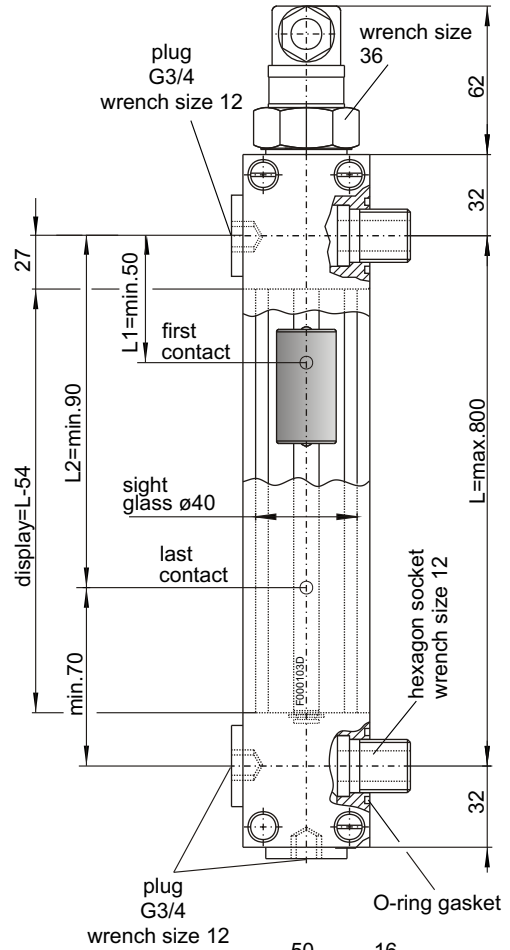
Material

Housing anodized aluminum
 Sight glass acrylic glass (PMMA)
 Mounting bolts chromated steel
 Gasket NBR
 Level switch brass
 Float NBR

Level contacts

	K8	W9
Function	NC / NO*	changeover
Distance min.	40 mm	40 mm
Operating voltage max.	230 V	48 V
switching current max.	0,5 A	0,5 A
Contact load	10 VA	20 VA

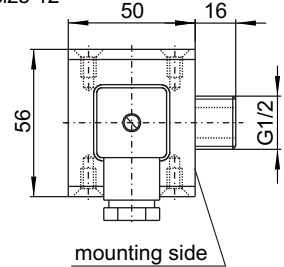
* NC = falling closer / NO = falling opener



Connector	M3 (EN 175301-803) 3 pol. + PE	M12 (Socket) 4 pol. 30 V IP 67**	C7 (EN 175201-804) 7 pol. + PE
Voltage max.	230 V*	30 V	230 V*
Protection class	IP 65	IP 67**	IP 65
Gland	PG 11		PG 11
Max. number of level contacts	2 x K8 1 x W9	2 x K8 1 x W9	4 x K8 2 x W9
Standard pin assignment			
Level contact(s) Type K8			
Level contact(s) Type W9			

* max. 48 V with changeover contact

** with connector mounted



required surface finish of the mounting surface



Product code for NS 1-G1/2-AM

NS 1-G1/2-AM

Connector

M3
M12
C7

Length max. 800 mm

280
370
500
variable (please indicate)

Level contact type

K = NO / NC
W = changeover (max. 2)

Number of level contacts

1-4

Ordering example

You need: Level switch for external mounting. G1/2 fitting. length L=370 mm, Connector M3, 2 level contacts, 1st contact 100 mm NC, 2nd contact 300 mm NO

You order: NS 1-G1/2-AM-M3 / 370-2K L1=100 NC , L2 = 300 NO



NS 6/15 AM, NS 6/25 AM, NS 25/15 AM, NS 25/25 AM

NS 10/15 AM - NS 100/25 AM



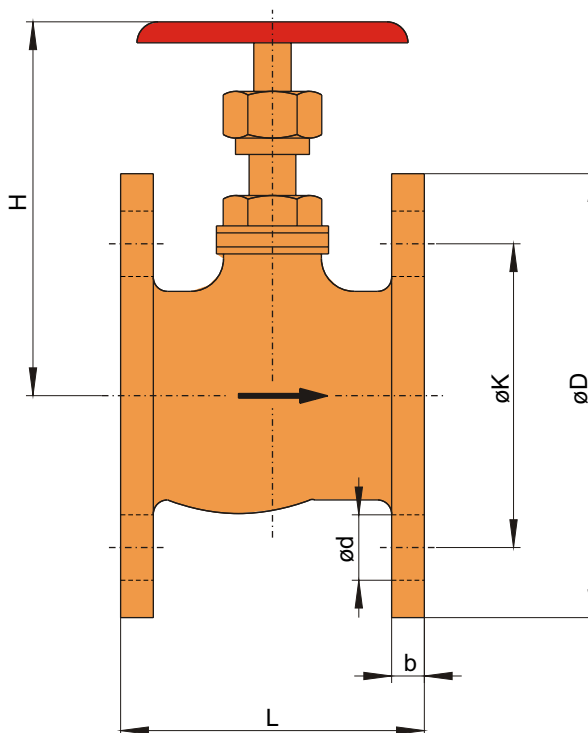
- short length
- different models
- universal use

Technical data NS 6/15 AM, NS 6/25 AM, NS 25/15 AM, NS 25/25 AM

types	DN 15 ; PN 16 DN 25 ; PN 16
max. operating pressure	16 bar
max. operat. temperature	120 °C
material	red bronze and brass
valve seal	metallic packing

dimensions

description	DN 15	DN 25
øD	95	115
øK	65	85
b	7	8
H	80	115
L	65	85
ød	14	14
weight	1 kg	1,8 kg



Attention! Valves can be mounted at types NS 25/15 AM and NS 25/25 AM but only be used up to a max. operating pressure of 16 bar.

Order Information

Part-No.	Description
26 01 000	flange valve DN15 ; PN16
22 51 000	gasket DIN 2690, 45 / 22 x 2 mm
26 02 000	flange valve DN25 ; PN16
22 52 000	gasket DIN 2690, 68 / 27 x 2 mm
22 71 000	mounting screws with nuts, 8 x M12 x 50

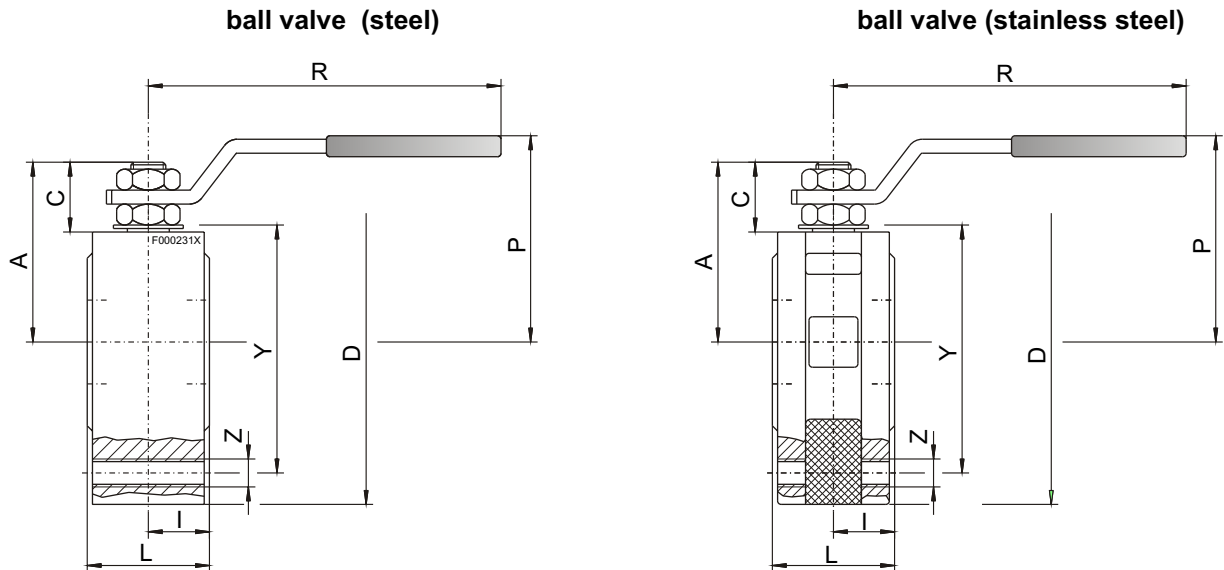
we reserve the right to amend specification

Technical data NS 10/15 AM - NS 100/25 AM

types	ball valve (steel)	ball valve (stainless steel)
nominal pressure (PN)	16/40 ; 65 ; 100	16/40 ; 65 ; 100
nominal size (DN)	15 (1/2") ; 20 (3/4") ; 25 (1")	15 (1/2") ; 20 (3/4") ; 25 (1")
operating temperature	-20 to +160°C	-30 to +160°C

material:

housing	steel C22.8	1.4408
ball	1.4301	1.4401
ball- and stem-seal	PTFE (Teflon)	PTFE (Teflon)
o-rings	FKM (Viton)	FKM (Viton)
Handle	galvanized steel	galvanized steel

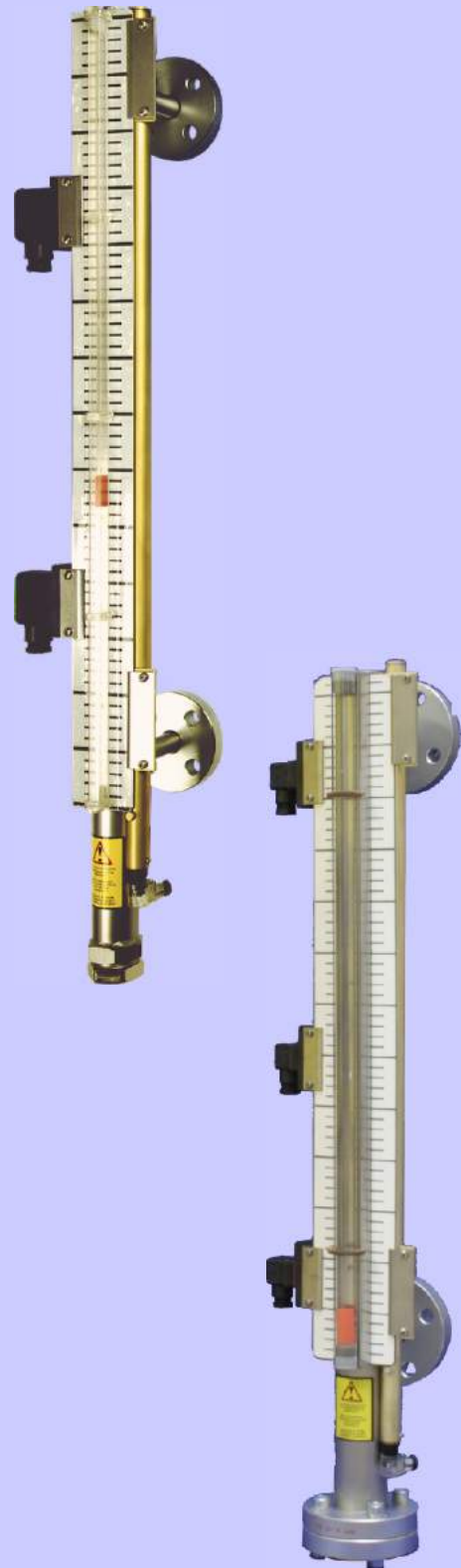


ball valves (steel)													
Part-no.	DN	D	Y	Z	I	L	R	P	A	C	PN	kg	
9008070	1/2"	15 mm	90	65	4xM12	19	35	131,5	64,5	47	15,5	16/40	1,3
9008001	3/4"	20 mm	100	75	4xM12	20	40	131,5	69	51,5	15,5	16/40	1,9
9008002	1"	25 mm	110	85	4xM12	24	46	174,5	80,5	61	19,5	16/40	2,7
9008073	1"	25 mm	140	100	4xM16	32,5	65	253	116	81	23	65	4,8
9008077	1"	25 mm	140	100	4xM16	32,5	65	253	116	81	23	100	4,8
ball valves (stainless steel)													
Part-no.	DN	D	Y	Z	I	L	R	P	A	C	PN	kg	
9008071	1/2"	15 mm	90	65	4xM12	19	35	131,5	64,5	47	15,5	16/40	1,3
9008072	3/4"	20 mm	100	75	4xM12	20	40	131,5	69	51,5	15,5	16/40	1,9
9008004	1"	25 mm	110	85	4xM12	24	46	174,5	80,5	61	19,5	16/40	2,7
9008078	1"	25 mm	140	100	4xM16	32,5	65	253	116	81	23	65	4,8
9008079	1"	25 mm	140	100	4xM16	32,5	65	253	116	81	23	100	4,8

Order information:

order with: part-no., type, normally pressure PN and normally size DN

Level switch NS 10 / NS 25 ..AM



Level switch NS for external installation

- Visual and electrical liquid level monitoring
- Pressure range up to 25 bar
- Lengths up to 5000 mm
- Adjustable level contacts
- Optional analog output 4-20mA
- Visual indicator with scale
- Robust design meets industrial standards
- Float with dynamic buoyancy
- Specials upon request

Technical data

NS 10 ..-AM

Basic unit

max. operating pressure	10 bar
max. operating temperature	100 °C
min. spec. density of fluid	0.75 kg/dm ³

Material

float SK166	NBR
standpipe	1.4571
flange	steel galvanized
sight glass	PC
sealing cap	1.4571

Design

	0-AM	15-AM	25-AM
connector	pipe	flange	flange
flange DIN 2656		DN15	DN25
øD	20	95	115
øk		65	85
ød		14	14
b		16	18
øA		45	68
h		12	14
weight at L1=500 mm, approx.	7.5 kg	8 kg	8.75 kg
weight L1 + 100 mm, approx.	0.2 kg	0.2 kg	0.2 kg
Other designs on request			

appropriate level contacts see on page 4

Option

transducer tube	-K continuous level	O P T I O N
measurement principle	reed contact	
resolution	5 or 10 mm	
operating voltage (U _B)	10 - 30 V DC	
output	4 - 20 mA (nominal voltage 24 V DC)	
load Ω max.	= (U _B - 7.5 V) / 0.02 A	

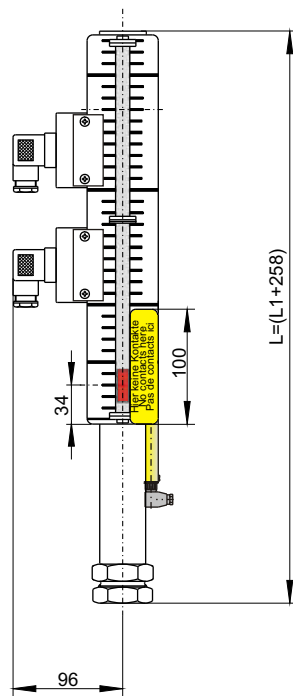
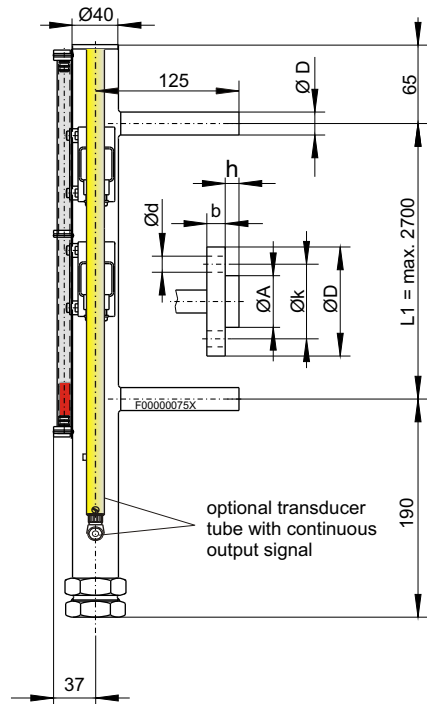
Accessories:

Part No.	
22 51 000	flange gasket 45/22x2 mm (DN15)
22 52 000	flange gasket 68/27x2 mm (DN25)
22 71 999	mounting bolts 8 x M12x65

Notes on the Pressure Equipment Directive:

The level switches were designed, manufactured and tested in accordance with the Pressure Equipment Directive 91/23/EU and the AD 2000 Code.

The category actually achieved by the level sensor is printed on the type plate. Depending on this category, comprehensive quality assurance is performed according to Module H and/or H1 standard.



Product code for NS 10

NS 10/ -SK166/ Length
L1 = ...mm

Design

0-AM	with stub pipe
15-AM	flange DN 15
25-AM	flange DN 25

Option transducer tube
-K5 continuous resolution 5 mm
-K10 continuous resolution 10 mm

O
P
T.
I
O
N

Example for order

You need: Level switch for the external mounting, operating pressure max. 10 bar, with flange connection DN15, distance of stub L1 = 1500 mm, with 2 change over contacts MKS - 1/W

You order: NS 10/15-AM-SK166 / 1500
2 x Part No. 288 99 99 contact MKS 1/W

Technical data

NS 25 ..-AM

Basic unit

max. operating pressure	25 bar	
max. operating temperature	120 °C	
min. spec. density of fluid	SK 661	SK 662
	0.85 kg/dm ³	0.70 kg/dm ³

Material

float	1.4571
standpipe	1.4571
flange	galvanized steel
sight glass	PC

Design

	15-AM	25-AM
connector	flange	flange
flange DIN 2656	DN15	DN25
øD	95	115
øk	65	85
ød	14	14
b	16	18
øA	45	68
h	12	14
S with float	SK 661 205	SK 662 205
	SK 662 390	SK 662 390
weight at L1 = 500 mm, approx	9.5 kg	10.5 kg
weight L1+100 mm, approx.	0.4 kg	0.4 kg
other designs on request		

appropriate level contacts see on page 4

Option

transducer tube	-K continuous level	O P T I O N
measurement principle	reed contact	
resolution	5 or 10 mm	
operating voltage (U _B)	10 - 30 V DC	
output	4 - 20 mA (nominal voltage 24 V DC)	
load Ω max.	= (U _B - 7.5 V) / 0.02 A	

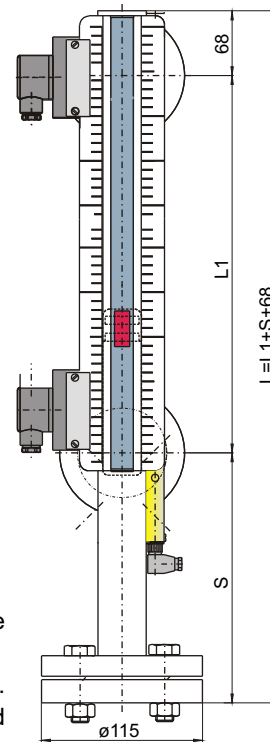
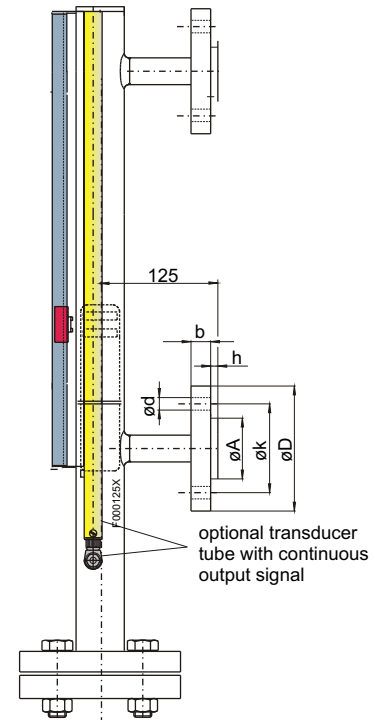
Accessories

Part No.	Description
22 51 000	flange gasket 45/22x2mm (DN15)
22 52 000	flange gasket 68/27x2mm (DN25)
22 71 999	mounting bolts 8 x M12x65

Notes on the Pressure Equipment Directive:

The level switches were designed, manufactured and tested in accordance with the Pressure Equipment Directive 91/23/EU and the AD 2000 Code.

The category actually achieved by the level sensor is printed on the type plate. Depending on this category, comprehensive quality assurance is performed according to Module H and/or H1 standard.



Product code for NS 25

NS 25/ [] [] [] / []

Design

15-AM flange DN 15
25-AM flange DN 25

O	Option transducer tube
P	-K5 continuous resolution 5 mm
T	-K10 continuous resolution 10 mm

Length

L1 = ...mm

float type

-SK661 min. spec. density of fluid 0.85 kg/dm³
-SK662 min. spec. density of fluid 0.70 kg/dm³

Example for order

You need: Level switch for external mounting, operating pressure max. 25 bar, with flange connector DN25, spec. density of fluid 0.89 kg/dm³ stub distance L1 = 1500mm, continuous level output, resolution 10 mm and with 2 change over contacts MKS - 1/W (see on page 4)

You order: NS 25/25-AM-K10-SK661 / 1500
2 x Part No. 288 99 99 contact MKS - 1/W

Contacts for NS ..AM

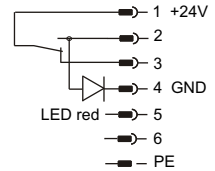
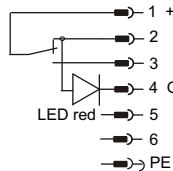
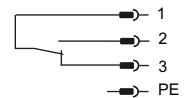
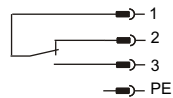
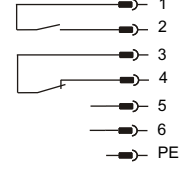
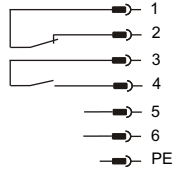
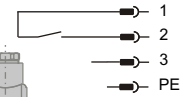
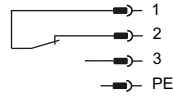
Pin assignment (contact position empty reservoir) mounting left mounting right

Type	MKS-1/K
function	NC / NO
max. voltage	230 V AC/DC
max. current	1 A
max. load of contact	50 VA
connector	DIN EN 175301-803 (M3)
protection system	3 pol. + PE
Part No.	28 88 999

Type	MKS-2/K
function	2 x NC / NO
max. voltage	230 V AC/DC
max. current	1 A
max. load of contact	50 VA
connector	S6
protection system	6 pol. + PE
Part No.	28 91 999

Type	MKS-1/W
function	change over
max. voltage	230 V AC/DC
max. current	1 A
max. load of contact	50 VA
connector	DIN EN 175301-803 (M3)
protection system	3 pol. + PE
Part No.	28 89 999

Type	MKS-1/W-L 24 V
function	change over with LED
max. voltage	24 V DC
max. current	1 A
max. load of contact	25 VA
connector	S6
protection system	6 pol. + PE
Part No.	28 90 999

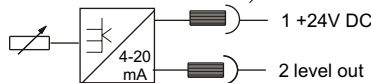


other contacts on request

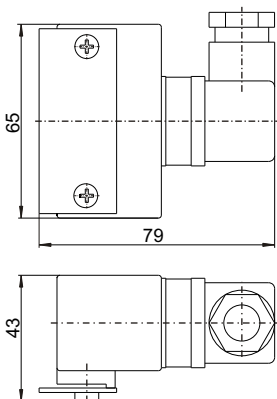
For operations in areas with strong vibrations we suggest to use contacts MKS-1/K and MKS-2K.

When mounting a transducer tube with continuous output signals you have to keep in mind that the mounting of contacts is possible only on the left side.

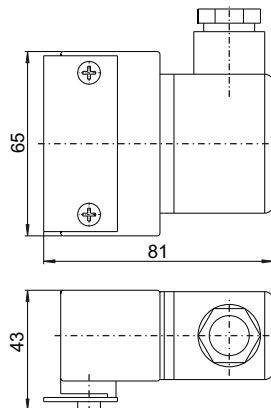
Pin assignment for AM-K with connector S3



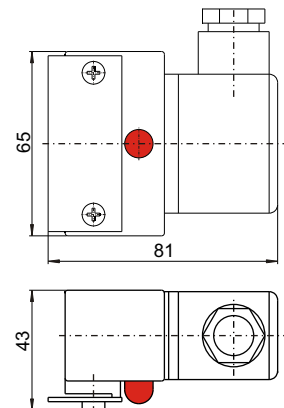
**MKS 1/K
MKS 1/W**



MKS 2/K



MKS 1/W-L24V



Differential Pressure Sensor VSA 24-DM /-DH /-DP



The differential pressure sensor VSA 24-D... is a microprocessor controlled pressure switch with two alarm outputs for pre-alarm and shut-off.

Depending on the pressure loss in the filter head, the inner piston moves towards a spring. The position of the piston is registered by a pressure sensor placed in the upper part of the sensor. The measured values are converted to optical and electrical signals.

As soon as power is turned on, four green LEDs, installed under a transparent cover, start flashing and indicate that the system is active. A temperature sensor measures the temperature of the fluid continuously. After the oil has reached its operational temperature, the device swaps to operation mode, and the green LEDs light up continuously. While the filter capacity decreases during operation, the differential pressure rises slowly. If the dirt holding capacity of the filter is reduced to approx. 25%, the yellow LED lights up. If 100% of the capacity is reached, the red LED appears additionally. Simultaneously, the electrical alarm outputs are activated, signaling the state to the monitoring device.

Since there is no flow across the filter if the system is running idle, no pressure loss can be measured. Nevertheless, the LEDs and the alarm outputs are self-locking and stay active unless the power supply is interrupted or the reset button is pressed.

Furthermore, the device has a self-checking function. In case of malfunction, the red LEDs start blinking and signal output 2 is activated without switching on the yellow LEDs.

- **Two alarm outputs**
- **Signal suppression during cold start operating and short-term pressure peaks**
- **Optical / electrical indication**
- **Self-monitoring**
- **360° highly visible LED corona**
- **Indication of status and fault**
- **M12 connector**
- **Reset function**

Technical Data

Mechanical Data:

Max. operating pressure 400 bar
 Operating temperature -20 °C to +85 °C

Models	VSA 24-DM	VSA 24-DH	VSA 24-DP
Thread	M20x1.5	G1/2	3/4 16-UNF-3A
for filter case type	Mahle	Hydac	Pall

Material

screw-in casing	1.4305	1.4305	1.4305
Gaskets	CU / NBR	NBR	NBR
Top	Al-eloxiert / PC (transparent)		
Weight	220 g		

Electrical Data:

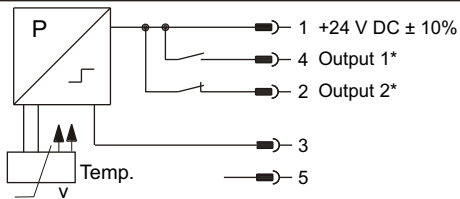
Connector	M12x1 (5-pol.)
Operating voltage	24 V DC \pm 10%
Current consumption	< 100 mA
Protection class	IP67 (with connector installed)
Alarm	
Display	optical (LED's) / electrical
Enable	\geq 30 °C (temp. of medium)
Signal outputs	2
Output 1 (NO)	Alarm at 75% (Δp 2.0 or Δp 4.1 bar \pm 10%)
Output 2 (NC)	Shut-off at 100% (Δp 2.8 or Δp 5.5 bar \pm 10%)
Max. switching current	1 A at 24 V DC

Function:

The capacity provides a display of LED's of different colours. The LED's visualise the operating states and faults.

green LED	continuously on	- sensor is ready for operation
yellow LED	continuously on	- output 1 is closed (alarm at $\Delta p = 2.0$ bar or $\Delta p = 4.1$ bar \pm 10%)
red LED	continuously on	- output 2 is open (alarm at $\Delta p = 2.8$ bar or $\Delta p = 5.5$ bar \pm 10%)
green LED (- ■ - ■ - ■ - ■ -)	flashing approx. 2x per second	- temperature < 30 °C; unit not yet ready for operation! (signal outputs are blocked)
red LED (- ■ - ■ - ■ - ■ -)	flashing approx. 2x per second	- defective pressure or temperature sensor (output 2 is open)
yellow LED	OFF	

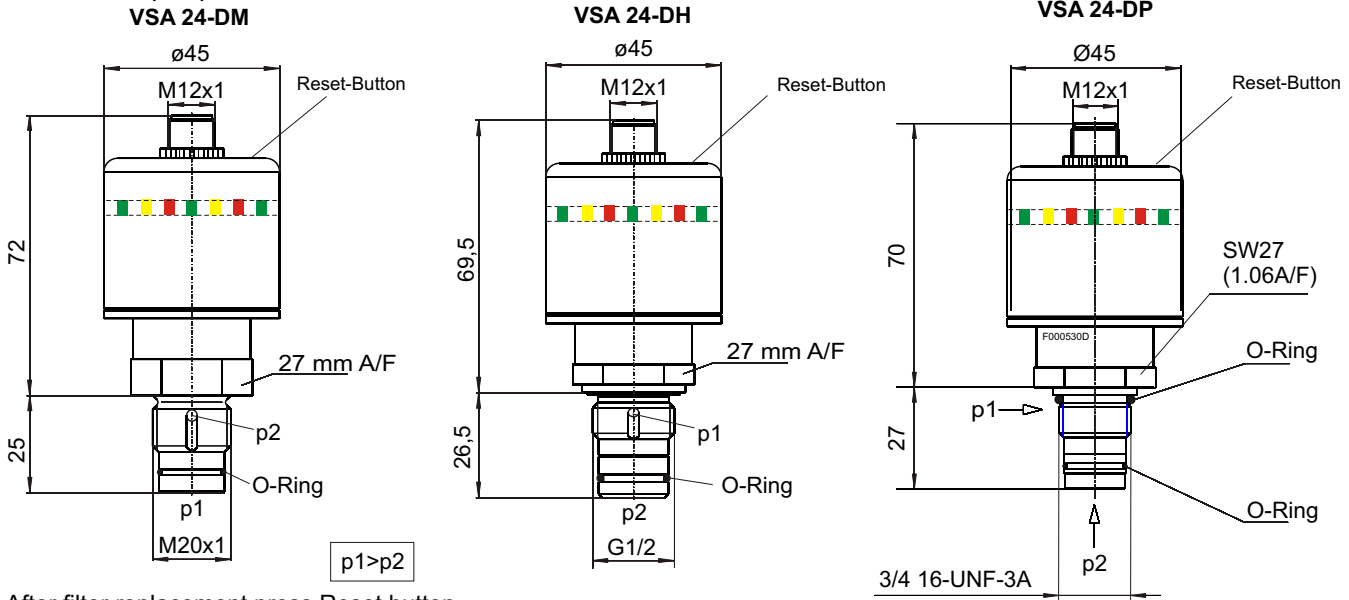
Wiring Diagram



Output 1 = activates at approx. 75%
 (approx. $\Delta p = 2.0$ or $\Delta p = 4.1$ bar)
 NO-contact at increasing pressure

Output 2 = Shut-off at 100%
 (approx. $\Delta p = 2.8$ or $\Delta p = 5.5$ bar)
 NC contact at rising temperature

Dimensions (mm)



After filter replacement press Reset button

Order Information

Part-No.	
13 20 099	Differential pressure sensor VSA 24-DM-2,0/2,8
13 20 199	Differential pressure sensor VSA 24-DH-2,0/2,8
13 20 499	Differential pressure sensor VSA 24-DP-2,0/2,8
13 20 299	Differential pressure sensor VSA 24-DM-4,1/5,5
13 20 399	Differential pressure sensor VSA 24-DH-4,1/5,5
13 20 599	Differential pressure sensor VSA 24-DP-4,1/5,5

Accessories

Part-No.	
9144050018	Connecting cable with plug M12x1 (5-pol.), 3.0 m, elbow plug and copper strands

Capacity Sensor

VSA 24-SM-2,2/2,9 / VSA 24-SH-2,2/2,9



The capacity sensor is a microprocessor controlled pressure switch with two alarm outputs for alert and shut-off.

A display of LED's with different color illuminates under a transparent cover. After power is turned on, green LED's start flashing, indicating that the system is active. A pressure sensor continuously controls the pressure loss in the filter head and a temperature sensor simultaneously registers the temperature of the fluid. After the oil has reached the operating temperature (which is typically above 86°F), the green LED's stop flickering. The sensor then is in operational mode.

After the dirt holding capacity of the filter element has been reduced to approx. 25%, yellow LED's light up. If 100% of the capacity has been reached, red LED's appear in addition. As soon as the yellow and/ or red LED's are lit up, the electrical alarm outputs are activated.

The signal points can be set closer to the cracking pressure of the bypass valve due to the high accuracy of the pressure sensor. This allows more use of the total dirt holding capacity and saves operational cost at the same time.

Since there is no flow across the filter if the system is running idle, no pressure loss can be measured. Therefore the visual and electrical alarms are self-locking until either power has been cut off or the Reset-button is pressed, at the latest after the next replacement of the filter element.

Furthermore, the device has a self-checking function. In case of malfunction, the red LEDs start blinking and signal output 2 is activated without switching on the yellow LEDs. As an option the capacity sensor monitors if the system starts-up without the filter element installed.

- **Two alarm outputs**
- **Signal suppression during cold start and temporary pressure peaks**
- **Visual/ electrical indication**
- **Self-checking**
- **High 360° visibility of LED's**
- **Indication of status and fault**
- **M12 connector**
- **Reset function**

Technical Data

Mechanical Data:

Max. operating pressure 10 bar
 Operating temperature -20 °C to +85 °C

Model

	VSA 24-SM	VSA 24-SH
Thread	M30x1,5	G1/2
For filter case type	Mahle	Hydac

Material

	VSA 24-SM	VSA 24-SH
Screw-in casing	1.4305	1.4305
Top	Al-eloxiert / PC (Transparent)	
Gaskets	CU / NBR	NBR

Weight 200 g

Electrical Data:

Connector M12x1 (5-pol.)
 Operating voltage 24 V DC ± 10%
 Current consumption < 100 mA
 Protection class IP67 (with mounted connector)
 Alarm
 Display optisch (LED's) / electrical
 Enable ≥ 30 °C (temp. of medium)
 Signal outputs 2
 Output 1 (NO) Alarm at 75% (2.2 bar)
 Output 2 (NC) Shut-off at 100% (2.9 bar)
 Max. switching current 1 A at 24 V DC

Function:

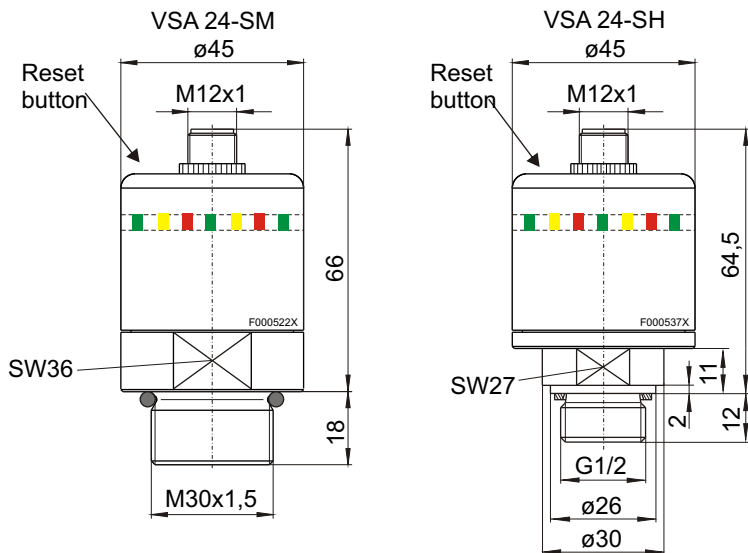
The capacity provides a display of LED's of different colours. The LEDs visualize the operating status and faults.

green LED	continuously on	- sensor is ready for operation
yellow LED	continuously on	- output 1 is closed (alarm at 2.2 bar)
red LED	continuously on	- output 2 is open (alarm at 2.9 bar)
green LED (_ ■ _ ■ _ ■ _ ■ _)	flashing approx. 2x per second	- temperature < 30°C; unit not yet ready for operation! (signal outputs are blocked)
red LED (_ ■ _ ■ _ ■ _ ■ _)	flashing approx. 2x per second	- defective pressure or temperature sensor (output 2 is open)
yellow LED	OFF	

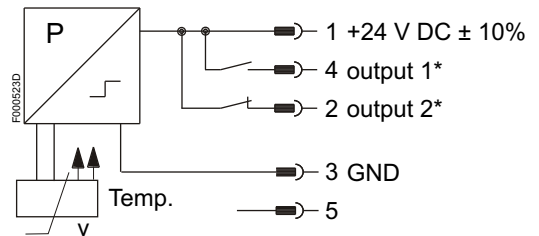
If the alarm outputs are activated by temporary over pressure, the signals will not be cleared before system shut off, pressing the reset button or oil-temperature falling below 20°C.

The alarms are only activated if the measured pressure loss (2,2 and 2,9 bar) lasts for min. 4 seconds.
 Thus short-term pressure peaks can not trigger false alarms.

Dimensions



Wiring Diagram



- * output 1 = activates at 2,2 bar (contact normally open at rising pressure)
- * output 2 = shut off at 2,9 bar (contact normally closed at rising pressure)

After filter replacement press Reset button

Order information

Capacity sensor VSA 24-SM-2,2/2,9
 Capacity sensor VSA 24-SH-2,2/2,9

Part-No.

1310099
 1310199

Accessories

Connection plug* M12x1 (5-pol.), length 3,0 m 9144050018

* Right-angle plug and copper strands

Level and temperature switch with display NT 61D

- Highly visible LED display indicates the switching outputs, able to rotate 270°
- Up to 4 programmable temperature switching outputs
- Continuous temperature signal (adjustable current or voltage) plus one programmable output
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Menu structure based on the VDMA guidelines
- Min/Max memory, logbook function



Level and temperature switch NT 61

- Flange according to DIN 24557 / Part 2
- Various connector options
- Up to 4 level outputs or 2 switching level outputs plus RTD or analog output for temperature
- Reliable dynamic float system
- Stainless steel option for temperatures up to 150 °C
- Probe length up to 1.5 m (longer on request)
- Voltage up to 230 V applicable



Technical data

Nivotemp NT 61-...

Basic unit

max. operating pressure
operating temperature
min. spec. density of fluid

1 bar
-20 °C to +80 °C
0,80 kg/dm³ with float SK 610
0,85 kg/dm³ with float SK 221
280, 370, 500 (standard)
variable up to max. 1500

length

weight
at L=280 mm
plus per 100 mm

MS
approx. 200 g
approx. 30 g

VA
approx. 300 g
approx. 50 g

Material / design

float
immersion tube
flange (DIN 24557)
stilling tube (option)

MS
hard PU (SK 610)
brass
PA
brass

VA
SS 1.4571 (SK 221)
SS 1.4571
PA
stainless steel

Level contacts

function
max. voltage
max. current
max. contact load
min. distance of contact

K10
NO / NC*
230 V
0,5 A
10 VA
40 mm

W11
change over
48 V
0,5 A
20 VA
40 mm

*NO= normally open / NC = normally closed at empty reservoir

Included in delivery

mounting bolts M5 (6 pieces) and GI cork-gasket

Temperature contact

of temp. contacts
max. voltage
max. current
max. contact load

TK
1
230 V
2,5 A
100 VA

TM
2
230 V
2 A
100 VA

Function

switching point °C
switching point tolerance
max. hysteresis

NC
50 / 60 / 70 / 80
± 3 K
10 K ± 3 K

NC
50 / 60 / 70 / 80
± 5 K
18 K ± 5 K

Function

switching point °C
switching point tolerance
max. hysteresis

NO
50 / 60 / 70 / 80
± 3 K
10 K ± 3 K

NO
50 / 60 / 70 / 80
± 5 K
26/35/40/45 K ± 5 K

NC = open / NO = closed at **increasing temperature**

Other temperatures and designs with 2x TK contacts on request

Temperature sensor

tolerance

RTD (Pt 100) class B, DIN EN 60 751
±0,8 °C

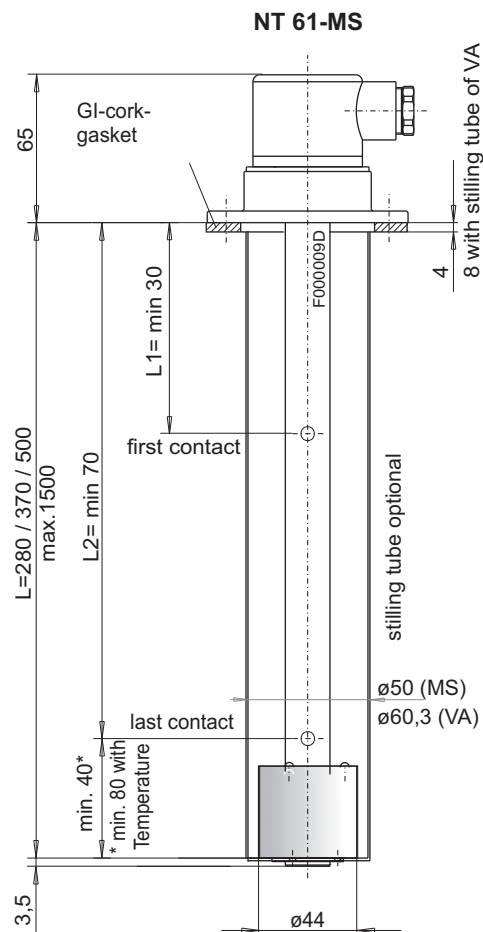
Temperature transmitter

probe element
measuring range
operating voltage (U_B)
output
load Ω max.
other measuring range on request

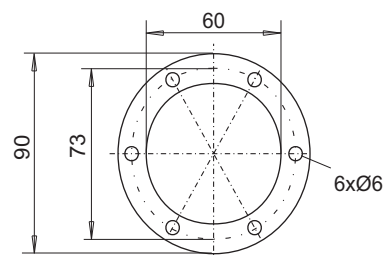
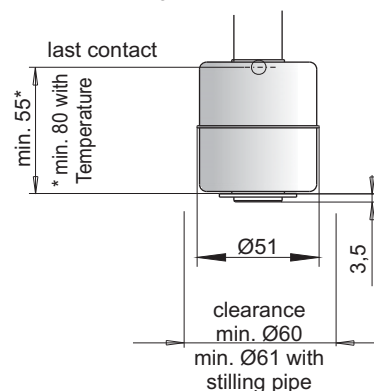
KT
RTD (Pt 100) class B, DIN EN 60 751
0 °C to +100 °C
10 - 30 V DC
4 - 20 mA
(U_B - 7,5 V) / 0,02 A

Options

stilling pipe (SSR) material same as immersion tube



NT 61-VA



according to DIN 24557 part 2

Product code for Nivotemp NT 61-...

NT 61- [] - [] - [] - [] - [] - **A** **B** - **C** - []

Series

Nivotemp NT 61

Design

MS brass
VA float and immersion tube
stainless steel

Connector

M3
S6
M12
2M12
C6F

Length (max. 1500 mm)

280
370
500
Variable (please specify length)

level contacts

1-4

Level contact

K = NC/NO
W = change over

Accessories

Part-No. 4-pole Description

9144 05 0010 Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046 Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047 Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Example for order

You need: Level switch design MS, connector S6, length L= 550 mm, 2 level contacts (NO/NC) and temperature contact 80 °C as NC, 1st contact 100 mm NC, 2nd contact 470 mm NO

You order: NT 61-MS-S6-550-2-K-T80NC, L1=100 NC, L2 = 470 NO

SSR = stilling tube

only for double temp. contact

C T2 (2nd Temperature contact)
NC NO
TM50NC TM50NO =50 °C
TM60NC TM60NO =60 °C
TM70NC TM70NO =70 °C
TM80NC TM80NO =80 °C

B T1 (1st Temperature contact)

NC NO
TM50NC TM50NO =50 °C
TM60NC TM60NO =60 °C
TM70NC TM70NO =70 °C
TM80NC TM80NO =80 °C

A Temperature *

Pt 100 = Temperature sensor (RTD)
KT = Temperature transmitter
TK = Temperature contact
TK50NC = 50 °C NC
TK60NC = 60 °C NC
TK70NC = 70 °C NC
TK80NC = 80 °C NC

TK50NO = 50 °C NO
TK60NO = 60 °C NO
TK70NO = 70 °C NO
TK80NO = 80 °C NO

*cannot be combined with temperature contact TM

Connection	M3 3 pol. + PE DIN EN 175301-803 230 V AC/DC* IP 65 PG 11	S6 6 pol. + PE DIN EN 175201-804 230 V AC/DC* IP 65 M20 x 1,5	M12 (base) 4 pol. DIN EN 61076-2-101 30 V DC IP 67**	2 x M12 (base) 2 x 4 pol. DIN EN 61076-2-101 30 V DC IP 67**	C6F 6 pol. + PE DIN EN 175301-804 230 V AC/DC* IP 65 PG 11
max. voltage protection class cable connection					
Max. # of contacts Level/ Temp. contact	1 x K10 / 1 x TK - / - - / -	3 x K10 / 1 x TK 2 x K10 / 2 x TM 1 x W11 / 1 x TK 1 x W11 / 2 x TM	1 x K10 / 1 x TK - / - - / -	3 x K 10 / 1 x TK 2 x K10 / 2 x TM 1 x W11 / 1 x TK 1 x W11 / 2 x TM	3 x K10 / 1 x TK 2 x K10 / 2 x TM 1 x W11 / 1 x TK 1 x W11 / 2 x TM
Only level or	2 x K10 1 x W11	4 x K10 2 x W11	2 x K10 1 x W11	4 x K10 2 x W11	4 x K10 2 x W11

* max. 48 V at switch contacts / **with casted connector head / other connectors on request

Technical data

Nivotemp NT 61D-...

Basic unit

max. operating pressure	1 bar	
operating temperature	-20 °C to +80 °C	
min. density of fluid	0.80 kg/dm ³ with float SK 610 0.85 kg/dm ³ with float SK 221	
standard length mm	280, 370, 500 variable up to max. 1.5 m	
weight	MS	VA
at L=280 mm., approx.	300 g	400 g
plus per 100 mm., approx.	30 g	50 g

Material	MS	VA
display housing	PA	PA
float	hard PU (SK 610)	SS 1.4571 (SK 221)
immersion tube	brass	SS 1.4571
flange (DIN 24557)	PA	PA
stilling tube (option)	brass	stainless steel

Level contacts	K10
max. #	2
function	NO/NC*
max. voltage	30 V
max. current	0.5 A
max. contact load	10 VA
min. distance of contact	40 mm

*NO= normally open / NC = normally closed at empty reservoir

Display

Temperature display range	-20 °C to +120 °C
alarm range	0 °C to 100 °C
accuracy	1%
resolution	0.5 °C
protection class	IP65
display	4 digit 7 segment LED display
operation	3 button keypad
current consumption at power up	approx. 100 mA for 100 ms
operating current consumption	approx. 50 mA
supply voltage (U _B)	10 - 30 V DC (nominal voltage 24 V DC)
ambient temperature	-20 °C to 70 °C
Temperature sensor	RTD (Pt 100) class B, DIN EN 60751

Included in delivery

mounting bolts M5 (6 pieces) and GI cork-gasket

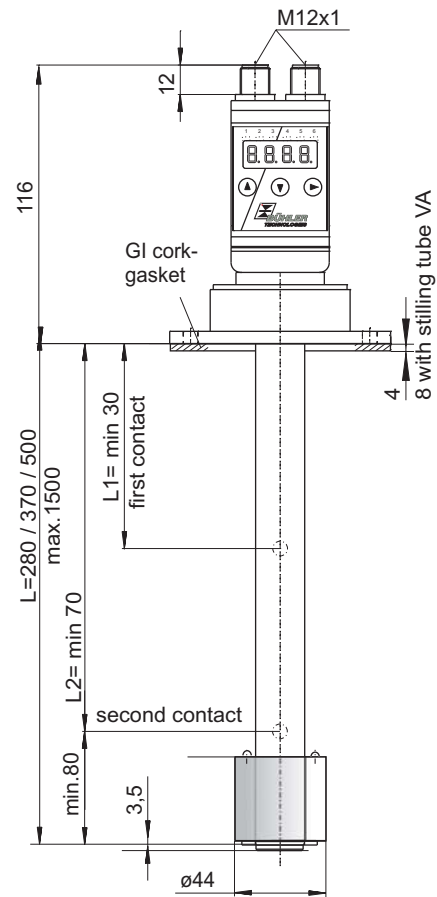
Following temperature outputs are available:

connector (base)	-2T 2 x M12 - 4 pol	O P T I O N A L
max. contact load	1 A	
PNP transistor output, max. current PNP output short-circuit proof	2 x free programmable 0.5 A per output	
connector (base)	-1T-KT 2 x M12 - 4 pol	O P T I O N A L
max. contact load.	1 A	
PNP transistor output, max. current PNP output short-circuit proof analog output	1 x free programmable max. 0.5 A per output	
load analog output	1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V max. 500 Ω	O P T I O N A L
connector (base)	-4T 1 x M12 - 4 pole 1 x M12 - 8 pole	
max. contact load PNP transistor output, max. current PNP output short-circuit proof	1 A 4 x free programmable 0.5 A per output / 1 A overall	

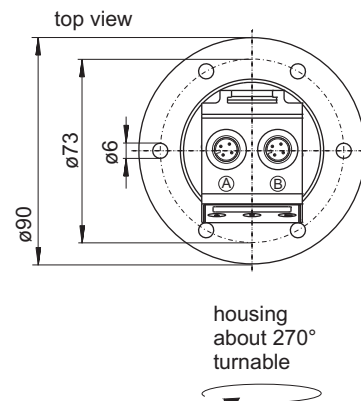
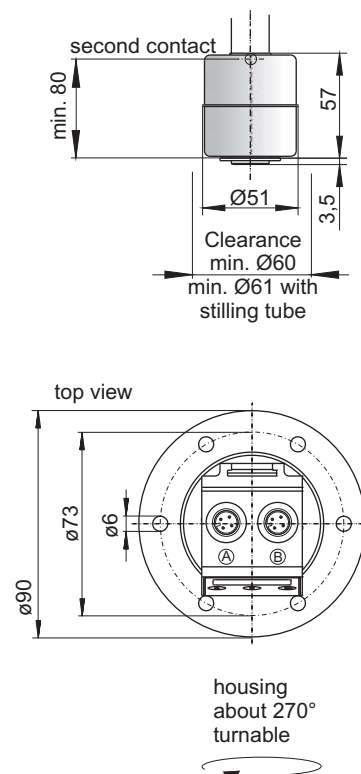
Options

stilling tube	SSR Material same as immersion tube
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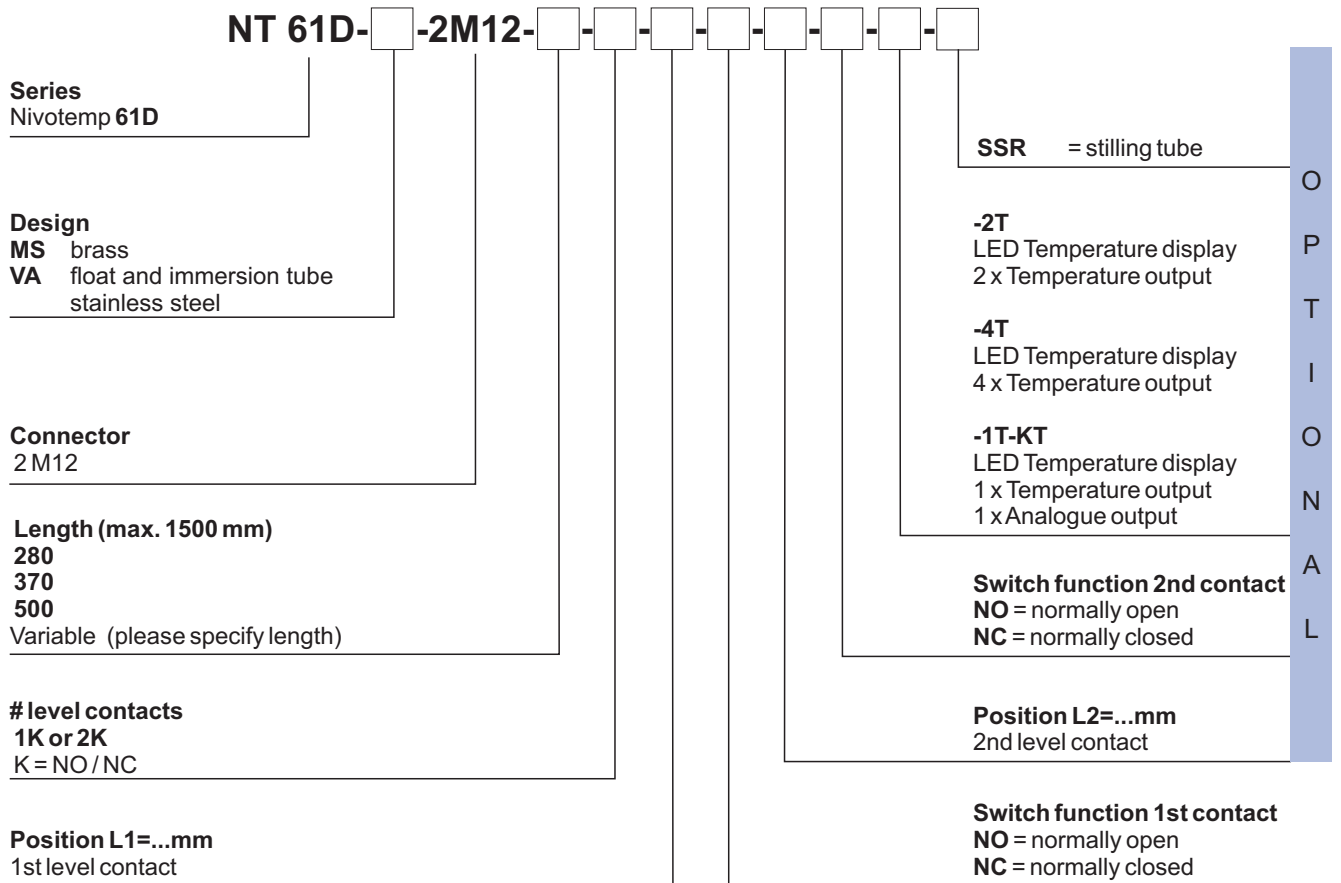
NT 61D-MS



NT 61D-VA



Product code for Nivotemp NT 61D-...



Accessories

Part-No. 4-pole	Part-No. 8-pole	Description
9144 05 0010	9144 05 0048	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0049	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0033	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

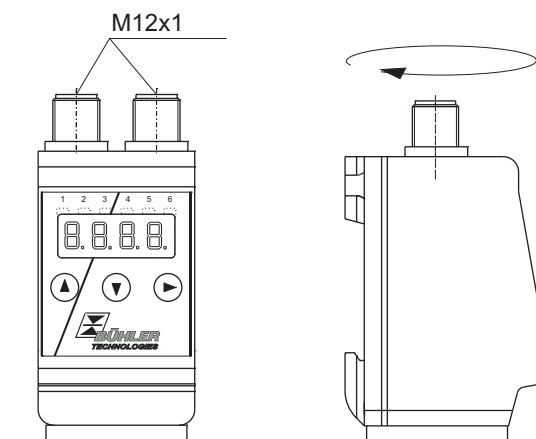
Example for order

You need: Level switch Design VA, length L= 550 mm, 2 level contacts: 1st contact 100 mm NC, 2nd contact 470 mm NO, 1 temperature output, 1 analogue output, stilling tube

You order: NT 61D-VA-2M12-550-2K-100-NC-470-NO-1T-KT-SSR

Connector **2 x M12 (base)**
 2 x 4 pol.
 DIN EN 61076-2-101
 max. voltage 30 V DC
 protection class IP 67**

housing
able to rotate 270 degrees



Technical data

Nivotemp NT 61-HT

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to 150 °C (only with HT contacts)
min. density of fluid	0.85 kg/dm ³ with float SK 221
standard length mm	280, 370, 500
	variable up to max. 1.5 m
weight	VA
at L=280 mm	approx. 950 g
plus per 100 mm	approx. 50 g

Material

float	SS 1.4571
immersion tube	SS 1.4571
flange	SS 1.4571

Level contacts

	K10	W11	K10HT*	W11HT*
max. voltage	230 V	48 V	230 V	48 V
max. current	0.5 A	0.5 A	0.5 A	0.5 A
max. contact load	10 VA	20 VA	10 VA	20 VA
min. distance of contact	40 mm	40 mm	40 mm	40 mm
max. operating temperature	105 °C	105 °C	150 °C	150 °C

*NO= normally open / NC = normally closed at empty reservoir

***HT = not adjustable**

Included in delivery

mounting bolts M5 (6 pieces) and GI cork-gasket

Temperature contact

	TK	TM
# of temp. contacts	1	2
max. voltage	230 V	230 V
max. current	2.5 A	2 A
max. contact load	100 VA	100 VA

Function

	NC	NC
switching point in °C	50 / 60 / 70 / 80	50 / 60 / 70 / 80
switching point tolerance	± 3 K	± 5 K
max. hysteresis	10 K ± 3 K	18 K ± 5 K

Function

	NO	NO
switching point in °C	50 / 60 / 70 / 80	50 / 60 / 70 / 80
switching point tolerance	± 3 K	± 5 K
max. hysteresis	10 K ± 3 K	18 K ± 5 K

NO= normally open / NC = normally closed at **increasing temperature**)

other temperatures and designs with 2 x TK contacts on request

Temperature sensor

RTD (Pt 100) class B, DIN EN 60751

tolerance

±0,8 °C

Temperature transmitter

KT

Pt 100 class B, DIN EN 60751

alarm range

0 °C to +100 °C

operating voltage (U_B)

10 - 30 V DC

output

4 - 20 mA

load Ω max.

= (U_B - 7.5 V) / 0.02 A

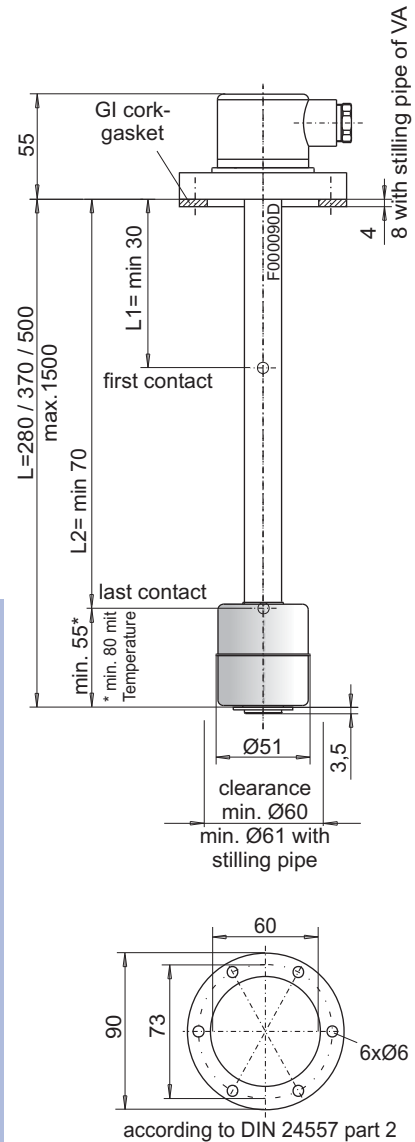
other measuring ranges on request

Options

stilling pipe

SSR

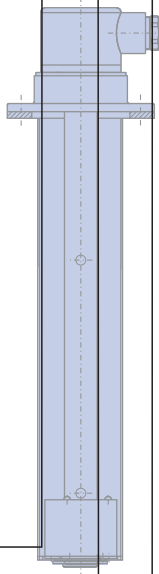
Material same as immersion tube



Product code for Nivotemp NT 61-...

NT 61-HT- [] - [] - [] - [] - **A** **B** - **C** - []

Series	Nivotemp	NT 61
Design	-HT	stainless steel
Connector	M3 S6 M12 2M12 C6F	
Length (max. 1500mm)	280 370 500 Variable (please specify length)	
# level contacts	1-4	
Level contact	K = NO/NC K-HT = NO/NC W = change over W-HT = change over	



SSR = stilling tube

Only for double temp. contact

C T2 (2nd Temperature contact)

NC	NO	
TM50NC	TM50NO	=50 °C
TM60NC	TM60NO	=60 °C
TM70NC	TM70NO	=70 °C
TM80NC	TM80NO	=80 °C

B T1 (1st Temperature contact)

NC	NO	
TM50NC	TM50NO	=50 °C
TM60NC	TM60NO	=60 °C
TM70NC	TM70NO	=70 °C
TM80NC	TM80NO	=80 °C

A Temperature *

Pt 100	= Temperature sensor (RTD)
KT	= Temperature transmitter
TK	= Temperature contact
TK50NC	= 50 °C NC
TK60NC	= 60 °C NC
TK70NC	= 70 °C NC
TK80NC	= 80 °C NC
TK50NO	= 50 °C NO
TK60NO	= 60 °C NO
TK70NO	= 70 °C NO
TK80NO	= 80 °C NO

*cannot be combined with temperature contact TM

Accessories

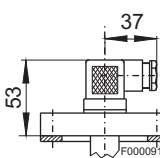
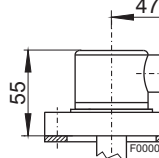
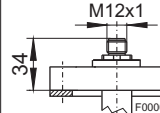
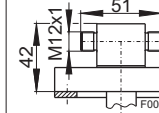
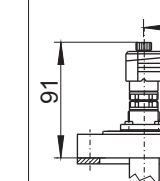
Part-No. 4-pole Description

9144 05 0010	Connecting cable M12x1, 1.5 m, elbow connector (female) and straight connector (male)
9144 05 0046	Connecting cable M12x1, 3.0 m, elbow connector (female) and straight connector (male)
9144 05 0047	Connecting cable M12x1, 5.0 m, elbow connector (female) and wire

Example for order

You need: Level switch, connector M3, length L= 550 mm, 2 level contacts (NO/NC)
 1st contact 100 mm NC, 2nd contact 470 mm NO, temperature sensor, stilling tube

You order: NT 61HT-M3-550-2-K-HT-Pt 100-SSR, L1=100 NC, L2 = 470 NO

Connector	M3	S6	M12 (base)	2 x M12 (base)	C6F
max. voltage	3 pol. + PE	6 pol. + PE	4 pol.	2 x 4 pol.	6 pol. + PE
protection class	DIN EN 175301-803	DIN EN 175301-804	DIN EN 61076-2-101	DIN EN 61076-2-101	DIN EN 175301-804
cable connection	230 V AC/DC* IP 65 PG 11	230 V AC/DC* IP 65 M20 x 1,5	30 V DC IP 67**	30 V DC IP 67**	230 V AC/DC* IP 65 PG 11
max. # of contacts					
level/ temp. contact	1 x K10 / 1 x TK - / - - / -	3 x K10 / 1 x TK 2 x K10 / 2 x TM 1 x W11 / 1 x TK 1 x W11 / 2 x TM	1 x K10 / 1 x TK - / - - / -	3 x K 10 / 1 x TK 2 x K10 / 2 x TM 1 x W11 / 1 x TK 1 x W11 / 2 x TM	3 x K10 / 1 x TK 2 x K10 / 2 x TM 1 x W11 / 1 x TK 1 x W11 / 2 x TM
only level or	2 x K10 1 x W11	4 x K10 2 x W11	2 x K10 1 x W11	4 x K10 2 x W11	4 x K10 2 x W11

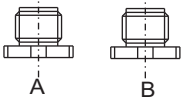

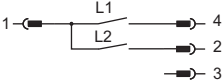
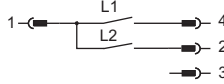
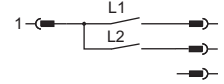

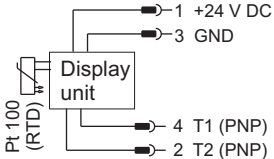
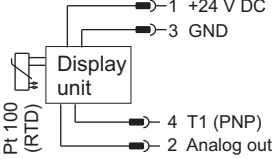
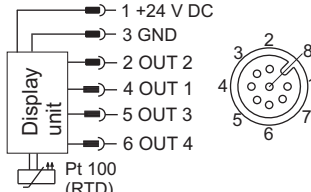
* max. 48 V at change over contacts / **with casted connector head / other connectors on request

Standard pin assignment NT 61 and NT 61-HT

Connector	M3	S6/C6	M12 (base)	2 x M12 (base)
only level contact(s) Type K10				
only level contact(s) Type W11				
level contact(s) Type K10 and temperature				
level contact(s) Type K10 and Pt 100 (RTD)				
level contact(s) Type W11 and temperature				
level contact(s) Type W11 and Pt 100 (RTD)				
level contact(s) Type K10 and 2 Temp. contacts				
level contact Type W11 and 2 Temp. contacts				

TK/TM = Thermo contact KT = Temperature transmitter PT = Temperature sensor Pt 100 (RTD) other assignment on request

Standard pin assignment NT 61D

	Type NT 61D-2T level contact(s) 2 x Temperature output	Type NT 61D-1T-KT level contact(s) 1 x Temperature output 1 x Analogue output	Type NT 61D-4T level contact(s) 4 x Temperature output
Connector A = Level 			
Connector B = Temperature 			

Note:

If the switching output is measured with high-impedance measuring equipment or if the frequency output is used, connect a 10 kΩ resistor between output and ground to avoid faulty measurements.

Nivotemp 61-0-WW



The entrance of water into fluid power or lubrication systems significantly reduces the life of oil and causes damage to other components used in the systems .

The most reliable method of detecting water in oil is to measure the interface level between water and oil when the water is separated.

This Nivotemp version is equipped with an additional float which rises in water but sinks in oil.

The reservoir has to be equipped with a small cavity in the bottom and the contact tube of the Nivotemp reaches down to the lowest point of the cavity.

When a volume of approx. 230 ml of free water accumulates in the cavity the float will rise and actuate a contact. The signal can either be used to open a drain valve, drain the water off, or just to set an alarm.

An easily installed prefabricated sump is available as an accessory.

- **With water alarm function**
- **Reliable physical measuring system**
- **Easy installation**
- **Independent of oil chemistry**
- **Up to four adjustable level contacts**
- **Cable connector standard**

Technical Data

Operating pressure	max. 1 bar
Operating temperature	max. 80 °C
Density of fluid	min. 0,8 kg/dm ³
Density of oil	max. 0.86 kg/dm ³

Material:

Float SK 610 for level control	hard PU
Float WW for water alarm	PPH
Switch tube	brass
Flange	PA 6
Weight	L=500 mm 750 g

Level contacts / water alarm contacts	K10	W11	-	-
Function	*NC / NO	change over	*NC / NO	change over
Distance of contact, min.	40 mm	40 mm	fixed	fixed
Max. voltage	230 V	48 V	230 V	230 V
Max. current	0,5 A	0,5 A	1 A	1 A
Contact load	10 VA	20 VA	50 VA	40 VA

*NC=normally closed / NO=normally open, all figures at empty reservoir

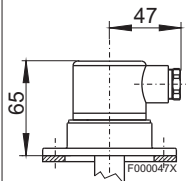
Connectors

(Other connectors upon request)

Protection class
Cable gland

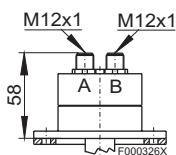
S6
6 pol. + PE
DIN 43651

IP 65
M20x1,5



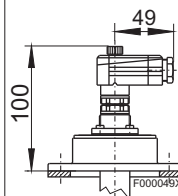
2xM12 (socket)
4 pol / 4 pol.

IP 67**
PG7**
**with plug fixed



C6F
6 pol. + PE
DIN 46651

IP 65
PG11



Max. no of contacts

or
or
or

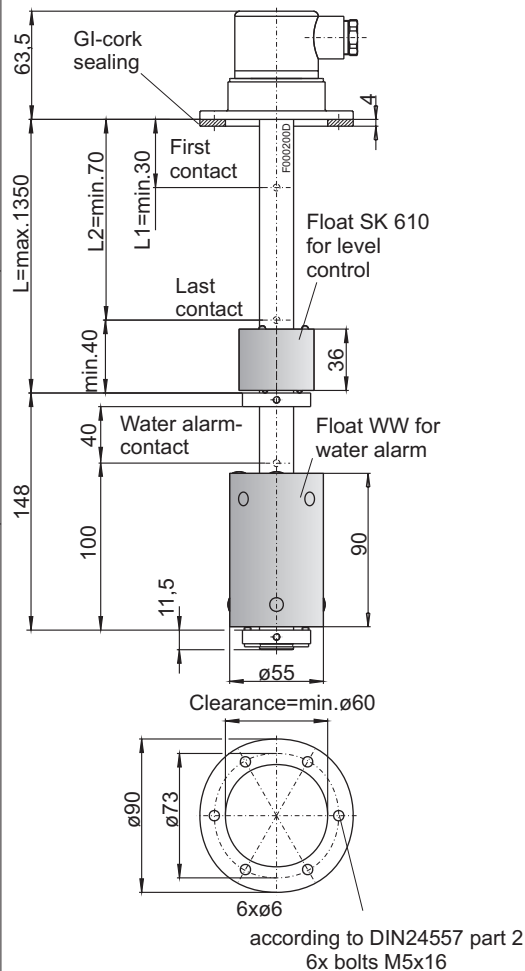
Max. voltage

4xK10 + 1xK6
2xW11 + 1xK6
3xK10 + 1xW7
1xW11 + 1xW7
230 V AC/DC
48 V with change over contacts

2xK10 + 1xK6
1xW11 + 1xK6
2xK10 + 1xW7
1xW11 + 1xW7
24 V DC

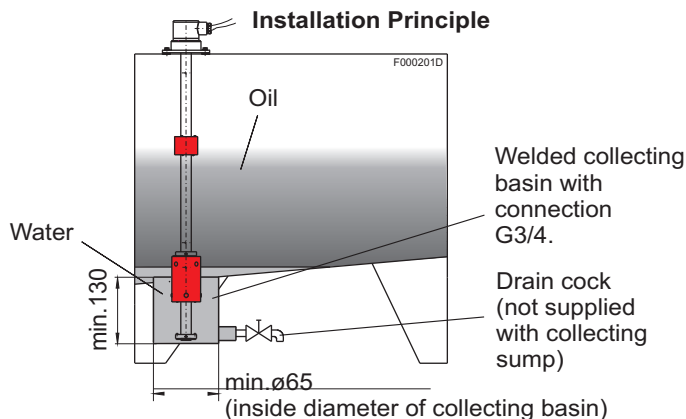
4xK10 + 1xK6
2xW11 + 1xK6
3xK10 + 1xW7
1xW11 + 1xW7
230 V AC/DC
48 V with change over contacts

Dimensions (mm)



Installation example

A small collecting basin is welded to the floor of the reservoir at the deepest appropriate point (see also installation principle). We recommend to use the prefab sump but you are free to provide a solution yourself. To make the unit effective the volume of the collecting basin should be as small as possible. Therefore please use the recommended dimensions.



Ordering information

Basic version (without level- and water alarm contacts)

Part-no.	Description	Connector	Length
10 30 099	Nivotemp 61-0-WW-S6-level contacts-water alarm contacts	S6	L (max. 1350 mm)
10 30 799	Nivotemp 61-0-WW-2xM12-level contacts-water alarm contacts	2xM12	L (max. 1350 mm)
10 30 899	Nivotemp 61-0-WW-C6F-level contacts-water alarm contacts	C6F	L (max. 1350 mm)

Part-no.	Description	Number of contacts	Type	Length
18 89 999	Level contact K10	see table connectors	NC / NO	L1 (, L2, L3, L4)
18 90 999	Level contact W11	see table connectors	change over	L1 (, L2, L3, L4)
18 50 999	Water alarm contact K6	1	NC / NO	fixed
18 49 999	Water alarm contact W7	1	change over	fixed

Accessories:

10 30 0991 collecting sump (with connection G3/4, include plug), dimensions: ø70/2,6 x height=133mm

Example:

You need:

Nivotemp (Basic): Connector: type S6; length L= 580 mm,

Level contacts: 1st contact 100 mm NC,
2nd contact 500 mm NO,

Water alarm contact: 1, normally closed (NC)

You order:

10 30 099 Nivotemp 61-0-WW-S6-2xK10-1xK6, L= 580

18 89 999 2 x level contacts K10,
L1=100 NC, L2 = 500 NO

18 50 999 1 x water alarm contact K6, NC



Level or level and temperature sensor NT 63

- Flange according to DIN 24557 / Part 2
- Continuous liquid level measurement
- Continuous liquid level and temperature measurement
- 4-20 mA outputs (2-10 V on request)
- Resolution 5 mm (liquid level)
- Multiple connector options
- Reliable dynamic float system
- Float and probe in stainless steel, optional
- Probe length up to 1420 mm, longer on request

Technical data

NT 63

Basic unit

K = continuous level and temperature measurement

KN = continuous level measurement

max. operating pressure 1 bar
 operating temperature -20 °C to +80 °C
 min. spec. density of fluid 0.80 kg/dm³ with float SK 604
 0.85 kg/dm³ with float SK 221
 lengths mm 280, 370, 500, 670, 820, 970, 1120,
 1270, and 1420 mm
 (other lengths on request)

weight **MS** **VA**
 at L=280 mm approx. 200 g approx. 300 g
 plus per 100 mm approx. 30 g approx. 50 g

Material / Construction

float **MS** **VA**
 hard PU (SK 604) 1.4571 (SK 221)
 flange DIN 24557 part 2 PA PA
 immersion tube brass 1.4571

Level measurement

resolution 5 mm
 supply voltage (U_B) 10 - 30 V DC
 ripple < 1 %
 output signal 4-20 mA
 load Ω max. (U_B - 7.5 V) / 0,02 A

Temperature measurement

for Type 63 K

sensor Pt 100 class B DIN EN 60 751
 tolerance ± 0,8 °C
 supply voltage (U_B) 10 - 30 V DC
 ripple < 1 %
 output signal 4-20 mA (≈ 0-100 °C*)
 load Ω max. (U_B - 7,5 V) / 0,02 A
 * on request other ranges

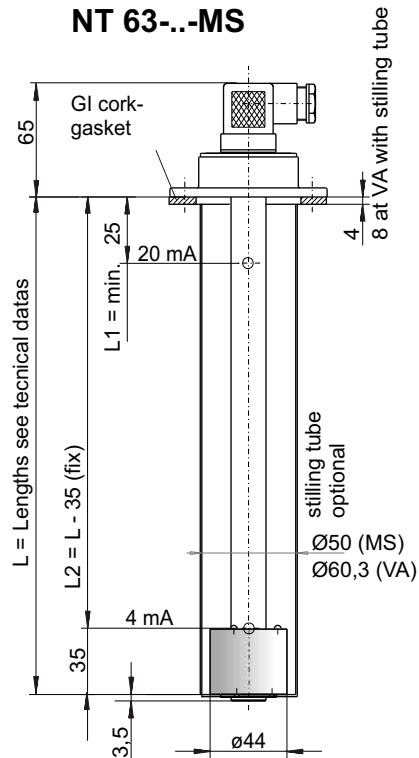
included in delivery

mounting bolts (6 pieces) and GI cork-gasket

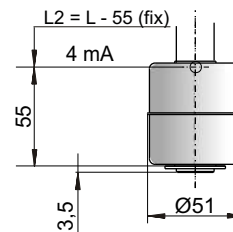
Options

stilling tube **SSR** Material like immersion tube

NT 63--MS

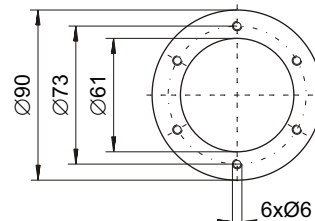


NT 63-- VA



Flange picture

according to DIN 24557 / Part 2



Connector	M3 (DIN EN 175301-803) 3 pol. + PE IP 65 PG 11	M12 (Sockel) 4 pol. IP67**
protection class cable connection		**with casted connector head
Standard pin assignment		
K continuous level and temperature		
KN continuous level		

Product code for NT 63

NT 63- - - - -

Series

Nivotemp **NT 63**

K = Level and temperature measurement

KN = only level measurement

Design

MS brass

VA float and immersion tube VA

Connector

M3

M12

Length (max. 1420 mm)

280

370

500

670

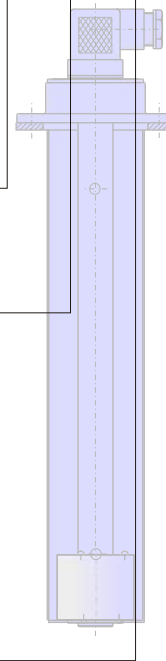
820

970

1120

1270

1420



Option

SSR = stilling tube

Accessories:

Part No.

Description

91 44 05 0010 Connecting cable M12x1, 4-pol., 1,5 m, elbow connector (female) and straight connector (male)

91 44 05 0046 Connecting cable M12x1, 4-pol., 3,0 m, elbow connector (female) and straight connector (male)

91 44 05 0047 Connecting cable M12x1, 4-pol., 5,0 m, elbow connector (female) and wire

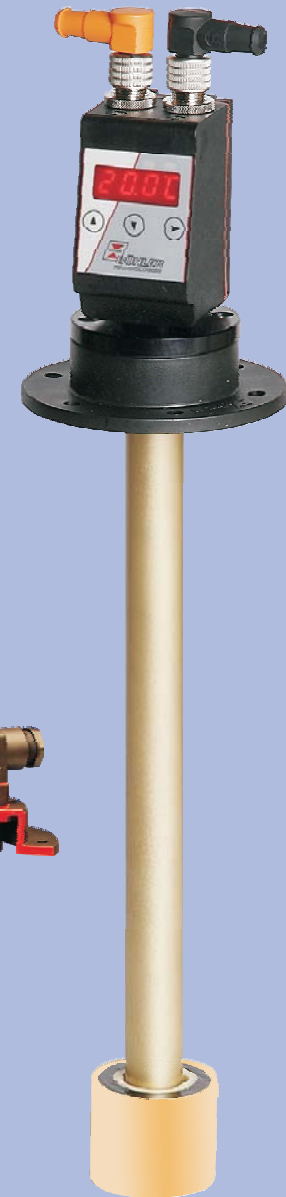
Optionally a programmable display and control unit is available which shows and monitors the measurement,

Example for order

You need: Level and temperature measurement with a resolution of 5mm, construction brass, with M12 connector and length L=670 mm

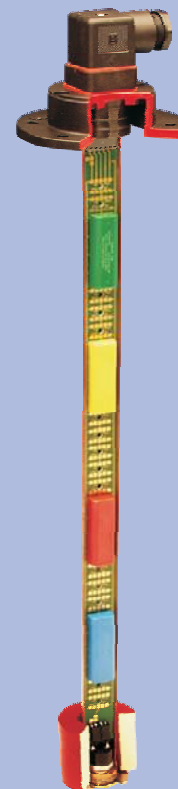
Level and temperature switch with display NT64D

- Highly visible LED display indicates the switching outputs, able to rotate 270°
- Menu structure based on the VDMA guidelines
- Two wireless, adjustable level contacts
- Up to four programmable temperature switching outputs
- Continuous temperature signal (adjustable current or voltage) plus one programmable output
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Min/Max memory, logbook function



Level and temperature switch NT 64

- Wireless, adjustable level contacts
- Flange according to DIN 24557 part 2
- Multiple connector options
- Up to four level contacts or two outputs for level plus RTD or analogue output for temperature
- Reliable dynamic float system
- Stainless steel option for temperatures up to 150 °C
- Probe length up to 1.5 m (longer on request)
- 24 V standard, 230 V on request



Technical data

NT 64

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.80 kg/dm ³ with float SK 610 0.85 kg/dm ³ with float SK 221
length mm	280, 370, 500

Material / Design

float	MS hard PU (SK 610)	VA 1.4571 (SK 221)
immersion tube	brass	1.4571
flange (DIN 24557)	PA	PA

Level contacts

function	K NO/NC*	W change over
max. #	4	2
max. voltage	30 V	30 V
max. current	0.5 A	0.5 A
max. contact load	10 VA	20 VA
min. distance of contact	40 mm	40 mm

*NO = normally open / NC = normally closed

included in delivery

mounting bolts M5 (6 pieces) and GI cork-gasket

Temperature contact

max. voltage	TK 30 V
max. current	2.5 A
max. contact load	100 VA

Function

switching point in °C	NC 50 / 60 / 70 / 80	NO 50 / 60 / 70 / 80
switching point tolerance	± 3 K	± 5 K
max. hysteresis	10 K ± 3 K	10 K ± 3 K

NO = normally open / NC = normally closed (figures at **increasing temperature**)

Temperature sensor

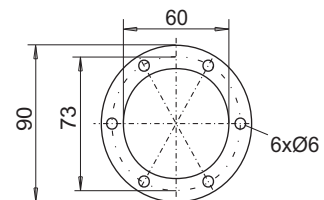
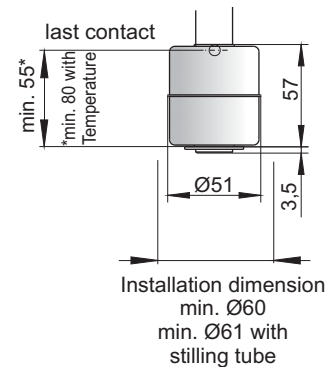
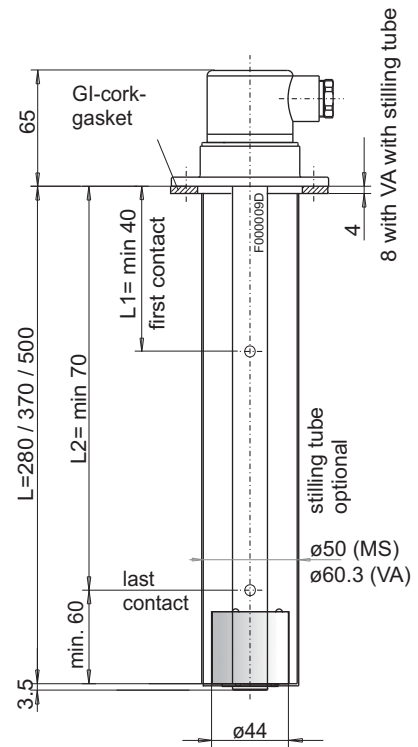
tolerance **Pt 100** (RTD), class B, DIN EN 60751 ± 0.8 °C

Temperature transmitter

probe element	KT Pt 100 (RTD), class B, DIN EN 60751
measuring range	0 °C to +100 °C
operating voltage (U _B)	10 - 30 V DC
output	4 - 20 mA
load Ω max.	= (U _B - 7.5 V) / 0.02 A
other measurement ranges on request	

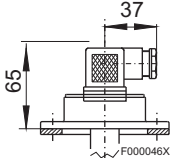
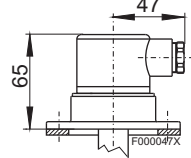
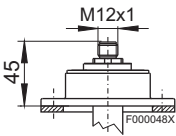
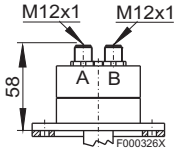
Option

SSR - stilling tube material same as immersion tube



according to DIN 24557 / Part 2

OPTIONAL

Connector	M3	S6	M12 (base)	2 x M12 (base)
max. voltage	3 pol. + PE DIN EN175301-803 30 V AC/DC	6 pol. + PE DIN EN 175201-804 30 V AC/DC	4 pol. 30 V DC	2 x 4 pol. 30 V DC
protection class	IP 65	IP 65	IP 67**	IP 67**
cable connection	PG 11	M20 x 1.5		
max. # of contacts				
- level / temp. contact	1 x K / 1 x TK - / -	3 x K / 1 x TK 1 x W / 1 x TK	1 x K / 1 x TK - / -	2 x K / 1 x TK 1 x W / 1 x TK
- level only	2 x K 1 x W	4 x K 2 x W	2 x K 1 x W	

**with casted connector head / other connectors on request

Product code for NT 64

NT 64-

Series
Nivotemp **NT 64**

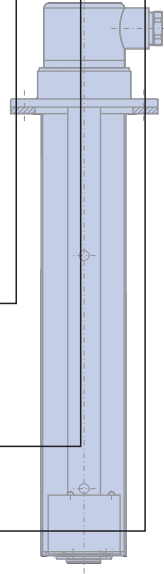
Design
MS brass
VA float and immersion tube stainless steel

Connector
M3
S6
M12
2M12

Length (mm)
280
370
500

of level contacts
1-4

Level contact
K = NO/NC
W = change over



Accessories
SSR = stilling tube

Temperature

Pt 100 = Temperature sensor (RTD)
KT = Temperature transmitter


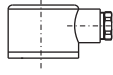

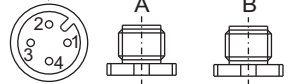
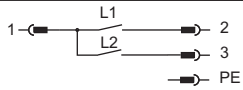
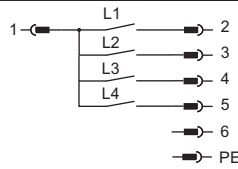
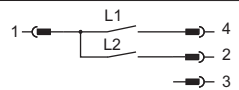
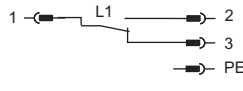
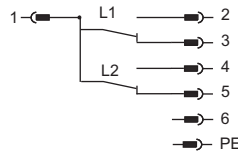
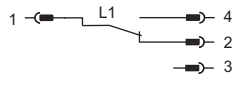
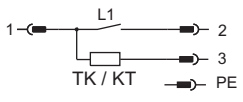
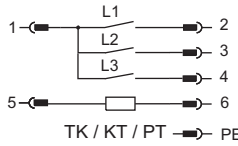
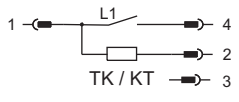
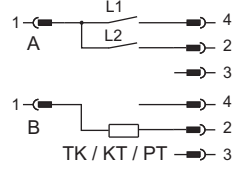
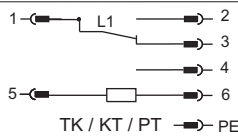
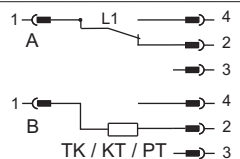
TK = Temperature contact
T50NO = 50 °C
T60NO = 60 °C
T70NO = 70 °C
T80NO = 80 °C

T50NC = 50 °C
T60NC = 60 °C
T70NC = 70 °C
T80NC = 80 °C

Example for order

You need: Level switch with flange, brass, connector S6, length L= 500 mm, 2 x level contacts and temperature contact TK80 as NC, 1st contact 100 mm) NC, 2nd contact 420 mm NO
You order: NT 64-MS-S6/ 500 - 2K -T80NC, L1=100 NC, L2 = 420 NO

Standard pin assignment NT 64

Connector	M3 	S6 	M12 (base) 	2 x M12 (base) 
only level contact(s) Type K				
only level contact(s) Type W				
Level contact(s) Type K and temperature				
Level contact(s) Type W and temperature				

TK = Thermo contact

KT = Temperature transmitter

PT = Temperature sensor Pt 100 (RTD)

other assignments on request

Technical data

NT 64D

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.80 kg/dm ³ , float SK 610 0.85 kg/dm ³ , float SK 221
lengths mm	280, 370, 500

Material / Design

	MS	VA
display housing	PA	PA
float	hard PU (SK 610)	1.4571 (SK 221)
immersion tube	brass	1.4571
flange (DIN 24557)	PA	PA
SSR (option)	brass	stainless steel

Level contacts

	K
max. #	2
function	NO / NC*
max. voltage	30 V
max. current	0.5 A
max. contact load	10 VA
min. distance of contact	40 mm

*NO = normally open / NC = normally closed

included in the delivery

mounting bolts M5 (6 pieces) and GI cork-gasket

Display

temperature display range	-20 °C to +120 °C
alarm indicator range	0 °C to 100 °C
accuracy	1%
resolution	0.5 °C
protection class	IP65
display	4 digit 7 segment LED display
operation	3 button keypad
current consumption at power up	approx. 100 mA for 100 ms
operating current consumption	approx. 50 mA
supply voltage (U _B)	10 - 30 V DC (nominal voltage 24 V DC)
ambient temperature	-20 °C to +70 °C

Temperature sensor: Pt 100 (RTD) class B, DIN EN 60751

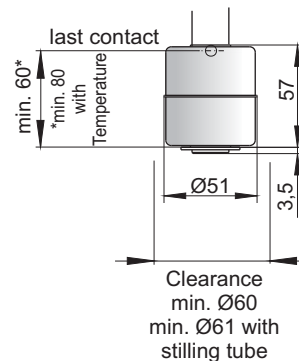
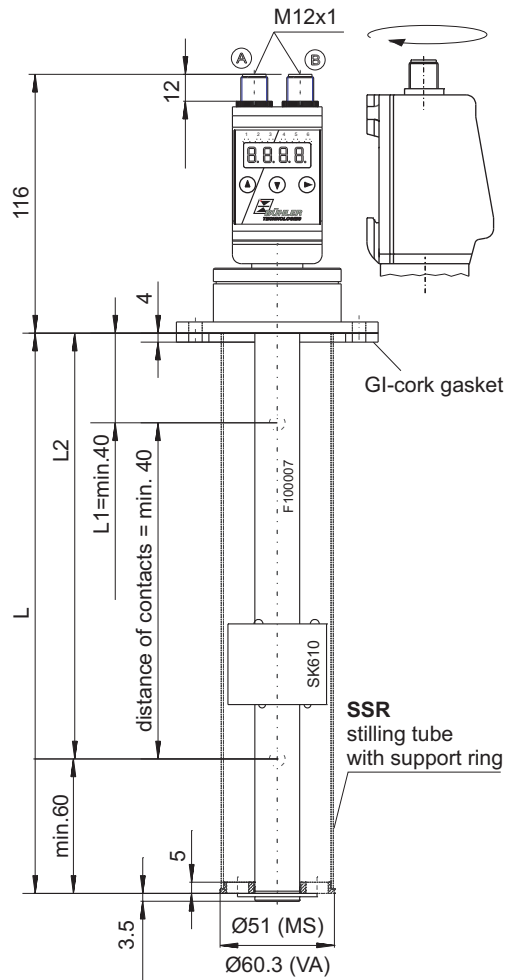
The following temperature outputs are available:

connector (base)	-2T 2 x M12 - 4 pol	O P T I O N S
max. contact load	1 A	
PNP transistor output,	2 x free programmable	
max. current PNP output	0.5 A per output	
connector (base)	1T-KT 2 x M12 - 4 pol	
max. contact load	1 A	
PNP transistor output,	1 x free programmable	
max. current PNP output	0.5 A per output	
analog output	1 x 4-20 mA, 2-10 V, 0-10 V or 0-5 V	
load analog output max.	500 Ω	
connector (base)	-4T 1 x M12 - 4 pole 1 x M12 - 8 pole	
max. contact load	1A	
PNP transistor output,	4 x free programmable	
max. current PNP output	0.5 A per output / 1 A overall	

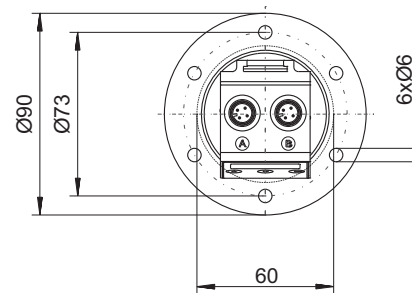
Option
stilling tube

SSR
Material same as immersion tube

Housing
able to rotate 270 degrees



top view:



Product code for NT 64D

NT 64D- -2M12

Series
Nivotemp **NT 64D**

Design
MS brass
VA float / immersion tube stainless steel

Connector
2 x M12

Length
280
370
500

of level contacts
1K or **2K**
K = NO/NC

Position L1=...mm
1st level contact

Switch function 1st contact
NO/NC

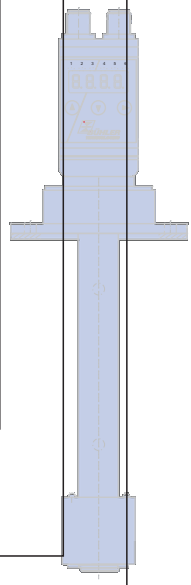
-2T
LED Temperature display
2 x Temperature output

-4T
LED Temperature display
4 x Temperature output

-1T-KT
LED Temperature display
1 x Temperature output
1 x Analogue output

Switch function 2nd contact
NO/NC

Position L2=...mm
2nd level contact



Accessories:

Part No.	Description
91 44 05 0010	Connecting cable M12x1, 4-pol., 1.5 m, elbow connector (female) and straight connector (male)
91 44 05 0046	Connecting cable M12x1, 4-pol., 3.0 m, elbow connector (female) and straight connector (male)
91 44 05 0047	Connecting cable M12x1, 4-pol., 5.0 m, elbow connector (female) and wire
91 44 05 0048	Connecting cable M12x1, 8-pol., 1.5 m, elbow connector (female) and straight connector (male)
91 44 05 0049	Connecting cable M12x1, 8-pol., 3.0 m, elbow connector (female) and straight connector (male)
91 44 05 0033	Connecting cable M12x1, 8-pol., 5.0 m, elbow connector (female) and wire

Example for order

You need: Level switch with flange, design MS, connector S6, length L= 500 mm, 2 x level contacts; 1st contact 100 mm NC, 2nd contact 420 mm NO, with temperature display and 2x programmable temperature output

You order: NT 64D-MS-2M12/500-2K-100NC-420NO-2T

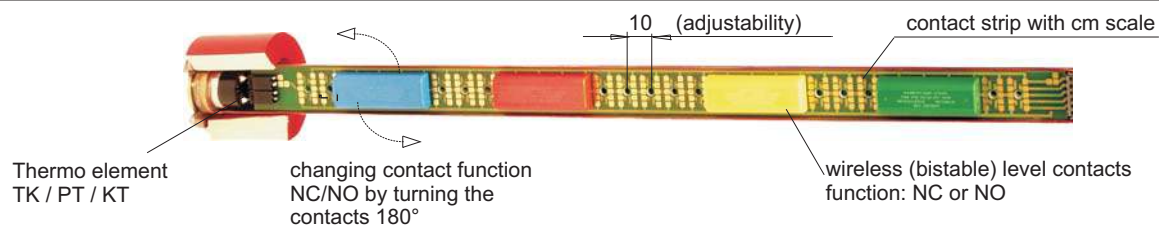
Standard pin assignment NT 64D

	Type NT 64D-2T Level contact(s) 2 x Temperature output	Type NT 64D-1T-KT Level contact(s) 1 x Temperature output 1 x Analogue output	Type NT 64D-4T Level contact(s) 4 x Temperature output
Connector A = level 			
Connector B = temperature 			

Note:

If the switching output is measured with high-impedance measuring equipment or if the frequency output is used, connect a 10 kΩ resistor between output and ground to avoid faulty measurements.

The EasyJust System



Using adjustable level contacts allows the application of standardized immersion tubes in oil tanks of different sizes and geometrical shapes.

The switching points are changeable to the requirement of the individual application at any time without purchasing a specific level switch.

This facilitates design and logistics for the users and OEMs.

The Easy Just System is based on a wireless structure of the contacts.

The contacts are designed of closed and color coded housings. They are positioned on a printed circuit board with gold plated contacts. The colors are used for the coding of the different contacts and assure the allocation of the connector's assignments.

The contacts' function (NC or NO) is determined by the 180° rotation on the printed circuit board.

An adjusted temperature switch (bi-metal, NO or NC), a Pt 100 (RTD) or a 4-20 mA transmitter is fixed at the lower end of the printed circuit board, depending on the chosen option for the temperature monitoring.

Level switch NS 64 / NS 100 ..-AM



Level switch NS for external installation

- Visual and electrical liquid level monitoring
- Pressure range up to 100 bar
- Adjustable level contacts
- Optional analog output 4-20 mA
- Visual indication with scale
- Robust design meets industrial standards
- Float with dynamic buoyancy
- Specials upon request

Technical data

NS 64 AM

Basic data

max. operating pressure	64 bar
max. operating temperature	50 °C
min. spec. density of fluid	0.85 kg/dm ³

Material

float SK596	plastic
stand pipe	1.4571
Flange	1.4541
sight glass	PC

Connector

flange DIN 2637	DN25
øD	140
øk	100
ød	18
b	22
øA	68
h	2
weight at L1=500 mm	approx. 22 kg
weight L1+ 100 mm	approx. 0.5 kg
Other designs on request	

appropriate level contacts see on page 4

Option

transducer tube	-K continuous level	O P T I O N
measurement principle	reed contact	
resolution	5 or 10 mm	
operating voltage (U _B)	10 - 30 V DC	
output	4 - 20 mA (nominal voltage 24 V DC)	
load Ω max.	(U _B - 7.5 V) / 0.02 A	

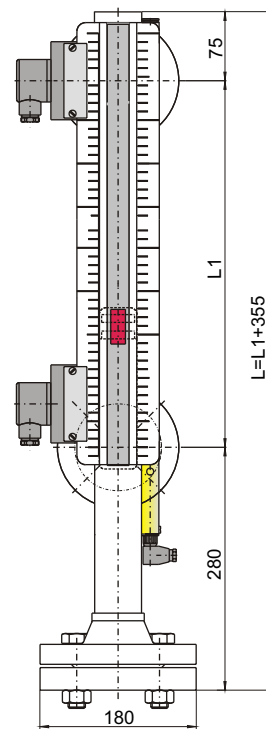
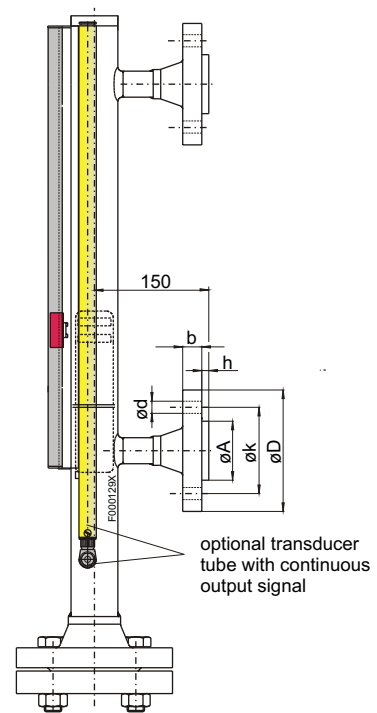
Accessories:

Part No.	
22 54 000	flange gasket 65/25x2 mm (DN25)
22 73 999	mounting bolts 8 x M16x70

Notes on the Pressure Equipment Directive:

The level switches were designed, manufactured and tested in accordance with the Pressure Equipment Directive 91/23/EU and the AD 2000 Code.

The category actually achieved by the level sensor is printed on the type plate. Depending on this category, comprehensive quality assurance is performed according to Module H and/or H1 standard.



Product code for NS 64

NS 64/25AM **SK596 /**

Length
L1 = ...mm

O	Option transducer tube
P	-K5 continuous, resolution 5 mm
T	-K10 continuous, resolution 10 mm

Example for order

You need: Level switch for external mounting, max. operating pressure 64 bar, with flange connector DN25, stub distance L1 = 1400 mm, with 2 change over contacts (see on page 4)

You order: NS 64/25-AM-SK596 / 1400
2 x Part No. 28 89 999; contact MKS - 1/W

Technical data

NS 100 AM

Basic data

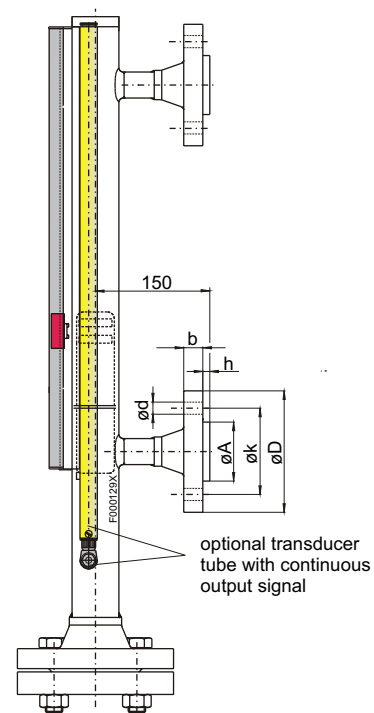
max. operating pressure	100 bar
max. operating temperature	50 °C
min. density of fluid	0.85 kg/dm ³

Material

float SK596	plastic
stand pipe	1.4571
Flange	1.4541
sight glass	PC

Connector

flange DIN 2637	DN25
øD	140
øk	100
ød	18
b	22
øA	68
h	2
weight at L1=500 mm	approx. 25 kg
weight L1+ 100 mm	0.5 kg
Other designs on request	



appropriate level contacts see on page 4

Option

transducer tube	-K continuous level	O P T I O N
measurement principle	reed contact	
resolution	5 or 10 mm	
operating voltage (U _b)	10 - 30 V DC	
output	4 - 20 mA (nominal voltage 24 V DC)	
load Ω max.	= (U _b - 7.5 V) / 0.02 A	

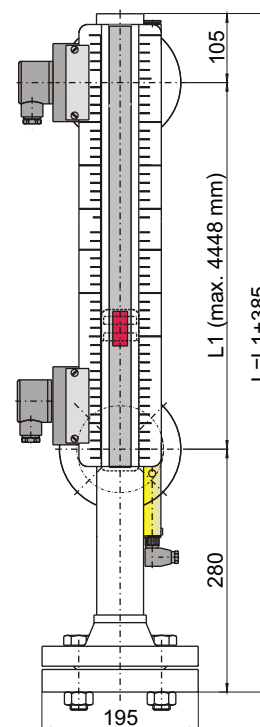
Accessories:

Part No.	
22 54 000	flange gasket 65/25x2 mm (DN25)
22 73 999	mounting bolts 8 x M16x70

Notes on the Pressure Equipment Directive:

The level switches were designed, manufactured and tested in accordance with the Pressure Equipment Directive 91/23/EU and the AD 2000 Code.

The category actually achieved by the level sensor is printed on the type plate. Depending on this category, comprehensive quality assurance is performed according to Module H and/or H1 standard.



Product code for NS 100

NS 100/25AM -SK596 /

O	Option	transducer tube
P	-K5	continuous resolution 5 mm
T	-K10	continuous resolution 10 mm

Length
L1 = ...mm

Example for order

You need: Level switch for external mounting, max. operating pressure 100 bar, with flange connector DN25, stub distance L1 = 1500 mm, continuous level output, resolution 5 mm and with 2 change over contacts (see on page 4)

You order: NS 100/25-AM-K5-SK596 / 1500
2 x Part. No. 28 89 999 contact MKS 1/W

Contacts for NS ..-AM

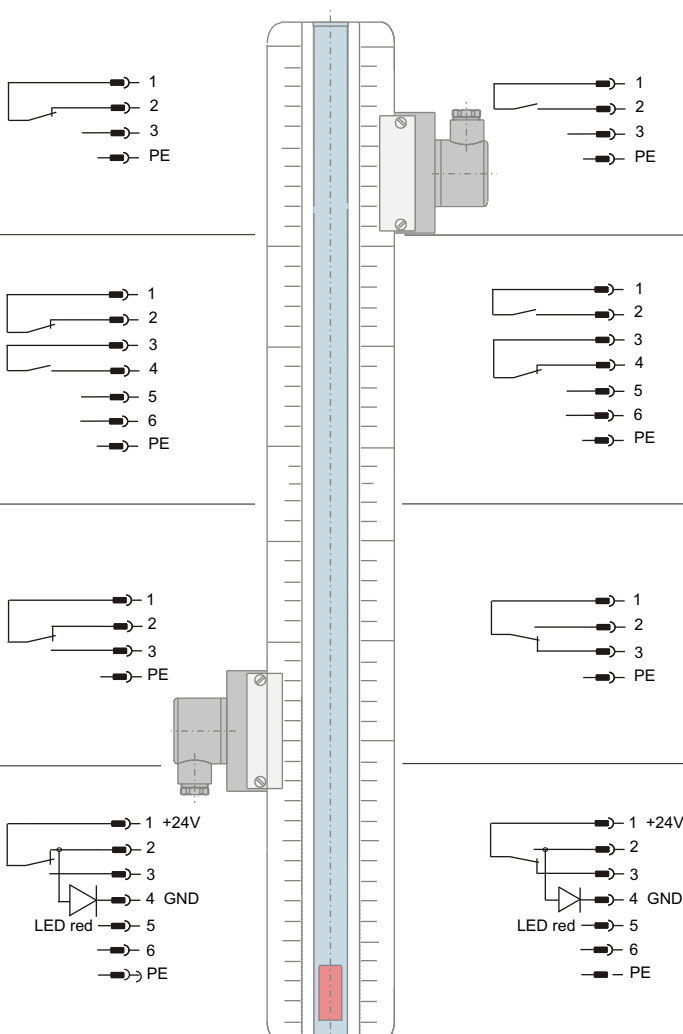
Type **MKS-1/K**
 function NC / NO
 max. voltage 230 V AC/DC
 max. current 1 A
 max. contact load 50 VA
 connector M3 (DIN EN 175301-803)
 3 pol. + PE
 protection class IP 65
Part No. 28 88 999

Type **MKS-2/K**
 function 2 x NC / NO
 max. voltage 230 V AC/DC
 max. current 1 A
 max. contact load 50 VA
 connector S6 (DIN EN 175201-804)
 6 pol. + PE
 protection class IP 65
Part No. 28 91 999

Type **MKS-1/W**
 function change over
 max. voltage 230 V AC/DC
 max. current 1 A
 max. contact load 50 VA
 connector M3 (DIN EN 175301-803)
 3 pol. + PE
 protection class IP 65
Part No. 28 89 999

Type **MKS-1/W-L 24 V**
 function change over with LED
 max. voltage 24 V DC
 max. current 1 A
 max. contact load 25 VA
 connector S6 (DIN EN 175201-804)
 6 pol. + PE
 protection class IP 65
Part No. 28 90 999

Pin assignment (contact position empty reservoir)

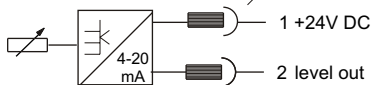


other contacts on request

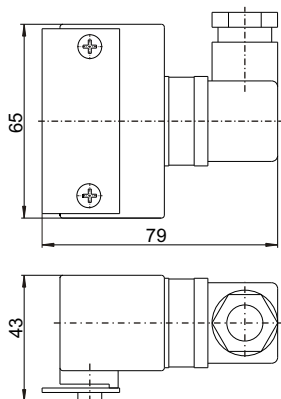
For operations in areas with strong vibrations we suggest to use contacts MKS-1/K and MKS-2K.

When mounting a transducer tube with continuous output signals you have to keep in mind that the mounting of contacts is possible only on the left side.

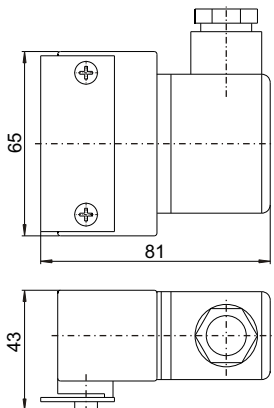
Pin assignment for AM-K with connector S3



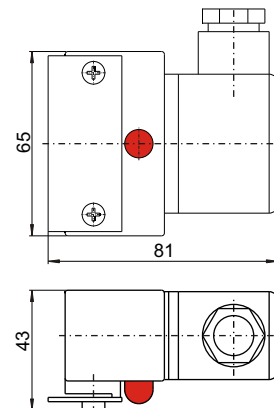
**MKS 1/K
MKS 1/W**



MKS 2/K



MKS 1/W-L24V



The new generation of level and temperature monitoring

- Flange according to DIN 24557 / Part 2
- Combined, continuous monitoring of level and oil temperature
- Highly visible LED display shows the actual temperature in the basic mode, with status indicator of the switching outputs, able to rotate 270°
- Menu structure based on the VDMA guideline.
- 4 programmable outputs optional as level or temperature signal
- Continuous temperature signal (adjustable current or voltage) plus 2 or 4 programmable output
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Min/Max memory, logbook function
- M12 connector base
- Reliable dynamic float system
- Immersion tube in matched lengths up to 1420 mm max., other lengths on request



Technical data

NT67-XP

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
Min. density of fluid	0,80 kg/dm ³ with float SK 604 0,85 kg/dm ³ with float SK 221
	Lengths 280, 370, 500, 670, 820, 970, 1120, 1270 and 1420 mm
	(on request other lengths)

weight	MS	VA
at L=280 mm	approx. 850 g	approx. 950 g
plus per 100 mm	approx. 50 g	approx. 70 g

Material / Design	MS	VA
float	hard PU (SK 604)	1.4571 (SK 221)
immersion tube	brass	1.4571
flange DIN 24557 part 2	PA	PA

Options		O P T.
SSR - stilling tube	material same as immersion tube	

Level measurement	
measuring resistor	reed contact
resolution	5 mm

Temperature measurement	
measuring resistor	Pt 100 (RTD) class B, DIN EN 60751
tolerance	± 0,8 °C

Display and control unit	XP
display	4 digit 7 segment LED display
operation	3 button keypad
storage	Min. and Max. values
current consumption at power up	approx. 100 mA for 100 ms
operating current consumption	approx. 50 mA
supply voltage (U _B)	10 - 30 V DC (nominal voltage 24 V DC)
ambient temperature	-20 °C to +70 °C
protection class	IP65

	Level	Temperature
indicating device	%, cm, L, i, Gal	C / F
indicating range	adjustable	-20 °C to +120°C or 4 °F to 248°F

alarm indicator range	e. g. 0-100%	0 °C to 100 °C or 32 °F to 178 °F
accuracy	1% of the final value	

Following cards are available

-4S	
connector (base)	2 x M12 - 4 pol
PNP Transistor output	4 x free programmable with free selectable allocation for e.g. 2 x Level / 2 x Temperature
alarm memory	1 x PNP output allocable as alarm logbook
max. current contact load	0,5 A per output max. 1 A overall

-2S-KN-KT	
connector (base)	2 x M12 - 4 pol
PNP Transistor output	2 x free programmable with free selectable allocation
alarm memory	1 x PNP output allocable as alarm logbook
max. current contact load	0,5 A per output max. 1 A overall

Level	1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V (U _B - 8 V) / 0,02 A
Temperature	1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V (U _B - 8 V) / 0,02 A
load Ω max.	
programmable as	
load Ω max.	

-4S-KN-KT	
connector (base)	1 x M12 - 8 pol
PNP Transistor output	4 x free programmable with free selectable allocation
alarm memory	1 x PNP output allocable as alarm logbook
max. current	0,5 A per output
contact load	sustained short-circuit proof max. 1 A overall

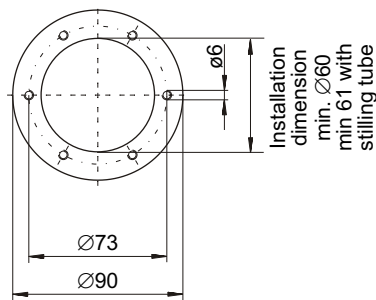
Level	1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V (U _B - 8 V) / 0,02 A
Temperature	1 x 4-20 mA, 2-10 V, 0-10 V or 0-5 V (U _B - 8 V) / 0,02 A
load Ω max.	
analog output programmable as	
load Ω max.	

Other output options on request

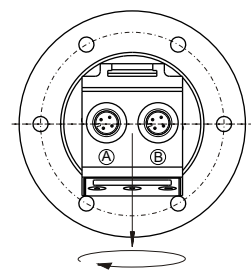
OPTIONAL

Flange picture

according to DIN 24557/part 2

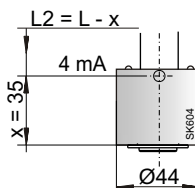


Top view

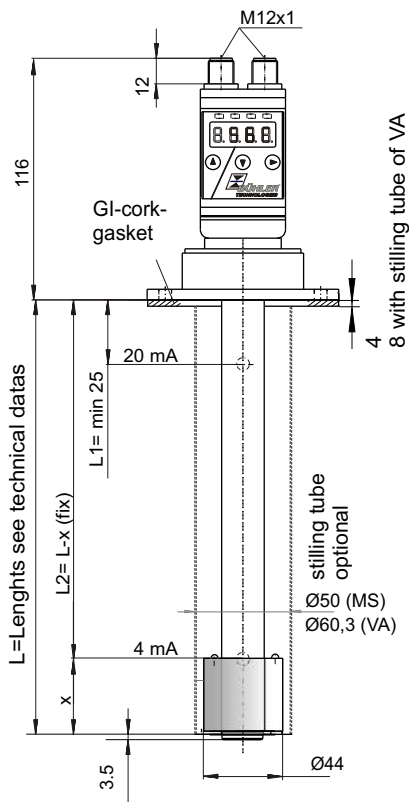
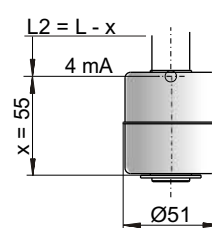


Housing able to rotate 270°

Float SK 604 for NT67-XP-MS



Float SK 221 for NT67-XP-VA



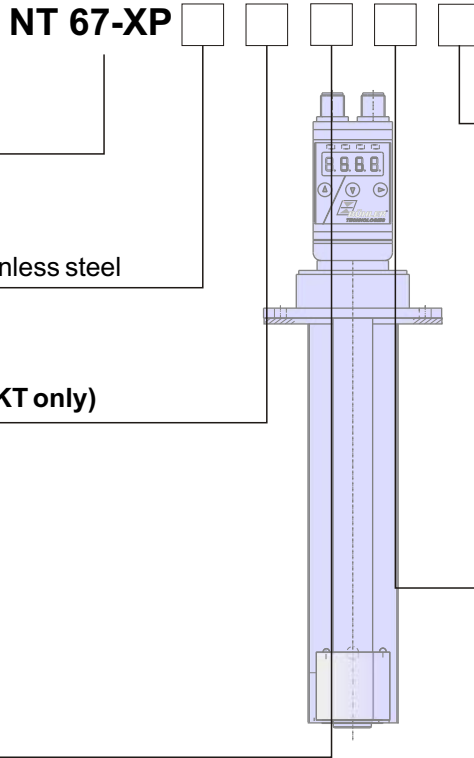
Product code for NT 67-XP

Series
Nivotemp NT 67-XP
with display and control unit

Design
MS brass
VA float and immersion tube stainless steel

Connector
2M12
M12-8-pol. (with option 4S-KN-KT only)

Length (max. 1420 mm)
280
370
500
670
820
970
1120
1270
1420



Option
SSR = stilling tube

Card

-4S
4 x PNP transistor output

-2S-KN-KT
2 x PNP transistor output
1 x analogue output level
1 x analogue output temperature

-4S-KN-KT
4 x PNP transistor output
1 x analogue output level
1 x analogue output temperature

O
P
T
I
O
N
S

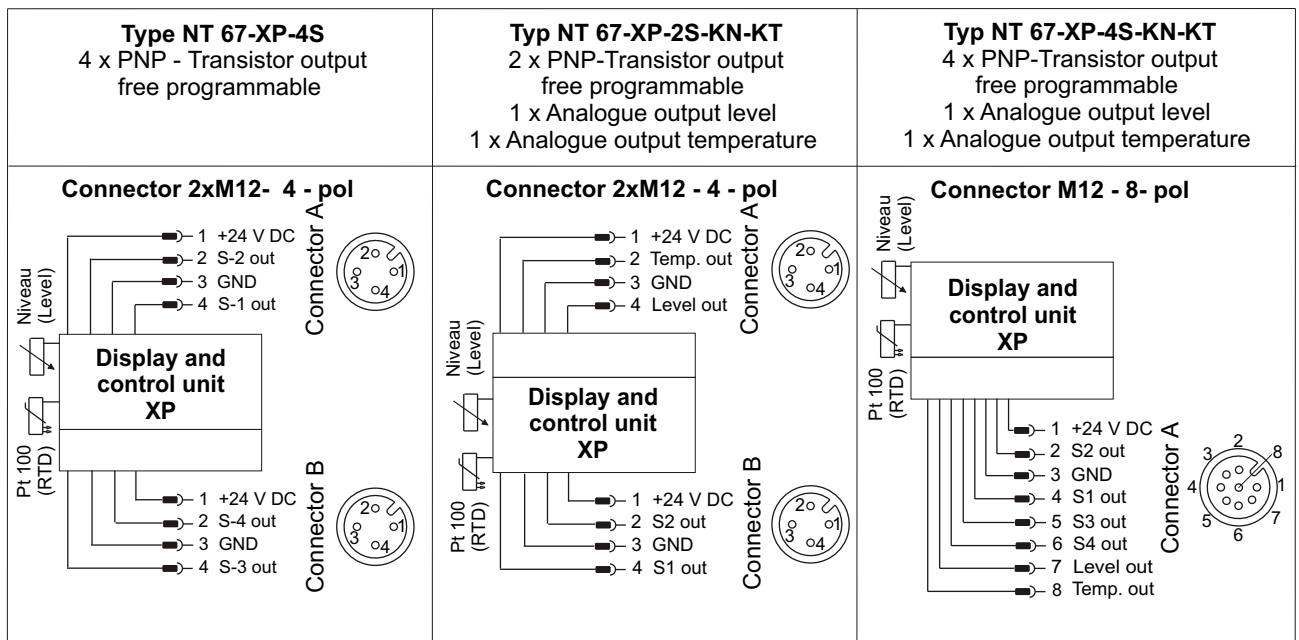
Part No. 4-pol.	Part No. 8-pol.	Description
9144 05 0010	9144 05 0048	Connecting cable M12x1, 1.5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0049	Connecting cable M12x1, 3.0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0033	Connecting cable M12x1, 5.0 m, elbow connector (female) and wire

Example for order

You need: Level and temperature measurement with 5 mm resolution, brass design, 2xM12 connector, length L=670mm with 2 programmable PNP - switch-points and analogue output for level and temperature

You order: NT 67-XP-MS-2M12 / 670-2S-KN-KT

Standard pin assignment NT 67-XP



Note:

If the switching output is measured with high-impedance measuring equipment or if the frequency output is used, connect a 10 kΩ resistor between output and ground to avoid faulty measurements.

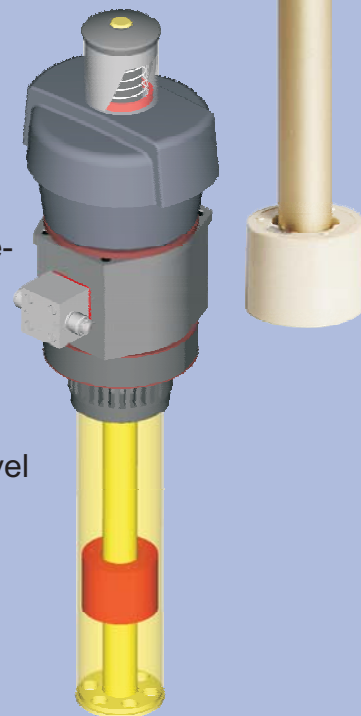
Level and temperature switch with display NV 71D

- Highly visible LED display indicates the switching outputs
- High performance air breather with replaceable element
- Optional air breather clogging indicator
- Up to 4 programmable temperature switching outputs
- Continuous temperature signal (adjustable current or voltage) plus one programmable switching output
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Menu structure based on the VDMA guidelines
- Min/Max memory, logbook function



Level and temperature switch NV 71

- Flange according to DIN 24557 Part 2
- High performance air breather with replaceable element
- Optional air breather clogging indicator
- Multiple connector options
- Up to 4 level contacts or 2 switching outputs for level plus RTD or analogue output for temperature
- Reliable dynamic float system
- Probe length up to 1.5 m (longer on request)
- Up to 230 V applicable



Technical data

NV 71

Basic units

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.80 kg/dm ³ / SK 610 0.85 kg/dm ³ / SK 221
lengths	mm
	280, 370, 500 (standard) variable up to max. 1500

MS VA

weight at L=280 mm	790 g	870 g
approx.	30 g	50 g
add. per 100 mm		

Air breather filter

grade of filtration	HY Type Hydac BF 7
accessories	3 µm filling protection cover - not applicable for filling adapter -

Material / Design

float	MS hard PU SK 610	VA* 1.4571 SK 221
immersion tube	brass	1.4571
flange/ filter housing	PA	PA
SSR (option)	brass	stainless steel

Level contacts

function	K10 NO / NC	W11 change over
max. voltage	230 V	48 V
max. current	0.5 A	0.5 A
max. contact load	10 VA	20 VA
min. contact distance	40 mm	40 mm

NO = normally open / NC = normally closed at empty reservoir

Temperature contact

# of temp. contacts	TK 1	TM 2
max. voltage	230 V	230 V
max. current	2.5 A	2 A
max. contact load	100 VA	100 VA

Function

switching point °C	NC 50/60/70/80	NO 50/60/70/80
tolerance	±3 K	±5 K
max. hysteresis	10 K ±3 K	26/35/40/45 K ±5 K

NC= normally open / NO = normally closed (at low temperature)
other temperatures & designs with 2 x TK contact on request

Temperature sensor

tolerance	Pt 100 class B, DIN EN 60751 ± 0.8 °C
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Temperature transmitter

sensor element	KT Pt 100 class B, DIN EN 60751
measurement range	0 °C to +100 °C
operating voltage (U _B)	10-30 V DC
output	4 - 20 mA
load Ω max.	(U _B - 7.5 V) / 0.02 A
other measurement ranges	on request

Options/ Accessories (see details on page 6)

- VS** visual clogging indicator for the air breather
- BFA**** filling adapter incl. ribbed flange with sieve insert:
- SSR**** stilling tube with support ring and filling adapter
- MT** for Multiterminal
- MTS** for Multiterminal including stilling tube
- FCT** Fluidcontrolterminal

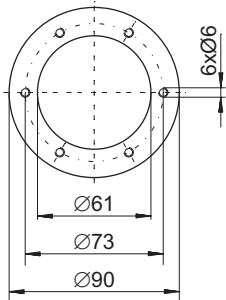
* not available in combination with option **FCT**

** not available in combination with option **FCT, MT and MTS**

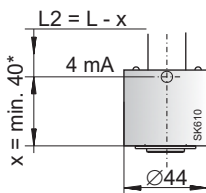
O P T I O N A L

Flange picture

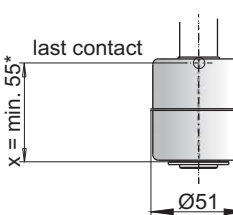
according to DIN 24557/part 2



Float SK 610 for NV 71-MS

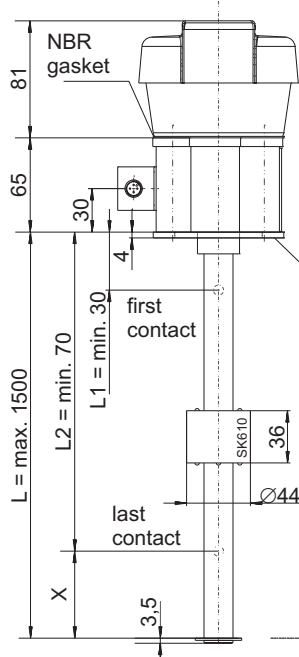


Float SK 221 for NV 71-VA

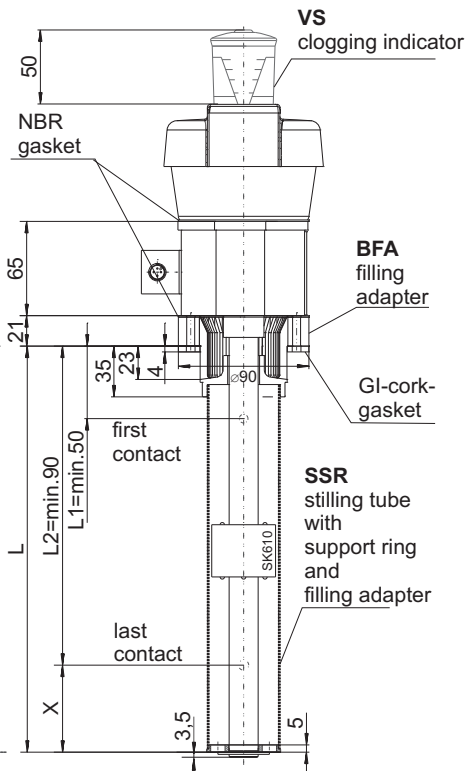


* min. 80 with temperature

Basic version



Design with options



Product code for NV 71

NV 71-HY- **A** **B** **C**

Series

Nivovent NV 71-HY

Design

MS brass

VA* float and immersion tube
stainless steel

Connector

M3

S6

M12

2M12

Lengths (max. 1500 mm)

280

370

500

other lengths (please specify)

level contacts

1-4

Level contact

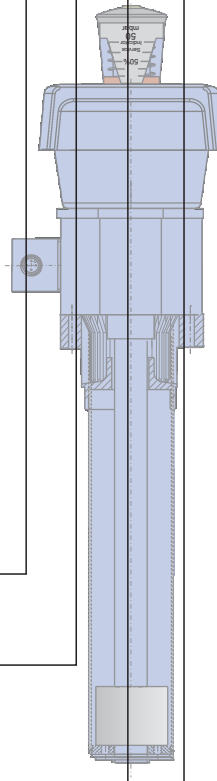
K = NC/NO

W = change over

* not available in combination with option FCT

** not available in combination with option **FCT, MT and MTS**

***not for combination with temperature contact TM



Options / Accessories

VS = clogging indicator

BFA** = filling adapter

SSR** = stilling tube with filling adapter

MT = for Multiterminal

MTS = for Multiterminal incl. stilling tube

FCT = Fluidcontrolterminal

Only for double temp. contact

C T2 (2nd Temperature contact)

Opener Closer

TM50NC TM50NO =50°C

TM60NC TM60NO =60°C

TM70NC TM70NO =70°C

TM80NC TM80NO =80°C

B T1 (1st Temperature contact)

NC NO

TM50NC TM50NO =50°C

TM60NC TM60NO =60°C

TM70NC TM70NO =70°C

TM80NC TM80NO =80°C

A Temperature ***

Pt 100 (RTD) = Temperature sensor

KT = Temperature transmitter

TK = Temperature contact

TK50NC = 50°C (NC)

TK60 NC = 60°C (NC)

TK70 NC = 70°C (NC)

TK80 NC = 80°C (NC)

TK50 NO = 50°C (NO)

TK60 NO = 60°C (NO)

TK70 NO = 70°C (NO)

TK80 NO = 80°C (NO)

Accessories

Part-No. 4-pole Description

9144 05 0010 Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)

9144 05 0046 Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)

9144 05 0047 Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Example for order

You need: Level switch brass with air breather and clogging indicator, length L=500 mm, 2 level contacts and temperature contact TK 80 °C as opener, 1st contact: 100 mm NC, 2nd contact: 420 mm NO

You order: NV 71-HY-MS-S6-500-2K -TK80NC-VA, L1=100 NC, L2 = 420 NO

Connector	M3 (DIN43650)	S6 (DIN43651)	M12 (base)	2x M12 (base)
max. voltage	3 pol. + PE 230 VAC/DC*	6 pol. + PE 230 VAC/DC*	4 pol. 30 VDC	4 pol./4 pol. 30 VDC
protection class	IP 65	IP 65	IP67**	IP67**
cable connection	PG 11	M20x1,5		
max. # of contacts	1 x K10 / 1 x TK	3 x K10 / 1 x TK	1 x K10 / 1 x TK	3 x K 10 / 1 x TK
Level / Temp. contact	- / -	2 x K10 / 2 x TM	- / -	2 x K10 / 2 x TM
	- / -	1 x W11 / 1 x TK	- / -	1 x W11 / 1 x TK
		1 x W11 / 2 x TM		1 x W11 / 2 x TM
level only	2 x K10	4 x K10	2 x K10	4 x K10
or	1 x W11	2 x W11	1 x W11	2 x W11

* max. 48V for change over contact / **with casted connector head / other connectors on request

Technical Data

NV 71D

Basic units

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.80 kg/dm ³ / SK 610 0.85 kg/dm ³ / SK 221
lengths	mm 280, 370, 500 (standard) variable to max. 1500

	MS	VA
weight at 280 mm app.	825 g	910 g
add. per 100 mm app.	30 g	50 g

Air breather filter	HY Typ Hydac BF 7
grade of filtration	3 µm
accessories	filling protective cover - not applicable for filling adapter -

Material / Design	MS	VA*
display housing	PA	PA
float	hard PU SK 610	1.4571 SK 221
immersion tube	brass	1.4571
flange/ filter housing	PA	PA

Level contacts	K10
max. quantity	2
function	NC / NO
max. voltage	30 V
max. current	0.5 A
max. contact load	10 VA
min. contact distance	40 mm

* NC= normally open / NO = normally closed at **empty reservoir**

Display

Temperature display range	-20 °C to +120 °C
Alarm range	0 °C to 100 °C
accuracy	1%
resolution	0.5 °C
protection class	IP 65
display operation	4 digit, 7 segment LED
current consumption at power up	3 button keypad
operating current consumption	approx. 100 mA for 100 ms
supply voltage (U _B)	approx. 50 mA 10 V to 30 V DC (nominal 24 V DC)

ambient temperature	-20 °C to +70 °C
Temperature sensor	Pt 100 class B, DIN EN 60 751

The following temperature outputs are available:

-2T	
connector (base)	2 x M12 - 4 pol
max. contact load	1 A
PNP transistor output,	2 x free programmable
max. current PNP output	0.5 A per output
sustained short-circuit proof	

-1T-KT	
connector (base)	2 x M12 - 4 pol
max. contact load	1 A
PNP transistor output,	1 x free programmable
max. Current PNP output	0.5 A per output
analogue output	1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V
max. load analogue output	500 Ω

-4T	
connector (base)	1 x M12 - 4 pol. 1 x M12 - 8 pol.
max. contact load	1 A
PNP transistor output,	4 x free programmable
max. current PNP output**	0.5 A per output
sustained short-circuit proof	

Options/ Accessories (see details on page 6)

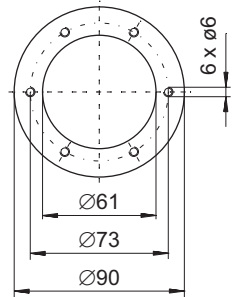
- VS** visual clogging indicator for the air breather
- BFA**** filling adapter incl. ribbed flange with sieve insert
- SSR**** stilling tube with support ring and filling adapter
- MT** for Multiterminal
- MTS** for Multiterminal including stilling tube
- FCT** Fluidcontrolterminal

* not available in combination with option **FCT**

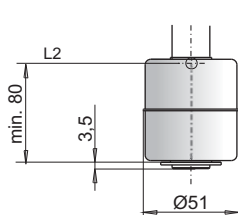
** not available in combination with option **FCT, MT and MTS**

OPTIONAL

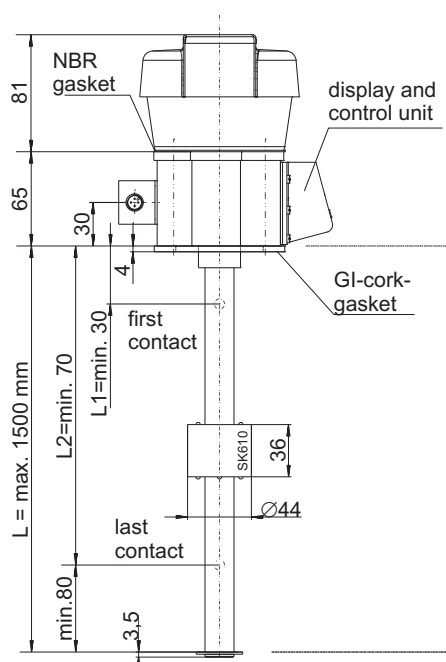
Flange picture
according to DIN 24557/part2



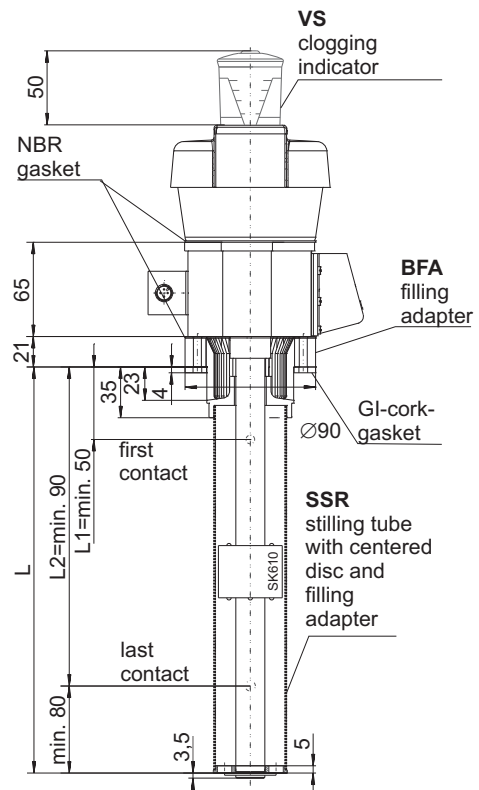
Float for NV 71D-VA



Basic version



Design with options



Product code for NV 71D

NV 71D-HY- -2M12

Series
Nivovent **NV 71D-HY**

Design
MS brass
VA* float and immersion tube stainless steel

Connector
2 x M12
S6

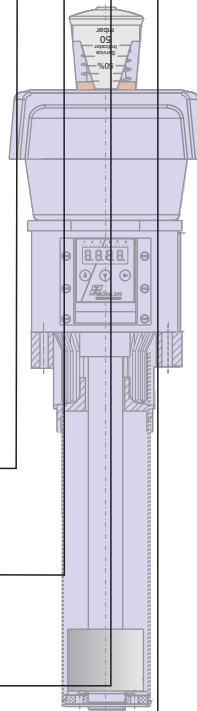
Length (max. 1500 mm)
Variable (please quote)

level contacts
1K or 2K
K = NO/NC

Position L1=...mm
1st level contact

Switch function 1st contact
NO = normally open
NC = normally closed

* not available in combination with option FCT
** not available in combination with option FCT, MT and MTS



Options / Accessories
VS = clogging indicator

BFA** = filling adapter
SSR** = stilling tube with filling adapter

MT = for Multiterminal
MTS = for Multiterminal incl. stilling tube
FCT = Fluidcontrolterminal

-2T
LED temperature indicator
2 x temperature outputs

-4T
LED temperature indicator
4 x temperature outputs

-1T-KT
LED temperature indicator
1 x temperature output
1 x analogue output 4-20 mA

Switch function 2nd contact
NO = normally open
NC = normally closed

Position L2=...mm
2nd level contact

Accessories

Part-No. 4-pole	Part-No. 8-pole	Description
9144 05 0010	9144 05 0048	Connecting cable M12x1, 1.5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0049	Connecting cable M12x1, 3.0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0033	Connecting cable M12x1, 5.0 m, elbow connector (female) and wire

Example for order

You need: Level switch stainless steel with air breather and clogging indicator, length L= 500 mm, 2 level contacts, 1st contact: 100 mm NC, 2nd contact: 420 mm NO, 2 temperature outputs

You order: NV 71D-HY-VA-2M12-500-2K-100 NC-420 NO-2T-VA


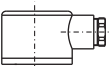


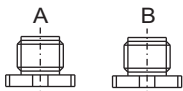
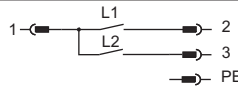
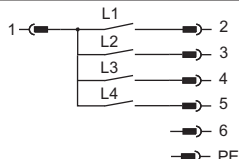
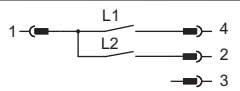
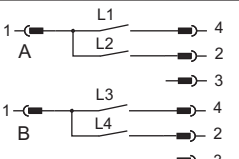
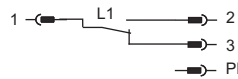
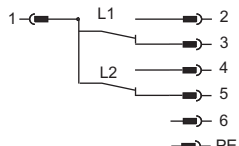
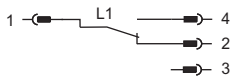
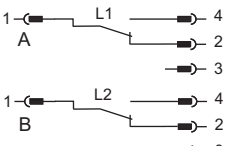
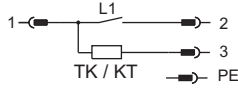
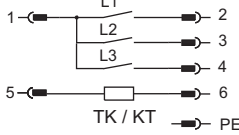
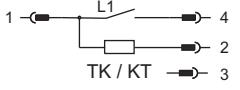
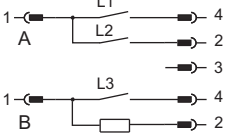
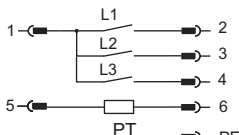
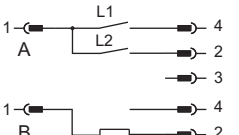
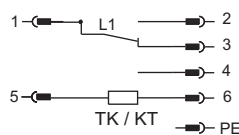
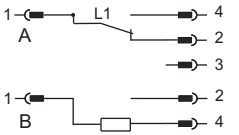
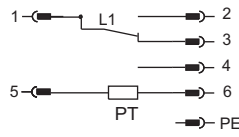
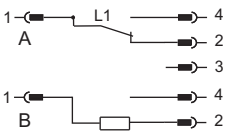
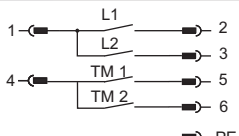
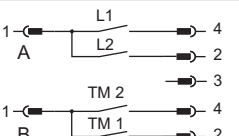
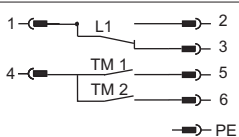
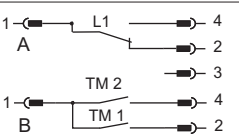
Standard pin assignment NV 71D

Connector 2xM12	Type NV 71D-2T Level contact(s) 2 x Temperature outputs	Type NV 71D-1T-KT Level contact(s) 1 x Temperature output 1 x Analogue output	Type NV 71D-4T Level contact(s) 4 x Temperature output
<p>Connector A: Level</p>			
<p>Connector B: Temperature</p>			
<p>Connector S6</p>			

Note:

If the switching output is measured with high-impedance measuring equipment or if the frequency output is used, connect a 10 kΩ resistor between output and ground to avoid faulty measurements.

Standard pin assignment NV 71

Connector	M3 (DIN EN 175301-803)	S6 (DIN EN 175201-804)	M12 (base)	2 x M12 (base)
			 	
only level contact(s) Type K10				
only level contact(s) Type W11				
level contact(s) Type K10 and temperature				
level contact(s) Type K10 and Pt 100 (RTD)				
level contact(s) Type W11 and temperature				
level contact(s) Type W11 and Pt100 (RTD)				
level contact(s) Type K10 and 2 temp. contacts				
level contact Type W11 and 2 temp. contacts				

TK/TM = Thermo switch KT = temperature transmitter PT = temperature sensor Pt 100 (RTD) other configurations on request

Options / Accessories

- VS** visual clogging indicator for the air breather: analog underpressure indicator, display range 0.35 bar.
- BFA*** filling adapter incl. ribbed flange with sieve insert: this option allows that small oil quantities can be filled via the air breather housing. Therefore the corresponding housing is equipped with that version.
- SSR*** stilling tube with support ring and filling adapter: This includes the option stilling tube as well as the option for filling as the **BFA**. The stilling tube is made of the same material as the requested immersion tube (MS/VA).
- MT** for integration into Multiterminal: The basic unit will be mounted to the Multiterminal. For specification we refer to data sheet DA 10 0201.
- MTS** for integration into Multiterminal including stilling tube: in addition to the basic unit, a stilling tube with support ring is mounted to the Multiterminal.
- FCT** Fluidcontrolterminal: The Fluidcontrolterminal (**FCT**) will be mounted to the basic product. For specification we refer to data sheet DA 10 0202.

* not available in combination with option **FCT**, **MT** and **MTS**

Level or level and temperature sensor NV 73

- Flange according to DIN 24557 / Part 2
- High performance air breather with replaceable element
- Optional air breather clogging indicator
- Continuous level measurement
- Continuous level and temperature measurement
- 4-20 mA outputs (2-10 V on request)
- Resolution 5 mm (level)
- Various connector options
- Reliable dynamic float system
- Optional float and probe in stainless steel optional
- Probe length up to 1420 mm (longer on request)



Technical data

NV 73

Basic units

K = continuous level and temperature measurement
KN = continuous level measurement

max. operating pressure 1 bar
 operating temperature -20 °C to 80 °C
 min. density of fluid 0.80 kg/dm³ / SK 604
 0.85 kg/dm³ / SK 221
 Lengths (L=) mm 280, 370, 500, 670, 820, 970
 1120, 1270, 1420
 (other lengths on request)

weight **MS** **VA**
 at L=280mm, approx. 800 g approx. 900 g
 plus per 100 mm approx. 30 g approx. 50 g

Air breather filter HY Type Hydac BF 7
 grade of filtration 3 µm
 Accessories filling protective cover
 - not applicable for filling adapter -

Material / Design **MS** **VA***
 float hard PU 1.4571
 SK 604 SK 221
 immersion tube brass 1.4571
 flange / filter housing PA PA
 stilling tube (option) brass stainless steel

Level measurement

measuring resistor reed contact
 resolution 5 mm
 supply voltage (U_B) 10 - 30 V
 ripple < 1 %
 output signal 4-20 mA
 max. load Ω = (U_B - 7.5 V) / 0.02 A

Temperature measurement at Type 73 K

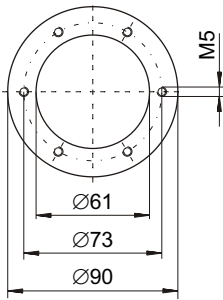
measuring resistor Pt 100 (RTD)
 class B DIN EN 60 751
 tolerance ± 0.8 °C
 supply voltage (U_B) 10 - 30 V
 ripple < 1 %
 output signal 4-20 mA
 (≈ 0 to 100 °C)
 other ranges on request
 max. load Ω = (U_B - 7.5 V) / 0.02 A

included in the delivery

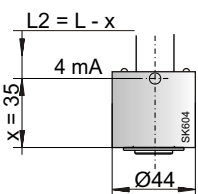
mounting bolts M5 (6 pieces) and GI -cork gasket
 * not available in combination with option FCT

Flange picture

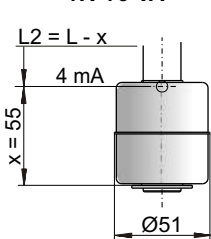
according to DIN 24557 / Part 2



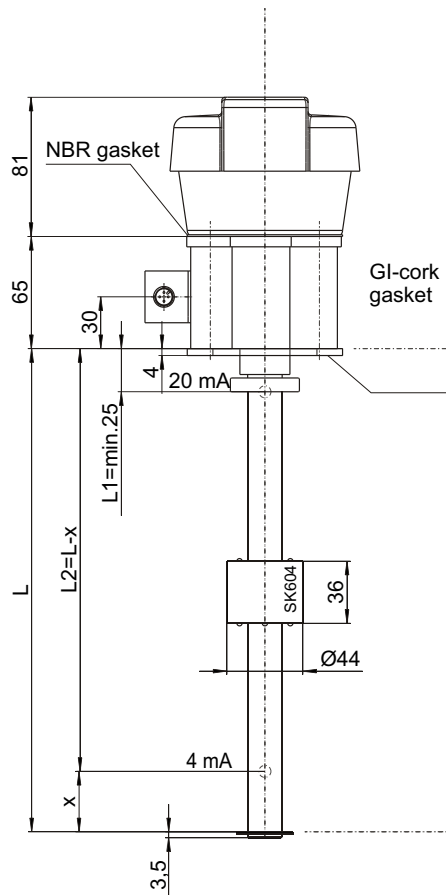
Float SK 604 for NV 73-MS



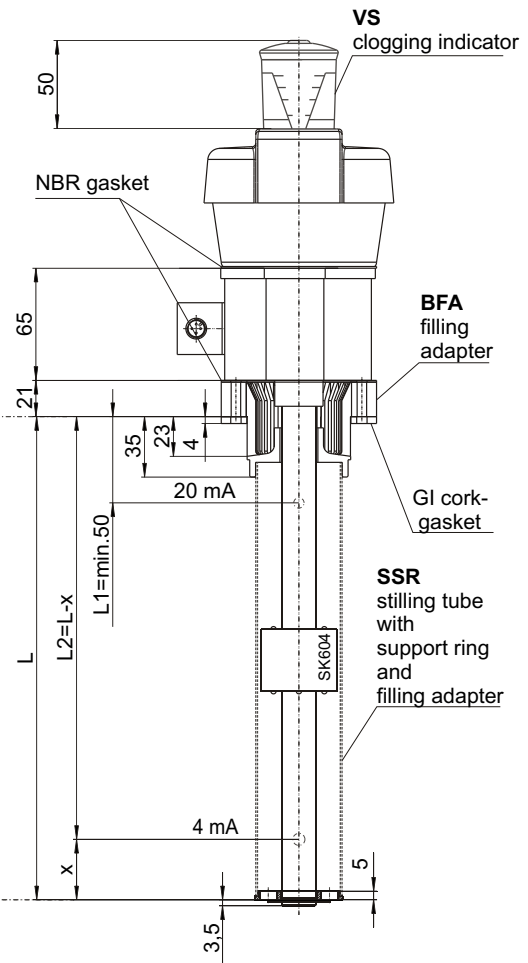
Float SK 221 for NV 73-VA



Basic version



Design with options

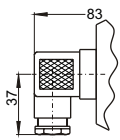
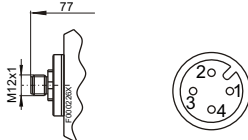
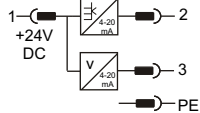
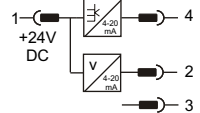
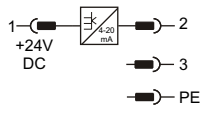
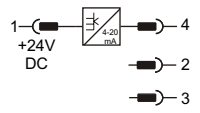


Options / Accessories

- VS** visual clogging indicator for the air breather: analog underpressure indicator, display range 0.35 bar.
- BFA*** filling adapter incl. ribbed flange with sieve insert: this option allows that small oil quantities can be filled via the air breather housing. Therefore the corresponding housing is equipped with that version.
- SSR*** stilling tube with support ring and filling adapter: This includes the option stilling tube as well as the option for filling as the **BFA**. The stilling tube is made of the same material as the requested immersion tube (brass / stainless steel).
- MT** for integration into Multiterminal: The basic unit will be mounted to the Multiterminal. For specification we refer to data sheet DE 10 0201.
- MTS** for integration into Multiterminal including stilling tube: in addition to the basic unit, a stilling tube with support ring is mounted to the Multiterminal.
- FCT** Fluidcontrolterminal: The Fluidcontrolterminal (**FCT**) will be mounted to the basic product. For specification we refer to data sheet DE 10 0202.

Optionally, a programmable display and control unit is available which can show and monitor the measurement, see data sheet DE 18 0201.

* not available in combination with option **FCT** and **MT/MTS**

Connector protection system cable connection	M3 (DIN EN 175301-803) 3 pol. + PE IP 65 PG 11	M12 (base) 4 pol. IP67** **with casted connector head
Standard pin assignment		
K continuous level and temperature measurement		
KN continuous level measurement		

Product code for NV 73

NV 73-HY-

Series

Nivovent **NV 73-HY**

K = Level and temperature measurement
KN = only level measurement

Design

MS brass

VA* float and immersion tube stainless steel

Connector

M3

M12

Length (max. 1420 mm)

280 mm

370 mm

500 mm

670 mm

820 mm

970 mm

1120 mm

1270 mm

1420 mm

Options / Accessories

BFA** = filling adapter

SSR** = stilling tube with filling adapter

MT = for Multiterminal

MTS = for Multiterminal incl.
stilling tube

FCT = Fluidcontrolterminal

VS = clogging indicator

* not available in combination with option FCT

** not available in combination with option FCT, MT and MTS

Accessories:

Part No.	Description
91 44 05 0010	Connecting cable M12x1, 4-pol., 1,5 m, elbow connector (female) and straight connector (male)
91 44 05 0046	Connecting cable M12x1, 4-pol., 3,0 m, elbow connector (female) and straight connector (male)
91 44 05 0047	Connecting cable M12x1, 4-pol., 5,0 m, elbow connector (female) and wire

Furthermore a programmable display and control unit is available which can show and monitor the measurement, see data sheet DE 18 0201.

Example for order

You need: Level and temperature measurement with air breather, resolution 5 mm, brass design with M12 connector and a length L = 670 mm

You order: NV 73-HY-K-MS-M12 / 670

Level and temperature switch with display NV 74D

- Highly visible LED display indicates the switching outputs
- High performance air breather with replaceable filter element
- Optional air breather clogging indicator
- Two wireless, variable level switches
- Up to 4 programmable temperature switching outputs
- Continuous temperature signal, (adjustable current or voltage) plus one programmable output
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Menu structure based on VDMA guidelines
- Min/Max memory, logbook function



Level and temperature switch NV 74

- Wireless, variable level switches
- Flange according to DIN 24557 Part 2
- High performance air breather with replaceable filter element
- Optional air breather clogging indicator
- Multiple connector options
- Up to 4 level contacts or 2 switching outputs for level plus bi-metal, RTD or analog output for temperature
- Reliable dynamic float system
- 24 V standard, 230 V on request

Technical data

NV 74

Basic unit

max. operating pressure	1 bar	
operating temperature	-20 °C to +80 °C	
min. density of fluid	0,80 kg/dm ³ float SK 610 0,85 kg/dm ³ float SK 221	
standard length (in mm)	280, 370, 500 (standard)	
weight	MS	VA*
at L=280 mm	ca. 800 g	ca. 900 g
additional per 100 mm	ca. 30 g	ca. 50 g
Air breather filter	HY Type Hydac BF 7	
grade of filter	3 µm	
Accessories	filling protective cover (not applicable for filling adapter)	

Material/Design

float	MS	VA*
	hard PU	1.4571
	SK 610	SK 221
immersion tube	brass	
flange / filter housing	PA	

Level contacts

max. quantity	K	W
function	NO / NC	change over
max. voltage	30 V	30 V
max. current	0,5 A	0,5 A
max. contact load	10 VA	20 VA
min. distance of contact	40 mm	40 mm

NO=<normally open / NC=normally closed, all figures at empty reservoir

Temperature contact

max. voltage	TK
max. current	30 V
max. contact load	2,5 A
	100 VA

O
P
T.

Function

switching point °C	NC	NO
	50/60/70/80	50/60/70/80
switching point tolerance	± 3 K	± 3 K
max. hysteresis	10 K ± 3 K	10 K ± 3 K

NC = normally open / NO = normally closed (all figures at increasing temperature)

Temperature sensor RTD

Pt100 class B, DIN EN 60 751

tolerance ±0,8 °C

Temperature transmitter KT

sensor element RTD Pt100 class B, DIN EN 60 751

measurement range 0 °C to +100 °C

operating voltage (U_B) 10-30 V DC

output 4 - 20 mA

load Ω max. = (U_B - 7,5 V) / 0,02 A

other measurement ranges on request

Options/ Accessories (see details on page 6)

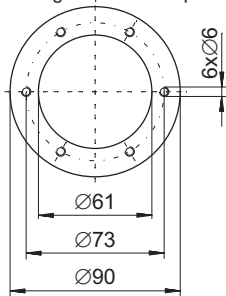
- VS** visual clogging indicator for the breather
- BFA**** filling adapter incl. ribbed flange with sieve insert:
- SSR**** stilling tube with support ring and filling adapter
- MT** for Multiterminal
- MTS** for Multiterminal including stilling tube
- FCT** Fluidcontrolterminal

* not available in combination with the option **FCT**

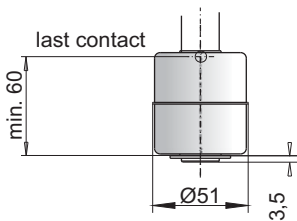
** not available in combination with the option **FCT, MT and MTS**

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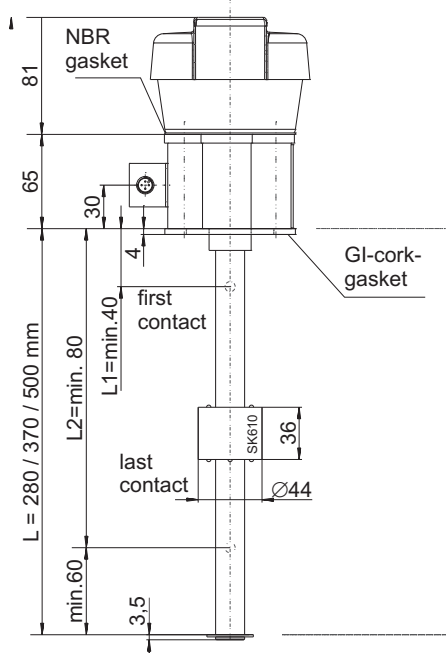
Flange picture
according to DIN 24557/part 2



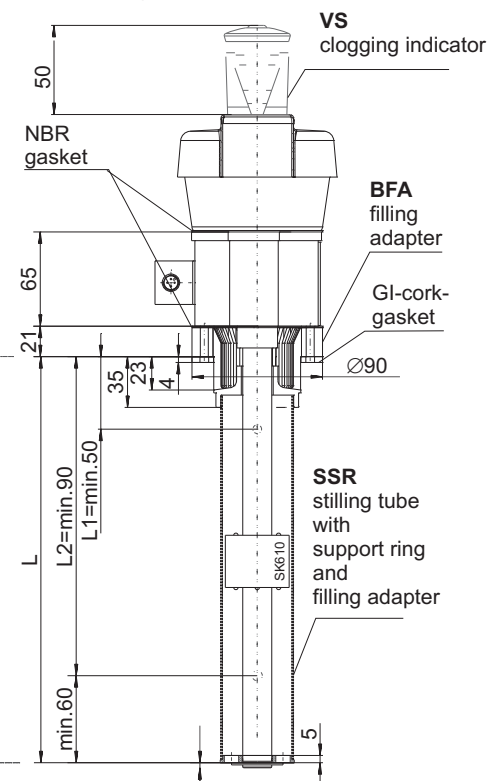
NV 74-VA



Basic version



Design with options



Connector	M3 (DIN EN 175301-803)	S6 (DIN EN 175201-804)	M12 (base)	2x M12 (base)***
max. voltage	3 pol. + PE	6 pol. + PE	4 pol.	4 pol./4 pol.
protection class	30 VAC/DC	30 VAC/DC	30 V DC	30 V DC
cable connection	IP 65 PG 11	IP 65 M20x1,5	IP 67**	IP 67** M12x1
max. quantity of contacts	1 x K / 1 x TK	3 x K / 1 x TK	1 x K / 1 x TK	2 x K / 1 x TK
level/ temp.-contact	- / -	1 x W / 1 x TK	- / -	1 x W / 1 x TK
level only	2 x K	4 x K	2 x K	
or	1 x W	2 x W	1 x W	

** with casted connector head *** Connectors electrically isolated / on request other connectors

Product code for NV 74

Series
Nivotemp NV 74-HY

Design
MS brass
VA* float and immersion tube stainless steel

Connector
M3
S6
M12
2M12

Length (mm)
280
370
500

Quantity of level contacts
1-4

Level contact
K = NC / NO
W = change over

Accessories
VS = clogging indicator

Optionen
BFA** = filling adapter
SSR** = stilling tube with filling adapter
MT = for Multiterminal
MTS = for Multiterminal incl. stilling tube
FCT = Fluidcontrolterminal

Temperature
Pt 100 = Temperature sensor (RTD)
KT = Temperature transmitter

TK = Temperature contact
T50NO = 50°C NO
T60NO = 60°C NO
T70NO = 70°C NO
T80NO = 80°C NO

T50NC = 50°C NC
T60NC = 60°C NC
T70NC = 70°C NC
T80NC = 80°C NC

* not available in combination with option FCT
** not available in combination with the option FCT, MT and MTS

Accessories

Part-No. 4-pole Description

9144 05 0010	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Example for order

You need: Level switch with breather, clogging indicator, length L = 500 mm, 2 level contacts, temperature contact TK, 80°C as NC, 1st contact 100 mm NC, 2nd contact 420 mm NO

You order: NV 74-HY-MS-S6 500-2-K-TK80NC-VS 100 NC, 420 NO

Standard pin assignment NV 74

Connector	M3	S6	M12 (base)	2 x M12 (base)
only level contact(s) Type K				
only level contact(s) Type W				
level contact(s) Type K and temperature				
level contact(s) Type W and temperature				

TK = Thermo contact KT = Temperature transmitter PT = Temperature sensor Pt 100 (RTD) other assignments on request

Technical data

NV 74D

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0,80 kg/dm ³ float SK 610 0,85 kg/dm ³ float SK 221
standard length (mm)	280, 370, 500

weight	MS	VA*
at L=280 mm approx.	850 g	950 g
add. per 100 mm approx.	30 g	50 g

Air breather filter

grade of filtration	HY Typ Hydac BF 7
Accessories	3 µm filling protective cover (not applicable for filling adapter)

Material / Design

display housing	MS	VA*
flange / filter housing	PA	PA
immersion tube	hard PU	1.4571
flange / filter housing	SK 610	SK 221
SSR (option)	brass	1.4571
	PA	PA
	brass	stainless steel

Level contacts

max. quantity	K
function	2
max. voltage	NO / NC
max. current	30 V
max. contact load	0,5 A
min. distance of contact	10 VA
	40 mm

NO= normally open / NC = normally closed, all figures at empty reservoir

Display

temperature display range	-20 °C to +120 °C (4 °F to 248 °F)
alarm range setting	0 °C to 100 °C (32 °F to 178 °F)
accuracy	1%
resolution	0,5 °C (1 °F)
protection class	IP65
display	4 digit 7 segment LED
operation	3 button keypad

current consumption at power up approx. 100 mA for 100 ms
operating current consumption approx. 50 mA
supply voltage (U_B) 10 - 30 V DC
(nominal voltage 24 V DC)

ambient temperature -20 °C to +70 °C
temperature sensor RTD
class B; DIN EN 60751

Following temperature outputs are available:

-2T
connector (base) 2 x M12 - 4 pol
max. contact load 1A
PNP transistor output, 2 x free programmable
max. current PNP output 0,5 A per output
short-circuit proof

-1T-KT
connector (base) 2 x M12 - 4 pol
max. contact load 1 A
PNP transistor output, 1 x free programmable
max. current PNP output 0,5 A per output
short-circuit proof
analogue output 1 x 4 - 20 mA, 2-10 V,
0-10 V or 0-5 V

max. load analogue output 500 Ω
-4T
connector (base) 1 x M12 - 4 pol.
1 x M12 - 8 pol.
max. contact load 1 A
PNP transistor output, 4 x free programmable
max. current PNP output max. 0,5 A per output
short-circuit proof

Options/ Accessories (see details on page 6)

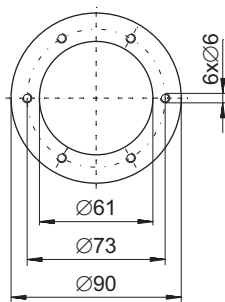
- VS** visual clogging indicator for the air breather
- BFA**** filling adapter incl. ribbed flange with **filter** insert:
- SSR**** stilling tube with support ring and filling adapter
- MT** for Multiterminal
- MTS** for Multiterminal including stilling tube
- FCT** Fluidcontrolterminal

* not available in combination with option **FCT**

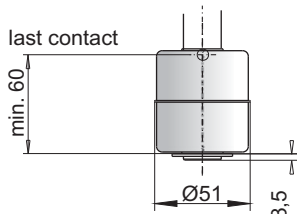
* not available in combination with option **FCT** and **MT/MTS**

Flange picture

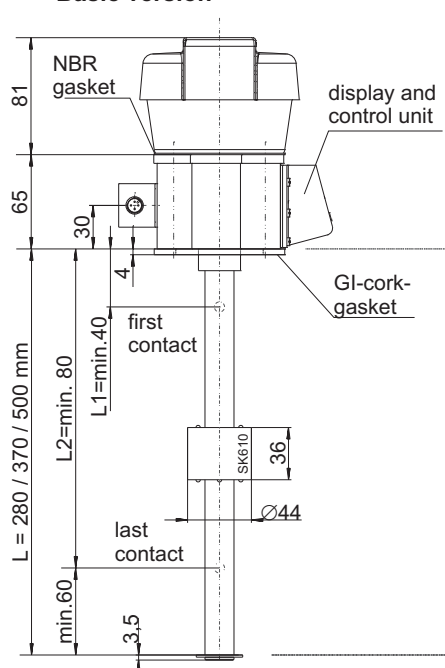
according to 24557/part2



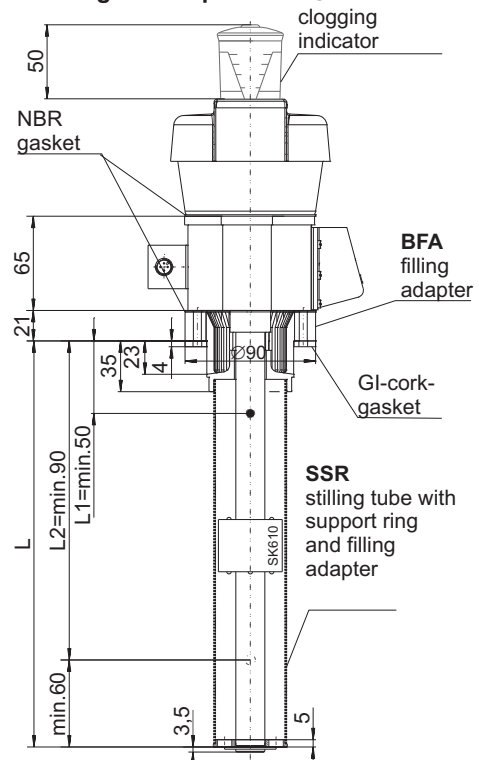
NV 74-VA



Basic version



Design with options VS



Product code for NV 74D

NV 74D-HY- [] [] [] [] [] [] [] [] [] []

Series

Nivovent NV 74D-HY

Design

MS brass

VA* float and immersion tube VA

Connector

2M12

S6

Length (mm, max. 1500)

280

370

500

Quantity level contacts

1K or 2K

K = NO / NC

Position L1 = ...mm

1st level contact

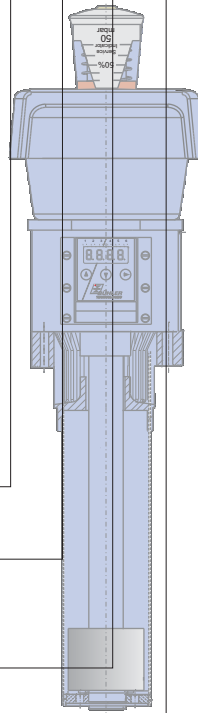
Switch function 1. contact

NO = normally open

NC = normally closed

* not available in combination with option FCT

** not available in combination with the option FCT, MT and MTS



Accessories

VS = clogging indicator

Options

BFA** = filling adapter

SSR** = stilling tube with filling adapter

MT = for Multiterminal

MTS = for Multiterminal incl. stilling tube

FCT = fluidcontrolterminal

-2T

LED temperature display

2 x temperature output

-4T

LED temperature display

4 x temperature output

-1T-KT

LED temperature display

1 x temperature output

1 x analogue output 4-20 mA

Switch function 2. contact

NO = normally open

NC = normally closed

Position L2 = ...mm

2nd level contact

Accessories

Part-No. 4-pole Part-No. 8-pole Description

9144 05 0010 9144 05 0048 Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)

9144 05 0046 9144 05 0049 Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)

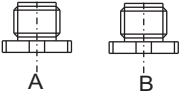

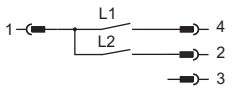
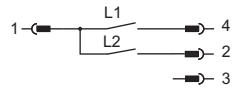
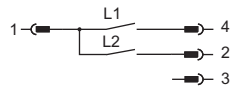

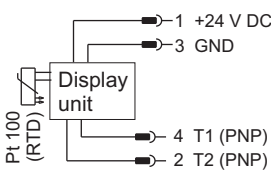
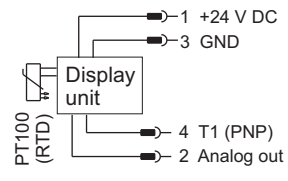
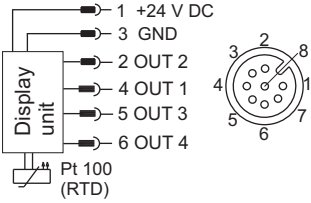
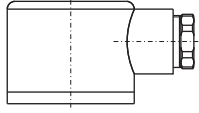
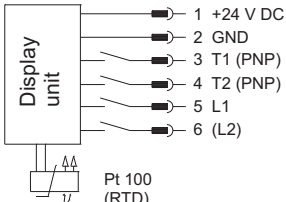
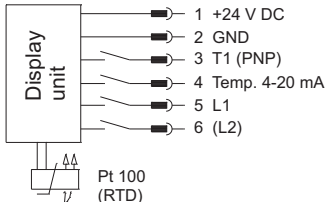
9144 05 0047 9144 05 0033 Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Example for order

You need: Level switch and breather, clogging indicator, length L = 500 mm, 2 level contacts, temperature contact TK 80°C as NC, 1st contact 100 mm NC, 2nd contact 420 mm NO

You order: NV 74-HY-MS-S6 500-2K -TK80NC-VS-100-NC-420 NO

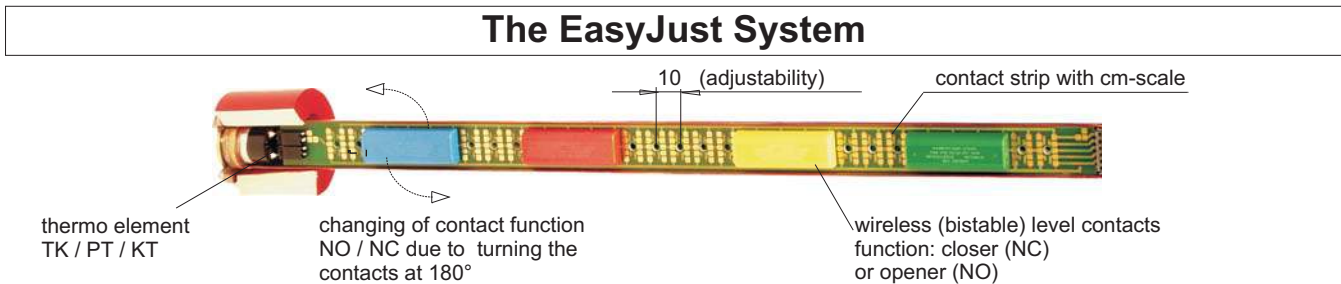
Standard pin assingment NV 74D

Connector 2xM12 	Type NV 74D-2T Level contact(s) 2 x Temperature output	Type NV 74D-1T-KT Level contact(s) 1 x Temperature output 1 x Analogue output	Type NV 74D-4T Level contact(s) 4 x Temperature output
Connector A Level 			
Connector B Temperature 			
Connector S6 			

Details about options and accessories:

- VS** visual clogging indicator for the air breather: analog underpressure indicator, display range 0.35 bar.
- BFA*** filling adapter incl. ribbed flange with sieve insert: this option allows that small oil quantities can be filled via the air breather housing. Therefore the corresponding housing is equipped with that version.
- SSR*** stilling tube with support ring and filling adapter: This includes the option stilling tube as well as the option for filling as the **BFA**. The stilling tube is made of the same material as the requested immersion tube (MS/VA).
- MT** for integration into Multiterminal: The basic unit will be mounted to the Multiterminal. For specification we refer to data sheet DE 10 0201.
- MTS** for integration into Multiterminal including stilling tube: in addition to the basic unit, a stilling tube with support ring is mounted to the Multiterminal.
- FCT** Fluidcontrolterminal: The Fluidcontrolterminal (**FCT**) will be mounted to the basic product. For specification we refer to data sheet DE 10 0202.

* not available in combination with option **FCT** and **MT/MTS**



Using adjustable level contacts allows the application of standardized immersion tubes in oil tanks of different sizes and geometrical shapes.

The switching points are changeable to the requirement of the individual application at any time without purchasing a specific level switch.

This facilitates design and logistics for the users and OEMs.

The Easy Just System is based on a wireless structure of the contacts.

The contacts are designed of closed and color coded housings. They are positioned on a printed circuit board with gold plated contacts. The colors are used for the coding of the different contacts and assure the allocation of the connector's assignments.

The contacts' function (NO or NC) is determined by the 180° rotation on the printed circuit board.

An adjusted temperature switch (bi-metal, NO or NC), a Pt 100 (RTD) or a 4-20 mA transmitter is fixed at the lower end of the printed circuit board, depending on the chosen option for the temperature monitoring.

The new standard for the level and temperature surveillance

- Flange according to DIN 24557 Part 2
- High performance air breather with replaceable filter element
- Visual monitoring of the air breather optional
- Combined, continuous monitoring of level and oil temperature
- Four switching outputs programmable for level or temperature signal
- Optional one analogue output (adjustable current or voltage) each for level and temperature plus 2 or 4 programmable switching outputs
- Highly visible LED display shows the actual temperature in the basic mode, with status indicator of the switching outputs
- Menu structure based on VDMA guidelines
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Min/Max memory, logbook function
- Reliable dynamic float system
- Immersion tube in matched lengths up to 1420 mm (55.9") max., other lengths on request



Technical data

NV 77

Basic unit

max. operating pressure
operating temperature
min. density of fluid

1 bar
-20 °C to +80 °C
0.80 kg/cm³ / SK 604
0.85 kg/cm³ / SK 221
280, 370, 500, 670, 820, 970,
1120, 1270 and 1420
(other lengths upon request)

lengths (mm/inch)

Air breather filter

grade of filtration
accessories

HY Typ Hydac BF 7
3 µm
filling protection cover
-not applicable for filling adapters

Material / Building

display housing
float
immersion tube
flange / filter housing

MS	VA
PA	PA
hard PU (SK 604)	SS 1.4571 (SK 221)
brass	SS 1.4571
PA	PA

Level transmitter

measuring resistor
resolution

reed contact
5 mm

Temperature measurement

measuring resistor
tolerance

Pt 100 (RTD)
class B, DIN EN 60751
± 0,8 °C

Display and control unit

display
operation
storage
current consumption at power up
operating current consumption
supply voltage (U_b)

XP
four digit seven segment- LED
3 button keypad
Min. / Max. values
approx. 100 mA for 100 ms
approx. 50 mA
10 - 30 V DC
(rated voltage 24 V DC)

ambient temperature
protection class

-20 °C to +70 °C (4 °F to 248°F)
IP65

units
displayed range

Level	Temperature
%, cm, L, i, Gal	°C / °F
adjustable	-20 °C to +120°C (4 °F to 248°F)
e. g. 0-100%	0 °C to 100 °C (32 °F to 178°F)

alarm indicator range

1% of the final value

accuracy

The following cards are optional:

-4S

connector (base) 2 x M12 - 4 pol
PNP transistor output, 4 x free programmable, selectable allocation for e.g.
2 x Level / 2 x Temperature
alarm memory 1 x PNP output as alarm logbook
max. current PNP output 0.5 A per output
Sustained short-circuit proof

-2S-KN-KT

connector (base) 2 x M12 - 4 pol
PNP transistor output, 2 x free programmable, free selectable allocation
alarm memory 1 x PNP output allocable to alarm logbook
max. current PNP output 0.5 A per output
sustained short-circuit proof

Level

1 x 4 - 20 mA, 2-10 V, 0-10 V, 0-5 V
(U_b - 8 V) / 0.02 A

Temperature

1 x 4-20 mA, 2-10 V, 0-10 V, 0-5 V
(U_b - 8 V) / 0.02 A

-4S-KN-KT

connector (base) 1 x M12 - 8 pol
PNP transistor output, 4 x free programmable, free selectable allocation
alarm memory 1 x PNP output allocable to alarm logbook
max. current PNP output 0,5 A per output
sustained short-circuit proof

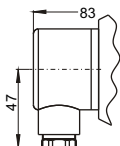
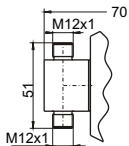
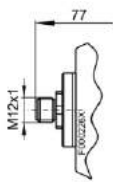
Level

1 x 4 - 20 mA, 2-10 V,
0-10 V, 0-5 V
(U_b - 8 V) / 0,02 A

Temperature

1 x 4-20 mA, 2-10 V,
0-10 V, 0-5 V
(U_b - 8 V) / 0,02 A

Other output options on request

Connection	S6	2x M12 (base)* ²	M12 (base)
voltage max.	6 pol. + PE 30 V AC/DC	4 pol./4 pol. 30 V DC	8 pol. 30 V DC
contact load max	0,5 A per output	0,5 A per output	0,5 A per output
over all max.	1 A	1 A	1 A
protection class	IP 65	IP67* ³	IP67* ³
cable connection			

*² Connectors electrically isolated

*³ with casted connector head

on request other connectors

Options / Accessories

- VS** visual clogging indicator for the air breather: analog underpressure indicator, display range 0.35 bar.
- BFA**^{*2} filling adapter incl. ribbed flange with sieve insert: this option allows that small oil quantities can be filled via the air breather housing. Therefore the corresponding housing is equipped with that version.
- SSR**^{*2} stilling tube with support ring and filling adapter: This includes the optional stilling tube as well as the option for filling as the **BFA**. The stilling tube is made of the same material as the requested immersion tube (MS/VA).
- MT** for integration in Multiterminal: The basic unit will be mounted to the Multiterminal. For specification we refer to data sheet DA 10 0201.
- MTS** for integration in Multiterminal including stilling tube: in addition to the basic unit, a stilling tube with support ring is mounted to the Multiterminal.
- FCT** Fluidcontrolterminal: The Fluidcontrolterminal (**FCT**) will be mounted to the basic product. For specification we refer to data sheet DA 10 0202.

^{*2} not available in combination with option **FCT** and **MT/MTS**

Product code for NV 77-XP

Series
Nivotemp **NV 77-XP-HY**
with display and control unit

Resolution
5 = 5 mm

Design
MS brass
VA^{*1} float and switching tube stainless steel

Connector
2M12
M12-8-pol. (with option 4S-KN-KT only)
S6

Length (max. 1420 mm)
280
370
500
670
820
970
1120
1270
1420

NV 77-XP-HY-5

Accessories
VS = clogging indicator

Optionen
BFA^{*2} = filling adapter
SSR^{*2} = stilling tube with filling adapter
FCT = Fluidcontrolterminal
MT = for Multiterminal
MTS = for Multiterminal incl. stilling tube

Card

-4S
4 x PNP transistor output

-2S-KN-KT
2 x PNP transistor output
1 x analogue output level
1 x analogue output temperature

-4S-KN-KT
4 x PNP transistor output
1 x analogue output level
1 x analogue output temperature

^{*1} not available in combination with option **FCT**
^{*2} not available in combination with option **FCT**, **MT** and **MTS**

Accessories

Part-No. 4-pole	Part-No. 8-pole	Description
9144 05 0010	9144 05 0048	Connecting cable M12x1, 1.5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0049	Connecting cable M12x1, 3.0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0033	Connecting cable M12x1, 5.0 m, elbow connector (female) and wire

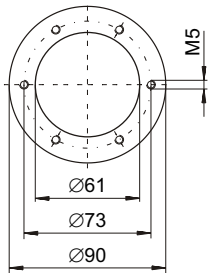
You need: Level and temperature measurement with 5 mm resolution, design MS, 2xM12 connector, L=670 mm, clogging indicator, display and control unit with 2 PNP - switching outputs and analog signals for level and temperature

You order: NV 77-XP-HY-5-MS-2M12 / 670-2S-KN-KT-VS

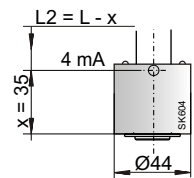
Standard pin assignment NV 77-XP

Type NV 77-XP..-4S 4 x PNP - transistor output free programmable	Type NV 77-XP..-2S-KN-KT 2 x PNP-transistor output free programmable 1 x analogue output level 1 x analogue output temperature	Type NV 77-XP..-4S-KN-KT 4 x PNP-transistor output free programmable 1 x analogue output level 1 x analogue output temperature
Connector 2xM12 4 - pol 	Connector 2xM12 4 - pol 	Connector M12 8 - pol
Connector S6 	Connector S6 	

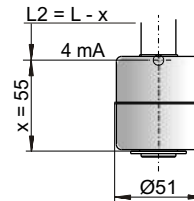
Flange picture
after DIN 24557/part 2



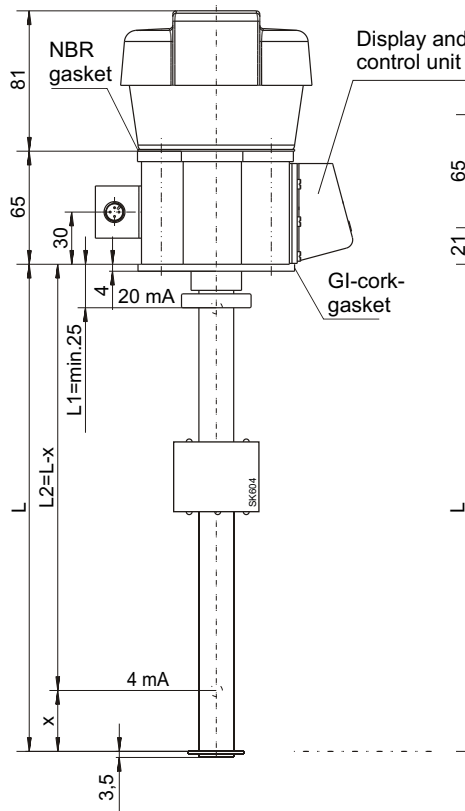
Float SK 604 for NV 77-XP-MS



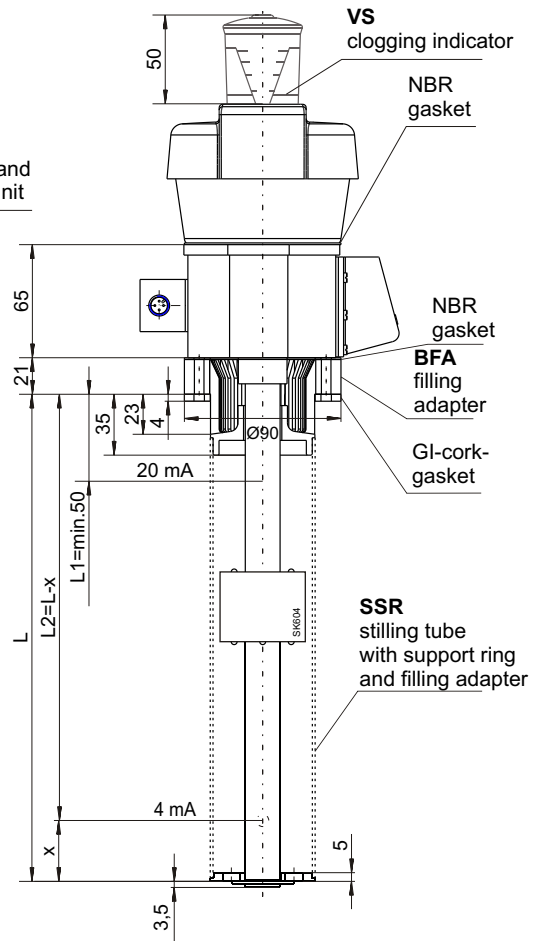
Float SK 221 for NV 77-XP-VA



Basic version

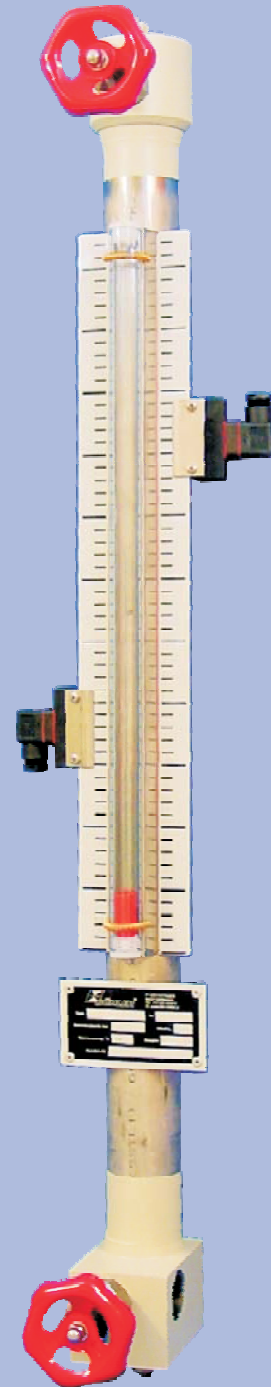


Design with options



Level switch HD NS for external installation

- Visual and electric monitoring of liquid level
- Pressure range up to 360 bar
- TÜV approved
- Lengths up to 5000 mm (longer on request)
- Adjustable level contacts
- Optional analog output 4-20 mA
- Visual indicator with scale
- Robust design meets industrial standards
- Float with dynamic buoyancy
- Specials upon request



Technical data

HD NS 250-AM-G1-V

Basic data

max. operating pressure	250 bar
max. operating temperature	50 °C
min. density of fluid	0.80 kg/dm ³
L1 max.	5000 mm
weight at L1=500 mm	approx. 15 kg
weight L1+ 100 mm	approx. 0.65 kg
on request longer lengths	

Material

float SK597	compact plastic
standpipe	1.4571
upper end piece	steel
bottom end piece	steel
check valve	1.4571
vent valve	1.4571
sight glass	PC

Connector

upper check valve	G1
lower check valve	G1

appropriate level contacts see on page 4

Option

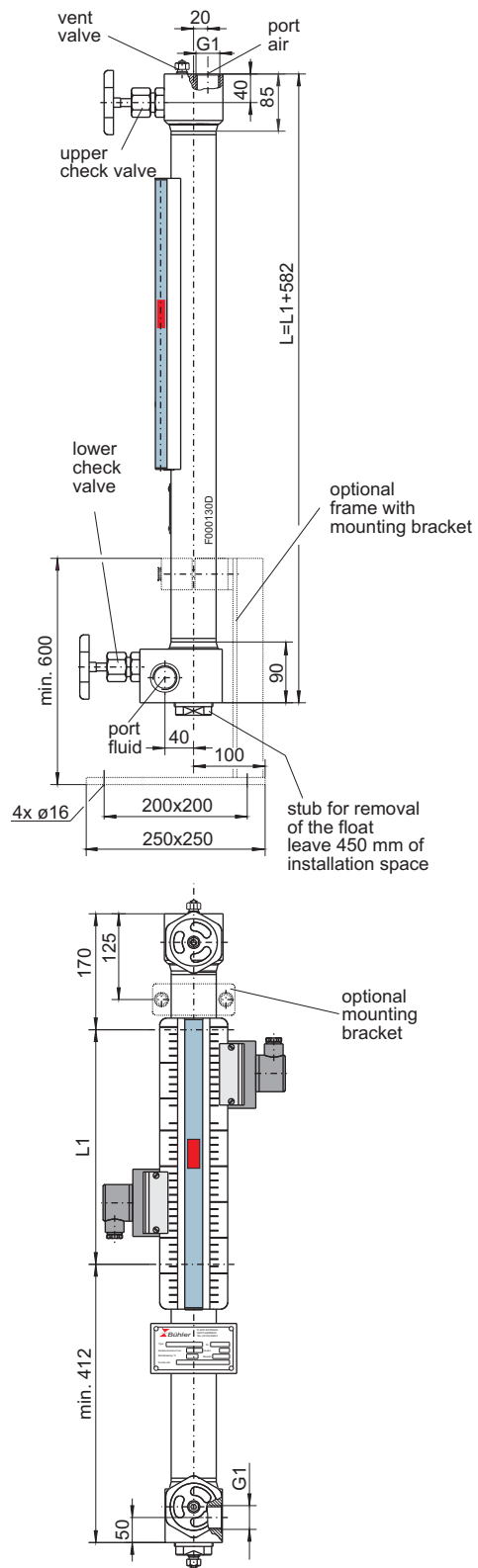
transducer tube	-K continuous level	O P T I O N
measurement principle	reed contact	
resolution	5 or 10 mm	
operating voltage (U _B)	10 - 30 V DC (nominal voltage 24 V DC)	
output	4 - 20 mA	
load Ω max.	= (U _B - 7.5 V) / 0.02 A	

Note:

This level switch includes TÜV approval.
Tested according to Pressure Equipment Directive 97/23/EC (Module G)

Accessories

Part No.	Description
2051002	mounting bracket heavy series SPAL 6060
2054999	frame for ground mounting of the level switch with mounting bracket SPAL 6060
2274999	bolts 4x DIN529-M12x300 with nuts



Product code for HD NS 250-AM-G1-V

HD NS 250-AM-G1-V- -SK597 /

Length
L1 = ...mm

O	Option	transducer tube
P	-K5	continuous, resolution 5 mm
T	-K10	continuous, resolution 10 mm

Example for order

You need: Level switch for external mounting, operating pressure 250 bar, measuring length L1 = 2400 mm, with continuous level output, resolution 10 mm and 2 change over contacts (see page 4)

You order: HD NS 250-AM-G1-V-K5-SK597 / L1 = 2400
2 x part no. 28 89 999 contact MKS 1/W

Technical data

HD NS 360-AM-G1-V

Basic data

max. operating pressure	360 bar
max. operating temperature	50 °C
min. spec. density of fluid	0.80 kg/dm ³
L1 max.	5000 mm
weight at L1=500 mm	approx. 20 kg
weight L1+ 100 mm	approx. 1.0 kg
on request longer lengths	

Material

float SK 597	compact plastic
standpipe	1.4571
topmost end piece	steel
bottom end piece	steel
check valve	1.4571
vent valve	1.4571
sight glass	PC

Connector

upper check valve	G1
lower check valve	G1

appropriate level contacts see page 4

Option

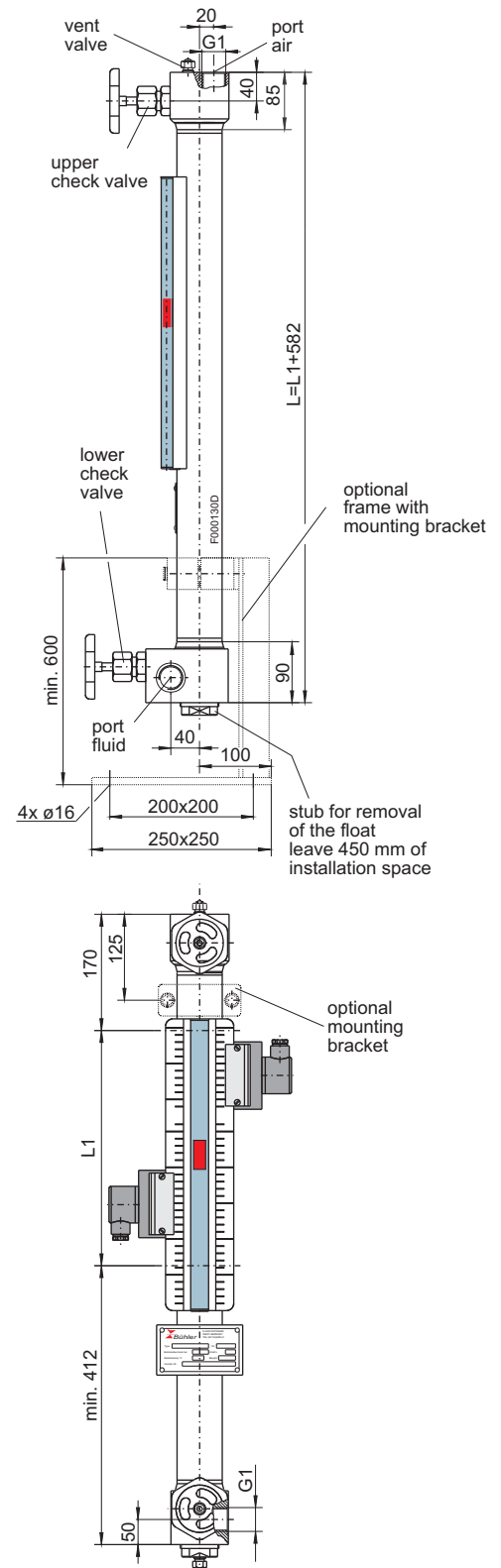
transducer tube	-K continuous level	O P T I O N
measurement principle	reed contact	
resolution	5 or 10 mm	
operating voltage (U _B)	10 - 30 V DC (nominal voltage 24 V DC)	
output	4 - 20 mA	
load Ω max..	(U _B - 7.5 V) / 0.02 A	

Note:

These level switches are delivered with TÜV approval.
Tested according to Pressure Equipment Directive 97/23/EC (Module G)

Accessories

Part No.	Description
2051003	mounting bracket heavy series SPAL 6063,5
2055999	frame for ground mounting of the level switch with mounting bracket SPAL 6063,5
2274999	bolts 4x DIN529-M12x300 with nuts



Product code for HD NS 360-AM-G1-V

HD NS 360-AM-G1-V- -SK597 /

O	Option	transducer tube
P	-K5	continuous, resolution 5 mm
T	-K10	continuous, resolution 10 mm

Length
L1 = ...mm

Example for order

You need: Level switch for external mounting, operating pressure max. 360 bar, measuring length L1 = 3200 mm, with 2 change over contacts (see page 4)

You order: HD NS 360-AM-G1-V-SK597 / L1=3200;
2 x part no. 28 89 999 contact MKS 1/W

Contacts for NS ..-AM

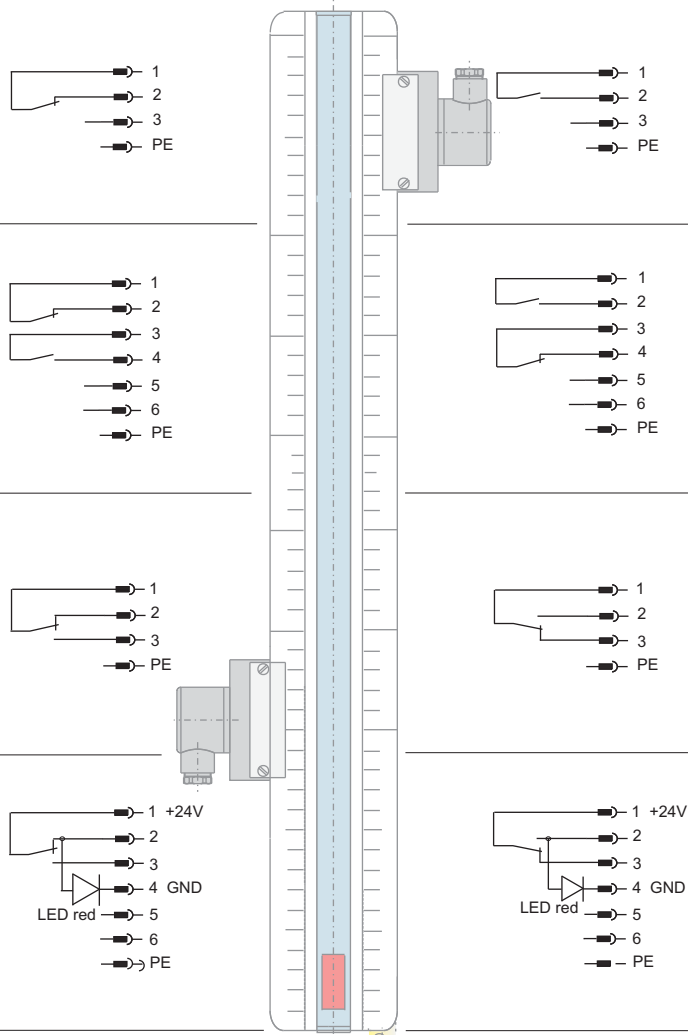
Pin assignment (contact position at empty reservoir) mounting left mounting right

Type	MKS-1/K
function	NC / NO
max. voltage	230 V AC/DC
max. current	1 A
max. contact load	50 VA
connector	M3 (DIN EN 175301-803) 3 pol. + PE
protection class	IP 65
Part No.	28 88 999

Type	MKS-2/K
function	2 x NC / NO
max. voltage	230 V AC/DC
max. current	1 A
max. contact load	50 VA
connector	S6 (DIN EN 175201-804) 6 pol. + PE
protection class	IP 65
Part No.	28 91 999

Type	MKS-1/W
function	change over
max. voltage	230 V AC/DC
max. current	1 A
max. contact load	50 VA
connector	M3 (DIN EN 175301-803) 3 pol. + PE
protection class	IP 65
Part No.	28 89 999

Type	MKS-1/W-L 24 V
function	change over with LED
max. voltage	24 V DC
max. current	1 A
max. contact load	25 VA
connector	S6 (DIN EN 175201-804) 6 pol. + PE
protection class	IP 65
Part No.	28 90 999

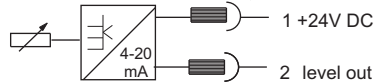


other contacts on request

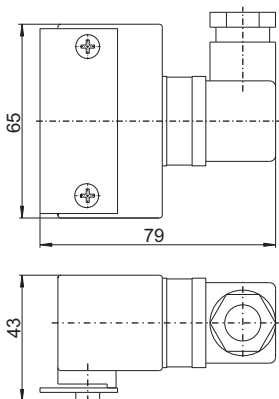
For operations in areas with strong vibrations we suggest to use contacts MKS-1/K and MKS-2K.

When mounting a transducer tube with continuous output signals you have to keep in mind that the mounting of contacts is possible only on the left side.

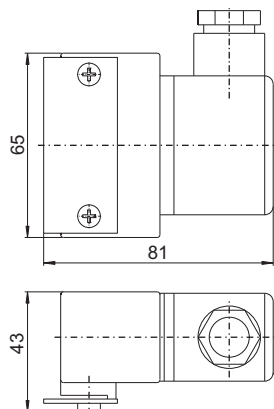
Pin assignment for AM-K with connector S3



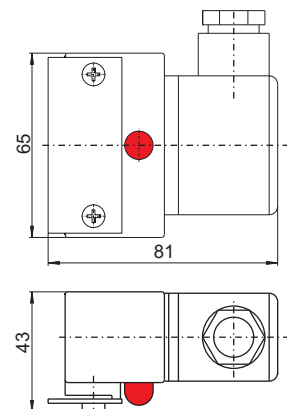
**MKS 1/K
MKS 1/W**



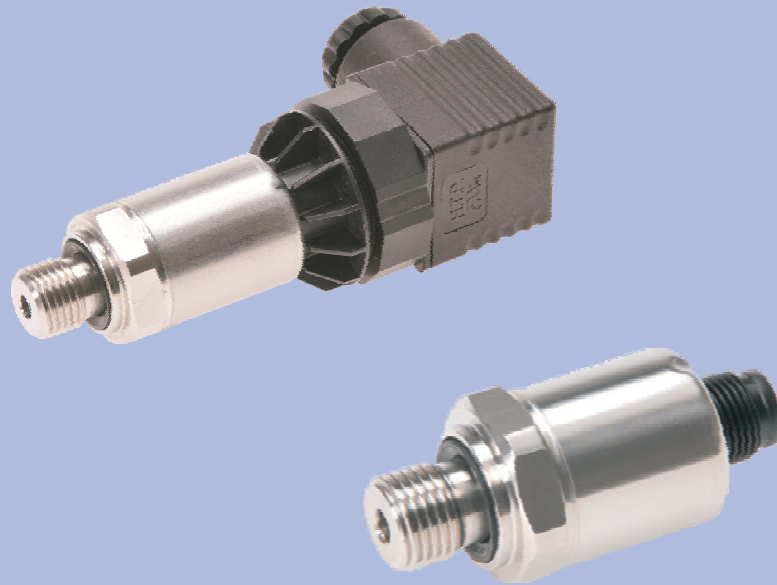
MKS 2/K



MKS 1/W-L24V



Pressure transmitter Pressotronik 702



Characteristics

- Pressure ratings up to 600 bar
- Compact and robust design
- Stainless steel measuring cell
- Pressure measuring cell with pressure sensor, welded seal-free, no elastomer seal
- High bursting safety
- 2 plug connection options

Technical Data

Pressure transmitter

Pressotronik 702

Pressure ranges

0 - 10 bar
0 - 25 bar
0 - 100 bar
0 - 250 bar
0 - 400 bar
0 - 600 bar

other pressure ranges available upon request

Medium

Liquids, gasses and refrigerants, incl. ammonia

Pressure connection
with FPM profile gasket
Overload
higher values upon request

G ¼ external thread, DIN 3852 form E
3 x terminal value at 10 to 600 bar (but max. 1500 bar)

Burst pressure

6 x terminal value (max. 2500 bar)

Material

Housing
Connector holder
Materials in contact with media
Pressure connection
Measuring element

Stainless steel 1.4404 / AISI 316L
Polyarylamide 50 % GF VO
Stainless steel 1.4404 / AISI 316L
Stainless steel

Temperature

Medium
Ambient temperature
Storage

-30...+135 °C
-30...+ 85 °C
-50...+100 °C

Response time

≤ 2 ms / typical 1 ms

Load cycle

≤ 100 Hz

Supply voltage (U_b)

7 - 33 V DC

Power input

≤ 23 mA

Output signal

4 - 20 mA, 2 wire

Burden Ω

= $(U_b - 7 V) / 0,02 A$

Reverse polarity safety

Short circuit and reverse polarity safety (each connection to each with max. voltage)

Electrical connection

M3 (IP 65)

M12 (IP 67) / Delivered without connector head

Accuracy (test conditions: 25 °C, 45 % rF, supply 24 VDC)

Characteristic (*1)

% FS ± 0,3

Resolution

% FS 0,1

Thermal behaviour (*2)

% FS/10K ± 0,2

Long-term stability according to
IEC EN 60770-1

% FS ± 0,25

*1: Typical max. 0,5 % FS

*2: -15...+85 °C

Mounting position

any

Weight

approx. 90 g

Tests / approvals

Electromagnetic compatibility
and shock per IEC 60068-2-27

CE compliant per EN 61326-2-3
100 g, 11 ms, Half-sine curve, all 6 directions, free fall from 1 m onto concrete (6x)

Bump per IEC 60068-2-29

40 g over 6 ms, 1000x all 3 directions

Vibration per IEC 60068-2-6

20 g, 15...2000 Hz, 15...25 Hz with amplitude ± 15 mm, 1 octave/minute all 3 directions,
50 continuous loads

Product code for Pressotronik 702

PT 702

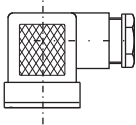
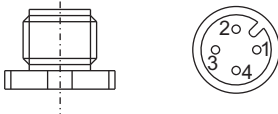
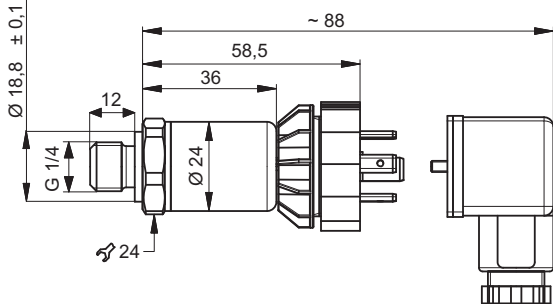
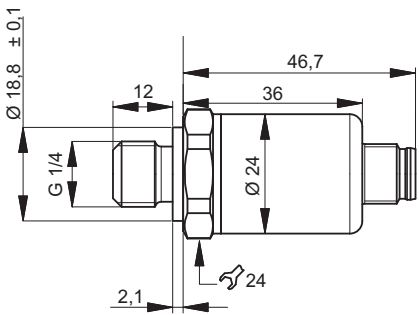
Series

Pressure range

- 0-10 bar
- 0-25 bar
- 0-100 bar
- 0-250 bar
- 0-400 bar
- 0-600 bar

Plug connection

- M3
- M12

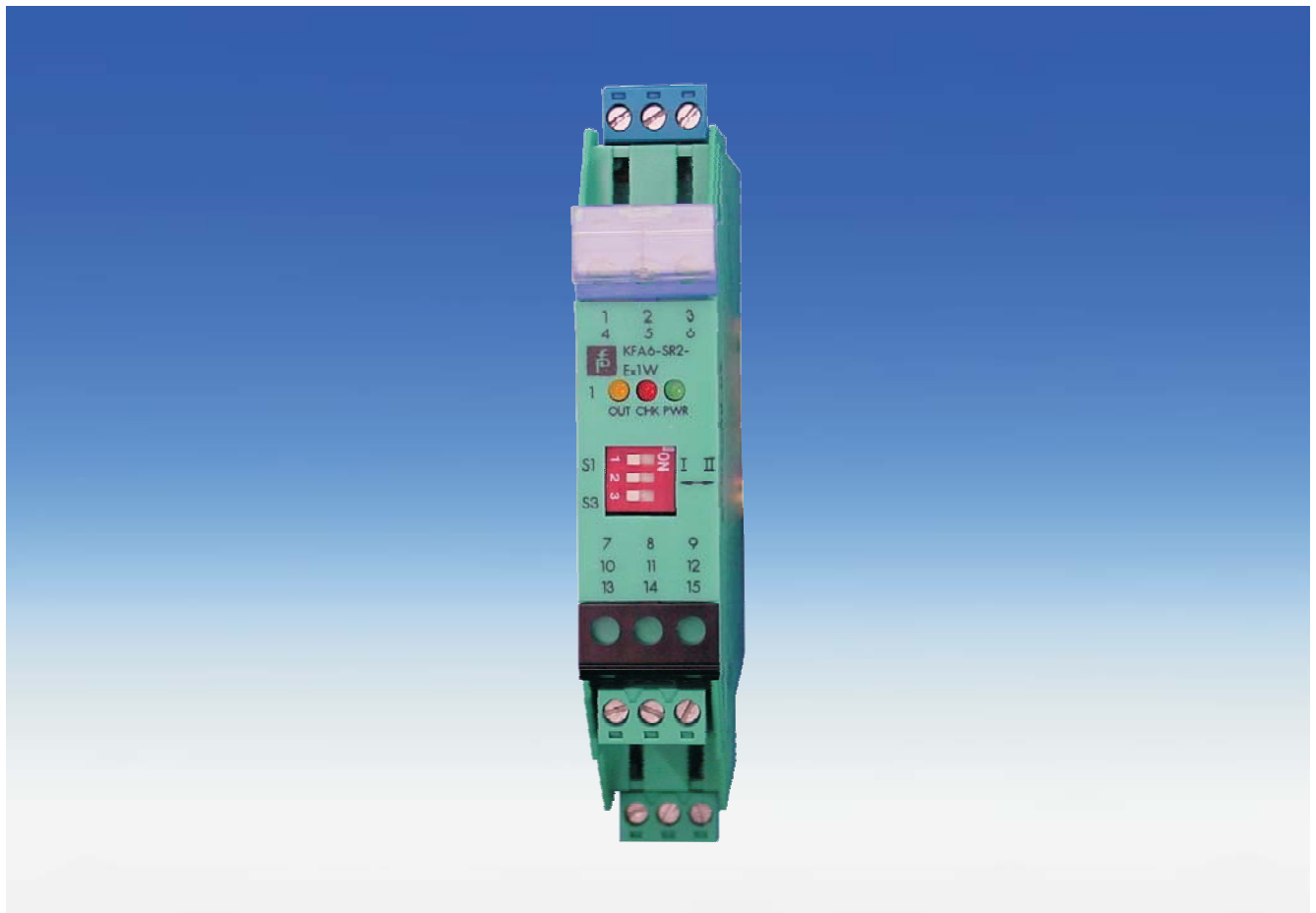
<p>Plug connection</p>	<p>M3 (DIN EN 175301-803-A) 3 pol. + PE IP 65</p> 	<p>M12 (base) 4 pol. IP 67</p> 
<p>Pin assignment 2-wire</p>	<ul style="list-style-type: none"> — 1 +24 V DC — 2 4-20 mA out — 3 — PE* 	<ul style="list-style-type: none"> — 1 +24 V DC — 2 — 3 4-20 mA out — 4
<p>Scale drawing</p>		

* not connected to the transmitter housing.

Accessory:

Part-no.	Description
9144 05 0010	Connecting cable M12x1, 1,5 m, angular coupling and straight plug
9144 05 0046	Connecting cable M12x1, 3,0 m, angular coupling and straight plug
9144 05 0047	Connecting cable M12x1, 5,0 m, angular coupling and strands

Switch Amplifier for Level- / Temperature Switch - ATEX



A variation of switch amplifiers is available for the control of level and temperature in hydraulic applications.

Single channel switch amplifier types KFD/KFA for intrinsically safe circuits with one or two alarm relays (change over contact), broken wire detection, 3 respective 5 LEDs for status indication on power, alarm and broken wire.

The devices must be installed outside the hazardous area!


- Rail mounting according to EN 60715
- Intrinsically safe inputs
- Approved by ATEX, FM, UL, CSA

Technical Data Controller

for use with trigger contact ; output one or two change over contacts

Power supply:	20 - 30 V DC	103,5 - 126 V AC 45 - 65 Hz	207 - 253 V AC 45 - 65 Hz
Model, 1-channel: part no:	KFD 2-SR2-Ex 1.W 91 000 700 04	KFA 5-SR2-Ex 1.W 91 000 700 05	KFA 6-SR2-Ex 1.W 91 000 700 06
Model, 2-channel: part no:	KFD 2-SR2-Ex 2.W 91 000 700 18	KFA 5-SR2-Ex 2.W 91 000 700 19	KFA 6-SR2-Ex 2.W 91 000 700 20

General Data

Intrinsically safe acc. to	EN 60079-11	Output	change over (non fail-safe)
broken wire detection	yes	Switch power output	230 V AC, 2A $\cos \varphi > 0.7$ 40 V cc, 2A resistive load
approved by 	II(1) GD [Ex ia] IIC	Ambient temperature	-20 ... +60 °C
UL	Class I, Groups A, B, C, D Class II, Groups E, F, G	Protection class	IP 20
CSA	Class I, Div. 1, Groups A, B, C, D Class II, Div. 1, Groups E, F, G	Dimensions WxHxD (in mm)	20 x 118 x 115

Circular pumps

BFP



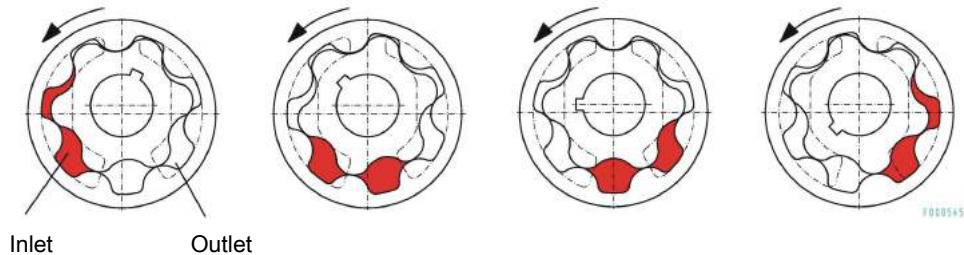
- Low noise emission
- High vol. efficiency
- Good suction performance
- Built-in bell housing
- Gerotor principle
- Not susceptible to contamination

Introduction and description

Why gerotor?

Numerous applications in hydraulic and lubrication systems just require the circulation of the fluid. In such cases low noise emissions and low pressure ripples are more important than highly efficient transmission of energy.

The gerotor is the ideal principle for such applications. The displacement mechanism consists of the inner and the outer rotor. The number of teeth of the inner rotor is always one less than the outer rotor. The rotation of the gerotor generates chambers of changing volumes between the inner and outer rotor. The variation follows a sinus curve, resulting in a very steady surge. Due to the inevitable displacement, the flow rate generated is proportional to the rotation speed.



When we designed the BFP series we specifically selected the number of teeth and the width of the gerotors so the pumps have the smallest possible physical dimensions, low weight and minimal loss in efficiency. The low relative speed between the internal and external gear make the pumps extremely durable and smooth.

The internal design of the pumps further reduces the flow paths and ensures good suction performance.

Why complete pump units?

Every additional component increases the overall installed size of the systems, inevitably increasing the space requirement and typically also the costs. One requirement in developing the BFP series was therefore to keep them as short and compact as possible. On the BFP 8 to 40 models the gerotor is driven directly by the motor shaft. On the larger BFP 60 and 90 pumps the motor shaft is built into a special coupling. The coupling runs in oil and is therefore optimally lubricated and cooled.

Planning information

Installation site requirements

Ensure adequate ventilation.

The pumps are mounted in the installation site using four screws

Electrical connection

The electrical connection must be made by an appropriately trained electrician! Observe the voltage and mains frequency! Fusing must comply with applicable standards! Please note the direction of rotation of the motor when connecting.

Hydraulic connection

Full utilisation of the high capacity of the pumps requires care when configuring the intake line. This is a very important factor with use in lubricating systems. These are typically filled with higher viscosity oils and must operate reliably in a large temperature range. Although the tremendous increase in viscosity in low temperatures are frequently overlooked. For applications where the parameters are within critical ranges, we recommend calculating the precise expected pressure loss in the suction pipe or using an adequate size (never smaller than the existing pump suction port!).

The suction and pressure pipe must be installed free from tension and vibration. When using hoses, pay particular attention to the appropriate reinforcement on the suction side so the hose cannot collapse due to the negative pressure.

If the pump unit is not already intended for an off-line filter, the oil should have an average purity class of 15/11 per ISO 4406 or better. This is essential in significantly extending the service life of all components.

Do not continuously exceed the recommended suction pressure of the pumps. Some situations may require priming the suction pipe prior to first start-up.

Avoid possible leaks in the circuit to prevent environmental damages. If necessary, use e.g. an oil pan.

Technical data

Technical data	
Pump housing:	anodised and impregnated cast aluminium
Gerotor:	sintered steel
Operating fluids:	mineral oils per DIN 51524
Operating oil temperature:	max. 80 °C (higher temperatures on request)
Seal:	Perbunan (NBR) Viton (FPM) available on request
Ambient temperature:	-15 °C to +40 °C

Electric motors	
Voltage / frequency:	230 / 400 V - 50 Hz ± 5 % 276 / 480 V - 60 Hz ± 5 %
Thermal stability:	Class of insulation F, utilisation per class B
Design:	three-phase asynchronous squirrel-cage induction motor totally enclosed, fan cooled
Protection class:	IP55
on request:	other voltages higher motor powers for higher viscosities UL- or CSA-approved motors higher protection type
The motors comply with standards IEC 60034, IEC 60072, IEC 60085	

Please also observe the operating manual for the motor! All pumps are supplied with cable gland inside the motor terminal box. The total length and height of the pump may vary by motor make.

Pump selection information:

When selecting the pump model, choose the motor output according to the oil viscosity to be used. Motor output information refers to the maximum oil viscosity at maximum operating pressure.

The BFP 5 to BFP 40 are also available as a special version with a 6 bar internal bypass valve for protection. This does not change the dimensions.

Installation information:

The pump head of all pumps can be mounted turned in 90° increments to align with the line routing. Please note the offset from the centre of the motor.

The connection threads are manufactured to ISO 228. The screw-in surfaces are finished and suitable for the use of soft seals. We recommend using screwed plugs per ISO 1179-2.

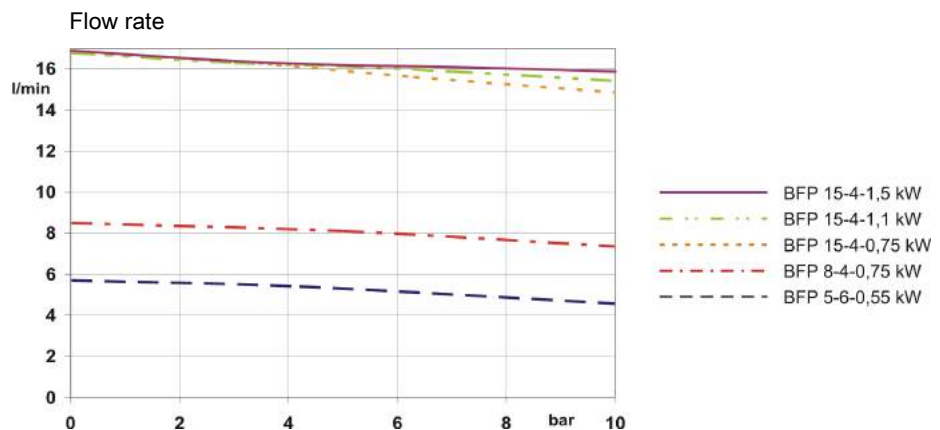
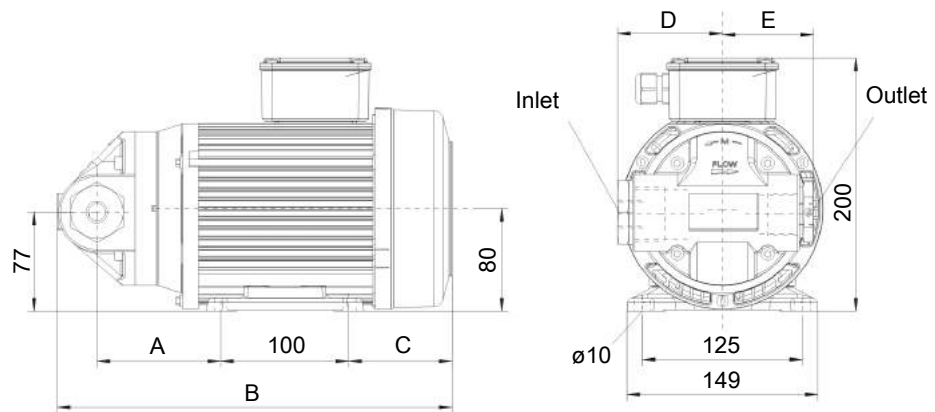
Please note:

Especially note the dimension of the suction pipe. The cross-sections should not be smaller than specified. In most cases, loud noise indicates the cross-section was reduced too much. Please refer to the notices in the operating instructions.

BFP 5 / BFP 8 / BFP 15

	BFP 5-6-0.55kW	BFP 8-4-0.75kW	BFP15-4-0.75kW	BFP15-4-1.1kW	BFP15-4-1.5kW
Item number	3705055	3708075IE2	3715075IE2	3715110IE2	3715150IE2
Motor power	0.55 kW	0.75 kW	0.75 kW	1.1 kW	1.5 kW
Max. oil viscosity	1500 cSt	1500 cSt	300 cSt	1500 cSt	2000 cSt
At max. working pressure	10 bar	10 bar	10 bar	10 bar	10 bar
Number of poles	6	4	4	4	4
Max. current consumption (400V / 50Hz)*	approx. 1.8 A	approx. 2.1 A	approx. 2.1 A	approx. 2.7 A	approx. 3.5 A
Nominal delivery volume*	5.8 cm ³ /U	5.8 cm ³ /U	11.7 cm ³ /U	11.7 cm ³ /U	11.7 cm ³ /U
	5.5 l/min	8 l/min	16 l/min	16 l/min	16 l/min
Suction side connection	G1/2-DN16	G3/4/DN20	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Pressure side connection	G3/8-DN12	G1/2-DN16	G1-DN25	G1-DN25	G1-DN25
Suction pressure for all models temporarily up to	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
			-0.6 bar		
Acoustic power per ISO 3744*	52 dB(A)	56 dB(A)	59 dB(A)	59 dB(A)	59 dB(A)
Weight	10.8 kg	10.8 kg	10.9 kg	13.2 kg	16.2 kg
Dimensions					
A	96.5	96.5	96.5	96.5	96.5
B	308	308	308	346	368
C	80	80	80	118	140
D	82	82	70	70	70
E	71	71	60	60	60

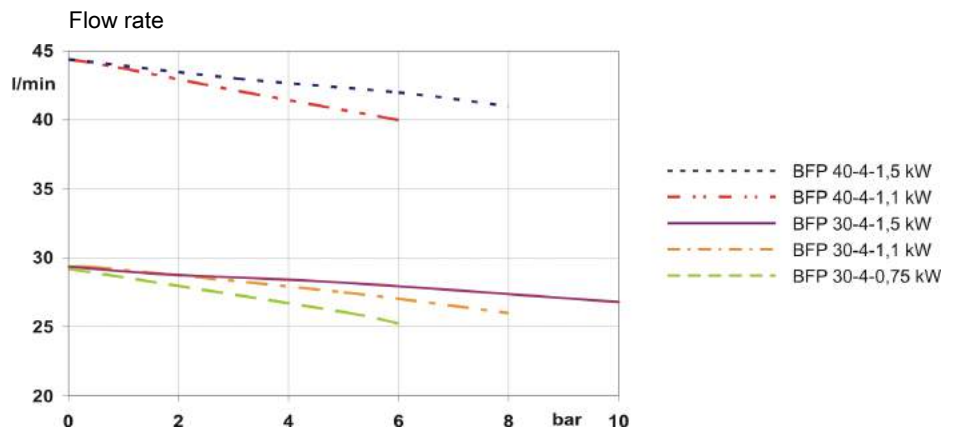
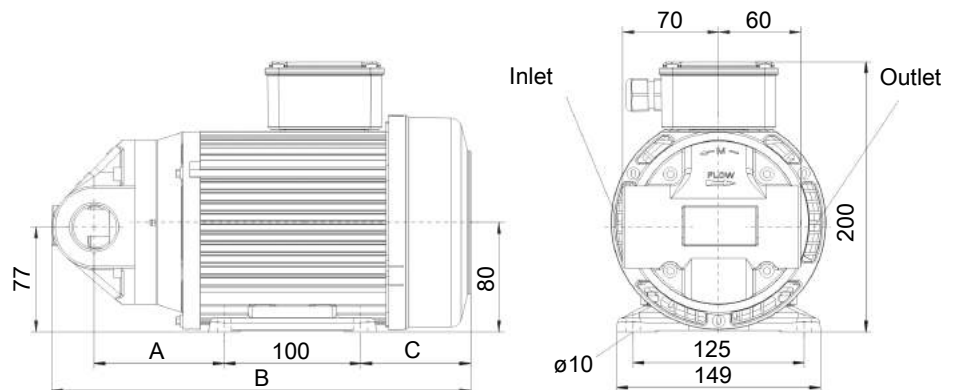
* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.



BFP 30 / BFP 40

	BFP 30-4-0.75kW	BFP 30-4-1.1kW	BFP30-4-1.5kW	BFP40-4-1.1kW	BFP40-4-1.5kW
Item number	3730075IE2	3730110IE2	3730150IE2	3740110IE2	3740150IE2
Motor power	0.75 kW	1.1 kW	1.5 kW	1.1 kW	1.5 kW
Max. oil viscosity	100 cSt	300 cSt	1000 cSt	100 cSt	700 cSt
At max. working pressure	6 bar	8 bar	10 bar	6 bar	8 bar
Number of poles	4	4	4	4	4
Max. current consumption (400V / 50Hz)*	approx. 2.1 A	approx. 2.7 A	approx. 3.5 A	approx. 2.7 A	approx. 3.5 A
Nominal delivery volume*	20.4 cm ³ /U	20.4 cm ³ /U	20.4 cm ³ /U	30.6 cm ³ /U	30.6 cm ³ /U
	29 l/min	29 l/min	29 l/min	42 l/min	42 l/min
Suction side connection	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Pressure side connection	G1-DN25	G1-DN25	G1-DN25	G1-DN25	G1-DN25
Suction pressure for all models temporarily up to	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
	-0.6 bar				
Acoustic power per ISO 3744*	61 dB(A)	61 dB(A)	61 dB(A)	62 dB(A)	62 dB(A)
Weight	11 kg	13.2 kg	16.2 kg	13.7 kg	16.7 kg
Dimensions					
A	95	95	95	104.5	104.5
B	306	344	366	354	376
C	80	118	140	118	140

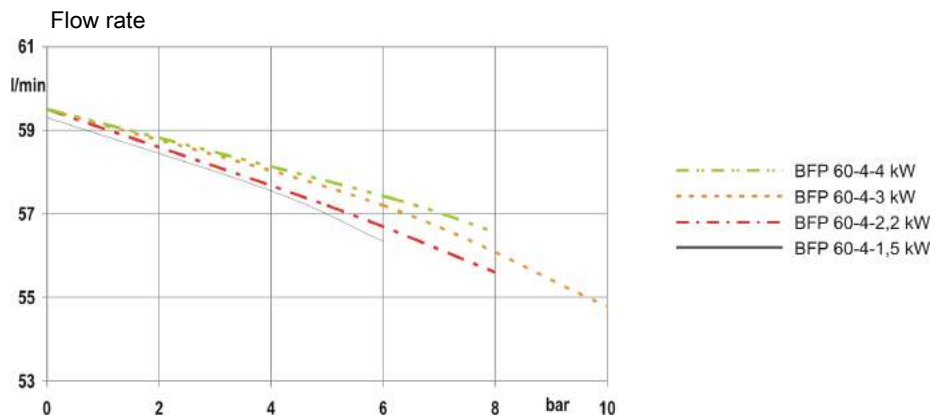
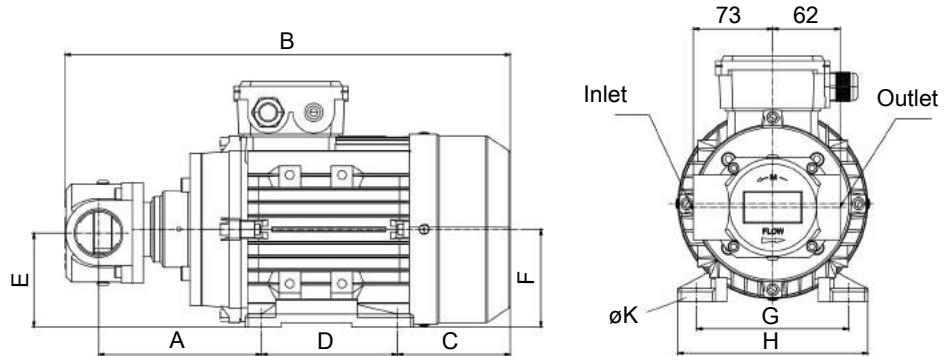
* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.



BFP 60

	BFP 60-4-1.5 kW	BFP 60-4-2.2kW	BFP 60-4-3kW	BFP 60-4-4kW
Item number	3760150IE2	3760220IE2	3760300IE2	3760400IE2
Motor power	1.5 kW	2.2 kW	3 kW	4 kW
Max. oil viscosity	100 cSt	300 cSt	800 cSt	1500 cSt
At max. working pressure	6 bar	8 bar	10 bar	8 bar
Number of poles	4	4	4	4
Max. current consumption (400 V / 50 Hz)*	approx. 3.6 A	approx. 4.9 A	approx. 6.4 A	approx. 8.3 A
Nominal delivery volume*	40.8 cm ³ /U	40.8 cm ³ /U	40.8 cm ³ /U	40.8 cm ³ /U
	58 l/min	58 l/min	58 l/min	58 l/min
Suction side connection	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40
Pressure side connection	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Suction pressure for all models temporarily up to	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
	-0.6 bar			
Acoustic power per ISO 3744*	64 dB(A)	64 dB(A)	64 dB(A)	64 dB(A)
Weight	17.4 kg	23.2 kg	23.2 kg	32.6 kg
Dimensions				
A	150	172	172	179
B	410	448	466	476
C	104	105	123	126
D	125	140	140	140
E	87	97	97	109
F	90	100	100	112
G	140	160	160	190
H	175	198	198	222
J	226	248	248	276
K	10	12	12	12

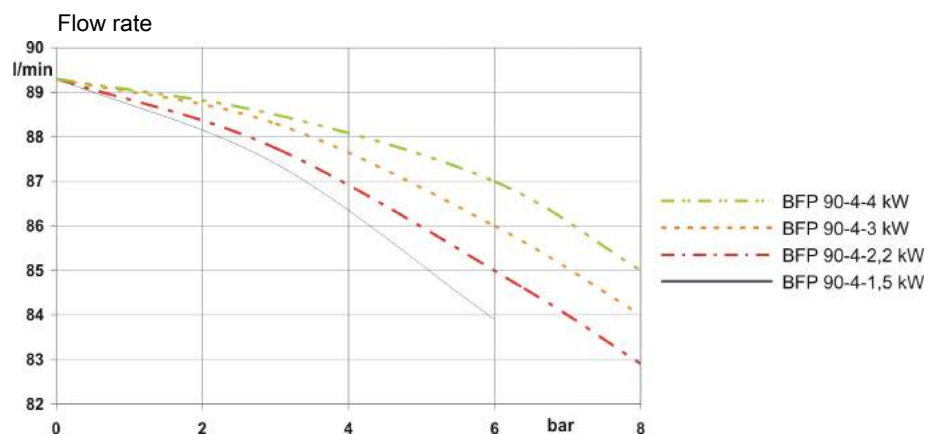
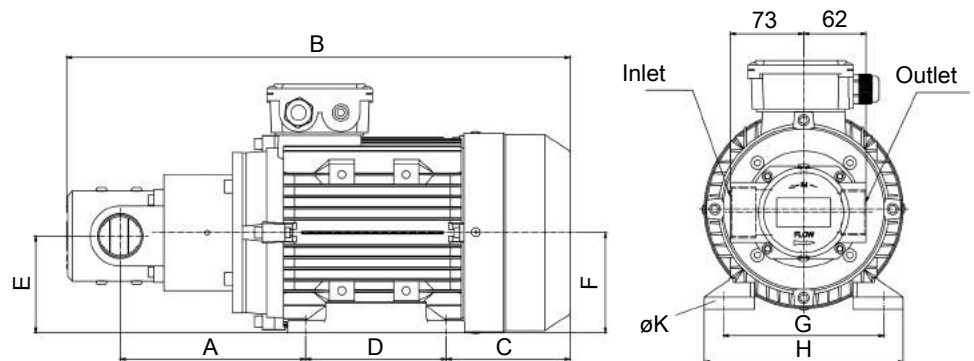
* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.



BFP 90

	BFP 90-4-1.5kW	BFP 90-4-2.2 kW	BFP 90-4-3kW	BFP 90-4-4kW
Item number	3790150IE2	3790220IE2	3790300IE2	3790400IE2
Motor power	1.5 kW	2.2 kW	3 kW	4 kW
Max. oil viscosity	46 cSt	100 cSt	300 cSt	1000 cSt
At max. working pressure	6 bar	8 bar	8 bar	8 bar
Number of poles	4	4	4	4
Max. current consumption (400 V / 50 Hz)*	approx. 3.6 A	approx. 4.9 A	approx. 6.4 A	approx. 8.3 A
Nominal delivery volume*	61.2 cm ³ /U	61.2 cm ³ /U	61.2 cm ³ /U	61.2 cm ³ /U
	88 l/min	88 l/min	88 l/min	88 l/min
Suction side connection	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40
Pressure side connection	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Suction pressure for all models temporarily up to	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
	-0.6 bar			
Acoustic power per ISO 3744*	65 dB(A)	65 dB(A)	65 dB(A)	65 dB(A)
Weight	19 kg	24.8 kg	24.8 kg	34.2 kg
Dimensions				
A	162.5	184.5	184.5	191.5
B	445	483	500	511
C	104	105	122	126
D	125	140	140	140
E	87	97	97	109
F	90	100	100	112
G	140	160	160	190
H	175	198	198	222
J	226	248	248	276
K	10	12	12	12

* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.



Off-line filter / cooler unit BKF



- Compact, space-saving design
- DIN filter elements
- Easy installation
- Easy element replacement
- Efficient plate heat exchanger



Introduction and description

Why off-line aggregates?

Depending on the system configuration there are operating conditions (variable capacity pumps, back-flow peaks, etc.), which significantly limit the effectiveness of full flow filtration or even render it completely ineffective.

In addition, quite practical considerations such as installing a cooler with is required anyway or the option of system-independent operation may argue for an off-line aggregate.

Why Bühler?

When we developed the BKF series, we incorporated our years of experience in designing and selling water coolers and filters. Special attention was paid to a compact design. By using standard filter elements in this respect we are not bound to a specific filter supplier.

Together with a well-known manufacturer, Bühler implemented these findings in a comprehensive product line customised for the requirements in fluid control.

Use the data in this leaflet to determine a suitable cooler for your application. If our standard range of products does not include the right system for your application, we will gladly develop a custom solution for you.

BKF 18/30

A low-noise gerotor pump resistant to dirt is integrated into the very compact baseplate. The drive motor and filter housing are arranged vertically and parallel to save space. The suction and pressure line are positioned so they can be routed straight down into the reservoir. This minimises the installation work.

Since the baseplate is also equipped with front connections, the aggregate can be cased next to the reservoir.

The aggregate has a built-in pressure limiting valve. NG 250 DIN elements are used as filter elements.

BKF 60/90

A compact, space-saving design was also realised in this series. Motor, pump and filter housing are combined into one unit and mounted to a frame for side mounting.

The DIN filter element with NG 400 removes to the top for changing.

Planning information

Installation site requirements

Ensure adequate ventilation.

The aggregates are mounted in the installation site using four screws

Electrical connection

The electrical connection must be made by an appropriately trained electrician! Observe the voltage and mains frequency! Fusing must comply with applicable standards! Please note the direction of rotation of the motor when connecting.

Hydraulic connection

Full utilisation of the high capacity of the aggregates requires care when configuring the intake line. This is a very important factor with use in lubricating systems. These are typically filled with higher viscosity oils and must operate reliably in a large temperature range. Although the tremendous increase in viscosity in low temperatures are frequently overlooked. For applications where the parameters are within critical ranges, we recommend calculating the precise expected pressure loss in the suction pipe or using an adequate size (never smaller than the existing pump suction port!).

The suction and pressure pipe must be installed free from tension and vibration. When using hoses, pay particular attention to the appropriate reinforcement on the suction side so the hose cannot collapse due to the negative pressure.

Do not continuously exceed the recommended suction pressure of the pumps. Some situations may require priming the suction pipe prior to first start-up.

Avoid possible leaks in the circuit to prevent environmental damages. If necessary, use e.g. an oil pan.

Technical data

Technical data	
Pump housing:	Anodised and impregnated cast aluminium
Gerotor:	Sintered steel
Hydraulic screw joint:	Galvanised steel
Operating fluids:	Mineral oils per DIN 51524
Operating oil temperature:	max. 80 °C (higher temperatures on request)
Seal:	Perbunan (NBR) or Viton (FPM) on request
Ambient temperature:	-20 °C to +40 °C

Electric motors	
Voltage / frequency:	230 / 400 V - 50 Hz ± 5 % 276 / 480 V - 60 Hz ± 5 %
Thermal stability:	Class of insulation F, utilisation per Class B
Design:	three-phase asynchronous squirrel-cage induction motor totally enclosed, fan cooled
Protection class:	IP55
on request:	other voltages higher motor power for higher viscosities UL- or CSA-approved motors higher protection class
The motors comply with standards IEC 60034, IEC 60072, IEC 60085	

Please also observe the operating manual for the motor! All motors are supplied with cable gland inside the terminal box. The total height of the aggregate may vary by motor make.

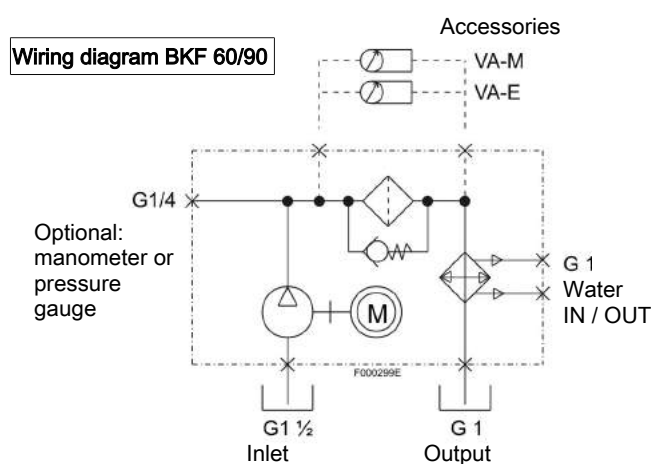
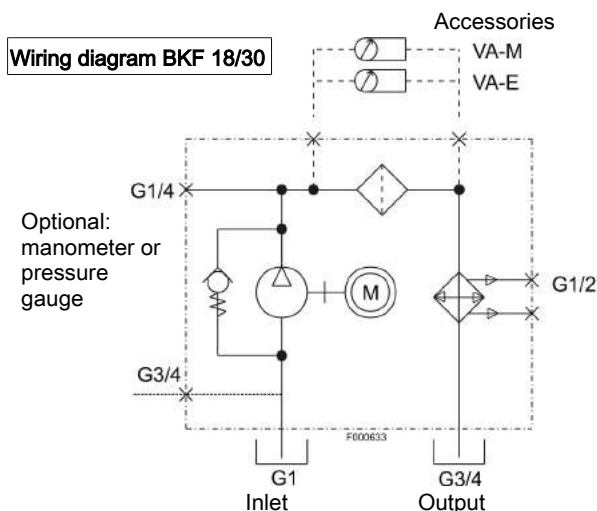
Installation information:

The connection threads are manufactured to ISO 228. The screw-in surfaces are finished and suitable for the use of soft seals. We recommend using screwed plugs per ISO 1179-2.

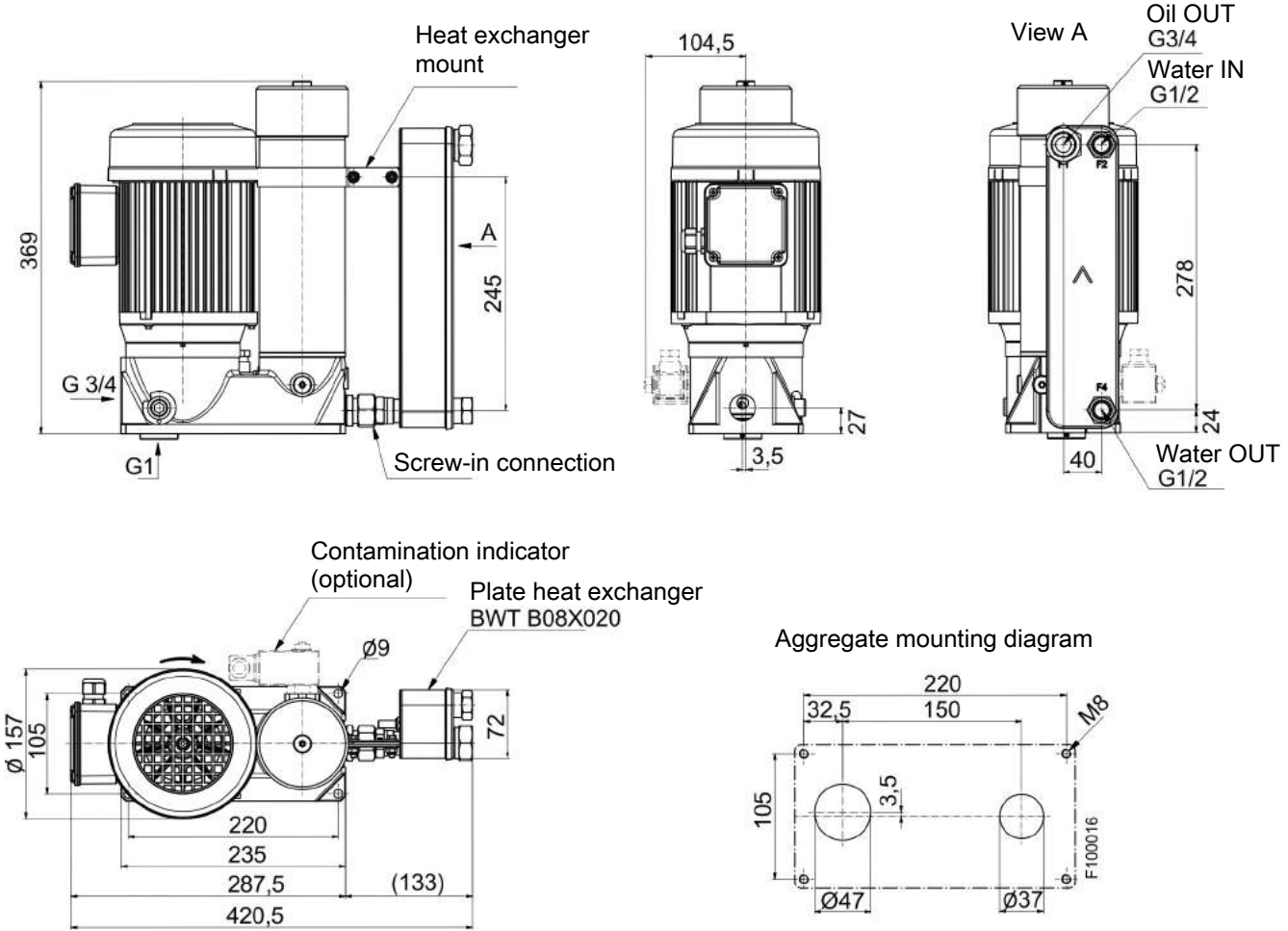
Please note:

Especially note the dimension of the suction pipe. The cross-sections should not be smaller than specified. In most cases, loud noise indicates the cross-section was reduced too much. Please refer to the notices in the operating instructions.

Wiring diagrams



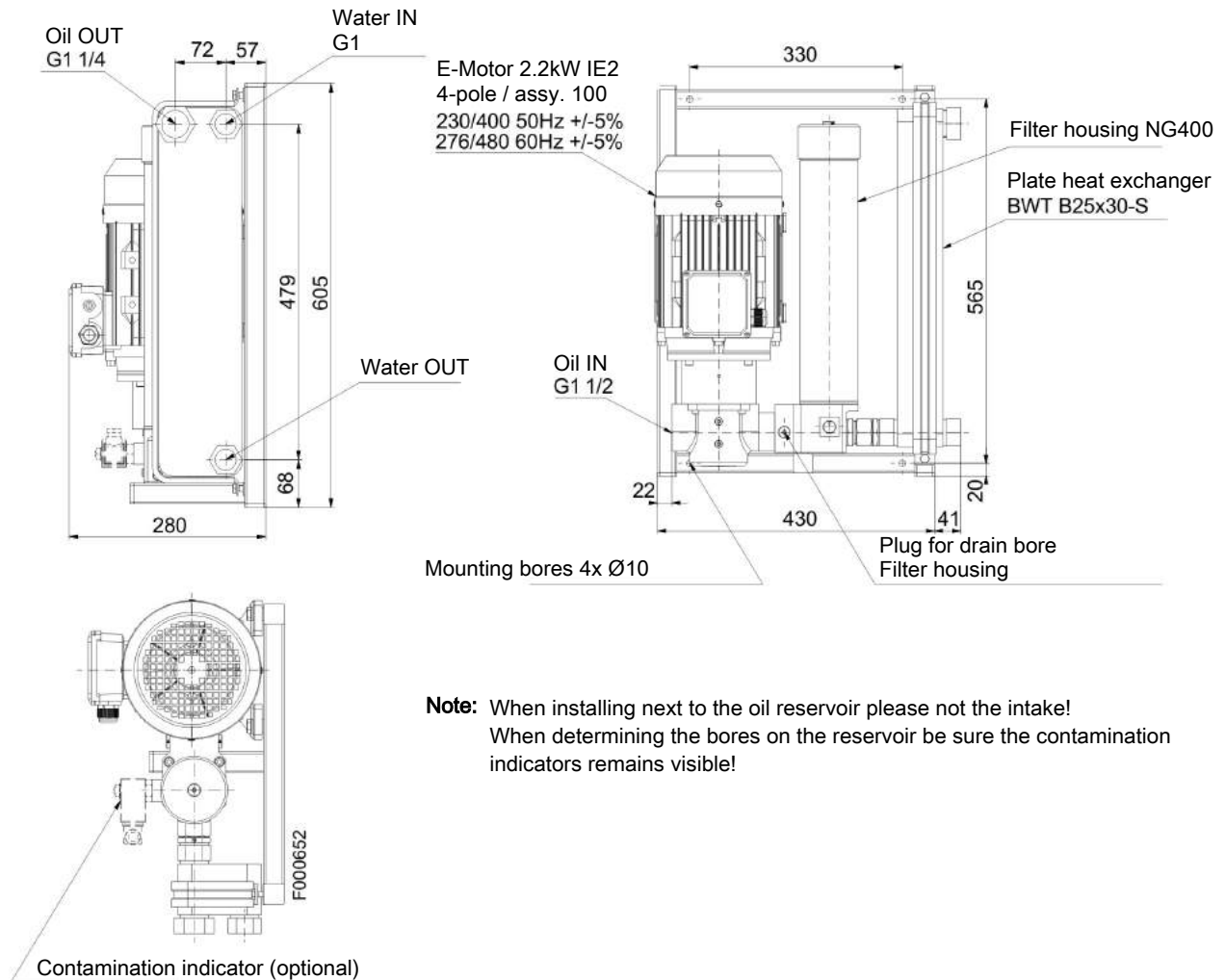
BKF 18 / BKF 30



Note: When installing next to the oil reservoir please not the intake!
 When determining the bores on the reservoir be sure the contamination indicators remains visible!

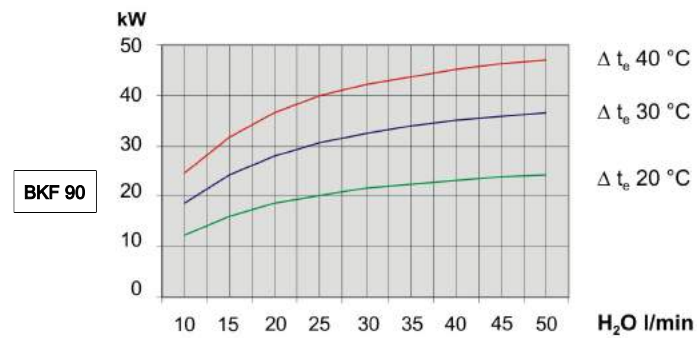
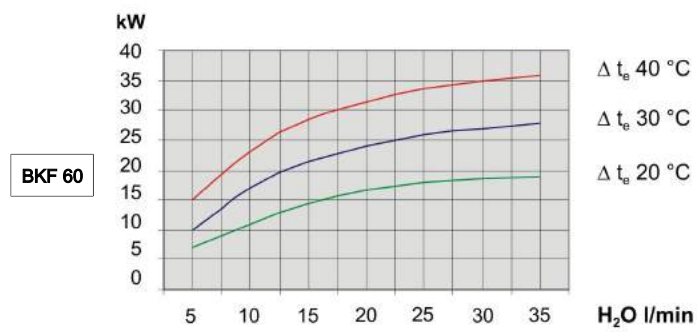
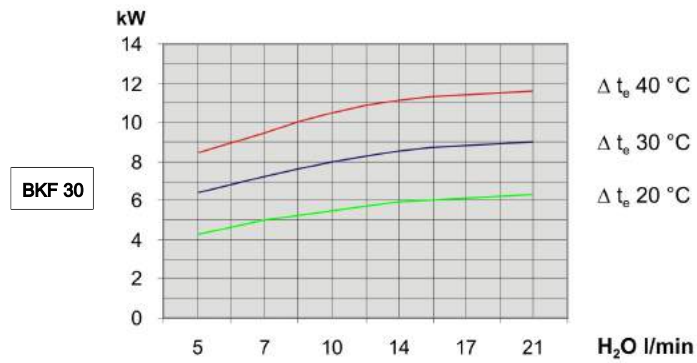
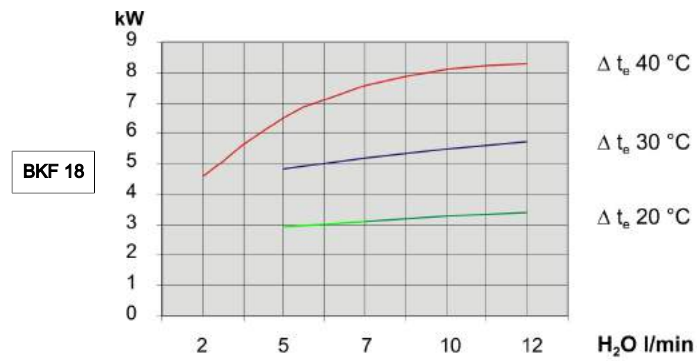
Type:	BKF 18-6-0.55	BKF 30-4-0.75
Motor power:	0.55 kW	0.75 kW
Number of poles:	6	4
Power input (400 V 50 Hz):	~ 1.7 A	~ 2 A
Suction lift:	2 m	2 m
Filter element pressure limit:	6 bar	6 bar
Display pressure contamination indicator:	2.2 bar	2.2 bar
Suction side connection:	G3/4 / G1	G3/4 / G1
Suction side hose:	DN 20 / DN 25	DN 20 / DN 25
Pressure side connection:	G3/4	G3/4
Pressure side hose:	DN 20	DN 20
Suction pressure:	-0.4 bar	-0.4 bar
For all aggregates briefly:	-0.6 bar	
Connection "Water IN":	G1/2	G1/2
Connection „Water OUT“:	G1/2	G1/2
Flow rate:	18 L/min	28 L/min
Max. feed pressure:	6 bar	6 bar
Weight:	approx. 20 kg	approx. 20 kg

BKF 60 / BKF 90



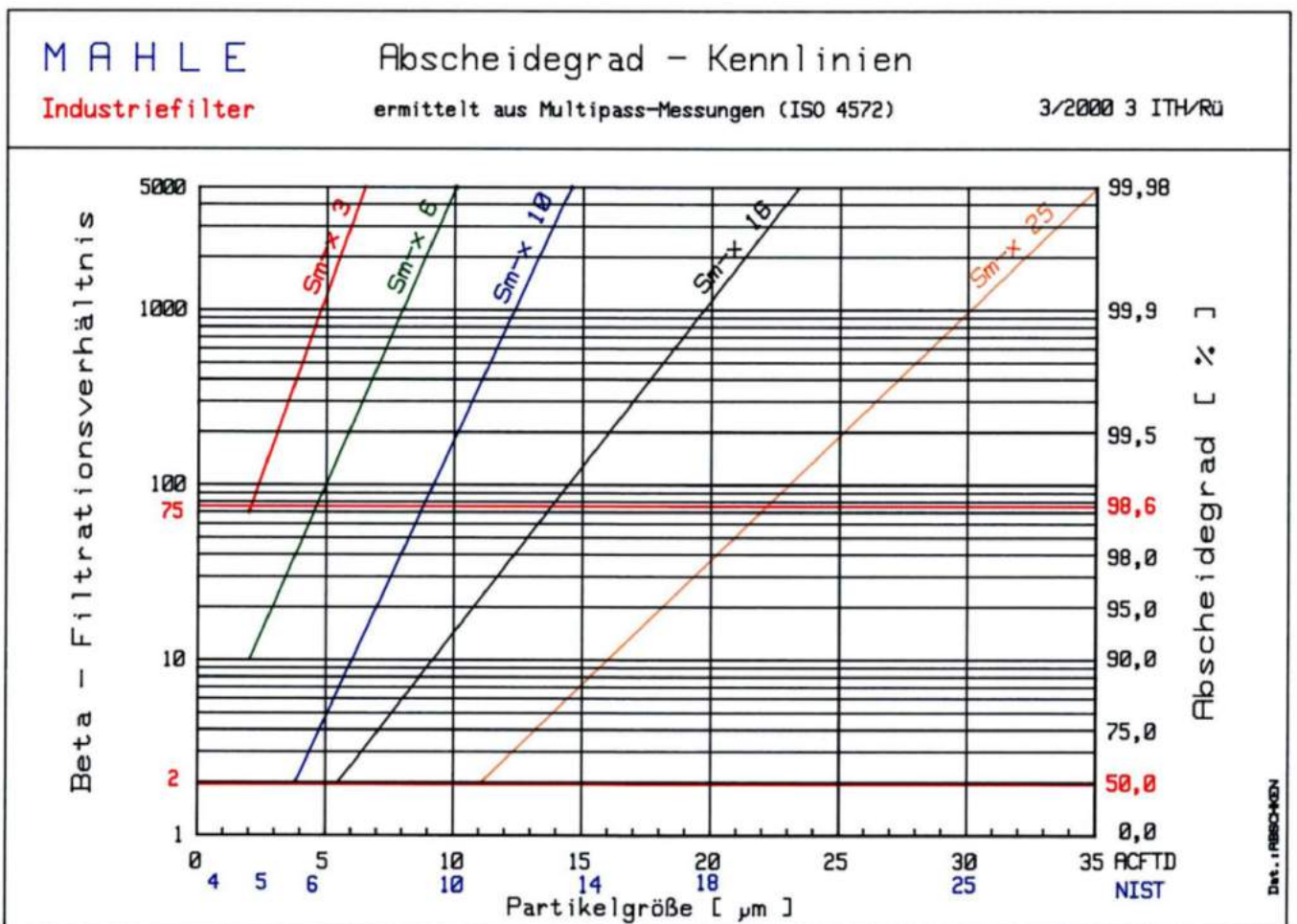
Type:	BKF 60-4-2.2	BKF 90-4-2.2
Motor power:	2.2 kW	2.8 kW
Number of poles:	4	4
Power input (400 V 50 Hz):	~ 4.6 A	~ 4.6 A
Suction lift:	2 m	2 m
Filter element pressure limit:	3.5 bar	3.5 bar
Display pressure contamination indicator:	2.2 bar	2.2 bar
Suction side connection:	G1 1/2	G1 1/2
Suction side hose:	DN 40	DN 40
Pressure side connection:	G1 1/4	G1 1/4
Pressure side hose:	DN 32	DN 32
Suction pressure:	-0.4 bar	-0.4 bar
For all aggregates briefly:	-0.6 bar	
Connection "Water IN":	G1	G1
Connection „Water OUT“:	G1	G1
Flow rate:	57 L/min	86 L/min
max. oil viscosity:	300 cSt	100 cSt
at max. operating pressure	8 bar	8 bar
Weight:	approx. 28 kg	approx. 28 kg

Cooling capacity curves



Selecting the filter fineness

Determining the contamination class per ISO 4406			System type	Recommend filter retention rate	Recommended element
>4 µm	>6 µm	>14 µm			
13	11	8	Highly reliable control systems susceptible to sludge accumulations; laboratory or aerospace	1-2	Sm-N2
14 16	12 13	9 10	High performance servo systems and high pressure systems with a long life; e.g. aviation, machine tool, etc.	3-5	Sm-x3 Sm-x6
17	15	11	High-quality, reliable systems: general machinery construction	10-12	Sm-x10
20	17	12	General machinery construction and vehicles; moderate pressure, moderate capacity	12-15	Sm-x16
23	19	13	General machinery construction and vehicles; low-pressure systems in heavy machinery construction	15-25	Sm-x25 / Mic 10



Ordering instructions

Off-line filters

Item no.	Type	Description
3902010	BKF 18	without contamination indicator NBR
3902110	BKF 18	mechanical contamination indicator NBR
3902210	BKF 18	electric contamination indicator NBR
3903020	BKF 30	without contamination indicator NBR
3903120	BKF 30	mechanical contamination indicator NBR
3903220	BKF 30	electric contamination indicator NBR
3906030	BKF 60	without contamination indicator NBR
3906130	BKF 60	mechanical contamination indicator NBR
3906230	BKF 60	electric contamination indicator NBR
3909030	BKF 90	without contamination indicator NBR
3909130	BKF 90	mechanical contamination indicator NBR
3909230	BKF 90	electric contamination indicator NBR

Filter elements

For type	Item no.	Description	Filter fineness	Purity class **
BKF 18 / BKF 30	3825003	N 0250 DN 3	3 µm	13/10
	3825006	N 0250 DN 6	6 µm	14/10
	3825010	N 0250 DN 10	10 µm	15/11
BKF 60 / BKF 90	3840003	N 0400 DN 3	3 µm	13/10
	3840006	N 0400 DN 6	6 µm	14/10
	3840010	N 0400 DN 10	10 µm	15/11

** Purity classes achievable per ISO 4406 for BKF 18/30 at V = 300 L and 24 h Circulation time (approx. numbers)

Oil/air coolers

BLK



- Easy to maintain design
- Compact installation dimensions
- Low noise emission
- Broad performance range
- Rugged cooling matrix
- Extensive accessories

Introduction and description

Why coolers?

There are basically two main concepts in the development of fluid power systems.

One is to design systems without using a cooler, and if operational conditions show that the system needs a cooler, install it later at additional costs. This understandably then often calls for compromises, making the system more expensive.

The other concept recognizes that a system originally designed with an integrated cooler needs less installation space and is a better choice with respect to construction and system costs.

Why Bühler?

If an oil/air cooler is planned for cooling it needs to have a simple and compact design, noise emission be low, and be easy and quick to maintain.

When we developed the BLK series, we incorporated our years of experience in designing and selling oil/air coolers. Especially the fatigue life of the cooling matrix was a focus during development, since in some cases the matrix has to withstand considerable pressure peaks in the return line.

The cooling matrix can easily be removed from the fan case for maintenance without uninstalling the fan or motor.

If our comprehensive standard range of products does not include the right solution for your application, we will gladly develop a custom solution for you.

Use the data in this leaflet to determine a suitable cooler for your application.

Construction and application

The BLK series consist of the following components:

- Cooling matrix
- Fan case with mounting rails
- Blower, consisting of AC motor, fan and protective/mounting grate
- The cooling matrix and fan can be removed from the fan case individually without having to uninstall other components

The BLK series cooling matrix are made from aluminum. The coolers are designed for use in hydraulic circuits - including return lines. They are not suitable for pure water.

We also offer cooling matrixes with bypass (see type code).

Depending on the application or system requirements, off line filtration is often required. In these cases we recommend combining them with an off line circuit. You will find suitable units in our BNK series. These units are also suitable for upgrading existing systems.

Planning information

Set-up

The cooler must be set up so as not to interfere with air supply and exhaust. The distance to air obstacles behind the cooler should be at least half the cooler height (Dimension B).

Ensure adequate ventilation. During set-up, avoid exiting hot air or noise emission causing problems.

If the ambient air is dirty, excess deposit on the cooling matrix must be expected. This will reduce the cooling capacity. In this case, particularly in the case of air loaded with oil mist, the air ducts must be cleaned regularly.

When set up outdoors, adequately protect the motor from the weather.

Ensure easy access for inspection and maintenance.

Mount

The coolers are secured to the mounting rails with four screws. Be sure the support structure is sized adequately. Install in any position.

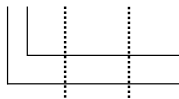
Connecting the oil circuit

The connection between the system and the cooling matrix should be connected stress and vibration free, which can be achieved by using conduit.

Follow the pertinent safety regulations to prevent environmental damage due to possible oil leaks (e.g. collection pans).

Model key

BLK 4.6- IBx - T50



Number of motor contacts
Frame size

BLK 4.6- IBx - T50

To also have a bypass and/or thermal contact, the specification will be added to the type designation:

Bypass version	AB (BLK 2-10)	external bypass
	IB (BLK 3-9)	internal bypass
	ITB (BLK 3-9)	internal temperature-dependent bypass 2 bar / 45 °C
	ATB (BLK 2-9)	external temperature-dependent bypass 2 bar / 45 °C
	x	bypass value 2 bar, 5 bar, 8 bar
Temperature switch	T50, T60 T70, T80	Temperature in °C, specification see separate data sheet

Technical data

Technical data	
Materials / Surface protection Cooling matrix: fan case, safety guard and motor brackets:	Aluminium, painted Plastic-coated steel
Colour:	RAL 7001
Fluids:	Mineral oils per DIN 51524 oil-/water emulsions HFA and HFB per CETOP RP 77 H Water glycol HFC per CETOP RF 77 H Phosphoric ester HFD-R per CETOP RP 77 H
Operating pressure static BLK 1.2: BLK 2.2 – BLK 10.8: dynamic BLK 1.2: BLK 2.2 – BLK 10.8:	max. 16 bar max. 21 bar 11 bar (at 5 M load cycle, 3 Hz) 15 bar (at 5 M load cycle, 3 Hz)
Operating oil temperature:	max. 80 °C (higher upon request)
Ambient temperature:	-15 to 40 °C

Electric motors (others available upon request)	
Voltage / frequency: BLK 1.2: BLK 2.2 – BLK 10.8:	230 V - 50 Hz 230 / 400 V - 50 Hz ± 5 % 276 / 480 V - 60 Hz ± 5 %
Thermal stability:	Class of insulation F, utilisation per Class B
Protection class: BLK 1.2: BLK 2.2 – BLK 10.8:	IP44 IP55
The motors comply with standards IEC 60034, IEC 60072, IEC 60085	

Basic data (at 50 Hz frequency)

Item no.	Cooler type	Motor power Number of poles Rated current at 400 V	Weight (kg)	Capacity (L)	Noise level db(A)*
3501200	BLK 1.2	0,05 kW / 2 / 0,24 A (230 V)	7	0.8	65
3502200	BLK 2.2	0,55 kW / 2 / 1,4 A	23	1.3	81
3502400	BLK 2.4	0,18 kW / 4 / 0,6 A	23	1.3	66
3503200IE2	BLK 3.2	1,1 kW / 2 / 2,6 A	31	1.8	87
3503400	BLK 3.4	0,25 kW / 4 / 0,9 A	28	1.8	71
3504400	BLK 4.4	0,37 kW / 4 / 1,1 A	34	2.3	73
3504600	BLK 4.6	0,18 kW / 6 / 0,6 A	34	2.3	63
3505400IE2	BLK 5.4	0,75 kW / 4 / 1,9 A	45	3.1	79
3505600	BLK 5.6	0,25 kW / 6 / 0,9 A	42	3.1	68
3506410IE2	BLK 6.4	2,2 kW / 4 / 4,9 A	77	4.1	86
3506610	BLK 6.6	0,55 kW / 6 / 1,9 A	60	4.1	74
3507410IE2	BLK 7.4	2,2 kW / 4 / 4,9 A	87	5.4	89
3507610	BLK 7.6	0,55 kW / 6 / 1,9 A	72	5.4	75
3508610IE2	BLK 8.6	1,5 kW / 6 / 3,8 A	95	6.3	79
3508810	BLK 8.8	0,55 kW / 8 / 1,9 A	91	6.3	73
3509610IE2	BLK 9.6	2,2 kW / 6 / 5,3 A	159	8.2	86
3509810	BLK 9.8	1,1 kW / 8 / 3,2 A	155	8.2	79
3510610IE2	BLK 10.6	5,5 kW / 6 / 12,1 A	256	19	90
3510810	BLK 10.8	2,2 kW / 8 / 6 A	241	19	84

The item numbers for BLK 2.2-5.6 are 50/60 Hz versions, for BLK 6.4-10.8 only the 50 Hz version, please contact us for the 60 Hz version.

*DIN EN ISO 3744, Class 3

Calculation example and nomenclature

Determination

An oil/air cooler is determined in two steps:

1. Determining or selecting the cooler size
2. Determining the actual pressure loss

t_{OE} [°C]	Inlet oil temperature
t_{LE} [°C]	Inlet air temperature
ETD [K]	Temperature differential: ETD = $t_{OE} - t_{LE}$
P_{spez} [kW / K]	specific cooling performance (see performance curves): $P_{spez} = P / ETD$
P [kW]	Cooling performance in kW
Q [l/min]	Oil flow rate
C_{oi} [kJ/kgK]	Specific heat capacity of the oil (approx. 2.0 kJ / kgK)
ζ [kg/dm ³]	Gravity of oil ≈ 0.9 kg/dm ³

Calculation example

Assumptions:

Tank capacity	(V)	approx. 200 L
Start up temperature of oil	(T ₁)	15 °C (≈ 288 K)
Oil heats up in approx. t = 25 min. (1500 s) to	(T ₂)	45 °C (≈ 318 K)
Required oil temperature	(t _{OE})	60 °C
Inlet air temperature	(t _{LE})	30 °C

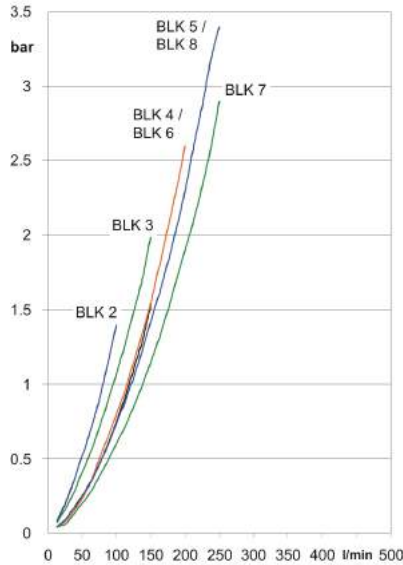
Calculation

1. Calculating P from the tank warming

$$P = \frac{V \cdot \rho \cdot c_{Oil} \cdot (T_2 - T_1)}{t} = \frac{200 \text{ l} \cdot 0.9 \frac{\text{kg}}{\text{l}} \cdot 2 \frac{\text{kJ}}{\text{kg} \cdot \text{K}} \cdot (318 \text{ K} - 288 \text{ K})}{1500 \text{ s}} = 7.2 \text{ kW}$$

2. $ETD = t_{OE} - t_{LE} = 60 \text{ }^\circ\text{C} - 30 \text{ }^\circ\text{C} = 30 \text{ K}$
3. Determining the cooler size: $P_{spez} = P / ETD = 7.2 \text{ kW} / 30 \text{ K} = 0.24 \text{ kW/K}$
4. In the graph, select a cooler at 80 l/min with $P_{spez} 0.24 \text{ kW/K}$. There are two options: BLK 2.2 or the larger but quieter BLK 3.4

Pressure loss curves determined with an average viscosity of 30 cSt



Attention: If the coolers are used in open air or the oil has even higher viscosity the installation of by-pass valves may be necessary. Please check the section "functions schemes".

Temperature/viscosity table

Type of oil	at 50 °C	at 60 °C	at 70 °C
VG 16	9.4	5.6	3.3 cSt
VG 22	15	11	8 cSt
VG 32	21	15	11 cSt
VG 46	29	20	14 cSt
VG 68	43	29	20 cSt
VG 120	68	44	31 cSt
VG 220	126	77	51 cSt
VG 320	180	108	69 cSt

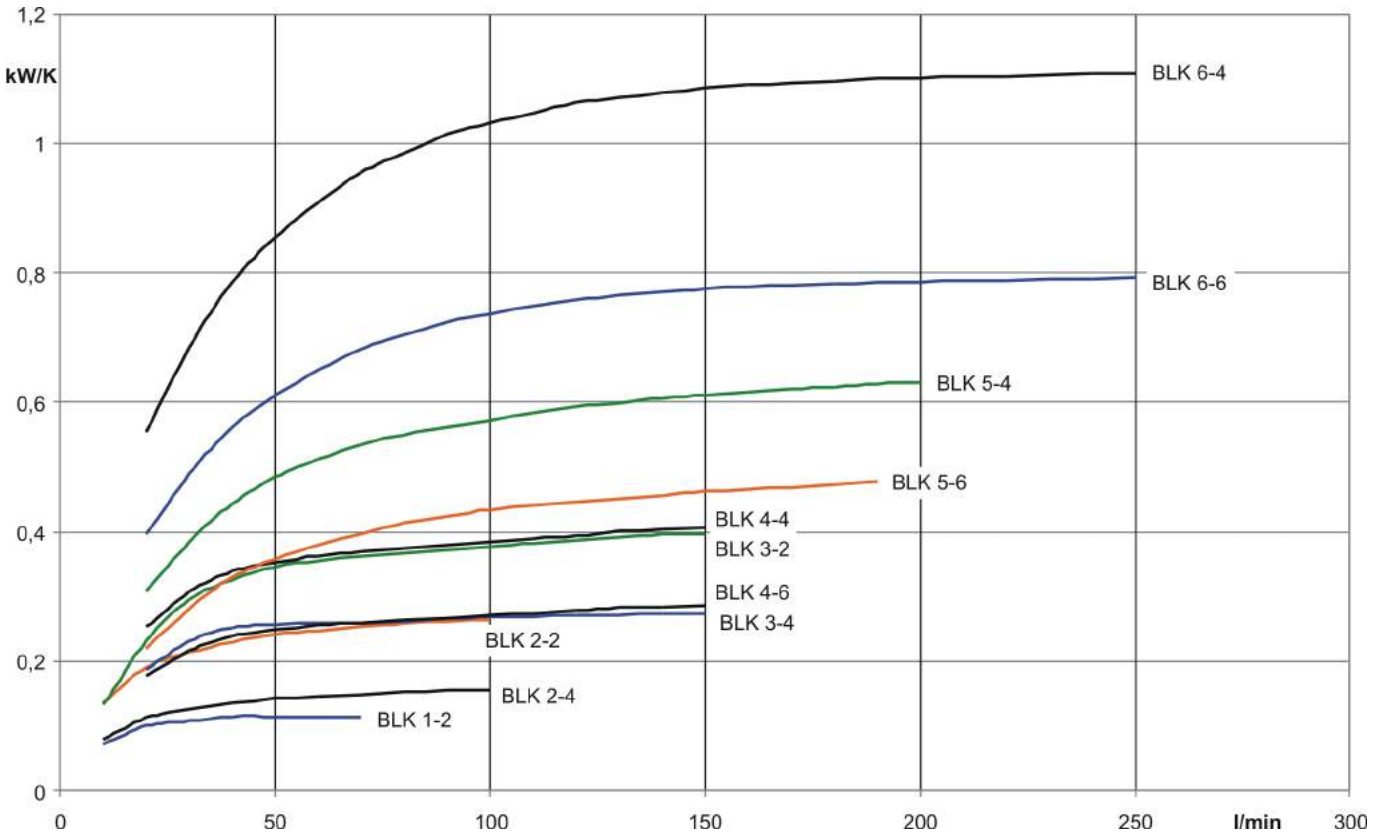
Correction k(visk)

Viscosity (cSt)	K(visk)	Viscosity (cSt)	K(visk)
10	0.6	60	1.6
20	0.8	80	2.1
30	1.0	100	2.7
40	1.2	150	4.2
50	1.4		

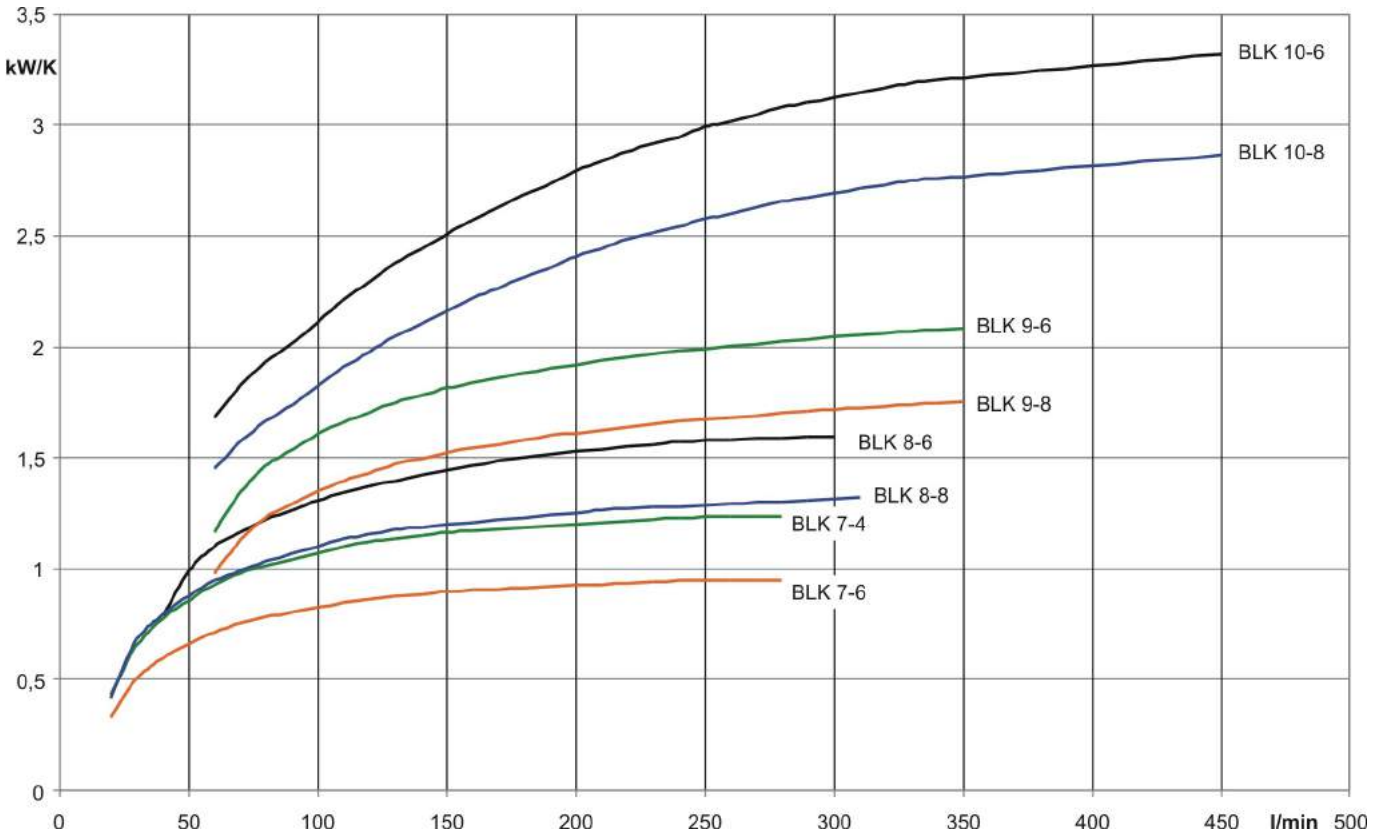
Determining the actual pressure loss

1. Determine Δp from the pressure loss graph for oil flow rate Q and the selected cooler size.
2. Determine the viscosity from the type of oil and temperature.
3. Determine the correction factor k(visk) and multiply by Δp from step 1.

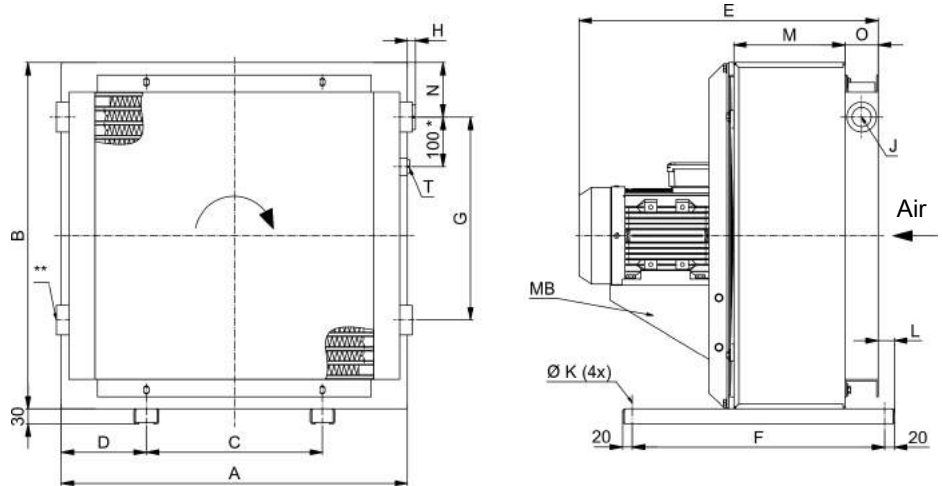
Performance curves frame size 1-6



Performance curves frame size 7-10



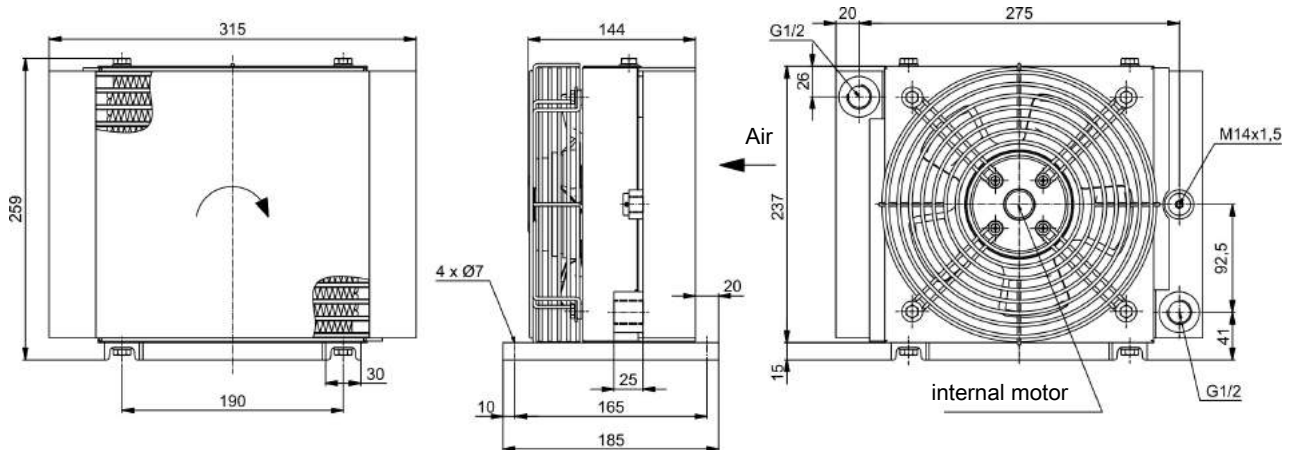
Dimensions



MB on some models the motors are mounted with a bracket
 * on BLK 9 and 10 = 150 mm
 ** Connection fitting on BLK 9 and 10 only

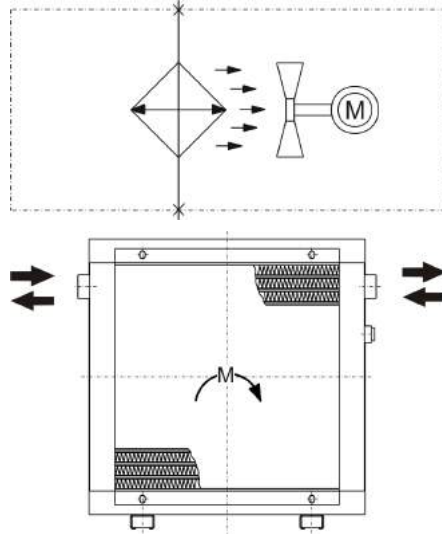
Model	A	B	C	D	E	F	G	H	J	K	L	M	N	O	MB
BLK 1.2	315	244	190	62,5	144	165	-	-	2x G1/2	7	20	50	33	45	-
BLK 2.2	370	370	203	83,5	415	510	-	25	2x G1	9	33	125	106	67	-
BLK 2.4	370	370	203	83,5	400	510	-	25	2x G1	9	33	125	106	67	-
BLK 3.2	440	440	203	118,5	470	510	230	25	3x G1	9	33	150	105	67	-
BLK 3.4	440	440	203	118,5	440	510	230	25	3x G1	9	33	150	105	67	-
BLK 4.4	500	500	203	148,5	465	510	230	25	3x G1	9	33	175	104	67	-
BLK 4.6	500	500	203	148,5	465	510	230	25	3x G1	9	33	175	104	67	-
BLK 5.4	580	580	356	112	523	510	305	23,5	3x G1	9	33	200	100	67	-
BLK 5.6	580	580	356	112	490	510	305	23,5	3x G1	9	33	200	100	67	-
BLK 6.4	700	700	356	172	605	510	410	9,5	3x G1 1/4	9	33	225	110	67	x
BLK 6.6	700	700	356	172	548	510	410	9,5	3x G1 1/4	9	33	225	110	67	x
BLK 7.4	700	840	356	172	630	510	590	9,5	3x G1 1/4	9	33	250	91	67	x
BLK 7.6	700	840	356	172	570	510	590	9,5	3x G1 1/4	9	33	250	91	67	x
BLK 8.6	870	870	508	181	644	510	585	11	3x G1 1/4	12	33	275	101,5	67	x
BLK 8.8	870	870	508	181	624	510	585	11	3x G1 1/4	12	33	275	101,5	67	x
BLK 9.6	1010	1020	518	246	713	890	822	3	4x G1 1/2	12	78	300	99	67	x
BLK 9.8	1010	1020	518	246	685	890	822	3	4x G1 1/2	12	73	300	99	67	x
BLK 10.6	1185	1185	600	292,5	830	910	940	5	4x SAE 2 1/2	12	73	325	130	94	x
BLK 10.8	1185	1185	600	292,5	830	910	940	5	4x SAE 2 1/2	12	73	325	130	94	x

BLK 1



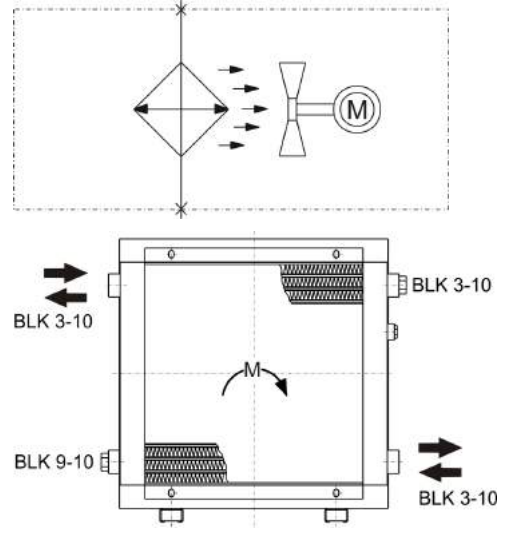
Functional diagram

Standard version BLK 2



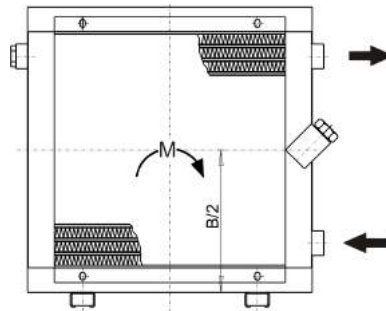
Direction of flow left to right or vice versa.

Standard version BLK 1, 3 to BLK 10



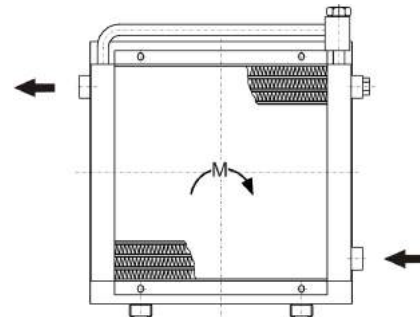
Direction of flow top left to bottom right or the exact opposite. The oil outlet is always on the opposite side. The second connection must be closed.

Internal bypass IB/ ITB (BLK 3-9)



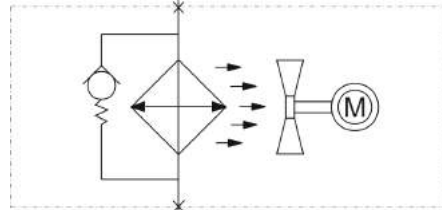
The oil inlet and outlet are always on the same side. Connections on the opposite side must be closed.

External bypass AB (BLK 2-10) / ATB (BLK 2-9)

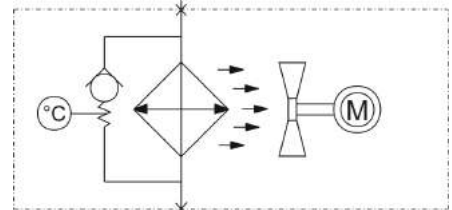


Oil inlet always at the bottom. Other connections must be closed. Oil outlet always on the opposite side.

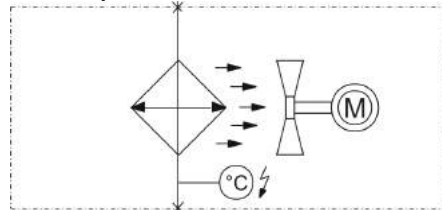
With bypass valve



With temperature-dependent bypass valve



With temperature switch attached



Off-Line Filter BNF



- Compact, space-saving design
- DIN filter elements
- Very easy to install

- Easy replacement of filter element
- Low-noise gerotor pump

Introduction and description

Why off-line aggregates?

Depending on the system configuration there are operating conditions (variable capacity pumps, back-flow peaks, etc.), which significantly limit the effectiveness of full flow filtration or even render it completely ineffective.

In addition, quite practical considerations such as installing a cooler with is required anyway or the option of system-independent operation may argue for an off-line aggregate.

Why Bühler?

When we developed the BNF series, we incorporated our years of experience in designing and selling water coolers and filters. Special attention was paid to a compact design. By using standard filter elements in this respect we are not bound to a specific filter supplier.

Together with a well-known manufacturer, Bühler implemented these findings in a comprehensive product line customised for the requirements in fluid control.

Use the data in this leaflet to determine a suitable cooler for your application. If our standard range of products does not includes the right system for your application, we will gladly develop a custom solution for you.

BNF 18/30

In a filter station it's important to offer a compact design with ample capacity to quickly and permanently clean any given amount of oil.

This aspect has been implemented in to a special degree in the BNF series. A low-noise ge-rotor pump resistant to dirt is integrated into the very compact baseplate. The drive motor and filter housing are arranged vertically and parallel . The suction and pressure line are positioned so they can be routed straight down into the reservoir. This minimises the installation work.

Since the baseplate is further equipped with front connections, the aggregate can be cased next to the reservoir, if so desired.

The aggregate has a built-in pressure limiting valve. DIN elements with NG 250 are used as filter elements.

BNF 60/90

A compact, space-saving design was also realised in this series. Motor, pump and filter housing are combined into one unit and mounted to a frame for side mounting.

The DIN filter element with NG 400 removes to the top for changing.

Planning information

Installation site requirements

Ensure adequate ventilation.

The aggregates are mounted in the installation site using four screws

Electrical connection

The electrical connection must be made by an appropriately trained electrician! Observe the voltage and mains frequency! Fusing must comply with applicable standards! Please note the direction of rotation of the motor when connecting.

Hydraulic connection

Full utilisation of the high capacity of the aggregates requires care when configuring the intake line. This is a very important factor with use in lubricating systems. These are typically filled with higher viscosity oils and must operate reliably in a large temperature range. Although the tremendous increase in viscosity in low temperatures are frequently overlooked. For applications where the parameters are within critical ranges, we recommend calculating the precise expected pressure loss in the suction pipe or using an adequate size (never smaller than the existing pump suction port!).

The suction and pressure pipe must be installed free from tension and vibration. When using hoses, pay particular attention to the appropriate reinforcement on the suction side so the hose cannot collapse due to the negative pressure.

Do not continuously exceed the recommended suction pressure of the pumps. Some situations may require priming the suction pipe prior to first start-up.

Avoid possible leaks in the circuit to prevent environmental damages. If necessary, use e.g. an oil pan.

Technical data

Technical data	
Pump housing:	Anodised and impregnated cast aluminium
Gerotor:	Sintered steel
Hydraulic screw joint:	Galvanised steel
Operating fluids:	Mineral oils per DIN 51524
Operating oil temperature:	max. 80 °C (higher temperatures on request)
Seal:	Perbunan (NBR) or Viton (FPM) on request
Ambient temperature:	-20 °C to +40 °C

Electric motors	
Voltage / frequency:	230 / 400 V - 50 Hz ± 5 % 276 / 480 V - 60 Hz ± 5 %
Thermal stability:	Class of insulation F, utilisation per Class B
Design:	three-phase asynchronous squirrel-cage induction motor totally enclosed, fan cooled
Protection class:	IP55
on request:	other voltages higher motor power for higher viscosities UL- or CSA-approved motors higher protection class
The motors comply with standards IEC 60034, IEC 60072, IEC 60085	

Please also observe the operating manual for the motor! All motors are supplied with cable gland inside the terminal box. The total height of the aggregate may vary by motor make.

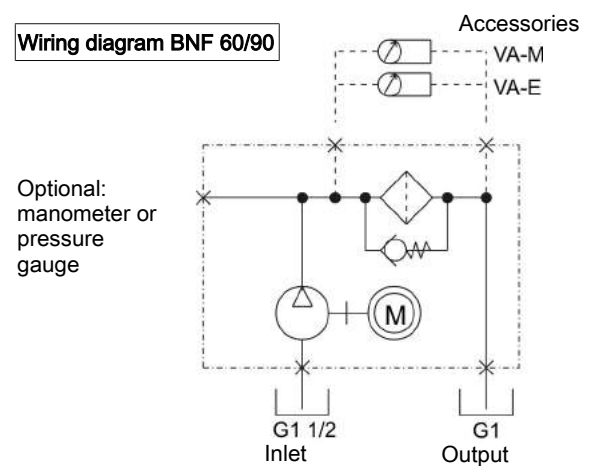
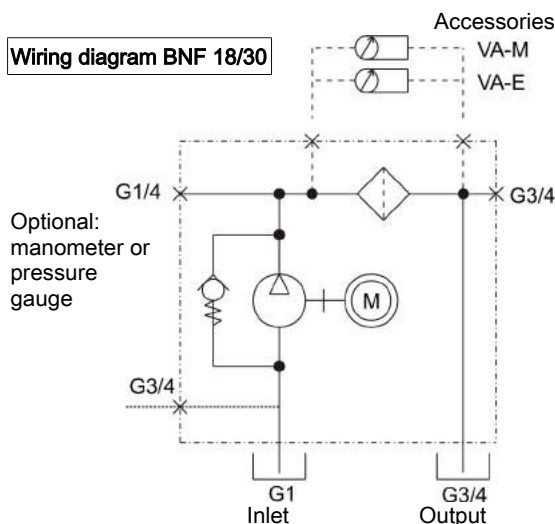
Installation information:

The connection threads are manufactured to ISO 228. The screw-in surfaces are finished and suitable for the use of soft seals. We recommend using screwed plugs per ISO 1179-2.

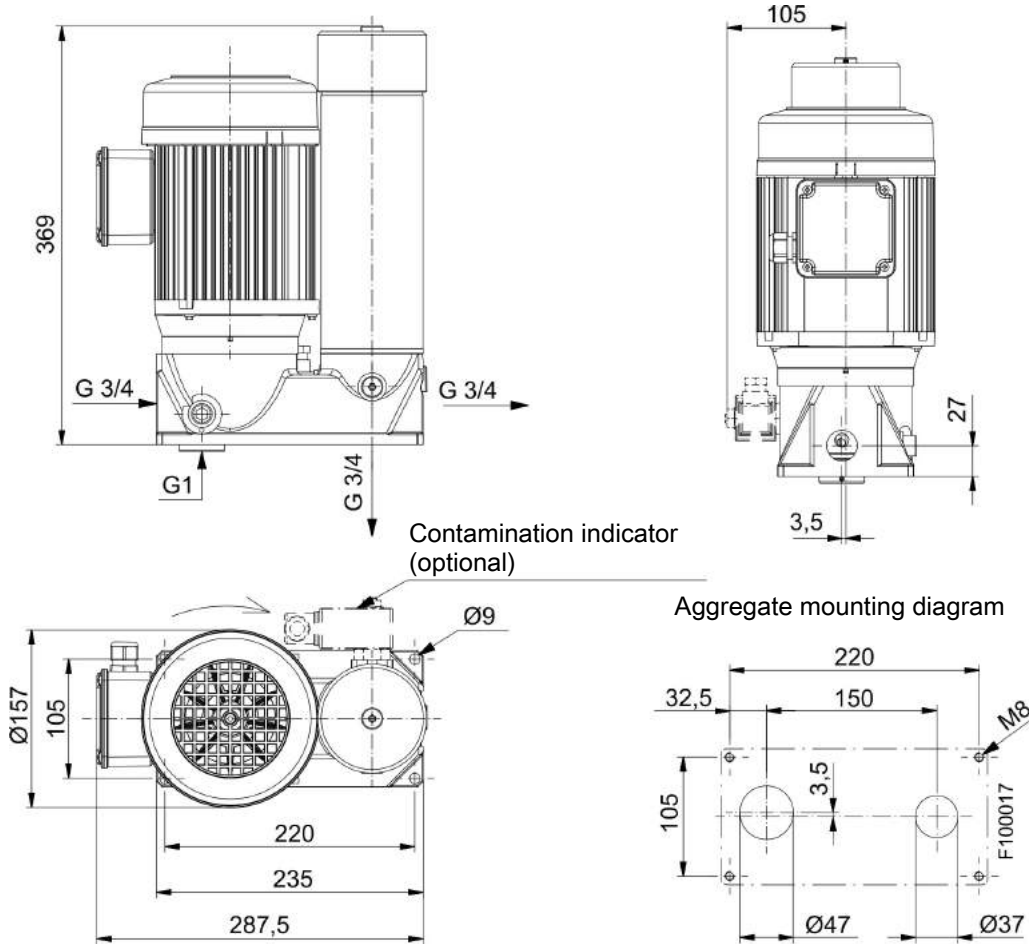
Please note:

Especially note the dimension of the suction pipe. The cross-sections should not be smaller than specified. In most cases, loud noise indicates the cross-section was reduced too much. Please refer to the notices in the operating instructions.

Wiring diagrams



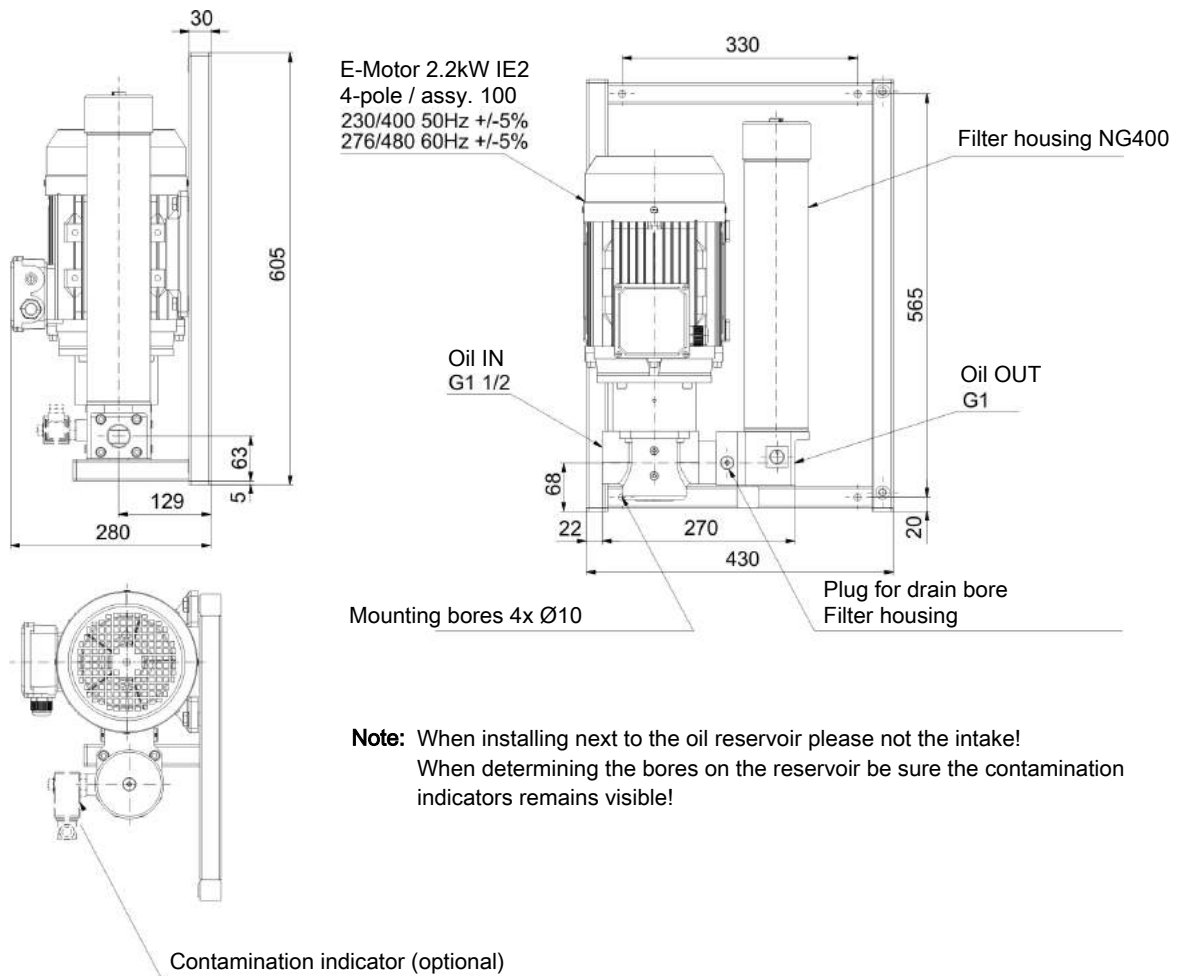
BNF 18 / BNF 30



Note: When installing next to the oil reservoir please not the intake!
 When determining the bores on the reservoir be sure the contamination indicators remains visible!

Type:	BNF 18-6-0.55	BNF 30-4-0.75
Motor power:	0.55 kW	0.75 kW
Number of poles:	6	4
Power input (400 V 50 Hz):	~ 1.7 A	~ 2 A
Suction lift:	2 m	2 m
Filter element pressure limit:	6 bar	6 bar
Display pressure contamination indicator:	2.2 bar	2.2 bar
Suction side connection:	G3/4 / G1	G3/4 / G1
Suction side hose:	DN 20 / DN 25	DN 20 / DN 25
Pressure side connection:	G3/4	G3/4
Pressure side hose:	DN 20	DN 20
Suction pressure:	-0.4 bar	-0.4 bar
For all aggregates briefly:	-0.6 bar	
Flow rate:	18 L/min	28 L/min
Feed pressure max.:	6 bar	6 bar
Weight:	approx. 18 kg	approx. 18 kg

BNF 60 / BNF 90

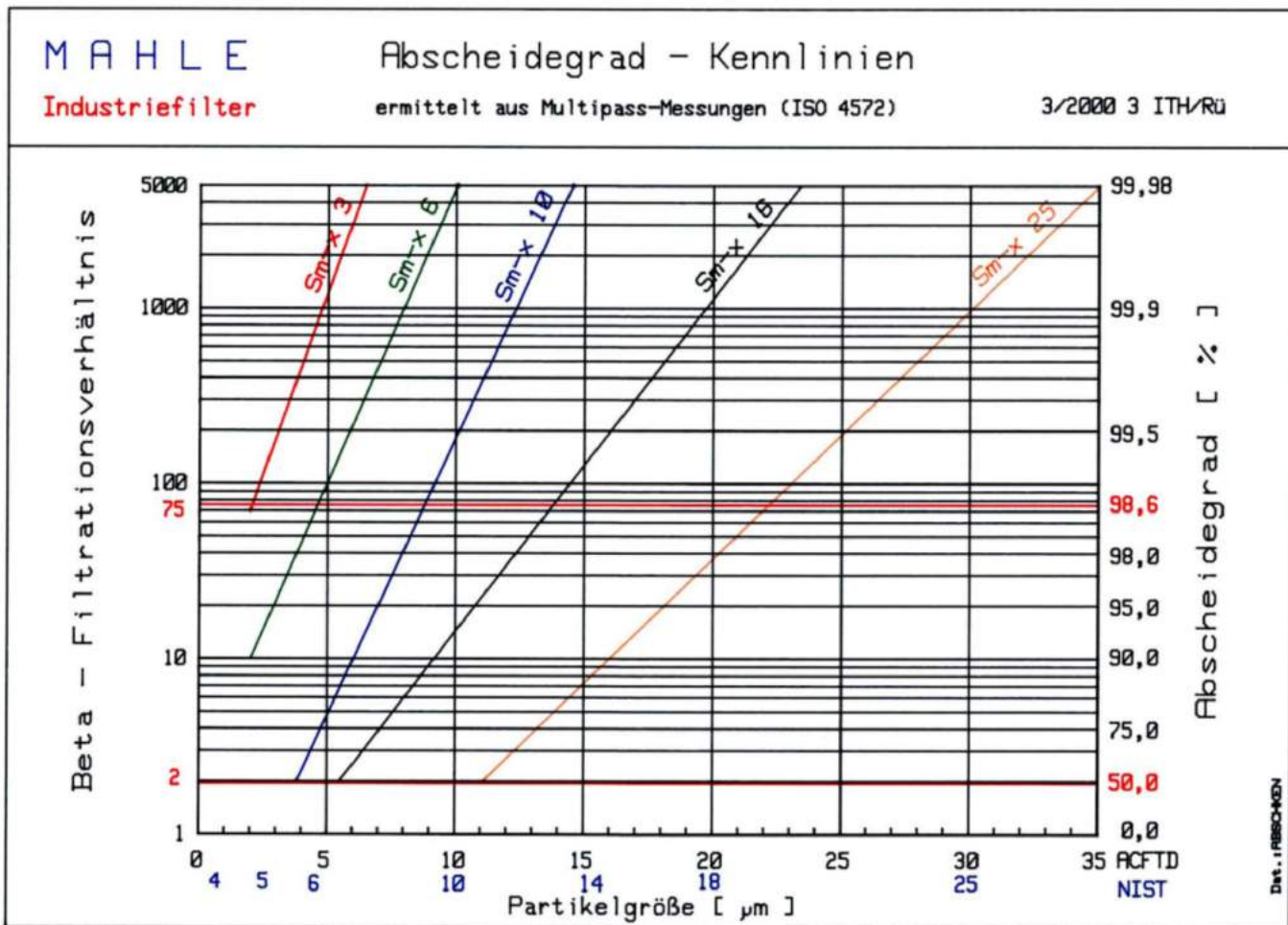


Note: When installing next to the oil reservoir please not the intake!
 When determining the bores on the reservoir be sure the contamination indicators remains visible!

Type:	BNF 60-4-2.2	BNF 90-4-2.2
Motor power:	2.2 kW	2.8 kW
Number of poles:	4	4
Power input (400 V 50 Hz):	~ 4.6 A	~ 4.6 A
Suction lift:	2 m	2 m
Filter element pressure limit:	3.5 bar	3.5 bar
Display pressure contamination indicator:	2.2 bar	2.2 bar
Suction side connection:	G1 1/2	G1 1/2
Suction side hose:	DN 40	DN 40
Pressure side connection:	G1 1/4	G1 1/4
Pressure side hose:	DN 32	DN 32
Suction pressure:	-0.4 bar	-0.4 bar
For all aggregates briefly:	-0.6 bar	
Flow rate:	57 L/min	86 L/min
max. oil viscosity:	300 cSt	100 cSt
at max. operating pressure	8 bar	8 bar
Weight:	approx. 24 kg	approx. 24 kg

Selecting the filter fineness

Determining the contamination class per ISO 4406			System type	Recommend filter retention rate	Recommended element
>4 µm	>6 µm	>14 µm			
13	11	8	Highly reliable control systems susceptible to sludge accumulations; laboratory or aerospace	1-2	Sm-N2
14	12	9	High performance servo systems and high pressure systems with a long life; e.g. aviation, machine tool, etc.	3-5	Sm-x3 Sm-x6
16	13	10			
17	15	11	High-quality, reliable systems: general machinery construction	10-12	Sm-x10
20	17	12	General machinery construction and vehicles; moderate pressure, moderate capacity	12-15	Sm-x16
23	19	13	General machinery construction and vehicles; low-pressure systems in heavy machinery construction	15-25	Sm-x25 / Mic 10



Ordering instructions

Off-line filters

Item no.	Type	Description
3802010	BNF 18	without contamination indicator NBR
3802110	BNF 18	mechanical contamination indicator (optional)
3802210	BNF 18	electric contamination indicator NBR
3803020	BNF 30	without contamination indicator NBR
3803120	BNF 30	mechanical contamination indicator (optional)
3803220	BNF 30	electric contamination indicator NBR
3806030	BNF 60	without contamination indicator NBR
3806130	BNF 60	mechanical contamination indicator (optional)
3806230	BNF 60	electric contamination indicator NBR
3809030	BNF 90	without contamination indicator NBR
3809130	BNF 90	mechanical contamination indicator (optional)
3809230	BNF 90	electric contamination indicator NBR

Filter elements

For type	Item no.	Description
BNF 18 / BNF 30	3825003	N 0250 DN 3
	3825006	N 0250 DN 6
	3825010	N 0250 DN 10
BNF 60 / BNF 90	3840003	N 0400 DN 3
	3840006	N 0400 DN 6
	3840010	N 0400 DN 10

Oil/air coolers BNK



- Easy to maintain design
- Compact installation dimensions
- System-compatible cooling matrix / flow rate ratio
- Low noise emission
- Rugged cooling matrix
- Extensive accessories
- High suction pump

Introduction and description

Why coolers?

In many cases, installing an off-line cooler is not only an emergency solution, but also the best solution with respect to mechanics and economics. Oftentimes off-line filtration can also be incorporated quite effectively.

Since a bypass also always requires installation of a separate circulation pump, it's reasonable to combine it with the motor already installed for the fan.

The BNK series is a tiered line of oil/air coolers with circulation pump directly flange-mounted. The cooler size and pump flow rate are coordinated for performance grades compatible with the system. The gerotor pump ensures low noise emission for the entire aggregate.

Why Bühler?

When we developed the BNK series, we incorporated our years of experience in designing and selling oil/air coolers. Especially the fatigue life of the cooling matrix was a focus during development.

The cooling matrix can easily be removed from the fan case for maintenance without uninstalling the fan or motor.

If our comprehensive standard range of products does not include the right solution for your application, we will gladly develop a custom solution for you.

Use the data in this leaflet to determine a suitable cooler for your application.

Construction and application

The BNK consists of the following components:

- Cooling matrix
- Fan case with mounting rails
- Blower and pump unit consisting of AC motor, pump, fan, protective/mounting grate and motor bracket

The cooling matrix and fan/pump unit can be removed from the fan case individually without having to uninstall other components

The BNK series cooling matrix are made from aluminum. The coolers are designed for use in hydraulic circuits.

We also offer cooling matrix bypass versions (see type code).

Planning information

Set-up

The cooler must be set up so as not to interfere with air supply and exhaust. The distance to air obstacles behind the cooler should be at least half the cooler height (Dimension B).

Ensure adequate ventilation. During set-up, avoid exiting hot air or noise emission causing problems.

If the ambient air is dirty, excess deposit on the cooling matrix must be expected. This will reduce the cooling capacity. In this case, particularly in the case of air loaded with oil mist, the air ducts must be cleaned regularly.

When set up outdoors, adequately protect the motor from the weather.

Ensure easy access for inspection and maintenance.

Mount

The coolers are secured to the mounting rails with four screws. Be sure the support structure is sized adequately. Install in any position.

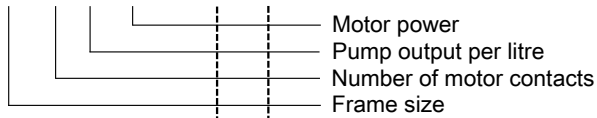
Connecting the oil circuit

The connection between the system and the cooling matrix should be connected stress and vibration free, which can be achieved by using conduit.

Follow the pertinent safety regulations to prevent environmental damage due to possible oil leaks (e.g. collection pans).

Model key

BNK 4.4-30-0.75kW- IBx - T50



BNK 4.4-30-0.75kW- IBx - T50

To also have a bypass and/or thermal contact, the specification will be added to the type designation:

Bypass version	AB (BNK 2-8)	external bypass
	IB (BNK 3-8)	internal bypass
	ITB (BNK 3-8)	internal temperature-dependent bypass 2 bar / 45 °C
	ATB (BNK 2-8)	external temperature-dependent bypass 2 bar / 45 °C
	x	bypass value 2 bar, 5 bar, 8 bar
Temperature switch	T50, T60 T70, T80	Temperature in °C, specification see separate data sheet

Technical data

Technical data	
Materials / surface protection	
Cooling battery:	Aluminium, painted
Ventilation box, safety guard and motor brackets:	Plastic-coated steel
Pump:	hard anodised aluminium, sintered steel
Colour:	RAL 7001
Operating fluids:	Mineral oils per DIN 51524 Gear oil per DIN 51517-3
Operating pressure, static:	15/28/42 L/min – max. 6 bar 58/86 L/min – max. 8 bar
Suction pressure:	max. -0.4 bar
Operating oil temperature:	max. 80 °C (higher upon request)
max. viscosity:	100 cSt medium viscosity (higher upon request)
Ambient temperature:	-15 to 40 °C

Electric motors (others available upon request)	
Voltage / frequency:	230 / 400 V - 50 Hz ± 5 % 276 / 480 V - 60 Hz ± 5 %
Thermal stability:	Class of insulation F, utilisation per class B
Protection class:	IP55
The motors comply with standards IEC 60034, IEC 60072, IEC 60085	

Basic data (at 50 Hz frequency)

Item no.	Cooler model	spec. cooling power kW/K	Cooling power at ETD = 40 K (kW)	max. circulation rate (l/min)	Motor power Number of poles Rated current at 400 V	Weight (kg)	Capacity (l)	Noise db(A)*
3601406IE2	BNK 1.4-7.5-0.75kW	0.04	1.6	7.5	0.75 kW / 4 / 1.94 A	25	0.7	64
3601401IE2	BNK 1.4-15-0.75kW	0.07	2.8	15	0.75 kW / 4 / 1.94 A	25	0.7	64
3602401IE2	BNK 2.4-15-0.75kW	0.09	3.6	15	0.75 kW / 4 / 1.94 A	30	1.3	66
3602402IE2	BNK 2.4-30-0.75kW	0.13	5.0	28	0.75 kW / 4 / 1.94A	33	1.3	66
3602407IE2	BNK 2.4-40-1.1kW	0.16	6.4	42	1.1 kW / 4 / 2.74 A	35	1.3	66
3603401IE2	BNK 3.4-15-0.75kW	0.15	6.0	15	0.75 kW / 4 / 1.94 A	35	1.8	71
3603402IE2	BNK 3.4-30-0.75kW	0.24	9.6	28	0.75 kW / 4 / 1.94 A	38	1.8	71
3603407IE2	BNK 3.4-40-1.1kW	0.28	11.2	42	1.1 kW / 4 / 2.74 A	40	1.8	71
3604402IE2	BNK 4.4-30-0.75kW	0.32	12.8	28	0.75 kW / 4 / 1.94 A	43	2.3	73
3604407IE2	BNK 4.4-40-1.1kW	0.34	13.6	42	1.1 kW / 4 / 2.74 A	45	2.3	73
3604403IE2	BNK 4.4-60-1.5kW	0.36	14.4	57	1.5 kW / 4 / 3.4 A	51	2.3	73
3604404IE2	BNK 4.4-90-2.2kW	0.38	15.2	86	2.2 kW / 4 / 4.59 A	61	2.3	73
3604605IE2	BNK 4.6-40-1.1kW	0.24	9.6	38	1.1 kW / 6 / 2.54 A	51	2.3	63
3604603IE2	BNK 4.6-60-1.1kW	0.26	10.4	57	1.1 kW / 6 / 2.54 A	61	2.3	63
3605403IE2	BNK 5.4-60-2.2kW	0.51	20.4	57	2.2 kW / 4 / 4.59 A	71	3.1	79
3605404IE2	BNK 5.4-90-2.2kW	0.56	22.4	86	2.2 kW / 4 / 4.59 A	73	3.1	79
3605605IE2	BNK 5.6-40-1.5kW	0.33	13.2	36	1.5 kW / 6 / 3.31 A	70	3.1	68
3605603IE2	BNK 5.6-60-1.5kW	0.38	15.2	55	1.5 kW / 6 / 3.31 A	72	3.1	68
3606413IE2	BNK 6.4-60-3.0kW	0.90	36.0	57	3.0 kW / 4 / 6.33 A	87	4.1	86
3606414IE2	BNK 6.4-90-3.0kW	1.01	40.4	86	3.0 kW / 4 / 6.33 A	88	4.1	86
3606613IE2	BNK 6.6-60-2.2kW	0.65	26.0	58	2.2 kW / 6 / 4.85 A	86	4.1	74
3607413IE2	BNK 7.4-60-3.0kW	0.93	37.2	58	3.0 kW / 4 / 6.33 A	99	5.4	89
3607414IE2	BNK 7.4-90-3.0kW	1.05	42.0	86	3.0 kW / 4 / 6.33 A	100	5.4	89
3607613IE2	BNK 7.6-60-2.2kW	0.71	28.4	58	2.2 kW / 6 / 4.85 A	98	5.4	75
3608613IE2	BNK 8.6-60-3.0kW	1.13	45.2	58	3.0 kW / 6 / 6.6 A	118	6.3	79

*DIN EN ISO 3744, Class 3

Calculation example and nomenclature

t_{OE} [°C]	Inlet oil temperature
t_{LE} [°C]	Inlet air temperature
ETD [K]	Temperature differential: ETD = $t_{OE} - t_{LE}$
P_{spez} [kW / K]	specific cooling performance (see performance curves): $P_{spez} = P / ETD$
P [kW]	Cooling performance in kW
Q [l/min]	Oil flow rate
c_{oil} [kJ/kgK]	Specific heat capacity of the oil (approx. 2.0 kJ / kgK)
ζ [kg/dm ³]	Gravity of oil ≈ 0.9 kg/dm ³

Calculation example

Assumptions:

Tank capacity	(V) approx. 200 L
Start up temperature of oil	(T₁) 15 °C (≈ 288 K)
Oil heats up in approx. t = 25 min. (1500 s) to	(T₂) 45 °C (≈ 318 K)
Required oil temperature	(t_{OE}) 60 °C
Inlet air temperature	(t_{LE}) 30 °C

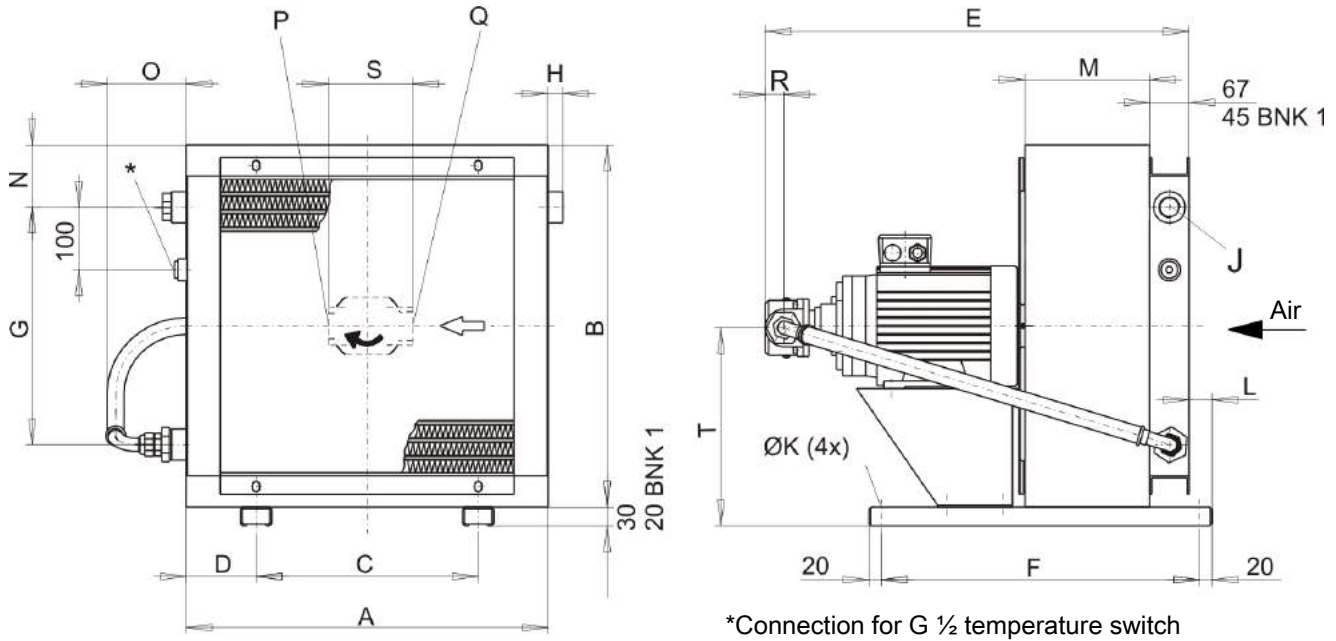
Calculation:

- Calculating P from the tank warming

$$P = \frac{V \cdot \zeta \cdot c_{oil} (T_2 - T_1)}{t} = \frac{200 \text{ l} \cdot 0.9 \frac{\text{kg}}{\text{l}} \cdot 2 \frac{\text{kJ}}{\text{kg} \cdot \text{K}} \cdot (318 \text{ K} - 288 \text{ K})}{1500 \text{ s}} = 7.2 \text{ kW}$$

- ETD = $t_{OE} - t_{LE} = 60 \text{ °C} - 30 \text{ °C} = 30 \text{ K}$
- Determining the cooler size: $P_{spez} = P / ETD = 7.2 \text{ kW} / 30 \text{ K} = 0.24 \text{ kW/K}$
- Select a cooler from the basic data with $P_{spez} 0.24 \text{ kW/K}$. There is one option: BNK 3.4 with 30 L pump

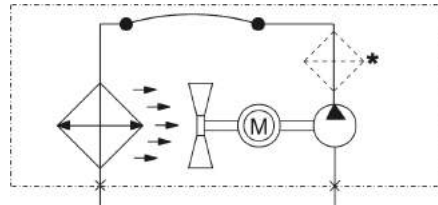
Dimensions



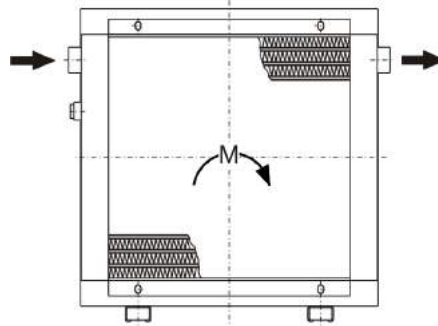
Model	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
BNK 1.4-7.5-0.75kW	315	243	190	62.5	417	340	-	-	2x G ½	9	40	52	-	-	G1	G ¾	30	144	130
BNK 1.4-15-0.75kW	315	243	190	62.5	417	340	-	-	2x G ½	9	40	52	-	-	G1	G1 ¼	30	130	130
BNK 2.4-15-0.75kW	370	370	203	83.5	476	510	-	25	2x G1	9	33	125	106	119	G1	G1 ¼	30	130	212
BNK 2.4-30-0.75kW	370	370	203	83.5	474	510	-	25	2x G1	9	33	125	106	119	G1	G1 ¼	30	130	212
BNK 2.4-40-1.1kW	370	370	203	83.5	524	510	-	25	2x G1	9	33	125	106	119	G1	G1 ¼	30	130	212
BNK 3.4-15-0.75kW	440	440	203	118.5	501	510	230	25	3x G1	9	33	150	105	119	G1	G1 ¼	30	130	247
BNK 3.4-30-0.75kW	440	440	203	118.5	499	510	230	25	3x G1	9	33	150	105	119	G1	G1 ¼	30	130	247
BNK 3.4-40-1.1kW	440	440	203	118.5	548	510	230	25	3x G1	9	33	150	105	119	G1	G1 ¼	30	130	247
BNK 4.4-30-0.75kW	500	500	203	148.5	524	510	230	25	3x G1	9	33	175	104	119	G1	G1 ¼	30	130	277
BNK 4.4-40-1.1kW	500	500	203	148.5	574	510	230	25	3x G1	9	33	175	104	119	G1	G1 ¼	30	130	277
BNK 4.4-60-1.5kW	500	500	203	148.5	617	510	230	25	3x G1	9	33	175	104	135	G1 ¼	G1 ½	30	135	277
BNK 4.4-90-2.2kW	500	500	203	148.5	688	510	230	25	3x G1	9	33	175	104	135	G1 ¼	G1 ½	53	135	277
BNK 4.6-40-1.1kW	500	500	203	148.5	617	510	230	25	3x G1	9	33	175	104	135	G1 ¼	G1 ½	30	135	277
BNK 4.6-60-1.1kW	500	500	203	148.5	652	510	230	25	3x G1	9	33	175	104	135	G1 ¼	G1 ½	53	135	277
BNK 5.4-60-2.2kW	580	580	356	112	678	510	305	23.5	3x G1	9	33	200	100	134	G1 ¼	G1 ½	30	135	317
BNK 5.4-90-2.2kW	580	580	356	112	713	510	305	23.5	3x G1	9	33	200	100	134	G1 ¼	G1 ½	53	135	319
BNK 5.6-40-1.5kW	580	580	356	112	678	510	305	23.5	3x G1	9	33	200	100	134	G1 ¼	G1 ½	30	135	317
BNK 5.6-60-1.5kW	580	580	356	112	713	510	305	23.5	3x G1	9	33	200	100	134	G1 ¼	G1 ½	53	135	314
BNK 6.4-60-3.0kW	700	700	356	172	719	510	410	9.5	3x G1 ¼	9	33	225	110	132	G1 ¼	G1 ½	30	135	377
BNK 6.4-90-3.0kW	700	700	356	172	754	510	410	9.5	3x G1 ¼	9	33	225	110	132	G1 ¼	G1 ½	53	135	377
BNK 6.6-60-2.2kW	700	700	356	172	729	510	410	9.5	3x G1 ¼	9	33	225	110	132	G1 ¼	G1 ½	53	135	377
BNK 7.4-60-3.0kW	700	840	356	172	744	510	590	9.5	3x G1 ¼	9	33	250	91	132	G1 ¼	G1 ½	30	135	447
BNK 7.4-90-3.0kW	700	840	356	172	779	510	590	9.5	3x G1 ¼	9	33	250	91	132	G1 ¼	G1 ½	53	135	447
BNK 7.6-60-2.2kW	700	840	356	172	754	510	590	9.5	3x G1 ¼	9	33	250	91	132	G1 ¼	G1 ½	53	135	447
BNK 8.6-60-3.0kW	870	870	508	181	795	510	585	11	3x G1 ¼	9	33	275	101.5	134	G1 ¼	G1 ½	53	135	462

Functional diagram

Standard version BNK 2

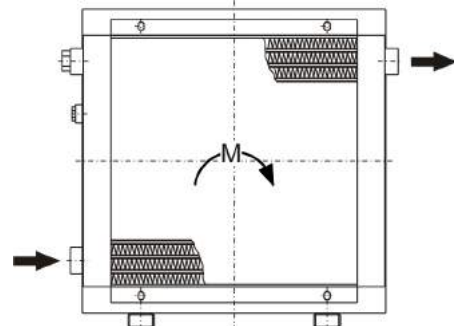
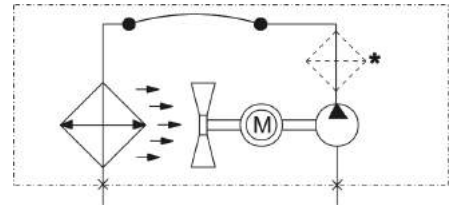


* recommended position of additional oil filter



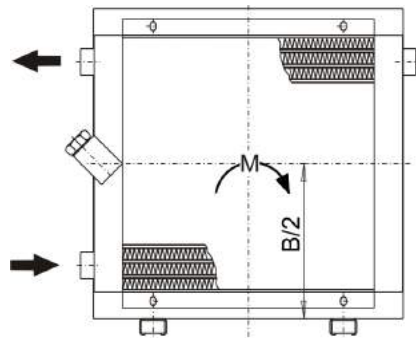
The oil inlet is on the left of the cooling battery. The oil outlet is always on the opposite side.

Standard version BNK 1, 3 to BNK 8



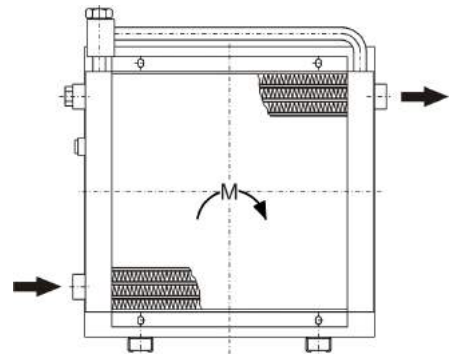
The oil inlet is on the bottom left of the cooling battery. The second connection at the top must be closed. The oil outlet is always on the opposite side.

Internal bypass IB/ ITB (BNK 3-8)



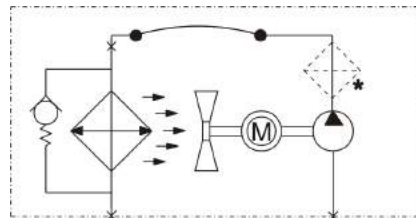
The oil inlet and outlet is always on the same side of the cooling battery. The connection on the opposite side must be closed.

External bypass AB/ATB (BNK 2-8)

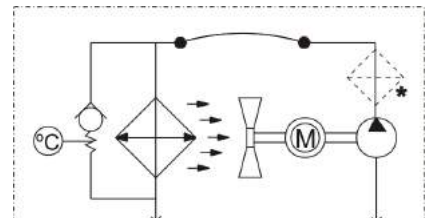


The oil inlet is always at the bottom left of the cooling battery. The second connection must be closed. The oil outlet is always on the opposite side.

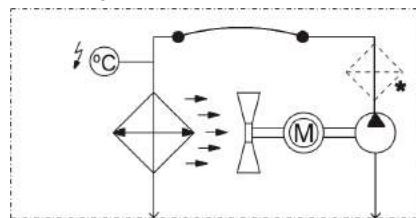
With bypass valve



With temperature-dependent bypass valve



With temperature switch attached



Heat exchangers BWT



- High exchange efficiency
- Equally distributed turbulent flow
- Little installation space required
- High pressure resistance
- Low water consumption
- Maintenance free
- Broad temperature range
- Easy installation

Introduction and description

Why coolers?

There are basically two main concepts in the development of fluid power systems.

One is to design systems without using a cooler, and if operational conditions show that the system needs a cooler, install it later at additional costs. This understandably then often calls for compromises, making the system more expensive.

The other concept recognizes that a system originally designed with an integrated cooler needs less installation space and is a better choice with respect to construction and system costs.

Why Bühler?

Using an oil/water cooler nowadays requires paying great attention to low water consumption. The tube bundle heat exchangers Bühler had been selling for decades could not meet this requirements, resulting in our search for a new exchanger concept for hydraulics.

Soldered plate heat exchangers meet these requirements outstandingly and further offer other advantages such as requiring little installation space and the high pressure resistance.

Together with a well-known manufacturer, Bühler implemented these findings in a comprehensive product line customised for the requirements in fluid control.

If our standard range of products does not include the right solution for your application, we will gladly develop a custom solution for you.

Use the data in this leaflet to determine a suitable cooler for your application. However, we do recommend using our calculator to configure your cooler. This will allow you to optimise it whilst incorporating various parameters.



Construction and application

BWT plate heat exchangers are made from patterned stainless steel plates. The direction of the pattern varies from plate to plate, yielding a large number of contacts on the back of the pattern. When the plates are soldered the contacts also connect, forming an extremely compact, pressure-resistant set of plates. And yet virtually the entire material is available for heat exchange.

Function

Compared to other systems the interior geometry of the BWT ensures a turbulent flow, yielding high heat transfer coefficients when using the limits for low flow rates, thus flow speeds, in the configuration. This excludes Zones with a low speed, maintaining an extremely equally distributed flow across the entire exchanger surface. The materials used result in dense, smooth exchanger plate surfaces, significantly reducing the risk of possible corrosion.

These design features of the BWT plate heat exchangers virtually eliminate the risk of deposits within the exchanger.

Planning information

Set-up

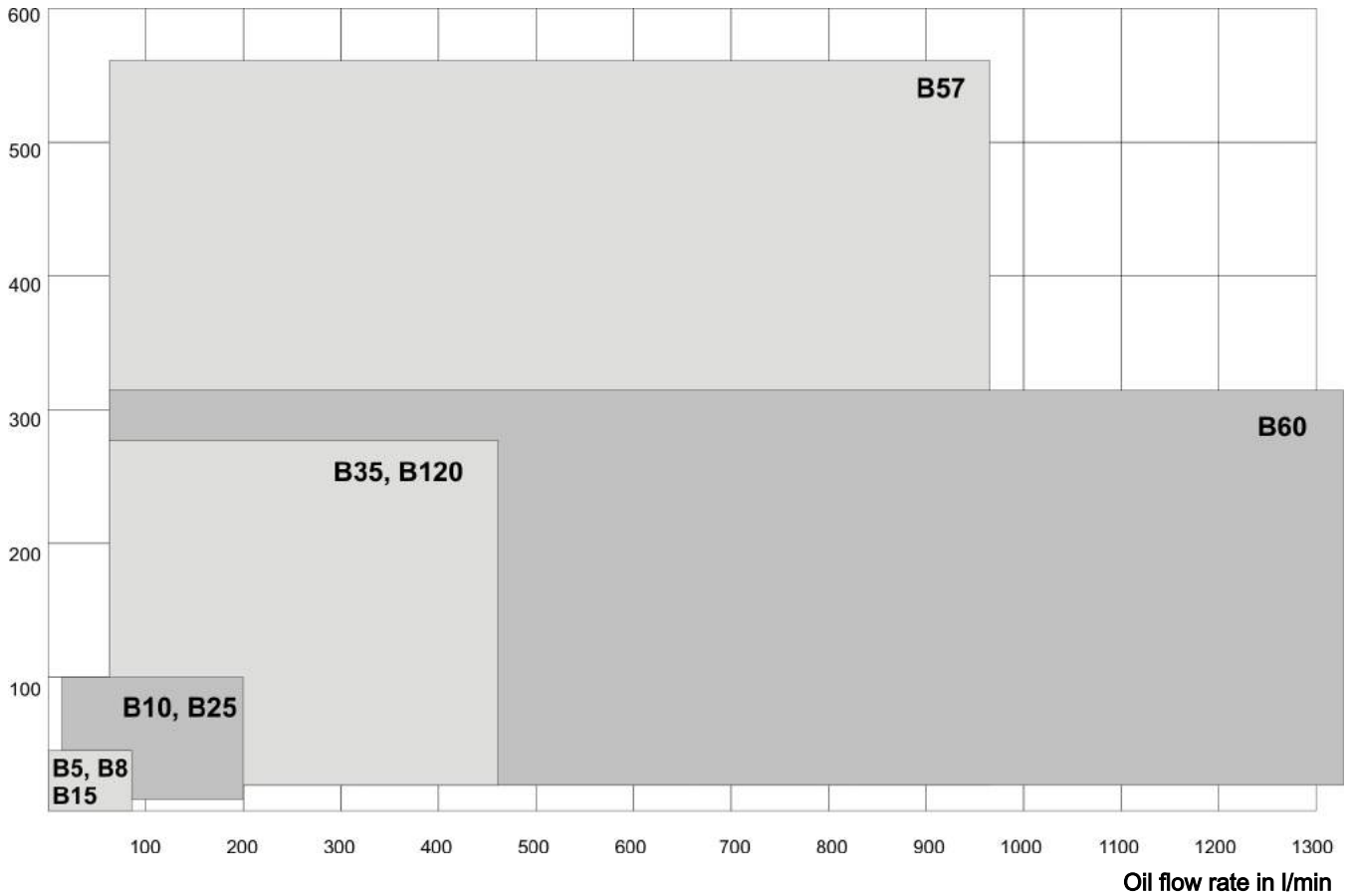
The coolers should be installed providing easy accessible and visibility. Any installation position is permitted and may be adapted to the installation conditions. However, the cooler should not be installed on its back.

Secure the plate heat exchanger with the bracket sold as an accessory. The connection lines must be installed free from tension and vibration. We recommend installing tubes or compensators.

Prevent freezing when installed outdoors.

Cooling capacity comparison for the various BWT lines

Cooling performance in kW



The diagram above shows the applications of the various base types.

A configuration program for custom specifications (optimising the water consumption or optimising the dimensions) is available on request.

Approvals

BWT plate coolers are approved by the following authorities:

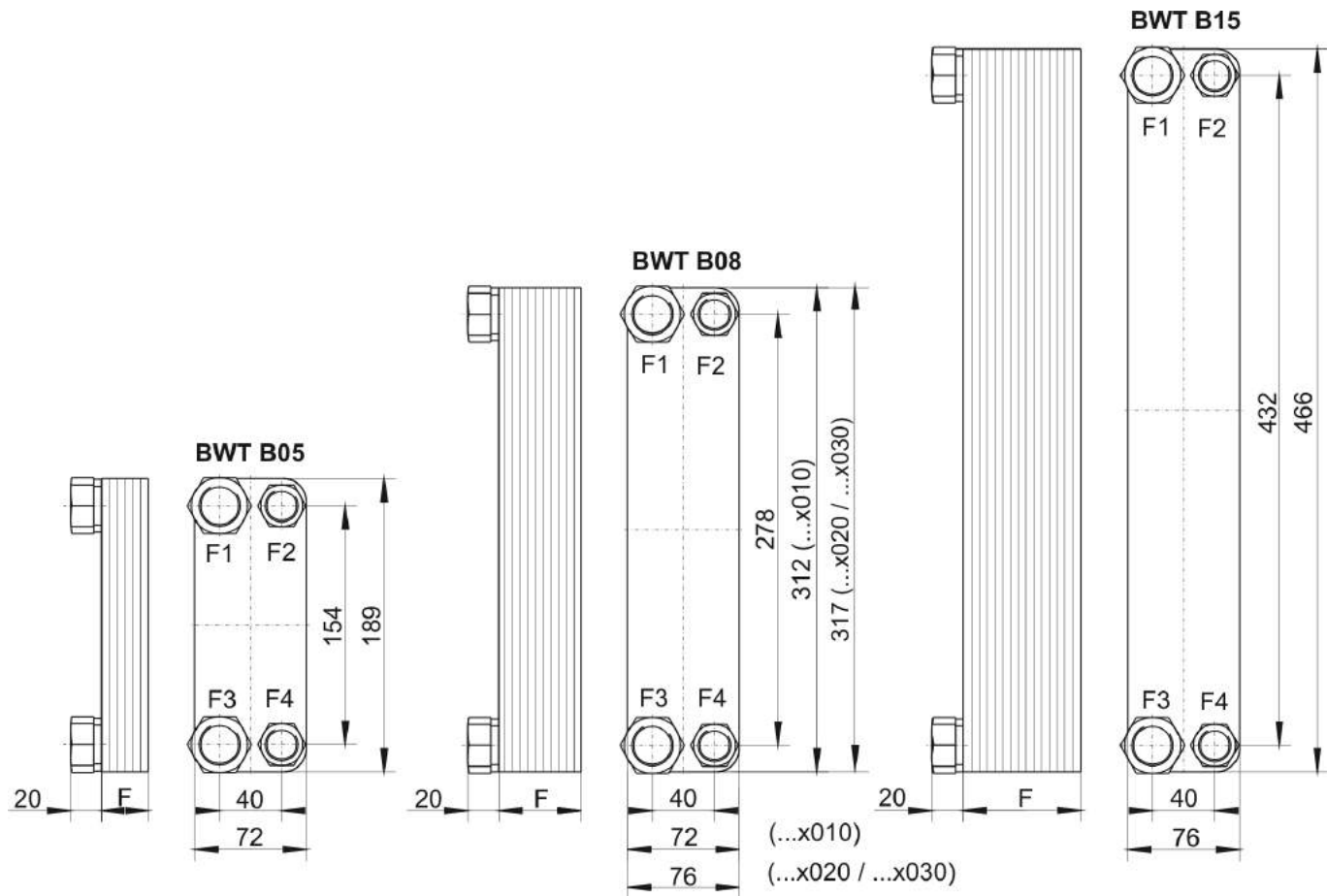
Sweden	Statens Anläggningsprovning (SA)
Norway	Kjelkontrollen
Canada	Canadian Standard Association (CSA)
Germany	Technischer Überwachungsverein (TÜV)
USA	Underwriters Laboratories (UL)
Finland	Teknillinen Tarkastuskeskus (TK)
Switzerland	Schweizerischer Verein des Gas- und Wasserfaches (SVGW)
EU	TRB801 No. 25

Bühler is ISO 9001 certified

Technical data BWT

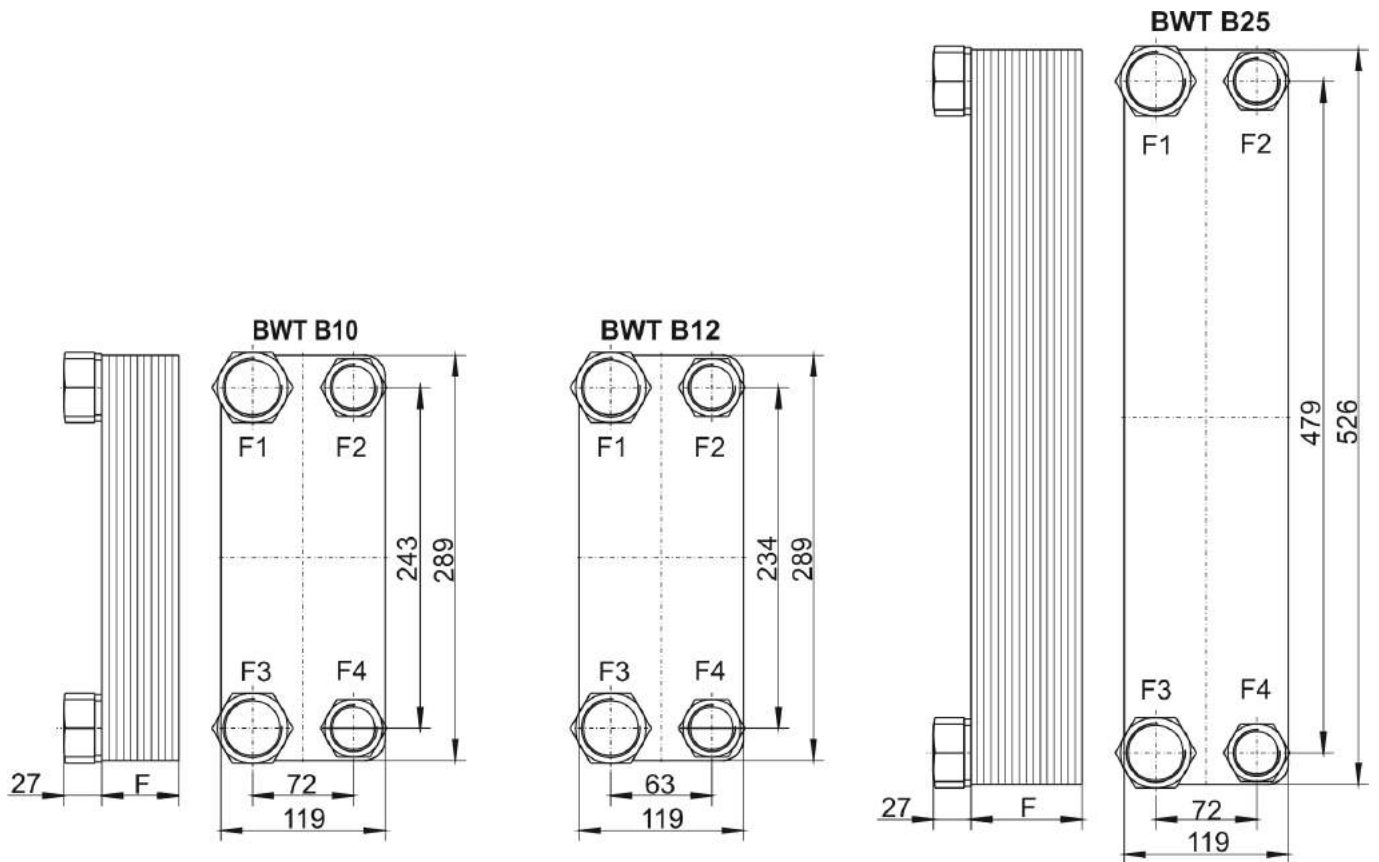
Technical Data	
Material	Stainless steel 1.4401, Cu 99.9% and Cu-free soldering material. Also use Cu-free soldering material in for special models B5 - B28, see data sheet 340005. Flange B57 + B60 and up in Swedish standard SS 2172, DIN 17175.
Operating pressure static: dynamic:	max. 30 bar 20 bar at 5 MM load cycle, 3 Hz
Operating oil temperature	max. +185 °C

B05 / B08 / B15



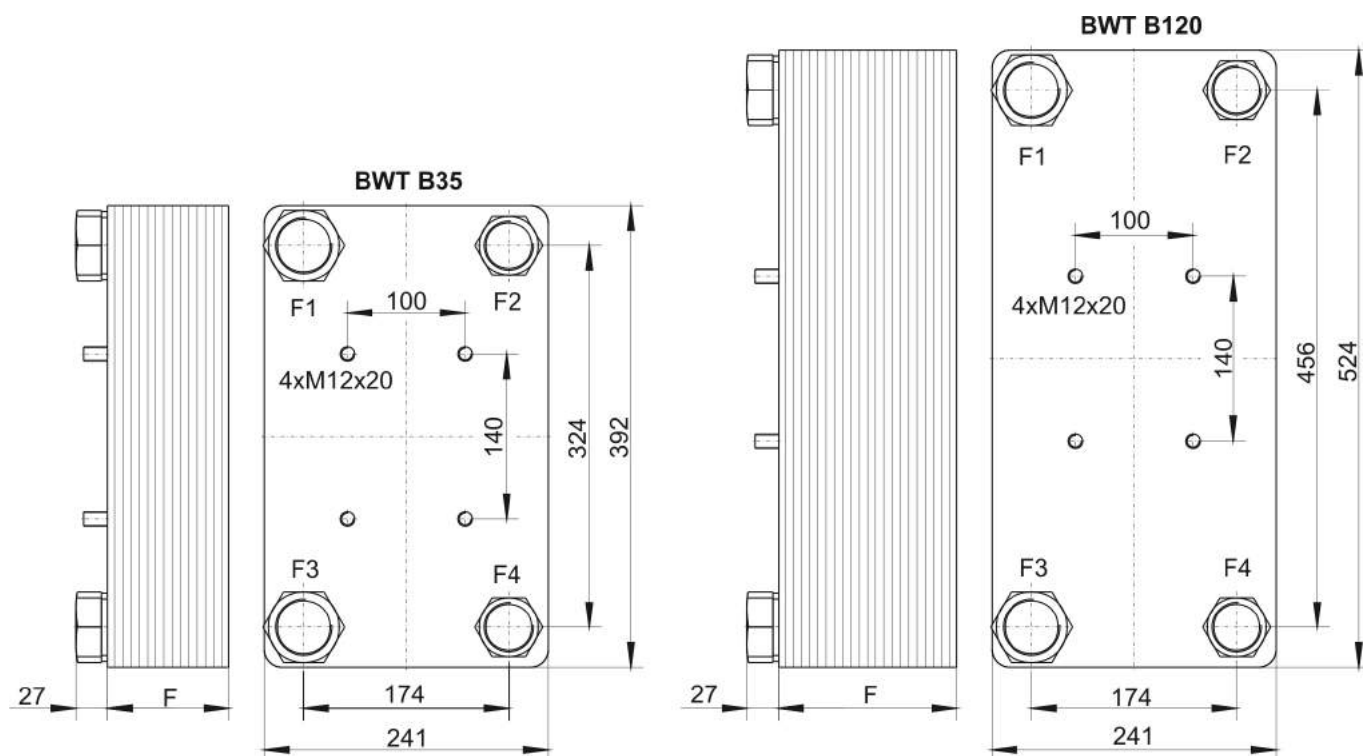
Type	Item no.	F (mm)	Cooling capacity (kW)	Oil connection F3, F1	Water connection F2, F4	Weight (kg – net)	Volume (Litre)
BWT B05x010	3405010	30	1.5 - 5.0	G ¾ 36 mm	G ½ 27 mm	1.0	0.1
BWT B05x020	3405020	53	1.5 - 11	G ¾ 36 mm	G ½ 27 mm	1.5	0.2
BWT B08x010	3408010	30	2.5 - 6.0	G ¾ 36 mm	G ½ 27 mm	1.6	0.5
BWT B08x020	34080200	53	5.0 - 16	G ¾ 36 mm	G ½ 27 mm	2.0	1.0
BWT B08x030	34080300	76	10 - 25	G ¾ 36 mm	G ½ 27 mm	3.0	1.5
BWT B15x030	3415030	76	6.0 - 30	G ¾ 36 mm	G ½ 27 mm	4.0	2.0

B10 / B12 / B25



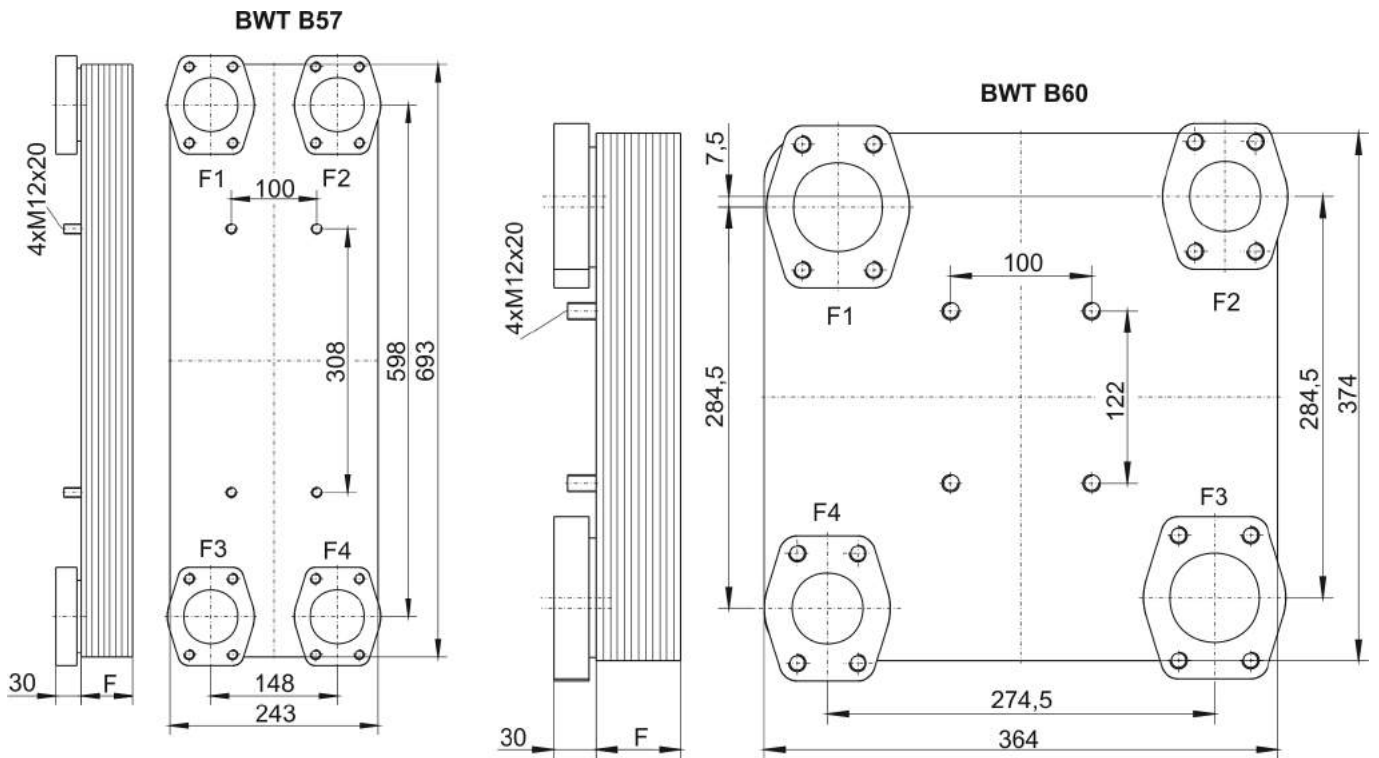
Type	Item no.	F (mm)	Cooling capacity (kW)	Oil connection F3, F1	Water connection F2, F4	Weight (kg – net)	Volume (Litre)
BWT B10x020	3410020	49	5 – 25	G 1 41 mm	G ¼ 36 mm	4.0	1.0
BWT B10x030	3410030	72	10 - 40	G 1 41 mm	G ¼ 36 mm	5.0	1.5
BWT B10x040	3410040	94	10 - 50	G 1 41 mm	G ¼ 36 mm	7.0	2.0
BWT B10x050	3410050	116	15 - 60	G 1 ¼ 50 mm	G 1 41 mm	8.0	3.0
BWT B10x070	3410070	161	20 - 65	G 1 ¼ 50 mm	G 1 41 mm	10.0	3.5
BWT B10x090	3410090	206	20 - 80	G 1 ¼ 50 mm	G 1 41 mm	13.0	4.0
BWT B12Hx060	3412060	145	35 - 85	G 1 ¼ 50 mm	G 1 41 mm	13.5	4.3
BWT B25x030	3425030	72	13 - 45	G 1 ¼ 50 mm	G 1 41 mm	10.0	2.0
BWT B25x040	3425040	94	13 - 65	G 1 ¼ 50 mm	G 1 41 mm	12.0	3.0
BWT B25x060	3425060	139	20 - 90	G 1 ¼ 50 mm	G 1 41 mm	17.0	5.0
BWT B25x080	3425080	184	25 - 105	G 1 ¼ 50 mm	G 1 41 mm	21.0	7.0

B35 / B120



Type	Item no.	F (mm)	Cooling capacity (kW)	Oil connection F3, F1	Water connection F2, F4	Weight (kg – net)	Volume (Litre)
BWT B35x040	3435040	103	30-105	G 1 ½ 60 mm	G 1 ¼ 50 mm	18.0	5.0
BWT B35x050	3435050	127	55-145	G 1 ½ 60 mm	G 1 ¼ 50 mm	21.0	7.0
BWT B35x060	3435060	151	55-155	G 1 ½ 60 mm	G 1 ¼ 50 mm	24.0	8.0
BWT B35x090	3435090	223	55-175	G 1 ½ 60 mm	G 1 ¼ 50 mm	34.0	12.0
BWT B120x040	3445040	103	40-125	G 1 ½ 60 mm	G 1 ¼ 50 mm	23.0	6.0
BWT B120x060	3445060	151	55-190	G 1 ½ 60 mm	G 1 ¼ 50 mm	31.0	10.0
BWT B120x080	3445080	199	65-245	G 1 ½ 60 mm	G 1 ¼ 50 mm	40.0	14.0
BWT B120x120	3445120	295	135-280	G 1 ½ 60 mm	G 1 ¼ 50 mm	57.0	21.0

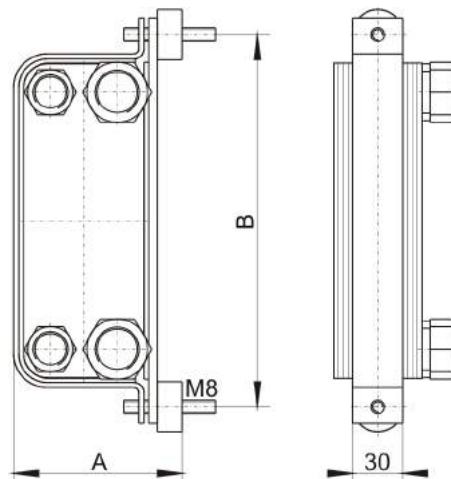
B57 / B60



Type	Item no.	F (mm)	Cooling capacity (kW)	Oil connection F3, F1	Water connection F2, F4	Weight (kg – net)	Volume (Litre)
BWT B57x040	3457040	113	39 - 160	SAE 2 ½ *	SAE 2 ½	39	13
BWT B57x060	3457060	162	74 - 232	SAE 2 ½ *	SAE 2 ½	50	20
BWT B57x080	3457080	211	79 - 327	SAE 2 ½ *	SAE 2 ½	61	26
BWT B57x100	3457100	259	84 - 424	SAE 2 ½ *	SAE 2 ½	73	33
BWT B57x120	3457120	308	89 - 494	SAE 2 ½ *	SAE 2 ½	84	40
BWT B57x140	3457140	357	93 - 566	SAE 2 ½ *	SAE 2 ½	95	46
BWT B60x040	3460040	104	30 - 113	SAE 2 ½ *	SAE 2	33	9
BWT B60x060	3460060	147	35 - 165	SAE 2 ½ *	SAE 2	42	13
BWT B60x080	3460080	190	40 - 216	SAE 2 ½ *	SAE 2	52	17
BWT B60x100	3460100	232	43 - 267	SAE 2 ½ *	SAE 2	61	22
BWT B60x120	3460120	275	56 - 301	SAE 2 ½ *	SAE 2	70	26
BWT B60x140	3460140	318	76 - 316	SAE 2 ½ *	SAE 2	80	31

* SAE connections at pressure range 3000 PSI

Mounting brackets



Type	Part no.	A	B	for BWT type
BB05	34BB05	104	223	
BB08	34BB08	104	347	B08 x 010
BB080	34BB080	108	355	B08 x 020 x 030
BB15	34BB15	104	501	
BB10	34BB10	151	323	
BB25	34BB25	151	561	
BB35	34BB35	273	426	
BB 45	34BB45	273	558	

NOTICE! We recommend using two brackets for the types B35-090 and B120-060 up to B120-120.

Level Control NS1-39-D934

Level Control NS1-39-D934 SW

- VW Specification -

Technical Data

Operating pressure max.	1 bar
Operating temperature max.	80 °C
Spec. gravity of float min.	0.8 kg/dm ³

Material

Float SK 603	PPH
Switch tube	brass
Flange	PP

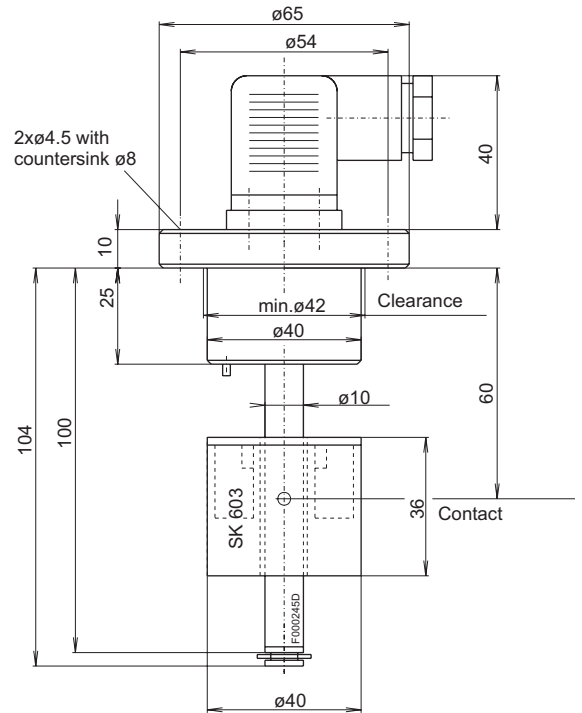
Connector	M3 (3 pol.+PE, DIN 43650)
Protection class	IP 65

NS 1-39-D934

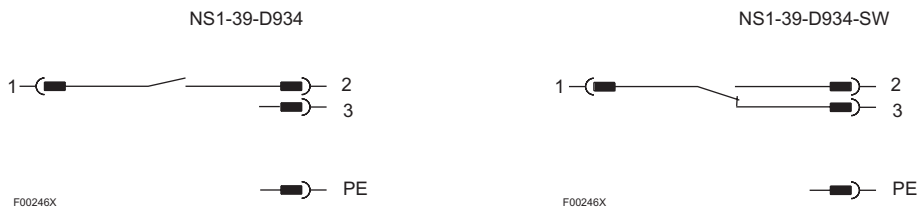
Level contact	K8 (NO)
Max. voltage	230 V DC/AC
Max. Current	0.5 A
Contact load max.	10 VA / 10 W

NS 1-39-D934 SW

Level contact	W9 (change over)
Max. voltage	48 V DC/AC
Max. Current	0.5 A
Contact load max.	20 VA



Wiring Diagramm



all figures at empty reservoir

Order Information

Part No.	Model	L	L1
1119099	NS1-39-D934	104	60 NO*
11190999	NS1-39-D934-SW	104	60 change over

* NO = normally open

we reserve the right to amend specifications

Level Control NS 1-39 D 933

- VW Specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material:

Float SK 610 hard PU
 Switch tube brass
 Flange PP

Level contacts

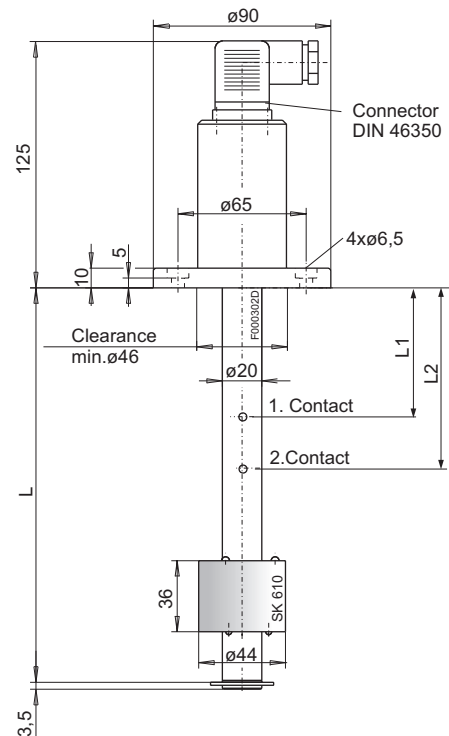
K6
 Function NO*
 Max. voltage 230 V DC/AC
 Max. Current 1 A
 Contact load 50 VA

Connector

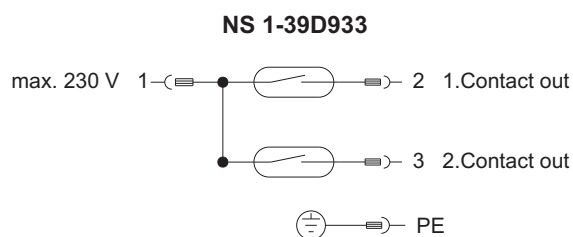
NS 1-39 D933 M3, 3 pol.+PE, DIN 43650

Protection class IP 65

* NO = normally open



Wiring Diagram



All figures at empty reservoir

Order information

Type	Part No..	L	L1	L2
NS 1-39 D 933	1115999	300	180 NO	255 NO

we reserve the right to amend specifications

Nivovent 75 DC with Thermotronic 71

- Daimler specification -

easyjust



The Nivovent 75 DC featuring the Bühler “easyjust” technology is a compact economic combination of level switch and precise temperature control with LED display. The unit can provide two temperature alarm/switch outputs in addition to two level contacts.

The “easyjust” system simplifies the adjustment of the level contacts. The system consists of level contact cartridges that clip onto a gold plated contact board which incorporates the Pt100 temperature sensor.

Both the level contacts and the temperature controls clip directly onto the contact board thus eliminating wiring.

The unit has a DIN 24557 flange for ease of installation and a variety of electrical terminations. The connection between the terminal blocks and the contact board is also a quick change type making this unit very adaptable for a wide variety of applications.

The Nivovent 75DC in the configuration shown overleaf complies with the Daimler requirements. It provides two M12 connector sockets, a temperature display and preset level contacts.

Please note that our programme contains more Daimler specific versions of the Nivotemp and Nivovent series.

- **Combination of breather/filter, level and temperature control**
- **Adjustable alarm outputs for temperature**
- **Cordless, adjustable level contacts**
- **High float sensitivity**
- **Easy installation**
- **Maintenance free (except filter element)**
- **High visibility LED display**
- **Standard length 250, 370 and 520 mm**
- **Clogging indicator**

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of fluid min. 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Flange PA
 Breather PA
 Retention rate SM-L (3 µm)

Level contact

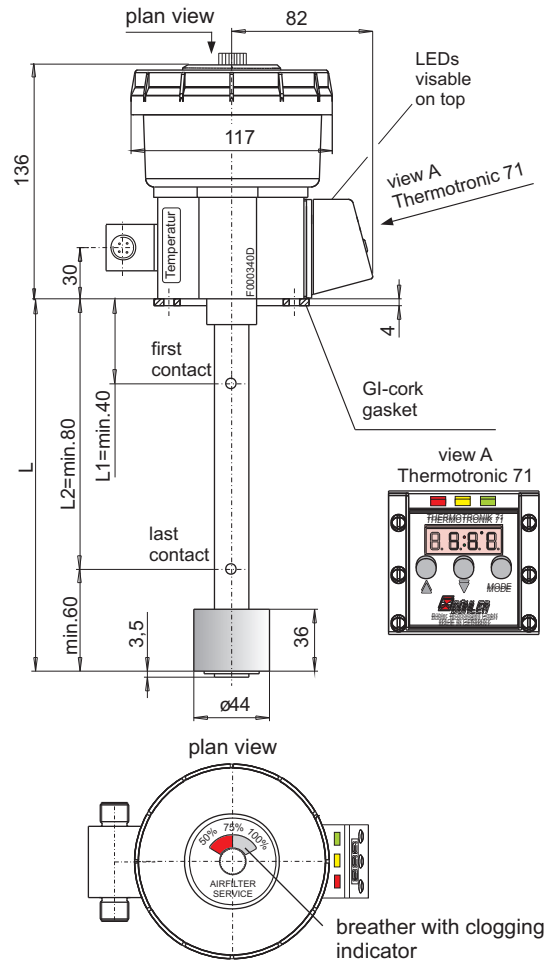
K101 and K102
 Function NC / NO*
 Min. distance between contacts 40 mm
 Max. voltage 24 V
 Max. current 0.5 A
 Max. contact load 10 VA

* NC = normally closed / NO = normally open (all figures at empty reservoir)

Thermotronic 71

Range of temperature display -20 to +120 °C / 4° to 248 °F
 Range of alarm indication 0 to +99 °C or 32° to 178 °F
 Programmable set points 2
 Material housing PA, IP65
 Display four digit seven segment-LED-display, light emitting diodes for status display

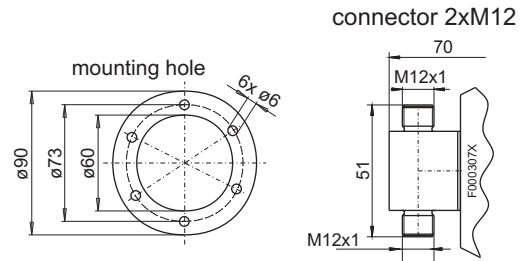
Current consumption at power up about 140 mA for 100 ms
 Operating current consumption approx. 30 - 50 mA
 Supply voltage 24 VDC ±10 %
 Output PNP
 Ambient temperature 0 - 70 °C
 Accuracy 1 % of full range
 Resolution 1 °C / 2 °F
 Programming via three touch keys
 Temperature sensor PT 100



General description of Thermotronic 71

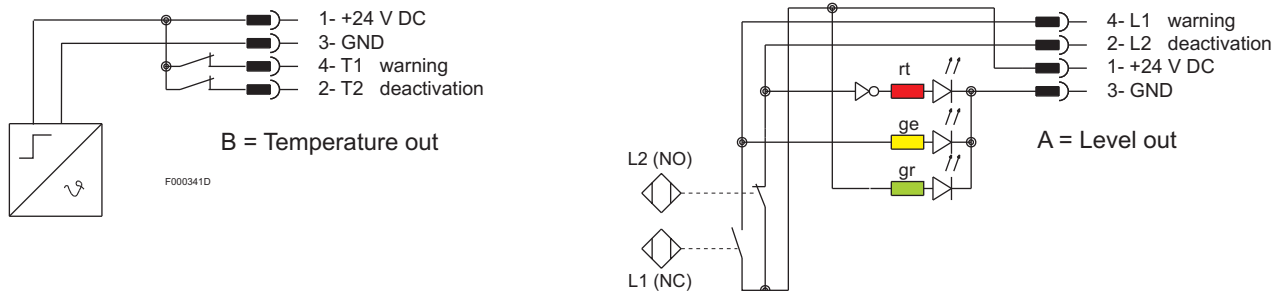
The Thermotronic 71 is a combined microprocessor controlled digital display and control unit for monitoring and stabilizing the operating temperature in fluid power systems.

The actual temperature is displayed on a high visibility LED display. The status of the entire unit (output, sensor, broken wire) is indicated by separate LED's. The temperature unit can be set to Celsius or Fahrenheit. Programming is by touch keys. The settings are protected against unauthorized operation by key lock.



Wiring Diagram

Normal position: float on top = filled reservoir



Order Information

Nivovent 75 DC

Part-no	Connector	Display	L =	L1=	L2=	Temperature-contact T1	Temperature-contact T2
1075900201	2xM12	yes	250mm	150mm NC *	190mm NO *	50°C / NC *	60°C / NC *
1075900202	2xM12	yes	370mm	150mm NC *	200mm NO *	50°C / NC *	60°C / NC *
1075900203	2xM12	yes	370mm	200mm NC *	300mm NO *	50°C / NC *	60°C / NC *
1075900204	2xM12	yes	520mm	200mm NC *	300mm NO *	50°C / NC *	60°C / NC *

*NC=normally closed / NO=normally open

Accessories

Part No. 9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0m

Nivotemp 61-2W11-3LED-M12

- Daimler specification -



By researching existing standards for fluid power packs including DIN 24346 regarding liquid level control, it was found that measuring to 300 mm depth was sufficient to control the level. Therefore the Bühler standard length of 370 mm is sufficient and covers most applications. Flange mounting is almost universal for breather/filler units so it is also suitable for mounting level controls.

The Nivotemp 61-2W11-3LED-M12 in this configuration complies with the Daimler requirements. The LED's into the transparent socket with an M12 connector indicate the working condition for the level.

Please note that our programme contains more Daimler specific versions of the Nivotemp and Nivovent series.

- **Adjustable level contacts**
- **Bistable level contacts = only one float**
- **High float sensitivity**
- **International standard flange dimensions**
- **Easy installation**

Technical Data

Operating pressure max.	1 bar
Operating temperature max.	80 °C
Spec. gravity of float min.	0.8 kg/dm ³

Material

Float SK 610	hard PU
Switch tube	brass
Flange	PA 6

Level contacts

Function	K10
Min. distance of contact	40 mm
Max. Voltage	24 V
Max. Current	0.5 A
Contact load	10 VA

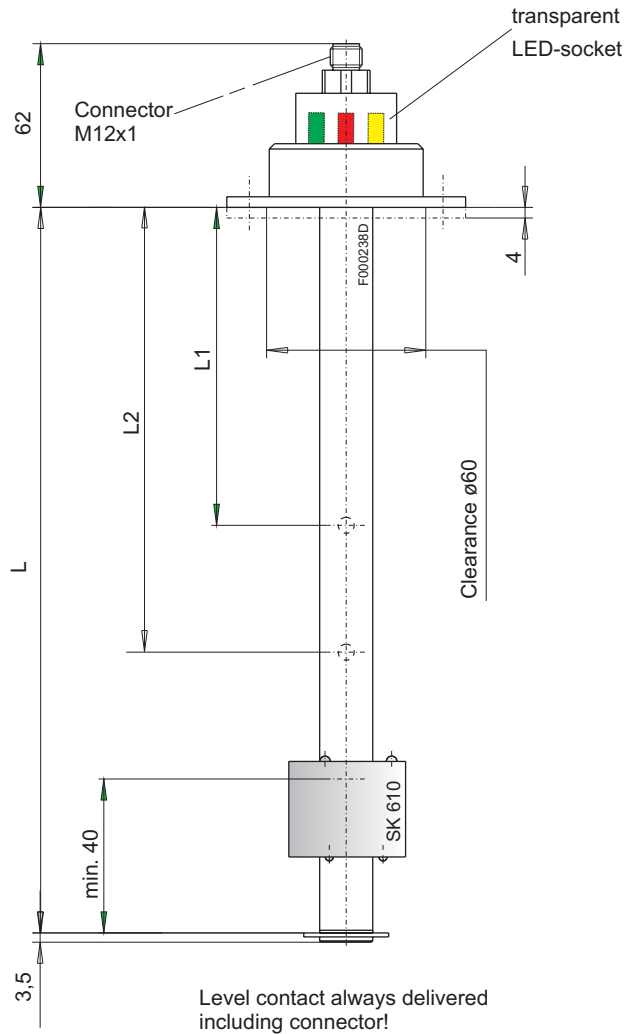
* NC = normally closed / NO = normally open

All figures at empty reservoir

Male plug

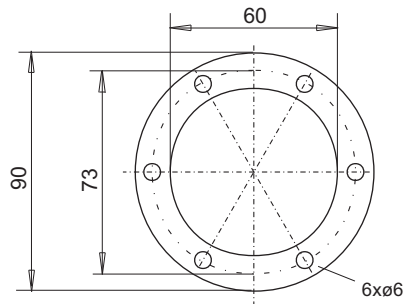
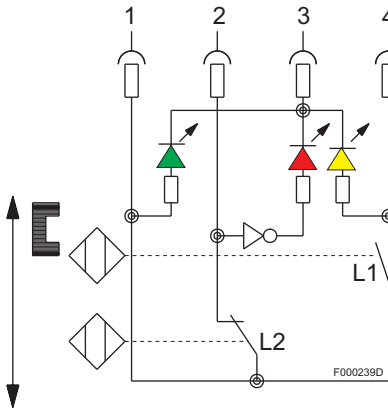
Protection class	M12 x 1 (4 pol.)
	IP67 with female plug fixed

Dimensions (mm)



Wiring Diagram

normal position = at filled reservoir



Ordering Information

Type	Part No.	L1	L2	Length L
Nivotemp 61-2W11-3LED-M12	1027899	variable NC	variable NO	variable

* NC = normally closed / NO = normally open

Accessories

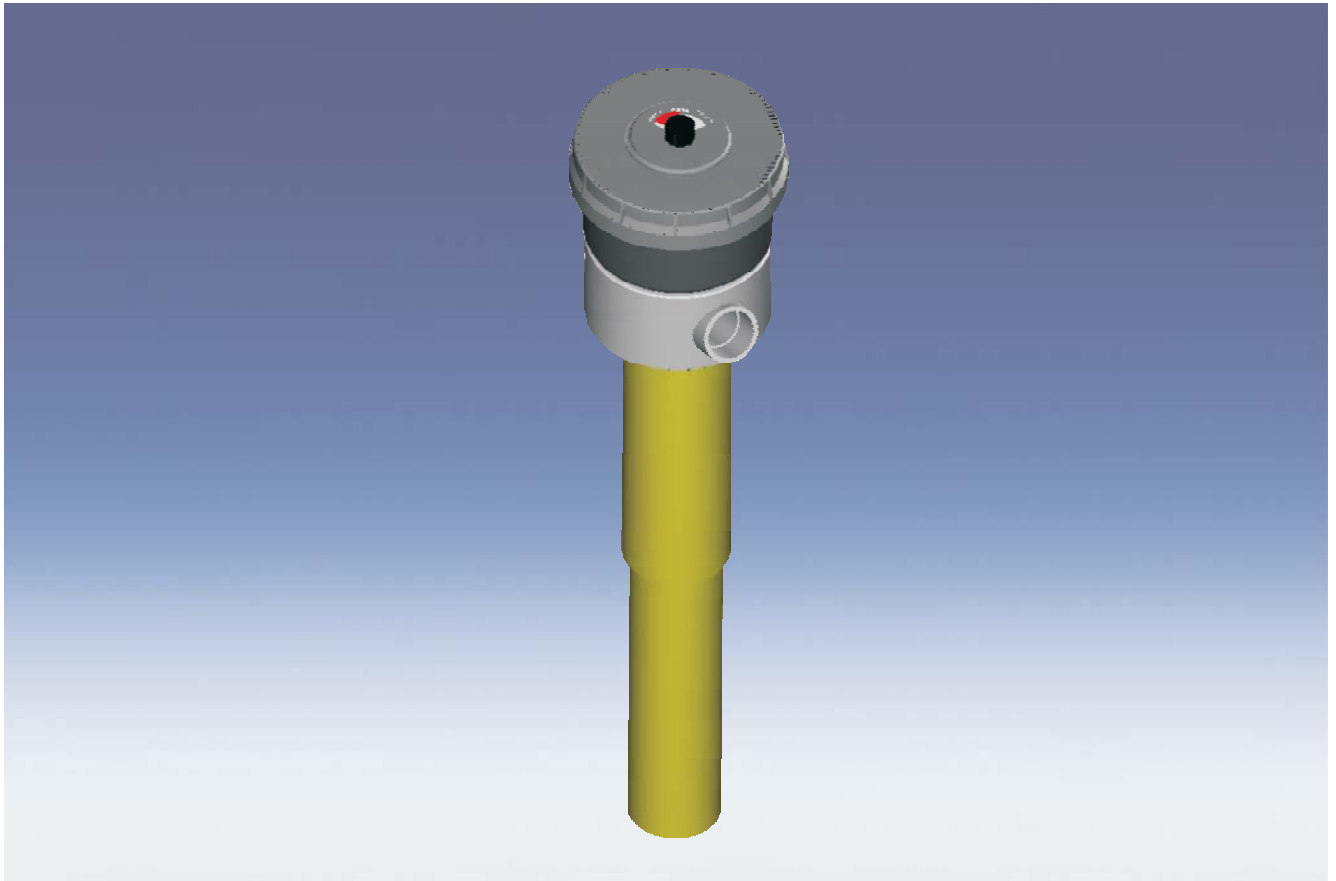
Part No.
9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3.0 m

Filling Adapter G1/2-DC

Filling Adapter G 1-DC

- Daimler Specification -



The reduction of maintenance costs is of very high importance to operators of fluid power and lubrication systems. Therefore systematic oil care is considered a high priority. Only if the oil is kept in good condition can the lifetime of both oil and system components be optimized cost effectively.

Systematic oil care also requires changes to current filling and topping up practices. The use of filter carts makes this task more efficient.

In order to reduce installation costs and space the combination of a breather filter with filling and sample port has been designed. Both ports are equipped with quick disconnects for fast and clean operation. The filling channel is completely separated from the breathing function. The breather filter element is disposable and available in different retention rates and materials. A contamination indicator for the filter is available either as a visual or electrical unit.

The filling adapter in the configuration shown overleaf complies with the Daimler requirements.

Please note that our programme contains more Daimler specific versions of the Nivotemp and Nivovent series.

- **Easy installation**
- **Compact design**
- **Clean operation**
- **Visual filter indicator 50%, 75% and 100%**
- **DIN flange fits on existing reservoirs**

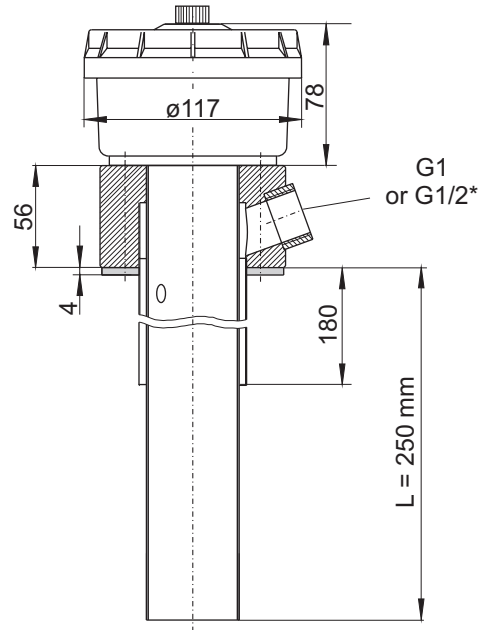
Technical Data

Operating temperature	max. 80 °C
Retention rate	SM-L (3 µm)
Visual filter indicator	50%, 75% and 100%

Material

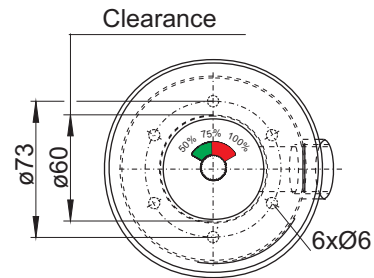
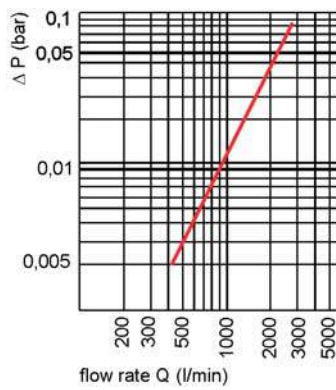
Breather housing material	Polyamid
Flange	galvanised steel
Tube	brass

Dimensions (mm)



*For connecting G1/2 flange use adapter

Low / Differential Pressure Diagram



Order Information

Filling adapter G1/2-DC with breather SM-L

Part No.	Length L
1088299	250 mm

Filling adapter G1-DC with breather SM-L

Part No.	Length L
1088499	250 mm

Nivotemp 62-2-C6F-T-03V001-ej

easyjust

- Daimler specification -



The Nivotemp 62-2-C6F-T-03V001-ej featuring the Bühler “easyjust” technology is a compact economic combination of level switch and precise temperature indication with LED display.

The unit provides two temperature alarm/switch outputs in addition to two level switching points.

The “easyjust” system simplifies the adjustment of the level contacts. The system consists of level contact cartridges that clip onto a gold plated contact board which incorporates the PT100 temperature sensor.

Both, the level contacts and the temperature controls clip directly onto the contact board thus eliminating wiring.

The unit has a DIN 24557 flange for easy installation.

The Nivotemp 62-2-C6F-T-03V001-ej in this configuration complies with the Daimler requirements. It provides two M12 connector sockets, a temperature display, and preset level contacts.

Please note that our programme contains more Daimler specific versions of the Nivotemp and Nivovent series.

- **Combined level and temperature control**
- **Adjustable alarm outputs for temperature**
- **”clip on” adjustable level contacts**
- **High float sensitivity**
- **Easy installation**
- **Maintenance free**
- **High visibility LED display**

Technical Data

Operating pressure max.	1 bar
Operating temperature max.	80 °C
Spec. gravity of fluid min.	0.8 kg/dm ³

Material

Float SK 610	hard PU
Switch tube	brass
Flange	PA

Level contact

K101 and K102

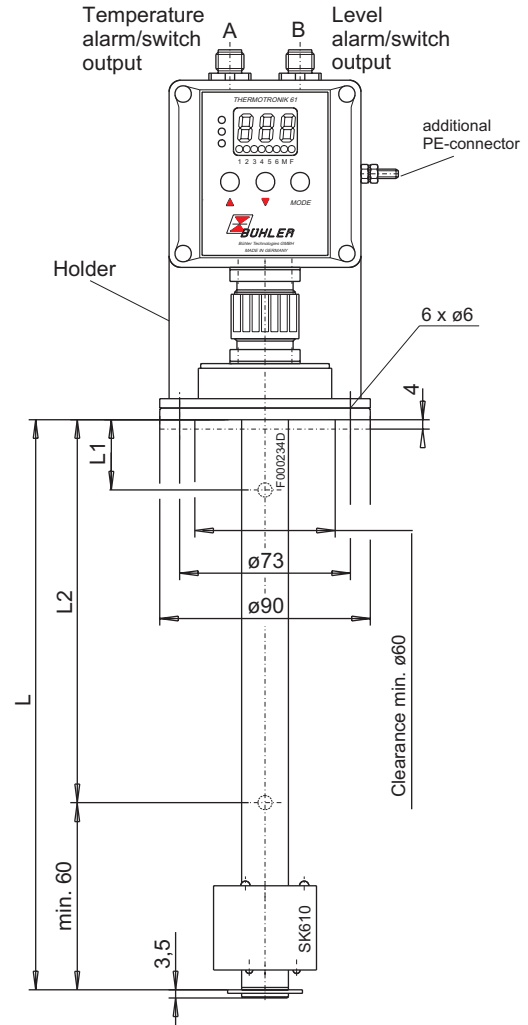
Function	NO / NC*
Min. distance between contacts	40 mm
Max. voltage	24 V
Max. current	0.5 A
Max. contact load	10 VA

* NC = normally closed / NO = normally open (all figures at empty reservoir)

Thermotronik 61

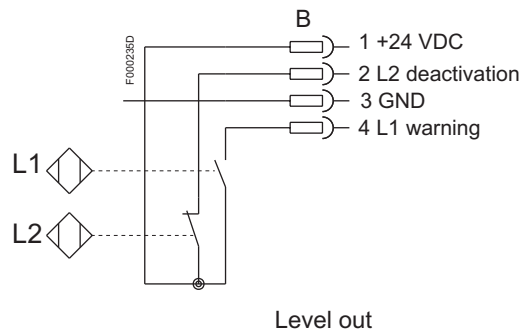
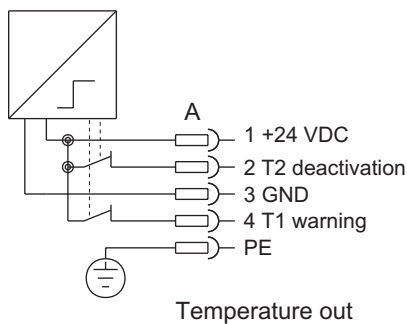
Range of temperature display	from -20 to +120 °C / 4° to 248 °F
Range of alarm indication	0 to +99 °C or 32° to 178 °F
Programmable set points	2 x
Connector socket	2 x M12
Housing	ABS-plastic
Depth of housing	55 mm
Protection class	IP 65
Display	three digit seven segment-LED-display light emitting diodes for status display
Current consumption at power up	about 140 mA for 100 ms
Operating current consumption	about 30 -70 mA
Supply voltage	24 VDC ±10 %
Output switches	2 x with max. 24V / 1A
Ambient temperature	0 - 70 °C
Accuracy	1 % of end indication value
Resolution	1 °C / 2 °F
Programming	via three touch keys

Dimensions (mm)



Wiring Diagram

normal position = at filled reservoir



Order Information

Nivotemp 62-2-C6F-T-03V001-ej with float SK610

Part No.	Connector socket	Display	L =	L1=	L2=	Temperature-contact T1	Temperature-contact T2
10318999	2xM12	yes	250 mm	100 mm NO*	190 mm NC*	50°C / NC*	60°C / NC*
101289999	2xM12	yes	250 mm	150 mm NO*	190 mm NC*	50°C / NC*	60°C / NC*
10254999	2xM12	yes	370 mm	150 mm NO*	200 mm NC*	50°C / NC*	60°C / NC*
101090999	2xM12	yes	370 mm	200 mm NO*	300 mm NC*	50°C / NC*	60°C / NC*
10255999	2xM12	yes	520 mm	200 mm NO*	300 mm NC*	50°C / NC*	60°C / NC*

* NC=normally closed / NO=normally open

Accessories

Part No.

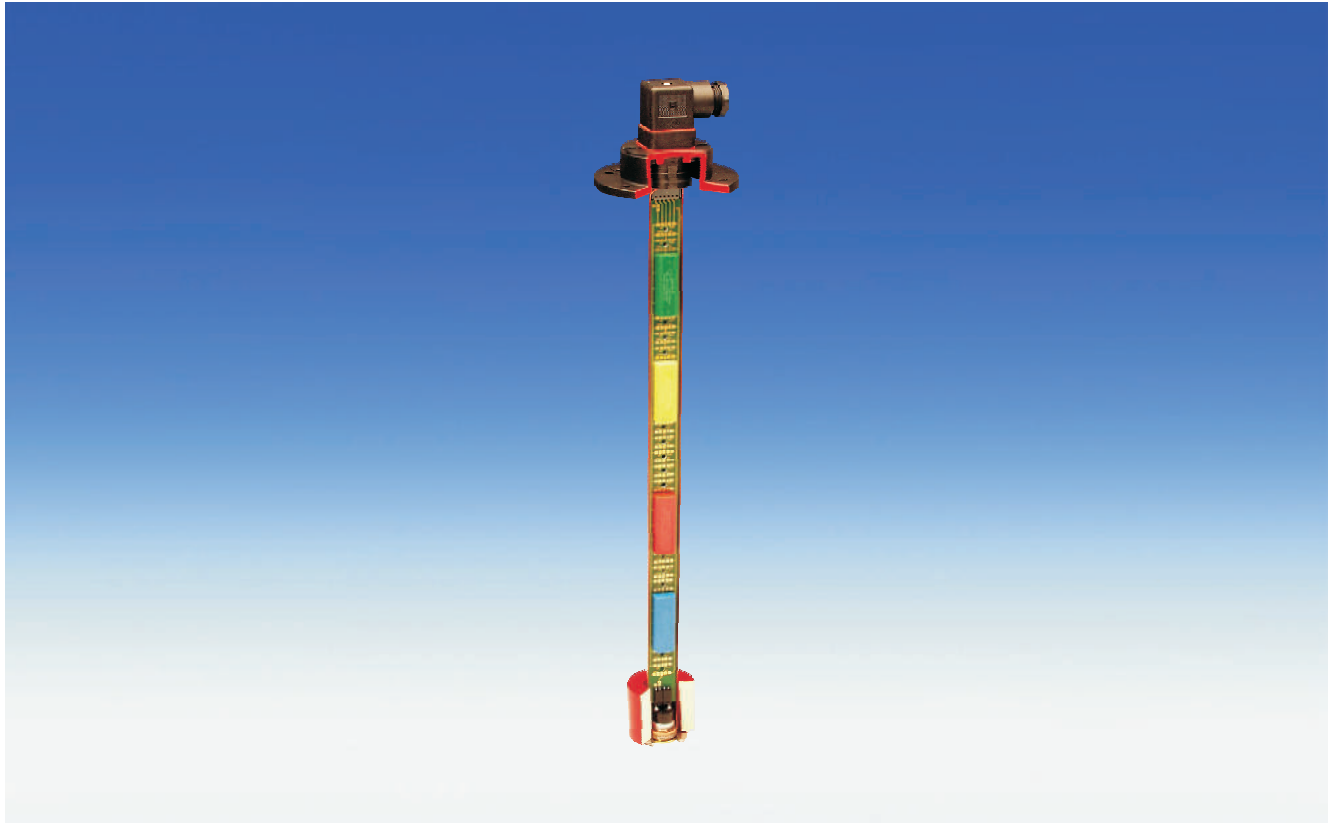
9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3.0 m

Nivotemp 64 RE

easyjust

- RENAULT specification -



The new Bühler "easyjust" system simplifies the adjustment of level contacts. The system consists of level contact cartridges that clip onto a gold plated contact board. This board can accommodate up to four contact cartridges plus the temperature control. The temperature control is a bimetal switch. Both the level contacts and the temperature control clip directly onto the contact board thus eliminating wiring.

By researching existing standards for fluid power packs including DIN 24346 regarding liquid level control, it was found that measuring to 300 mm depth was sufficient to control both level and temperature. Therefore the Bühler standard length of 370 mm is sufficient and covers most applications. Flange mounting is almost universal for breather/filler units so it is also suitable for mounting temperature and level controls.

The connection between the electrical connectors and the contact board is a quick change type making the stocking of spare parts and the adaption to specific applications very convenient.

The Nivotemp 64RE in the configuration shown overleaf complies with the Renault requirements. It provides an M12 connector socket, preset level contacts and a stilling tube.

Please note that our programme contains more Renault specific versions of the Nivotemp and Nivovent series.

- **Combined level and temperature control**
- **Cordless adjustable level contacts**
- **Bistable level contacts = only one float**
- **High float sensitivity**
- **International standard flange dimensions**
- **Easy installation**
- **Maintenance free**
- **Standard length 370 mm**

Technical Data

Max. operating pressure	1 bar
Max. operating temperature	80 °C
Min. density of fluid	0.8 kg/dm ³

Material

Float SK 610	hard PU
Switch tube	brass
Flange	PA 6

Level contacts single contact NC/NO*

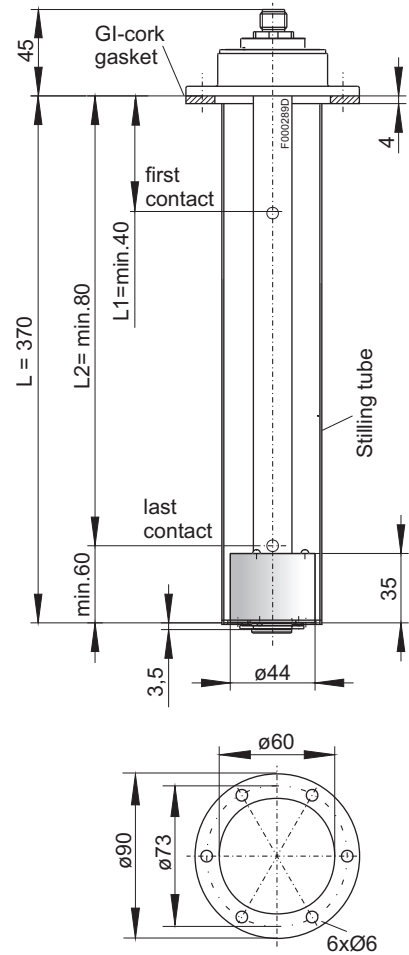
Min. distance btw. contacts	40 mm
Max. voltage	24 V
Max. current	0.5 A
Max. contact load	10 VA

* **NC** = normally closed / **NO** = normally open, all figures at empty reservoir

Temperature contacts TK

Max. voltage	24 V
Max. current	1 A
Max. contact load	24 VA
Hysteresis	10 K ± 3 K
Switch points	70°C
	normally closed (NC) at rising temperature

other settings upon request



Connector

M12

4 pol.

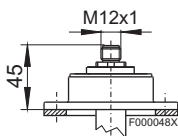
Protection class

IP67**

Cable gland

PG 7**

**with plug fixed



Order Information

Nivotemp 64 RE

Part-no	Connector	L =	L1=	L2=	Temperature-contact TK 1	Temperature-contact TK 2	Stilling tube
1064900101	M12	370	200 NO	no	T1 = 70 °C NC	no	yes
1064900102	M12	370	300 NO	no	T1 = 70 °C NC	no	yes
1064900103	M12	250	190 NO	no	T1 = 70 °C NC	no	yes

Nivovent 75 RE with Thermotronic 71



The Nivovent 75 RE featuring the Bühler “easyjust” technology is a compact economic combination of level switch and precise temperature control with LED display. The unit can provide two temperature alarm/switch outputs in addition to two level contacts.

The “easyjust” system simplifies the adjustment of the level contacts. The system consists of level contact cartridges that clip onto a gold plated contact board which incorporates the Pt100 temperature sensor.

Both the level contacts and the temperature controls clip directly onto the contact board thus eliminating wiring.

The unit has a DIN 24557 flange for ease of installation and a variety of electrical terminations. The connection between the terminal blocks and the contact board is also a quick change type making this unit very adaptable for a wide variety of applications.

The Nivovent 75RE in this configuration complies with the Renault requirements. It provides two M12 connector sockets, a temperature display, preset level contacts and a stilling tube.

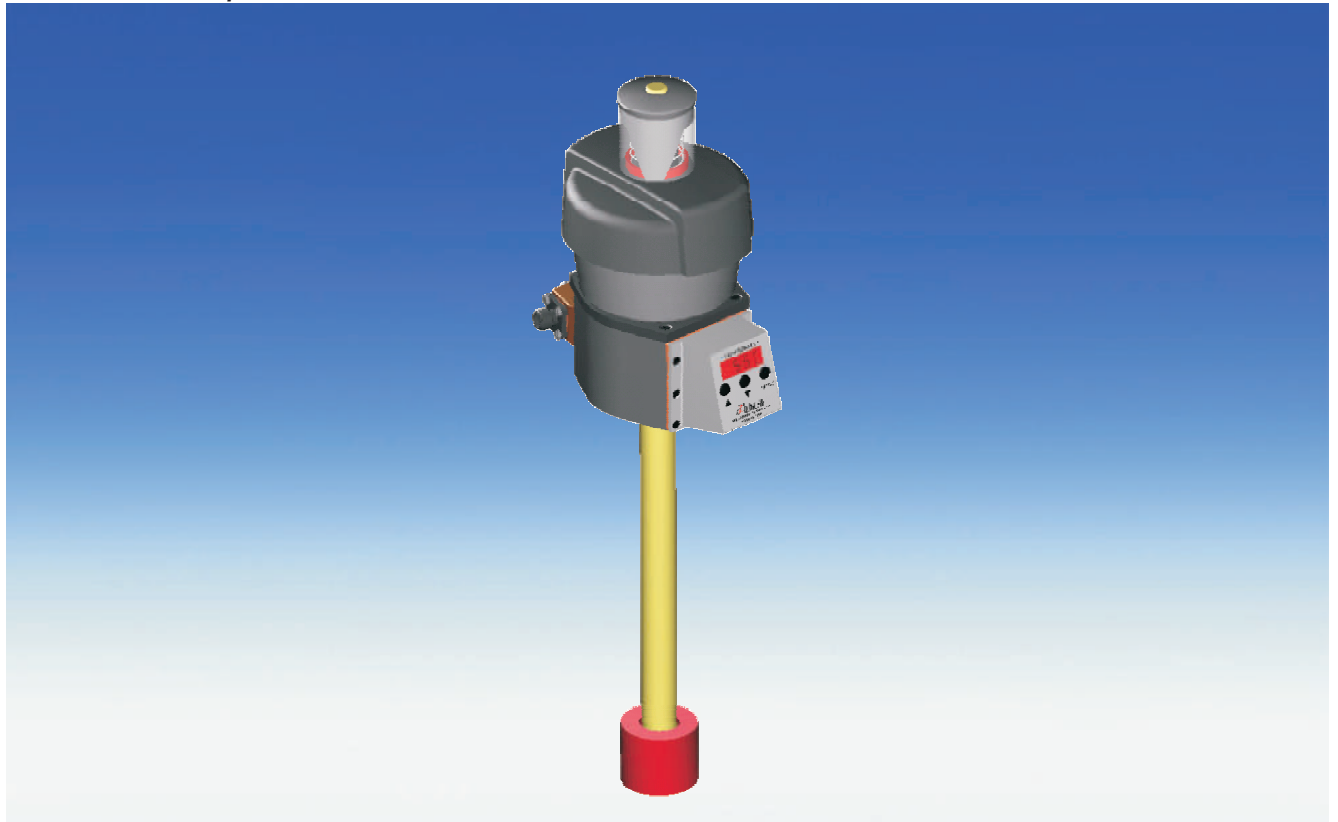
Please note that our programme contains more Renault specific versions of the Nivotemp and Nivovent series.

- **Combination of breather/filter, level and temperature control**
- **Adjustable alarm outputs for temperature**
- **Cordless adjustable level contacts**
- **High float sensitivity**
- **Easy installation**
- **Maintenance free (except filter element)**
- **High visibility LED display**
- **Standard length 250 and 370 mm**
- **Visual clogging indicator and antifilling device**

Nivovent 85 RE with Thermotronic 71

- RENAULT specification -

easyjust



The Nivotemp 85 RE featuring the Bühler “easyjust” technology is a compact economic combination of level switch and precise temperature control with LED display. The unit provides two temperature alarm/switch outputs in addition to two level contacts.

The “easyjust” system simplifies the adjustment of the level contacts. The system consists of level contact cartridges that clip onto a gold plated contact board which incorporates the Pt100 temperature sensor.

Both the level contacts and temperature controls clip directly onto the contact board thus eliminating wiring.

The unit has a DIN 24557 flange for easy installation and a variety of electrical terminations. The device can be easily be replaced or adopted to a variety of applications due to the solderless connection between terminal block and contact board.

The breather/filter type is a Hydac BF 7 / -CNOMO, released by Renault

The Nivovent 85RE in this configuration complies with the Renault requirements. It provides two M12 connector sockets, a temperature display, preset level contacts and a stilling tube. The unit must be completed with an breather filter according to Renaults specs.

Please note that our programme contains more Renault specific versions of the Nivotemp and Nivovent series.

- **Combination of breather/filter, level and temperature control**
- **Adjustable alarm outputs for temperature**
- **Cordless adjustable level contacts**
- **High float sensitivity**
- **Standard connectors**
- **Easy installation**
- **Breather/filter = Hydac, Cnomo-norm**
- **High visibility LED display**
- **Standard length 250, 370 mm**

Technical Data

Max. operating pressure	1 bar
Max. operating temperature	80 °C
Min. density of fluid	0.8 kg/dm ³

Material:

Float SK 610	hard PU
Switch tube	brass
Flange	PA

Level contact **single contact***

min. distance between contacts	40 mm
max. voltage	24 V
max. current	0.5 A
contact load	10 VA

*NC=normally closed / NO=normally open, all figures at **empty reservoir**

Breather **Hydac BF 7 / -Nomo**

Display	optic analog vacuum switch (reset by hand)
Indication range	0.35bar=100%
Breather retention rate	3µm
Mounting hole	according to DIN24557/part 2
Accessories	refilling protective cap

Thermotronic 71

Range of temperature display	from -20 to +120 °C / 4° to 248 °F
Range of alarm indication	0 to +99 °C or 32° to 178 °F
Programmable set points	max. 2
Material housing	PA, IP65
Display	four digit seven segment-LED-display, light emitting diodes for status display
Current consumption at power up	about 140 mA for 100 ms
Operating current consumption	approx 30 - 50 mA
Supply voltage	24 VDC ±10 %
Output	PNP
Ambient temperature	0 - 70 °C
Accuracy	1 % of full range
Resolution	1 °C / 2 °F
Programming	3 button key pad
Temperature sensor	Pt 100

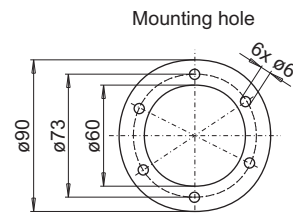
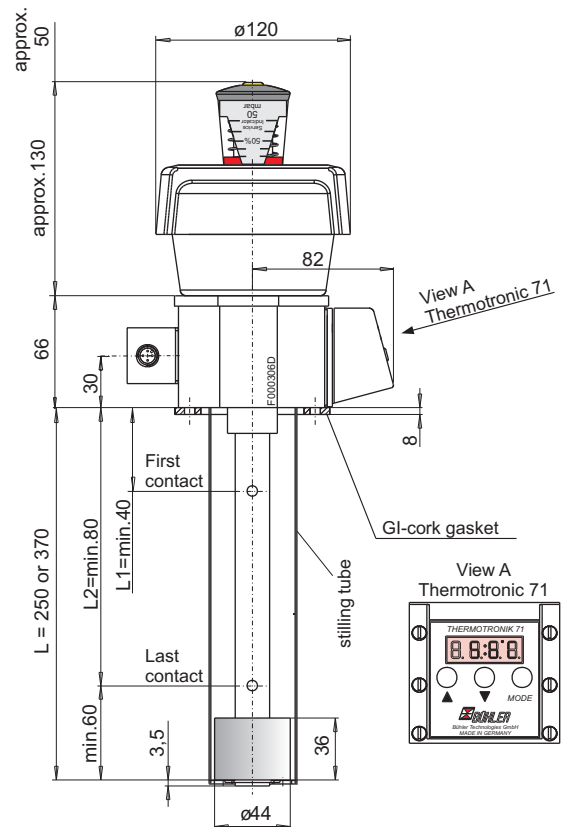
General Description of Thermotronic 71

The Thermotronic 71 is a combined microprocessor controlled digital display and control unit for monitoring and stabilizing the operating temperature in fluid power systems.

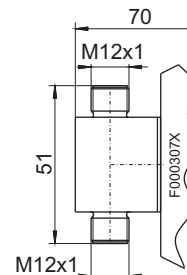
The actual temperature is displayed on a high visibility LED display. The status of the entire unit (output, sensor, broken wire) is indicated by separate LED's. The value can be set to Celsius or Fahrenheit.

Programming is by touch keys. The settings are protected against unauthorized operation by key lock.

Dimensions (mm)



Connector 2x M12



Order Information

Nivovent 85 RE

Part-no.	Connector	Display	L =	L1=	L2=	Temperature-contact T1	Temperature-contact T2	Stilling tube
1085900111	2xM12	yes	370	300 NO	no	no	no	yes
1085900113	2xM12	yes	370	300 NO	no	T1 = 70 PNP	no	yes
1085900117	2xM12	yes	250	190 NO	no	no	no	yes
1085900118	2xM12	yes	250	190 NO	no	T1 = 70 PNP	no	yes

Multiterminal RE

- RENAULT Specification -



Over the years the Fluidcontrolterminal has taken a very significant role in condition monitoring of fluid power systems.

Based on the experience with this combined unit, Bühler is introducing a more advanced product with a greater integration of functions.

The Multiterminal RE integrates the function of a tanktop return-line filter with advanced two-stage capacity monitor and filling port.

The design allows easy configuration for individual applications. The Multiterminal consists of a cast aluminum baseplate with integrated return-line filter head. The head offers three different G 1 inlet ports situated 90° and in addition an G 1/2 filling port. Also a port for a cartridge valve is provided where automated filling is required. Two sample ports are provided for alternate use plus one sample port in the return line.

The base plate has an interface flange according to DIN 24550/T2. The flange can take any suitable breather filter or can be equipped with Nivovent units from either series 7 or 8. These units feature a qualified breather filter with integrated level controls and temperature display plus controls as an option.

- **Combination of:**
 - **Breather,**
 - **Level- and temperature control,**
 - **Return-line filter with capacity indicator,**
 - **Sample ports for reservoir and return line,**
 - **Filling port**

- **Return-line filter with filter element 10µm according to DIN 24550**

- **International standard flange DIN 24557, part 2 integrated in base plate**

- **Compact dimensions**

- **Easy installation**

- **Modular design**

Technical Data

Operating pressure (Return-line)	max 10 bar
Operating temperature	max. 80°C

Material

Base plate	GK-AISI12
Gasket	GI-cork
Filter cap and -housing	plastic

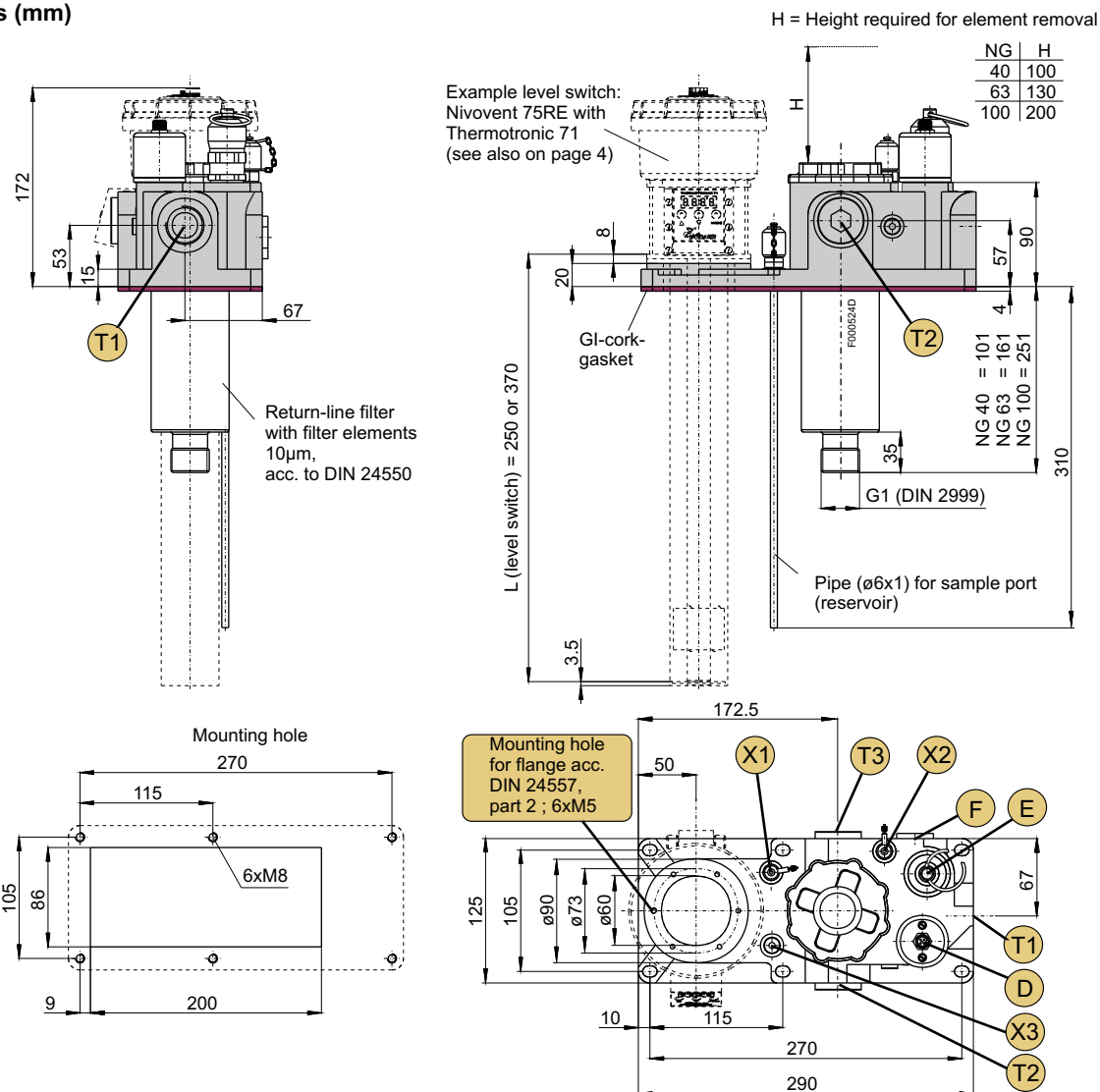
Filter Data

Opening pressure bypass	Δp 3.5 bar \pm 10%
Nominal size	NG 40, NG 63 or NG 100
Filter element according DIN 24550	10 μ m

Weight

Multiterminal without level switch	3.5 kg (NG 100)
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Dimensions (mm)



Note:

The return-line filter is part of the basic unit and available in the sizes NG40, NG63 and NG100.

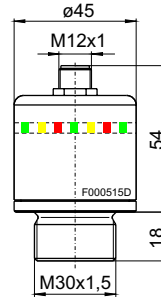
Placement of Connections:

D	= Capacity indicator, Bühler VSA 24-SM-2,2/2,9
E	= Filling port G1/2, Stäubli SBA 11/CN
F	= Sealing plug
T1	= Connection G1 for return-line filter
T2 / T3	= Sealing plug G1 (alternative connection for return-line filter, connection T1)
X1	= Sample port G1/8, mini-mess with pipe for probe reservoir
X2	= Sample port G1/8, mini-mess for probe return-line
X3	= Sealing plug G1/8 (alternative connection for X1)

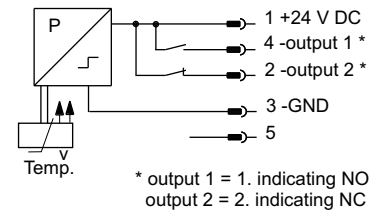
(The connections at T1, T2 and T3 as well as X1 and X3 may be configured by the customer .)

Connection D - Capacity Indicator

Model	Bühler VSA 24-SM-2,2/2,9
	- self-monitoring -
Max. voltage	24 V DC
Max. current	1 A at 24 V DC
Max. operat. pressure	10 bar
Indication	electric / visual (light-em. diodes)
1. indicating (forewarn)	2.2 bar
2. indicating (shutoff)	2.9 bar
Operating temperature	0 to + 85°C
Cold start suppression	from 30°C (medium temperature)
Connector	M12x1, 5-pol. (without plug)
Protection class	IP67 (with plug fixed)
Material	Al / PC

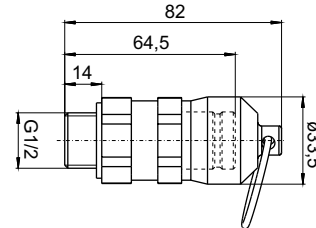


Wiring diagram



Connection E - Filling Port

Model	Stäubli SBA 11/CN
	(plug)
Nominal size	11
Connection	male thread G 1/2
Material	chromsteel / hardened steel



Ordering Information

Basic unit Multiterminal comprising of:
base plate, plate gasket, connections configured as described on page 2
and

return-line filter
with filter-element 10µm

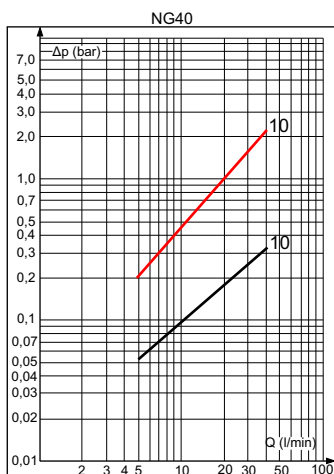
Multiterminal RE

Part-no.	10018199RE	10018299RE	10018399RE
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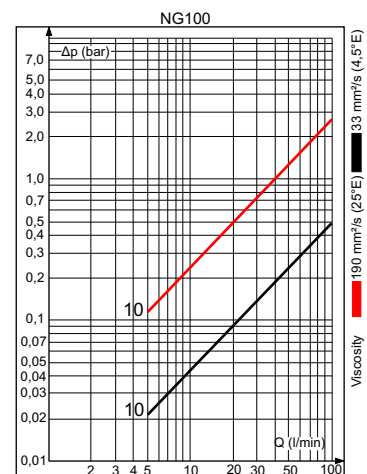
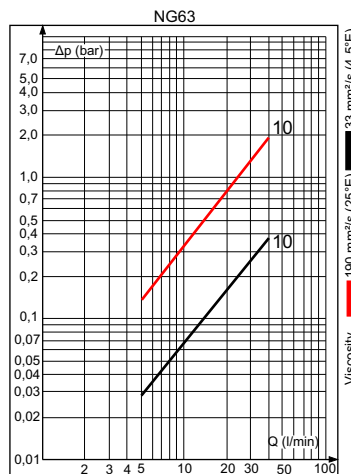
Accessories / Spare Parts: DIN-filter element 10µm

Model	NG 40	NG 63	NG 100
Part-no	N 0040 RN 10	N 0063 RN 10	N 0100 RN 10
	1001004010	1001006310	1001010010

Flow rate/pressure drop curve compl. filter



F000525X



Level Switches acc. to Renault Specification

Nivovent 75 RE 18
L = 250
Part-no: 1075900118

Nivovent 75 RE 13
L = 370
Part-no: 1075900113

Tecnical data: see data sheet DE 10 0061

Nivovent 85 RE 18
L = 250
Part-no: 1085900118

Nivovent 85 RE 13
L = 370
Part-no: 1085900113

Tecnical data: see data sheet DE 10 0062



Level Control NS 61-39 D 933

- VW Specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of fluid min. 0.8 kg/dm³

Material:

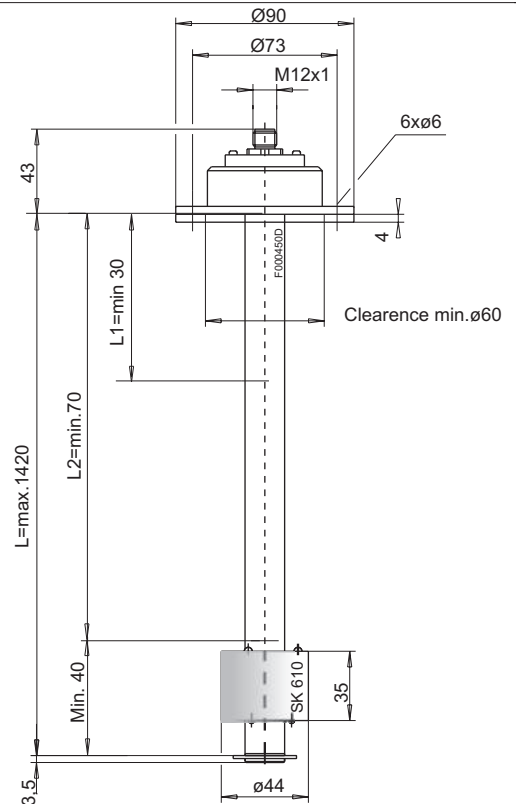
Float SK 610 hard PU
 Switch tube brass
 Flange PA 6

Level contacts

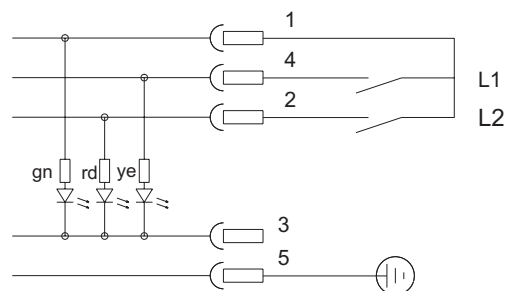
K10
 Function NO
 Min. distance of contact 40 mm
 Max. voltage 24 V
 Max. current 0.5 A
 Contact load 10 VA

Connector socket

M12 (with female plug fixed)
 Protection class IP 67
 LED-female plug not included in delivery



Wiring diagram



All figures at empty reservoir

Order Information

Type	Part No.	L	L1	L2
NS 61-39 D 933	10101399	Variable	Variable NO*	Variable NO*

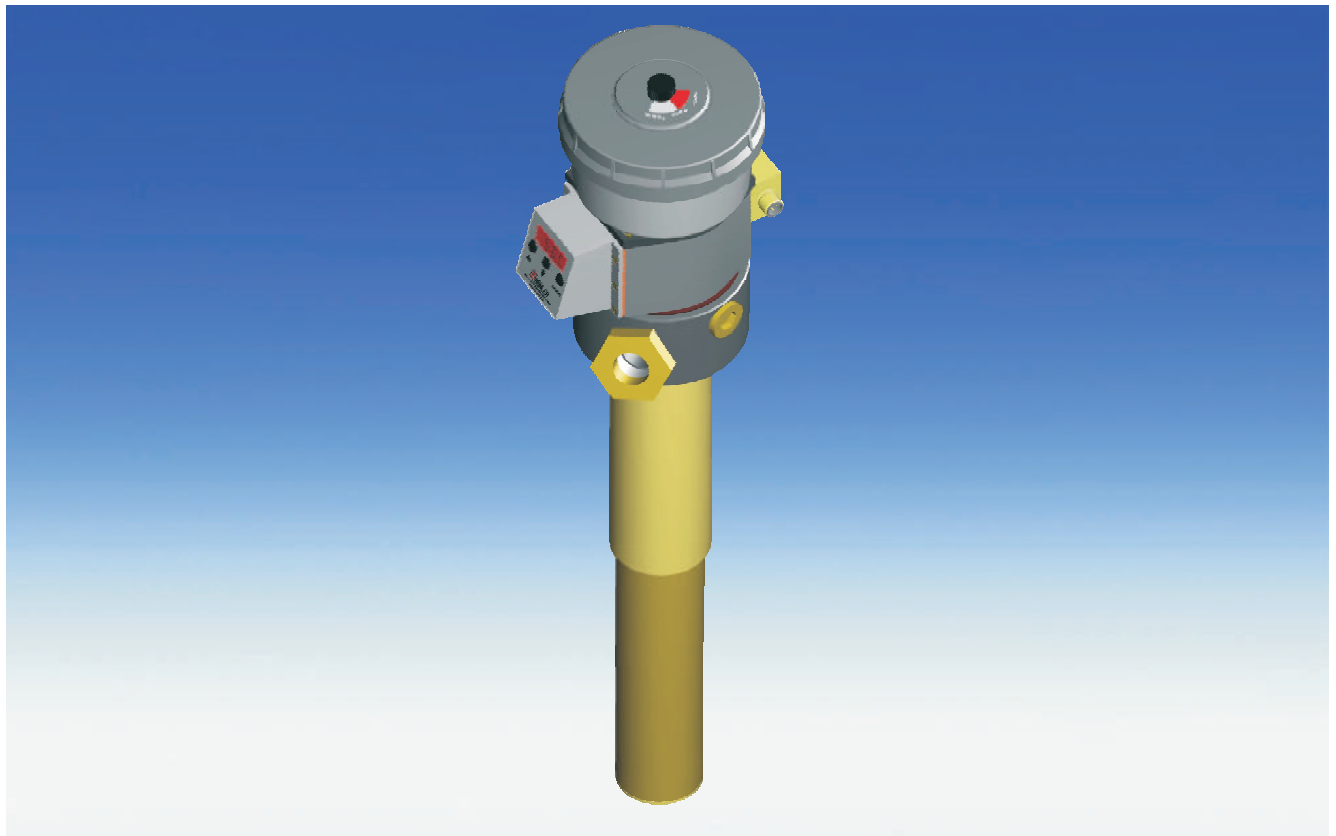
NO = normally open

we reserve the right to amend specifications

Fluidcontrolterminal FC-T G1/2-75-BMW

- BMW specification -

easyjust



Systematic oil care is of great importance to operators of fluid power and lubrication systems who wish to minimize maintenance costs and optimize the durability of both the oil and system components.

Checking both cleanliness and chemical composition is made easier by having a dedicated sampling port. Topping off the system through a dedicated G1/2 port fitted with a quick release coupling ensures cleanliness and facilitates the use of filter carts.

By incorporating the above features with a level control, temperature control and breather filter with condition indicator, BÜHLER has designed an integrated solution giving cost savings on installation. It should be noted that the filler port is totally isolated from the float tube in order to prevent incorrect level readings while filling/topping off.

The fluidcontrol terminal FC-T G1/2-75-DC 75BMW in the configuration shown complies with BMW requirements. It provides two M12 connector sockets, a temperature display and preset level contacts.

Please note that our product line contains many more options.

- **Level controls**
- **Temperature controls**
- **DIN - flange**
- **Filling port G1/2**
- **3 µm breather filter including fill prevention insert**
- **Clogging indicator**
- **Compact dimensions**
- **Easy installation**

Technical Data

Operating pressure max.	1 bar
Operating temperature max.	80 °C
Density of fluid min.	0.8 kg/dm ³ (0.029 lb/in ³)

Material:

Float SK 610	hard PU
Switch tube	brass
Stilling tube	brass
Flange	galvanised steel
Breather	PA
Retention rate	SM-L = 3 µm

Level contact

Level contact	K101 and K102
Min. distance between contacts	40 mm
Max. voltage	24 V
Max. current	0.5 A
Max. contact load	10 VA

Thermotronic 71

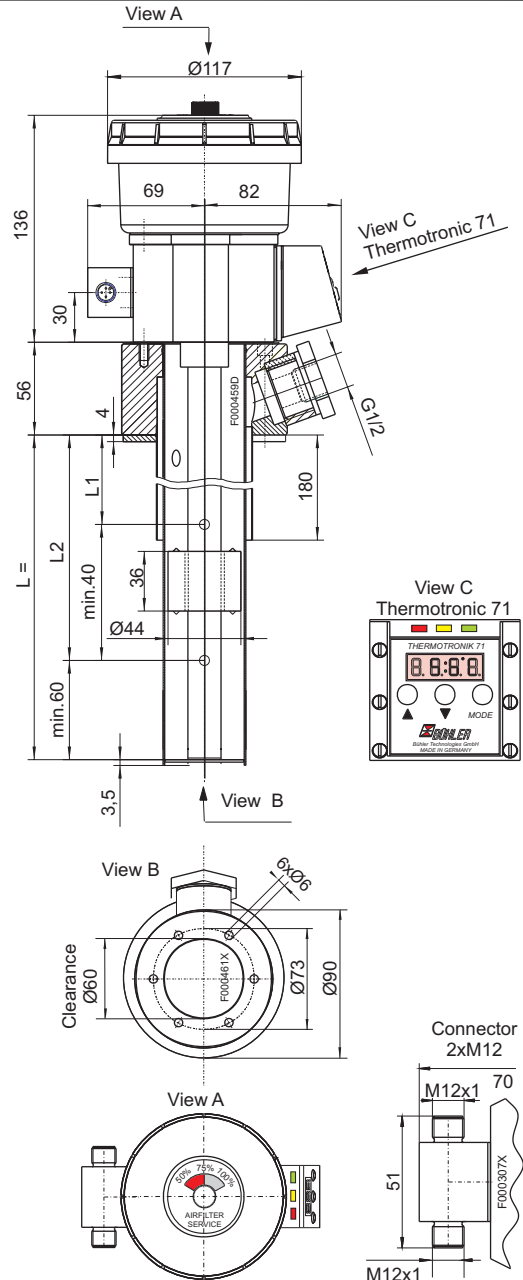
Range of temperature display	from -20 to +120 °C / 4° to 248 °F
Range of alarm indication	0 to +99 °C or 32° to 210 °F
Programmable set points	2
Material housing	PA, IP65
Display	four digit seven segment-LED-display and three light emitting diodes for level status display

Current consumption at power up	about 140 mA for 100 ms
Operating current consumption	approx 30 - 50 mA
Supply voltage	24 VDC ±10 %
Output	PNP
Ambient temperature	0 - 70 °C
Accuracy	1 % of full range
Resolution	1 °C / 2 °F
Programming	via three touch keys
Temperature sensor	PT 100

General description of Thermotronic 71

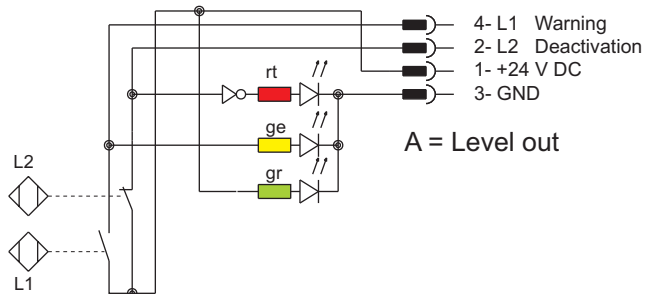
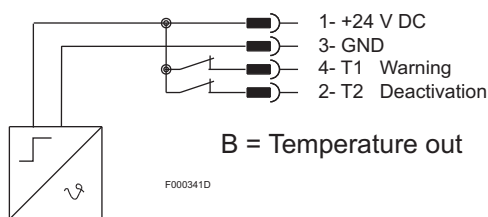
The Thermotronic 71 is a combined microprocessor controlled digital display and control unit for monitoring and stabilizing the operating temperature in fluid power systems.

The actual temperature is displayed on a high-visibility LED display. The status of the entire unit (output, sensor, broken wire) is indicated by separate LED's. The value can be set to Celsius or Fahrenheit. Programming is by touch keys. The settings are protected against unauthorized operation by key lock.



Wiring Diagram

Normal position: float on top = filled reservoir



Order Information

FC-Terminal G1/2-75BMW

Part-no	Connector	Display	L =	L1=	L2=	Temperature-contact T1	Temperature-contact T2
1175900401	2xM12	yes	250mm	150 NO *	190 NC *	50°C / NC *	60°C / NC *
1175900402	2xM12	yes	370mm	150 NO *	200 NC *	50°C / NC *	60°C / NC *
1175900403	2xM12	yes	520mm	200 NO *	300 NC *	50°C / NC *	60°C / NC *

*NC=normally closed / NO=normally open

Accessories

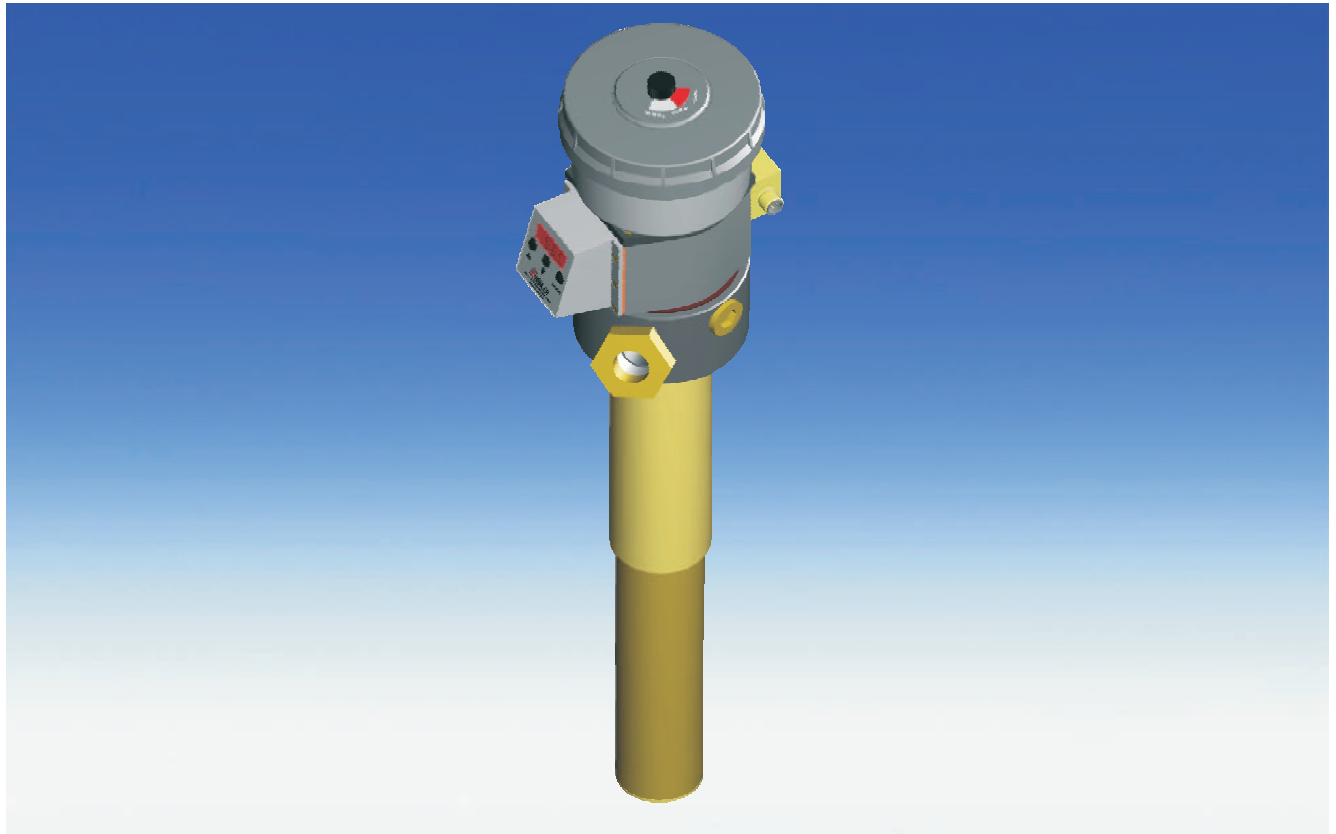
Part No. 9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0m

Fluidcontrolterminal FC-T G1/2-75-DC

- Daimler specification -

easyjust



Systematic oil care is of great importance to operators of fluid power and lubrication systems who wish to minimize maintenance costs and optimize the durability of both the oil and system components.

Checking both cleanliness and chemical composition is made easier by having a dedicated sampling port. Topping up the system through a dedicated G1/2 port fitted with a quick release coupling ensures cleanliness and facilitates the use of filter carts.

By incorporating the above features with a level control, temperature control and breather filter with condition indicator, BÜHLER has designed an integrated solution giving cost savings on installation and tank apertures. It should be noted that the filler port is totally isolated from the float tube in order to prevent incorrect level readings whilst filling/topping up.

The fluidcontrolterminal FC-T G1/2-75-DC 75DC in this configuration complies with the Daimler requirements. It provides two M12 connector sockets, a temperature display and preset level contacts.

Please note that our programme contains more Daimler specific versions of the Nivotemp and Nivovent series.

- Level controls
- Temperature controls
- DIN - flange
- Filling port G1/2
- 3 µm breather filter including fill prevention insert
- Clogging indicator
- Compact dimensions
- Easy installation

Technical Data

Operating pressure max.	1 bar
Operating temperature max.	80 °C
Spec. gravity of fluid min.	0.8 kg/dm ³

Material

Float SK 610	hard PU
Switch tube	brass
Stilling tube	brass
Flange	galvanised steel
Breather	PA
Filter element (retention rate)	SM-L (3 µm)

Level contact

Function	K101 and K102
Min. distance between contacts	40 mm
Max. voltage	24 V
Max. current	0.5 A
Contact load	10 VA

* NC = normally closed / NO = normally open, all figures at empty reservoir

Thermotronic 71

Range of temperature display	from -20 to +120 °C / 4° to 248 °F
Range of alarm indication	0 to +99 °C or 32° to 178 °F
Programmable set points	2
Material housing	PA, IP65
Display	four digit seven segment-LED-display, light emitting diodes for

status display

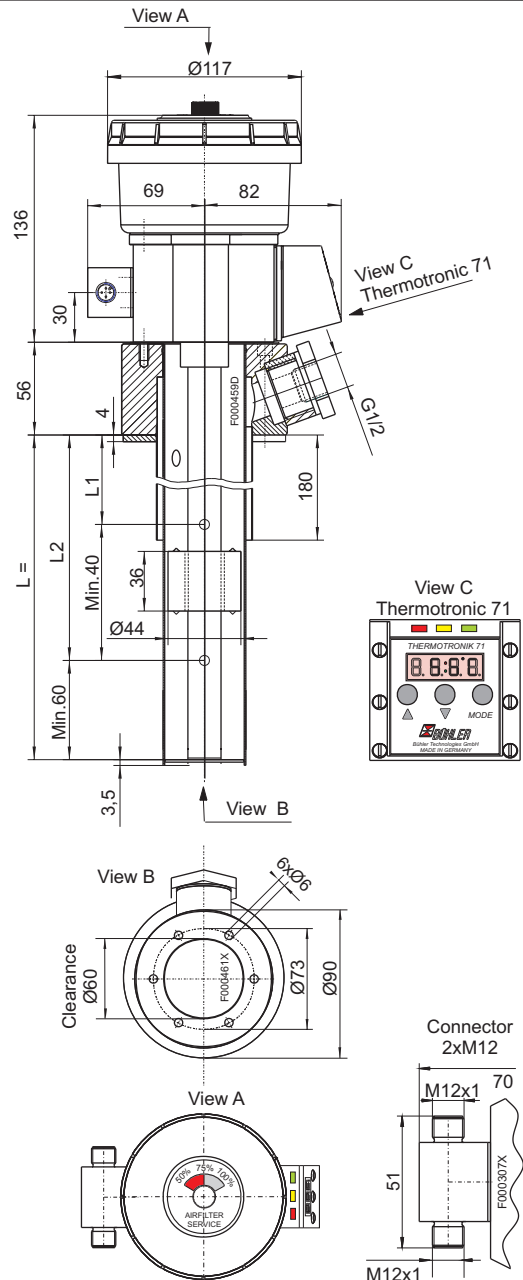
Current consumption at power up	about 140 mA for 100 ms
Operating current consumption	approx 30 - 50 mA
Supply voltage	24 VDC ±10 %
Output	PNP
Ambient temperature	0 - 70 °C
Accuracy	1 % of full range
Resolution	1 °C / 2 °F
Programming	3 button key pad
Temperature sensor	PT 100

General description of Thermotronic 71

The Thermotronic 71 is a combined microprocessor controlled digital display and control unit for monitoring and stabilizing the operating temperature in fluid power systems.

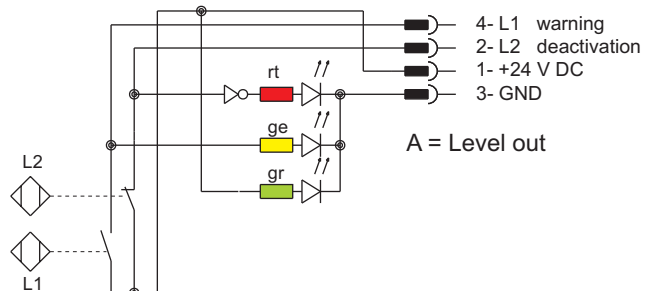
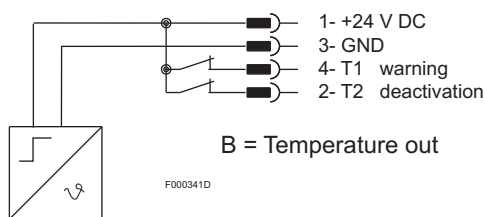
The actual temperature is displayed on a high visibility LED display. The status of the entire unit (output, sensor, broken wire) is indicated by separate LED's. The value can be set to Celsius or Fahrenheit. Programming is by touch keys. The settings are protected against unauthorized operation by key lock.

Dimensions (mm)



Wiring Diagram

Normal position: float on top = filled reservoir



Order Information

FC-T G1/2-75DC

Part-no	Connector	Display	L =	L1=	L2=	Temperature-contact T1	Temperature-contact T2
1175900201	2xM12	yes	250 mm	150 mm NC *	190 mm NO *	50 °C / NC *	60 °C / NC *
1175900202	2xM12	yes	370 mm	150 mm NC *	200 mm NO *	50 °C / NC *	60 °C / NC *
1175900203	2xM12	yes	370 mm	200 mm NC *	300 mm NO *	50 °C / NC *	60 °C / NC *
1175900204	2xM12	yes	520 mm	200 mm NC *	300 mm NO *	50 °C / NC *	60 °C / NC *

*NC=normally closed / NO=normally open

Accessories

Part No. 9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0m

Fluidcontrolterminal G3/4 tedrive

- tedrive Germany - Specification -

easyjust

Technical Data

Max. operating pressure 1 bar
 Max. operating temperature 80 °C
 Min. density of fluid 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Stilling tube brass
 Housing material PA 12
 Flange galvanised steel
 Breather retention rate SM-L (3 µm)

Level contacts

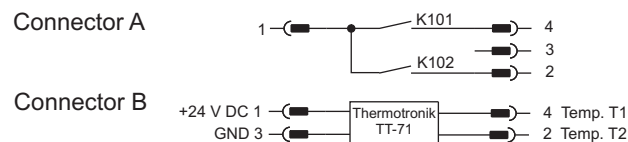
K101 and K102
 Function L1 = NO / L2 = NO*
 Max. voltage 24 V DC
 Max. current 0.5 A
 Max. contact load 10 VA
 * NO = normally open, NC = normally closed

Temperature sensor

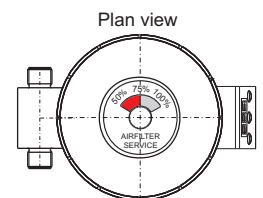
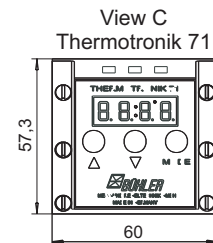
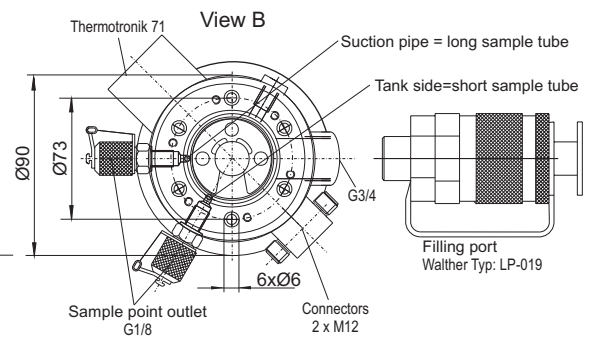
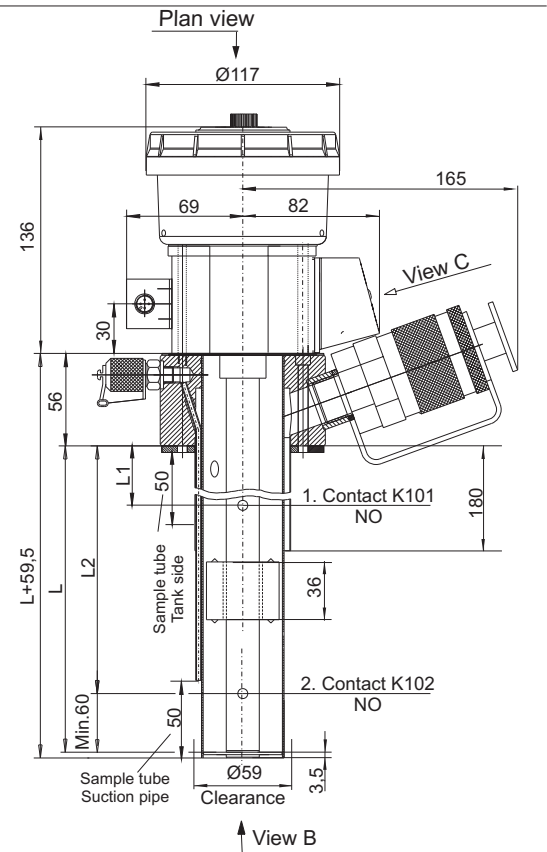
Thermotronic 71
 Range of temperature display from -20 to +120 °C / 4° to 248 °F
 Alarm indicator range 0 to +99 °C or 32° to 178 °F
 Display four digit seven segment-LED-Display
 Operating current consumption about 30 -50 mA
 Supply voltage 24 VDC ±10 %
 Output switches 2 x PNP
 T1 = 65°C NC
 T2 = 75°C NC
 Ambient temperature 0 - 70 °C
 Accuracy 1 % of full scale
 Resolution 1 °C / 2 °F
 Programming 3 button key pad
 Connector 2 x M12
 Protection class IP 65

Wiring Diagram

All figures at empty reservoir



F000463X



F000462D

We reserve the right to amend specification

Order Information

Type	Part No.	L	L1	L2	T1	T2
FC-T G3/4-75 GETRAG01	1175900301	250 mm	40 mm NO	190 mm NO	65 °C NC	75 °C NC
FC-T G3/4-75 GETRAG02	1175900302	370 mm	40 mm NO	310 mm NO	65 °C NC	75 °C NC

Accessories

Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0m

Fluidcontrolterminal G1/2-75-VST

- tedrive Germany - specification -

easyjust

Technical Data

Max. operating pressure 1 bar
 Max. operating temperature 80 °C
 Min. density of fluid 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Stilling tube brass
 Flange galvanised steel
 Breather PA
 Breather type Hydac BF P 7 F 3 UBM 0.0

Level contact

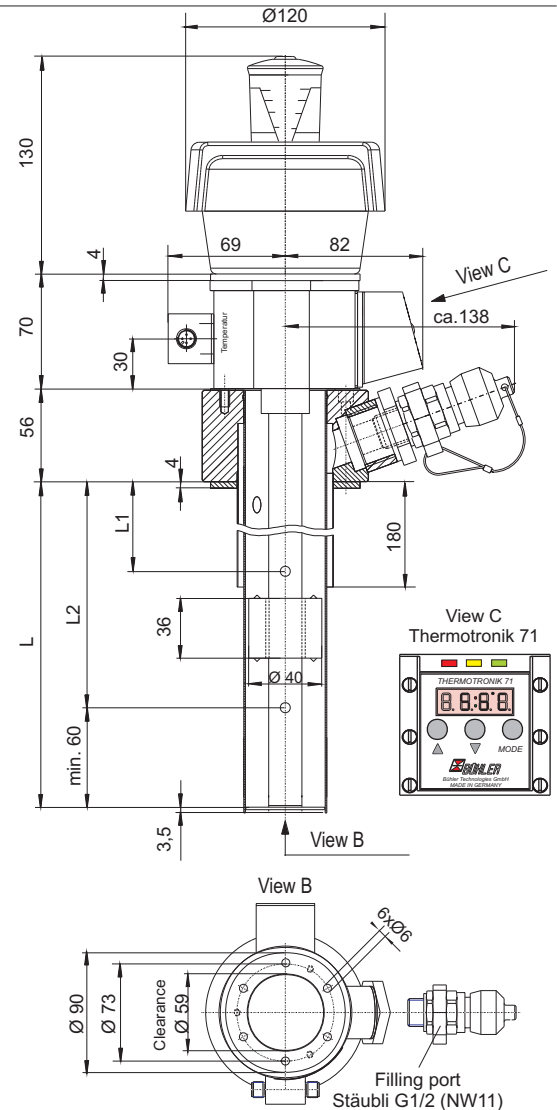
Function K101 and K102
 NC / NO*
 Min. distance between contacts 40 mm
 Max. voltage 24 V
 Max. current 0.5 A
 Max. contact load 10 VA
 * NC = normally closed / NO = normally open, all figures at empty reservoir

Thermotronic 71

Range of temperature display from -20 to +120 °C / 4° to 248 °F
 Alarm indicator range 0 to +99 °C or 32° to 178 °F
 Programmable set points 2
 Material housing PA, IP65
 Display four digit seven segment-LED-display, light emitting diodes

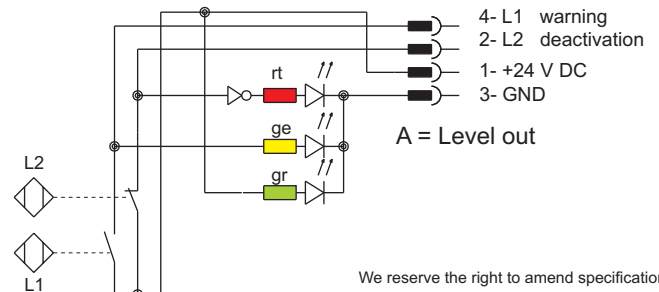
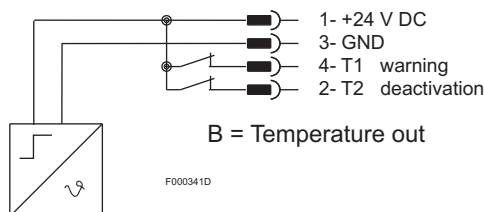
for status display

Current consumption at power up about 140 mA for 100 ms
 Operating current consumption approx 30 - 50 mA
 Supply voltage 24 VDC ±10 %
 Output PNP
 Ambient temperature 0 - 70 °C
 Accuracy 1 % of full range
 Resolution 1 °C / 2 °F
 Programming 3 button key pad
 Temperature sensor PT 100



Wiring Diagram

Normal position: float on top = filled reservoir



We reserve the right to amend specification

Order Information

FC-T G1/2-75 VST

Part-no	Connector	Display	L =	L1=	L2=	T1	T2
1175900501	2xM12	yes	250mm	120mm NC *	160mm NO *	50°C / NC *	55°C / NC

NC=normally closed / NO=normally open

Accessories Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0m

Fluidcontrolterminal GM-GL

- Opel / GM Specification -

Technical Data

Max. operating pressure 1 bar
 Max. operating temperature 80 °C
 Min. density of fluid 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Stilling tube brass
 Housing material PA 12
 Flange galvanised steel
 Breather retention rate SM-L (3 µm)

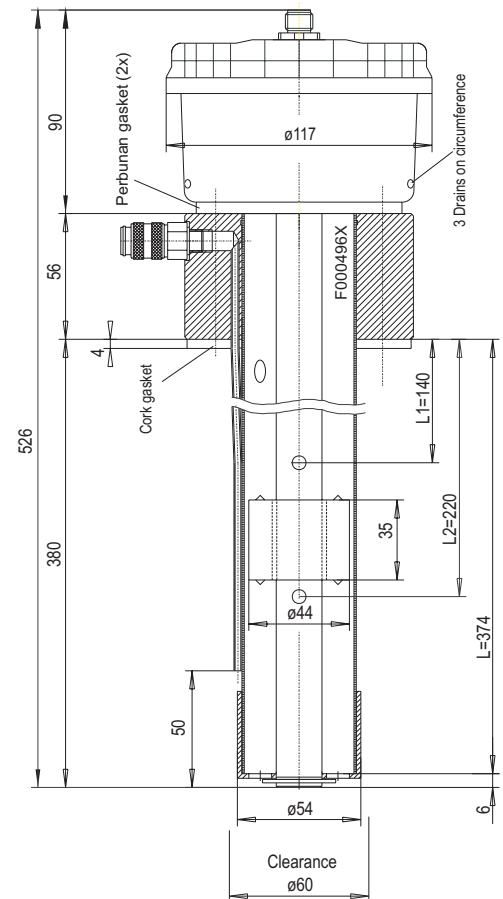
Male plug M12 (4-pol.)
 Protection class IP 67 with female plug fixed

Level contacts

2 x K10
 Function NO
 Max. voltage 24 V AC/DC
 Max. current 0.5 A
 Max. contact load 10 VA

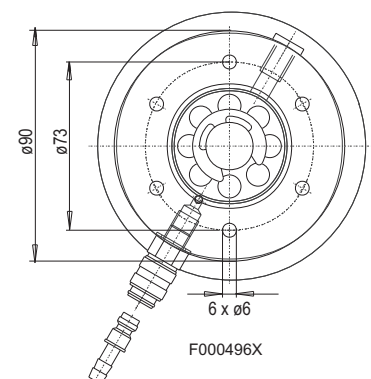
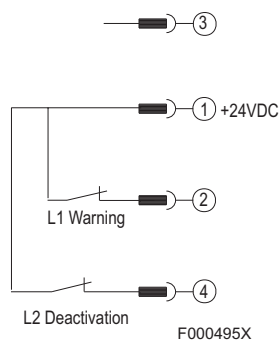
Scope of delivery

Sample point outlet hose coupling Rico-Mini DN 5
 Breather filter PI 0125-S:M-L
 Head screws 6 x M5x80
 Gaskets GI-cork-gasket
 2x Perbunan gasket



Wiring diagram

Normal position = at filled reservoir



we reserved the right to amend specification

Order Information

Type	Part No.	L	L1	L2
Fluidcontrolterminal GM-GL	10100599	370 mm	140 mm NO*	220mm NO*

NO=normally open

Accessories

Part No. 9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0 m

Fluidcontrolterminal GM-D

- Opel / GM Specification -

Technical Data

Operating pressure 1 bar
 Operating temperature max. 80 °C
 Lowest specific gravitymin. 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Stilling tube brass
 Housing material PA 12
 Flange galvanised steel
 Breather retention rate SM-L (3 µm)

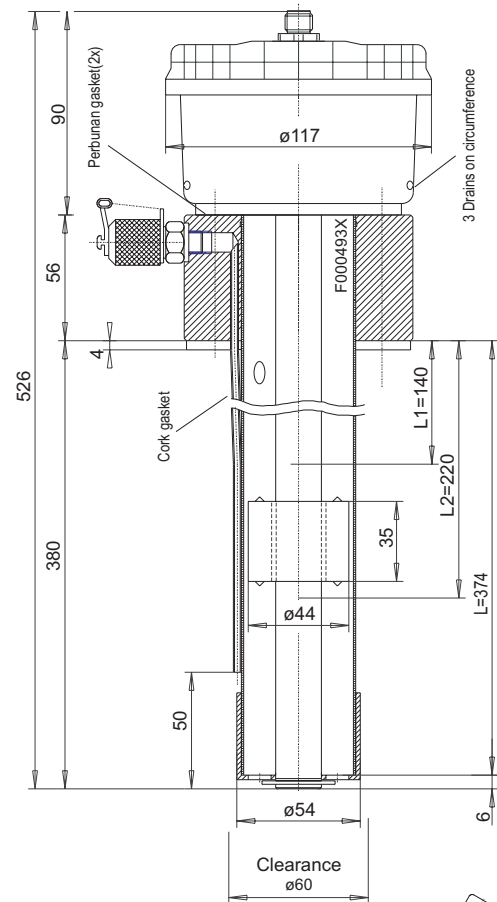
Male plug M12 (4-pol.)
 Protection class IP 67 with female plug fixed

Level contacts

Function 2 x K10
 L1 = NC / L2 = NO
 Max. voltage. 230 V AC/DC
 Max. current 0.5 A
 Max. contact load 10 VA

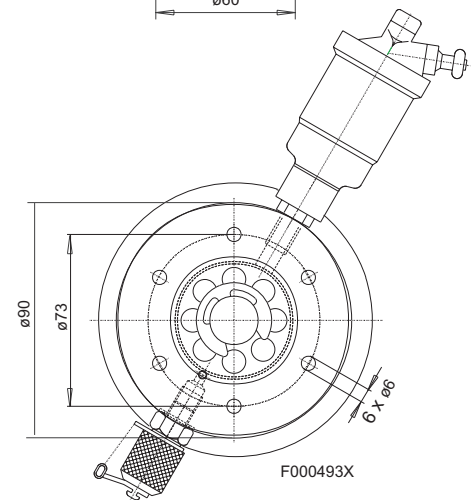
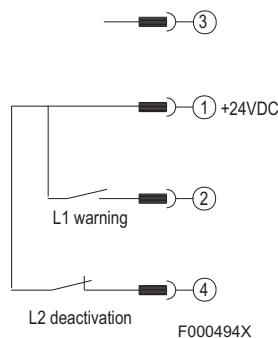
Scope of delivery

Sample point outlet Minimes 1620
 Breather filter PI 0125-SM-L
 Visual filter indicator TB 746/1
 Head screws 6 x M5x80
 Gaskets GI-cork-gasket
 2x Perbunan gasket



Wiring Diagram

Normal position = at filled reservoir



we reserved the right to amend specification

Order Information

Type	Part No.	L	L1	L2
Fluidcontrolterminal GM-D	10105399	370mm	140mm NC	220mm NO

*NC=normally closed / NO=normally open

Accessories

Part No. 9144050018

Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0 m

Nivotemp 64-2ej-3LED-M12

- Daimler specification -



By researching existing standards for fluid power packs including DIN 24346 regarding liquid level control, it was found that measuring to 300 mm depth was sufficient to control the level. Therefore the Bühler standard length of 370mm is sufficient and covers most applications. Flange mounting is almost universal for breather/filler units so it is also suitable for mounting level controls.

The Nivotemp 64-2ej-3LED-M12 in this configuration complies with the Daimler requirements. The LED's into the transparent socket with an M12 connector indicate the working condition for the level.

Please note that our product range contains more Daimler specific versions of the Nivotemp and Nivovent series.

- **Adjustable level contacts**
- **Bistable level contacts = only one float**
- **High float sensitivity**
- **International standard flange dimensions**
- **Easy installation**

Technical data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material:

Float SK 610 hard PU
 Switch tube brass
 Flange PA 6

Level contacts

Function NC / NO*
 Min. distance of contact 40 mm
 Max. voltage 24 V
 Max. current 0.5 A
 Max. contact load 10 VA

* NC = normally closed / NO = normally open

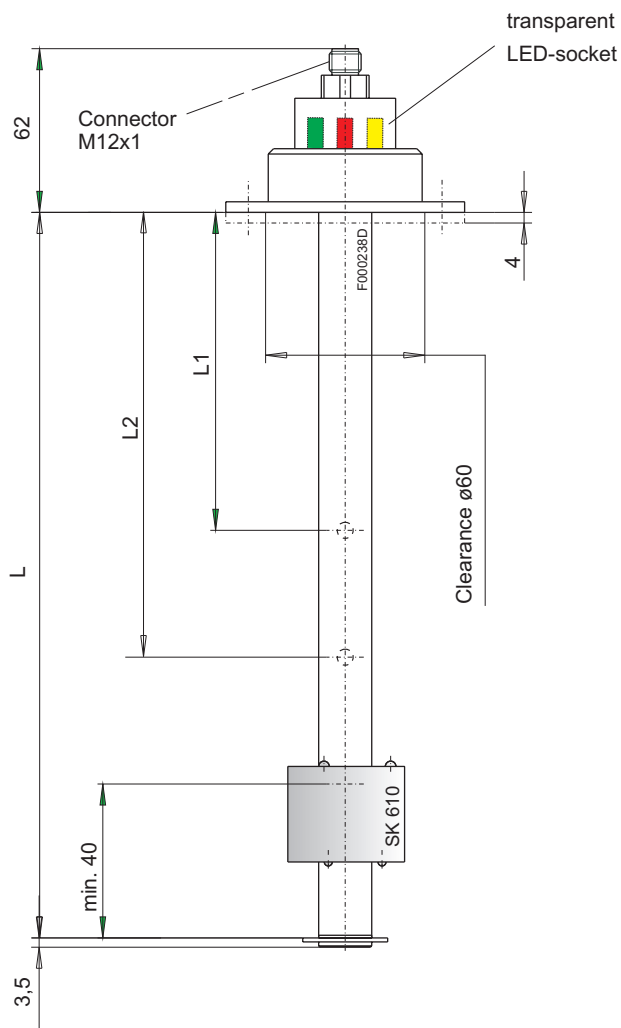
All figures at empty reservoir

Male plug

Protection class IP67 with female plug fixed

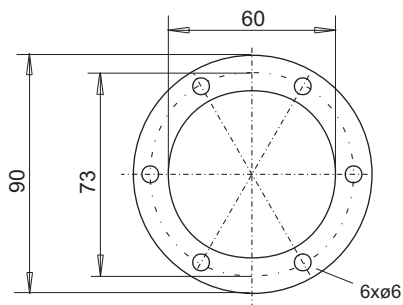
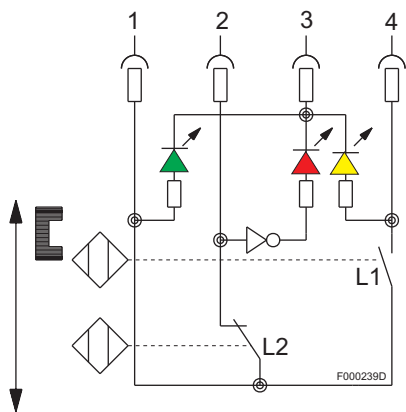
M12 x 1 (4 pol.)

Dimensions (mm)



Wiring Diagramm

Normal position = at filled reservoir



Ordering Information

Type	Part No.	L1	L2	Length L
Nivotemp 64-2ej-3LED-M12	10272999	150 mm NC *	200 mm NO *	370 mm
Nivotemp 64-2ej-3LED-M12	10273999	200 mm NC *	300 mm NO *	520 mm

* NC = normally closed / NO = normally open

Accessories

Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3,0 m

Nivotemp 61-1-TKÖ-..RD-M12

- Renault Specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Flange PA
 Stilling tube brass

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. voltage 24 V
 Max. current 1.0 A
 Max. contact load 10 VA

Temperature contacts

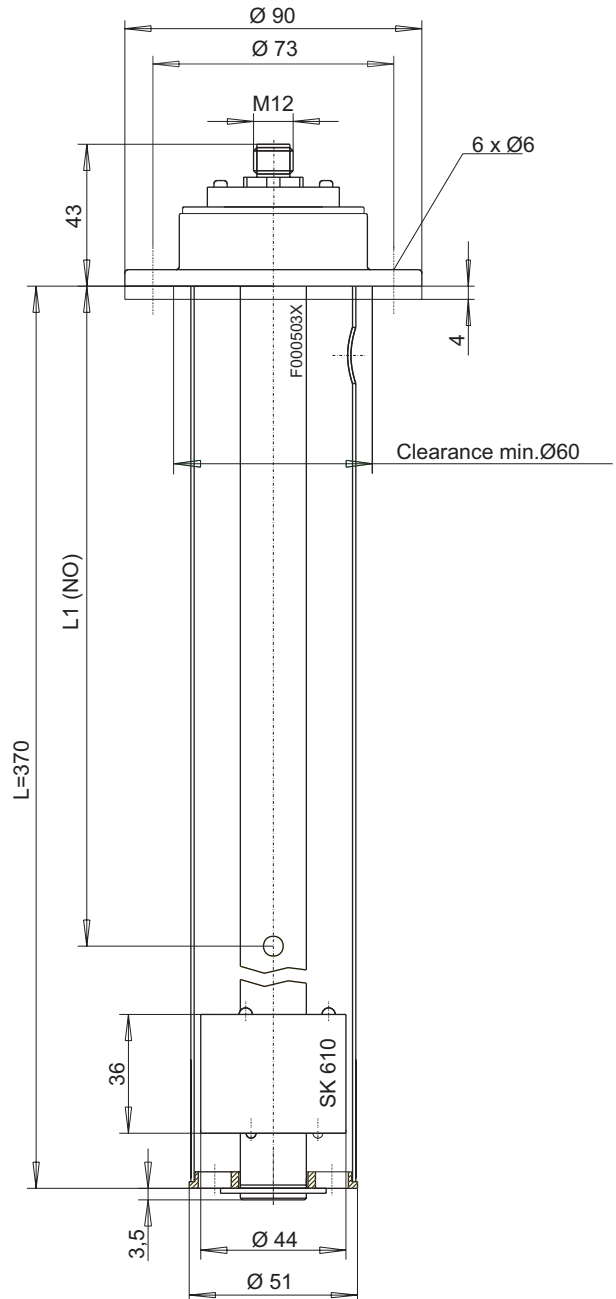
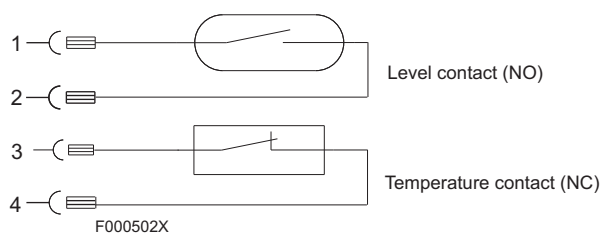
Max. voltage 24 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-60 = 60 °C NC
 TKÖ-70 = 70 °C NC

Connector

male plug M12 (4 pol.)
 female plug not in scope of delivery
 Protection class IP67 (with female plug fixed)

Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M12-V1	10113099	370 mm	200 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M12-V2	10113199	370 mm	300 mm NO *	70 °C NC *
61-1-TKÖ-60RD-M12-V3	10190199	370 mm	300 mm NO *	60 °C NC *

* NO = normally open, NC = normally closed

Accessories

Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3.0 m

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M12-VA

- Renault specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material

Float SK 221 1.4571
 Switch tube 1.4571
 Flange PA
 Stilling tube 1.4571

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 24 V
 Max. current 1.0 A
 Contact load 10 VA

Temperature contacts

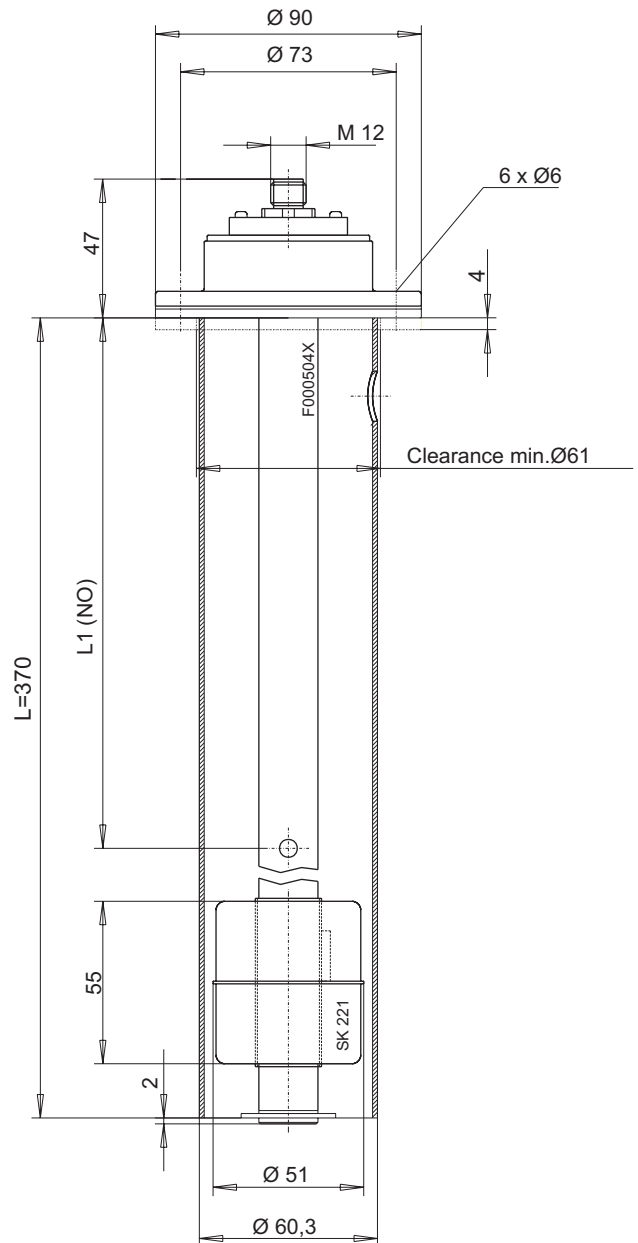
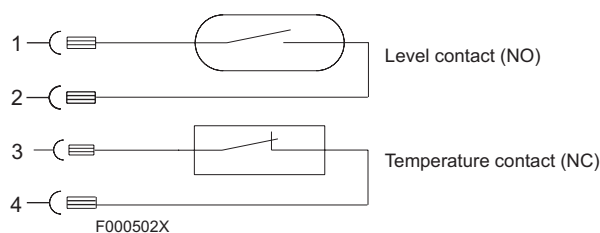
Max. voltage 24 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10K ± 3K
 Switch point TKÖ-70 = 70 °C NC

Connector

male plug M12 x 1 (4 pol.)
 female plug not in scope of delivery
 Protection class IP67 (with female plug fixed)

Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M12-VA1	10213099	370 mm	200 mm NO	70 °C NC
61-1-TKÖ-70RD-M12-VA2	10213199	370 mm	300 mm NO	70 °C NC

Accessories

Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3.0 m

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M3

- Renault specification -

Technical Data

Max. operating pressure 1 bar
 Max. operating temperature 80 °C
 Min. density of fluid 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Flange PA
 Stilling tube brass

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 230 V
 Max. current 1.0 A
 Max. contact load 10 VA

Temperature Contacts

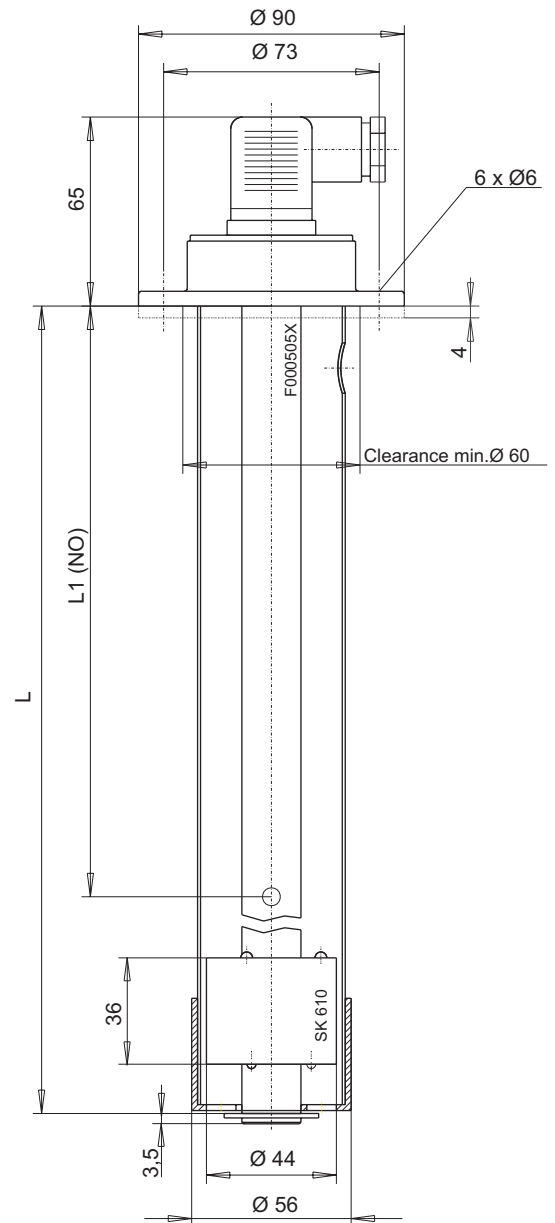
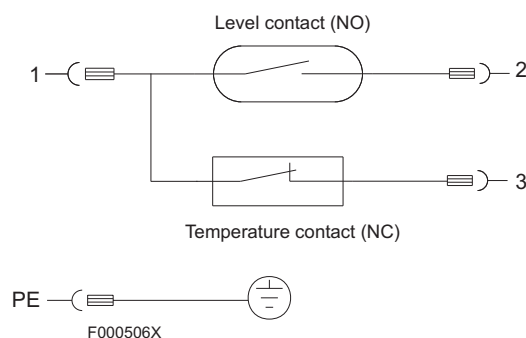
Max. voltage 230 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-70 = 70 °C

Connector

M3 (3-pol. + PE)
 Protection class IP 65

Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M3-V1	10108999	370 mm	200 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M3-V2	10110599	370 mm	300 mm NO *	70 °C NC *
61-1-TKÖ-70RDM3-V3	1016499	370 mm	80 mm NO *	60 °C NC *
61-1-TKÖ-70RD-M3-V4	10125399	370 mm	130 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M3-V5	10127899	250 mm	170 mm NO *	60 °C NC *

* NO = normally open, NC = normally closed

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M3-VA

- Renault Specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material

Float SK 221 1.4571
 Switch tube 1.4571
 Flange PA
 Stilling tube 1.4571

Level contacts

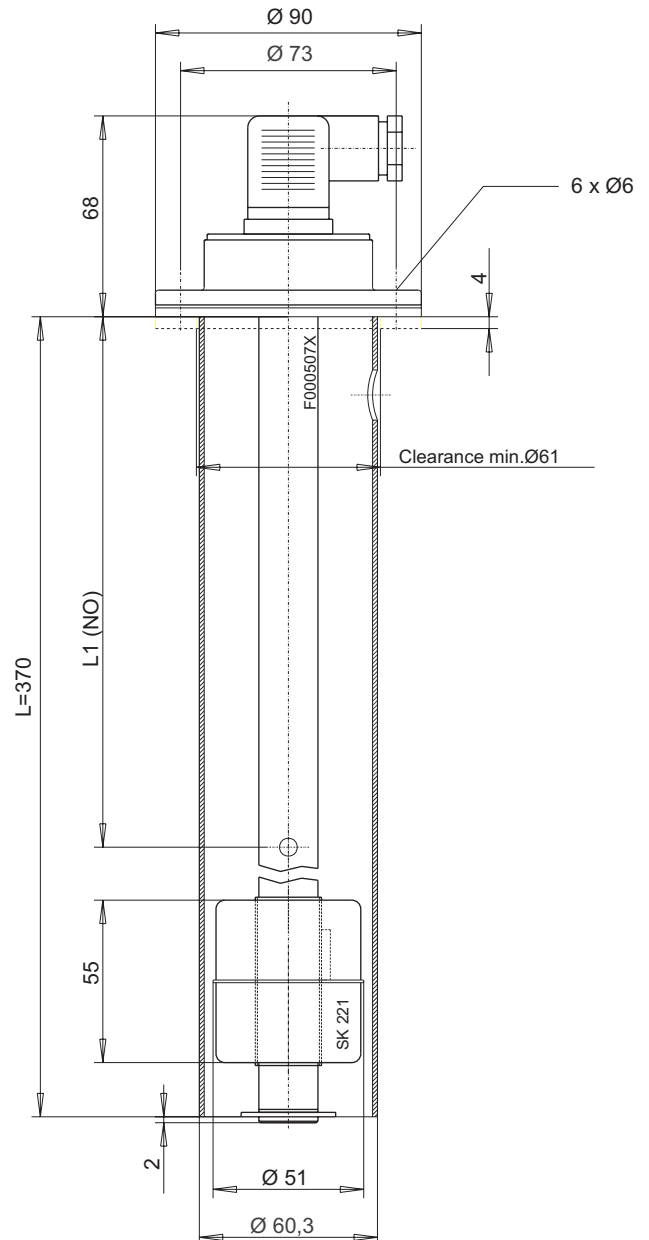
K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 230 V
 Max. current 1.0 A
 Contact load 10 VA

Temperature contacts

Max. voltage 230 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-70 = 70 °C NC

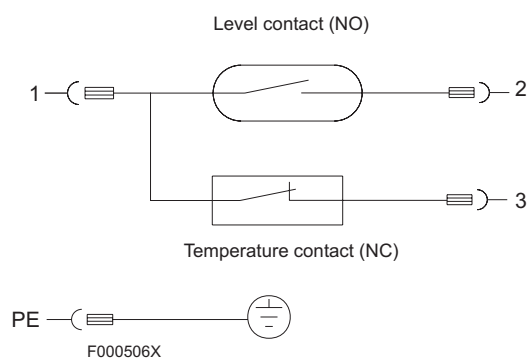
Connector

M3 (3-pol. + PE)
 Protection class IP 65



Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M3-VA1	10208999	370 mm	200 mm NO	70 °C NC
61-1-TKÖ-70RD-M3-VA2	10218999	370 mm	300 mm NO	70 °C NC

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M12

- PSA Peugeot Specification -

Technical Data

Max. operating pressure 1 bar
 Max. operating temperature 80 °C
 Min. density of fluid 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Flange PA
 Stilling tube brass

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 24 V
 Max. current 1.0 A
 Max. contact load 10 VA

Temperature contacts

Max. voltage 24 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-60 = 60 °C NC
 TKÖ-70 = 70 °C NC

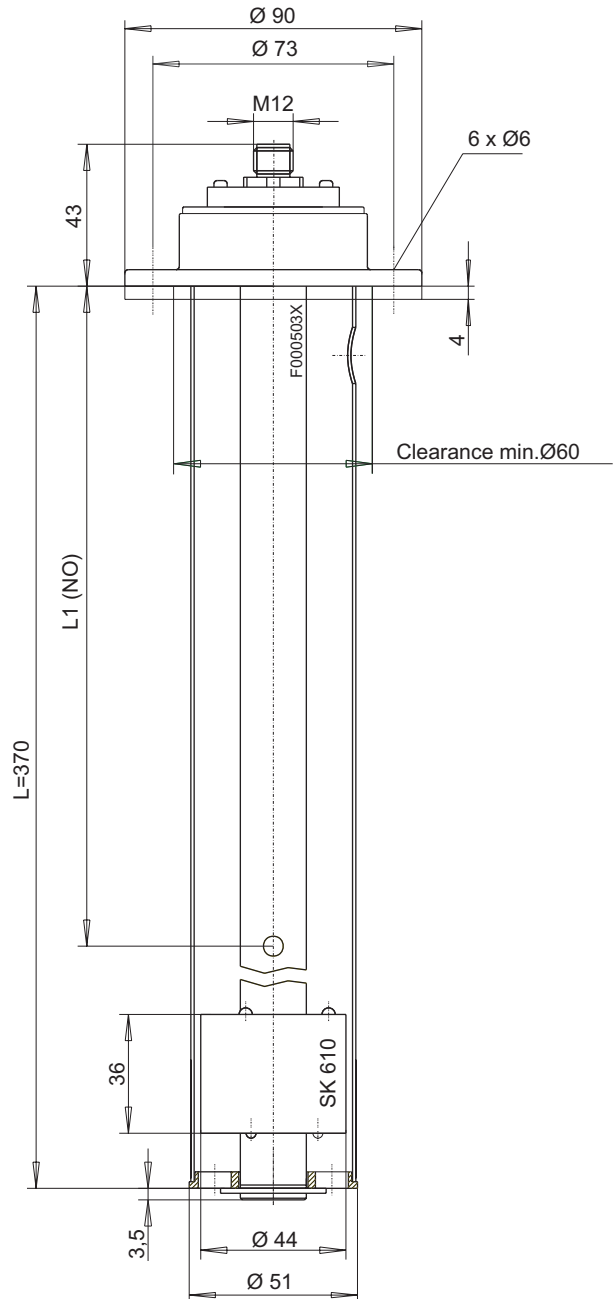
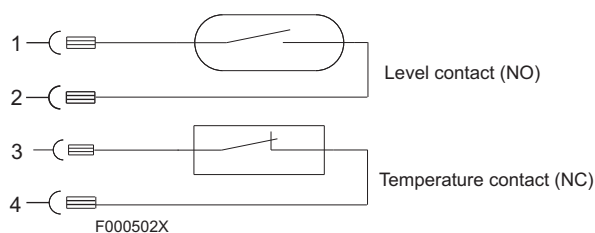
Connector

male plug M12 (4 pol.)
 female plug not in
 scope of delivery

Protection class IP67 (with female plug fixed)

Wiring diagram

All figures at empty reservoir



Order information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M12-V1	10113099	370 mm	200 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M12-V2	10113199	370 mm	300 mm NO *	70 °C NC *
61-1-TKÖ-60RD-M12-V3	10190199	370 mm	300 mm NO *	60 °C NC *

* NO = normally open, NC = normally closed

Accessories

Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3.0 m

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M12-VA

- PSA Peugeot Specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material

Float SK 221 1.4571
 Switch tube 1.4571
 Flange PA
 Stilling tube 1.4571

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 24 V
 Max. current 1.0 A
 Contact load 10 VA

Temperature contacts

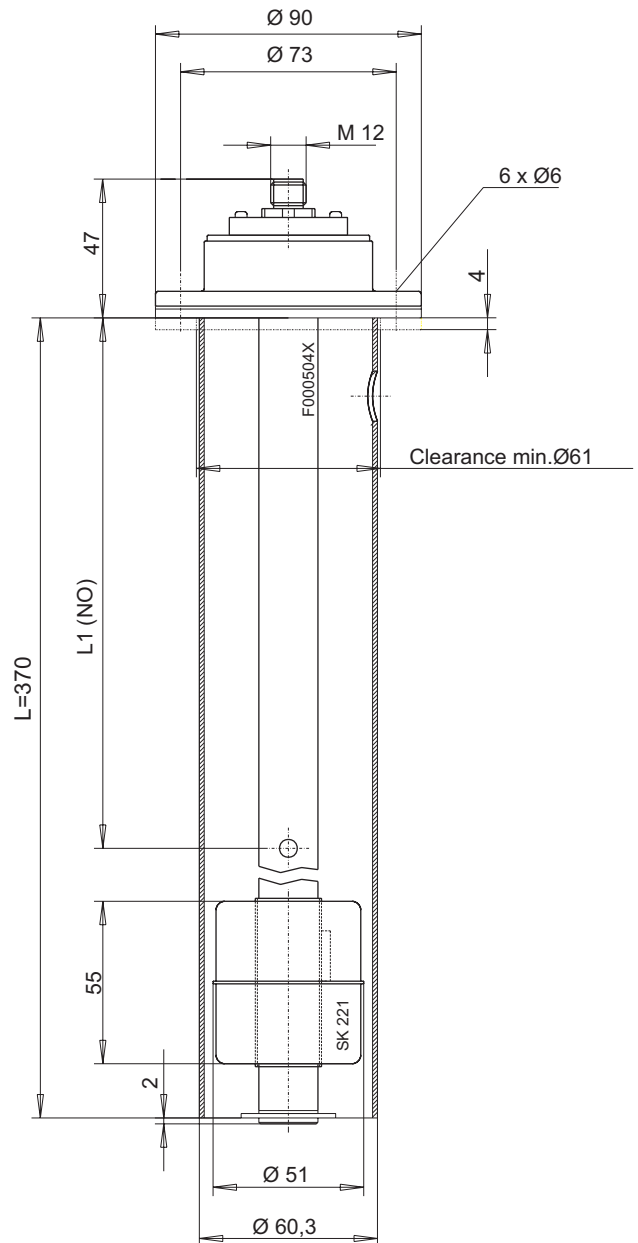
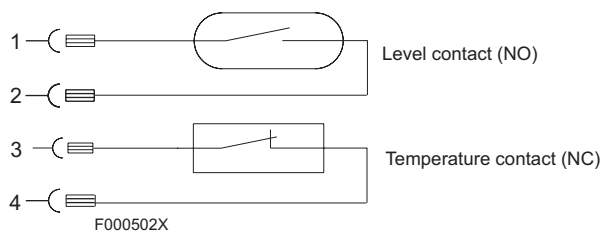
Max. voltage 24 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-70 = 70 °C NC

Connector

male plug M12 x 1 (4 pol.)
 female plug not in scope of delivery
 Protection class IP67 (with female plug fixed)

Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M12-VA1	10213099	370 mm	200 mm NO	70 °C NC
61-1-TKÖ-70RD-M12-VA2	10213199	370 mm	300 mm NO	70 °C NC

Accessories

Part No. 9144050018 Connecting cable M12x1 with 1 x 5 pole M12 plug cable length: 3.0 m

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M3

- PSA Peugeot Specification -

Technical Data

Max. operating pressure 1 bar
 Max. operating temperature 80 °C
 Min. density of fluid 0.8 kg/dm³

Material

Float SK 610 hard PU
 Switch tube brass
 Flange PA
 Stilling tube brass

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 230 V
 Max. current 1.0 A
 Max. contact load 10 VA

Temperature contacts

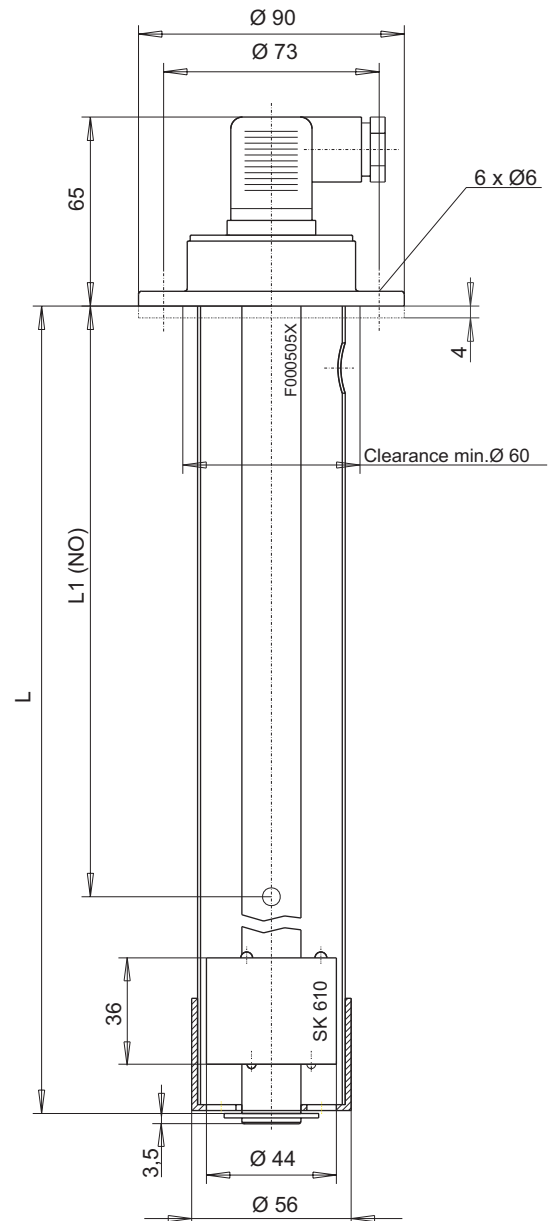
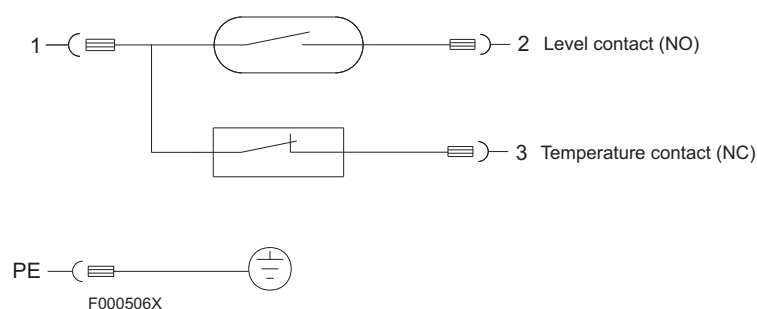
Max. voltage 230 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-70 = 70 °C

Connector

M3 (3-pol. + PE)
 Protection class IP 65

Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M3-V1	10108999	370 mm	200 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M3-V2	10110599	370 mm	300 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M3-V3	1016499	370 mm	80 mm NO *	60 °C NC *
61-1-TKÖ-70RD-M3-V4	10125399	370 mm	130 mm NO *	70 °C NC *
61-1-TKÖ-70RD-M3-V5	10127899	250 mm	170 mm NO *	60 °C NC *

* NO = normally open, NC = normally closed

we reserve the right to amend specifications

Nivotemp 61-1-TKÖ-..RD-M3-VA

- PSA Peugeot Specification -

Technical Data

Operating pressure max. 1 bar
 Operating temperature max. 80 °C
 Spec. gravity of float min. 0.8 kg/dm³

Material

Float SK 221 1.4571
 Switch tube 1.4571
 Flange PA
 Stilling tube 1.4571

Level contacts

K10
 Function NO
 Min. distance of contact 40 mm
 Max. Voltage 230 V
 Max. current 1.0 A
 Contact load 10 VA

Temperature contacts

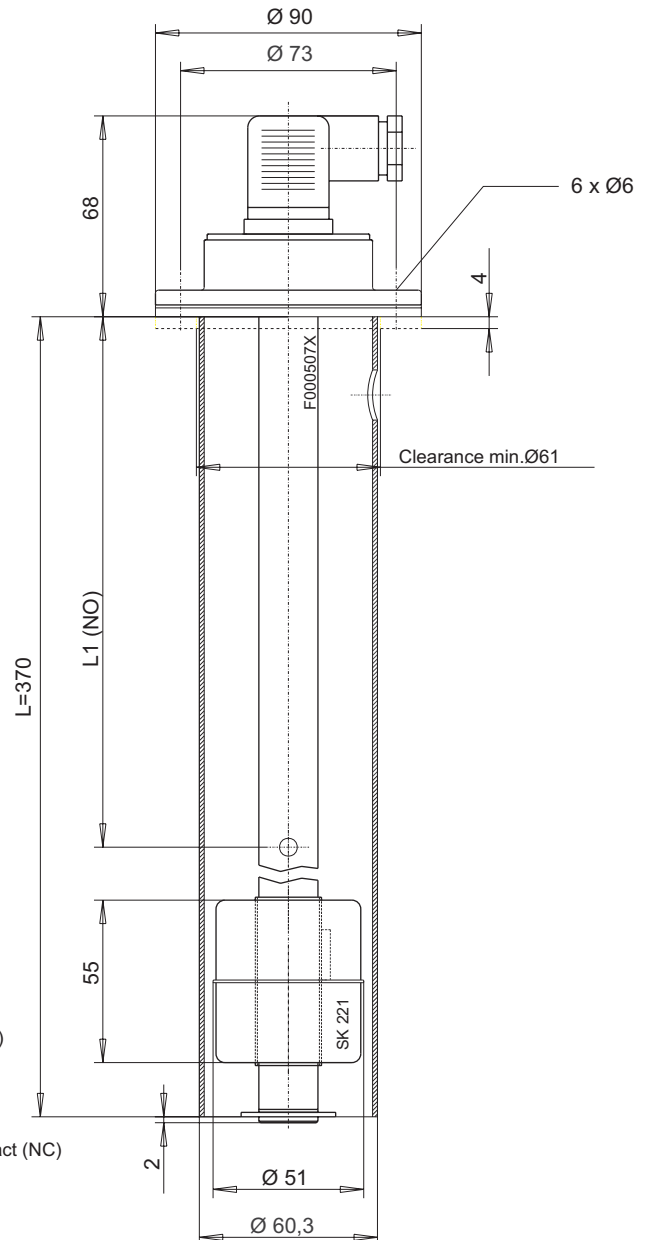
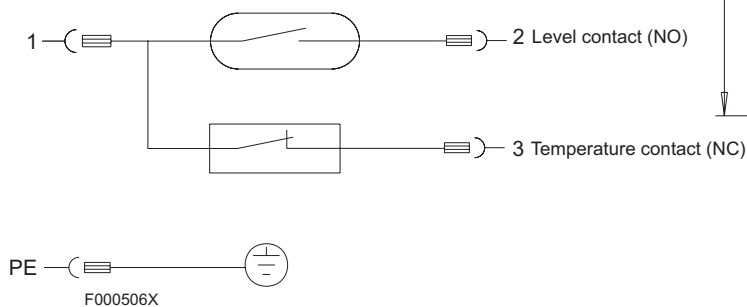
Max. voltage 230 V
 Max. current 2.5 A
 Contact load 100 VA
 Hysteresis 10 K ± 3 K
 Switch point TKÖ-70 = 70 °C NC

Connector

M3 (3-pol. + PE)
 Protection class IP 65

Wiring diagram

All figures at empty reservoir



Order Information

Type	Part No.	L	L1	Temperature
61-1-TKÖ-70RD-M3-VA1	10208999	370 mm	200 mm NO	70 °C NC
61-1-TKÖ-70RD-M3-VA2	10218999	370 mm	300 mm NO	70 °C NC

we reserve the right to amend specifications

Thermotronic 61-AAG2 Thermotronic 61-AAG4

- Audi Specification



Since the viscosity of oil changes with temperature precise control of the actual temperature is most important in fluid power and lubrication systems. Depending on the application, continuous and precise control is essential.

The Thermotronic 61 series offers modern solid state electronics with an LED display for excellent visibility. This product was developed for applications in the fluid power industry.

The unit is based on a microprocessor and features up to six individually programmable alarm outputs, can be set in °C or °F and has a maximum and minimum memory. The Thermotronic allows almost all important control functions in hydraulic and lube systems such as minimum temperature, heater on/off, cooler on/off, alert, emergency off.

Operation and settings are done via three keys on the front panel. The unit can be installed as a remote display or directly attached to the sensor on the tank top.

The Thermotronic 61 AAG2 + 4 in the configuration shown overleaf complies with the AUDI requirements.

- **Freely programmable set points**
- **Digital LED display**
- **Maximum / minimum memory**
- **Data storage in case of power supply failure**
- **Display in °C or °F**
- **Various cable connectors**
- **Easy installation**
- **Versatile combinations**

Technical Data

TF M-PT 100

Material probe	brass
Max. operating pressure	5 bar
Length of probe	380 mm
Temperature sensor	PT 100 class B DIN / IEC 751 / 4W
Connector	Male plug M12 (4 pol.)
Protection class	IP67

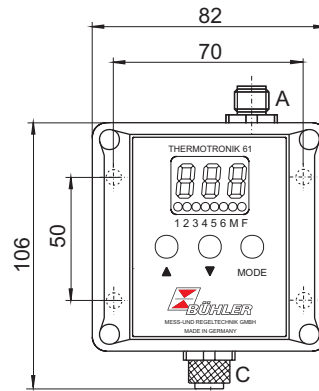
Thermotronik 61

Range of temperature display	from -20 to +120 °C / 4° to 248 °F
Range of alarm indication	0 to +99 °C or 32° to 178 °F
Programmable set points	AAG2 = 2 x AAG4 = 4 x
Housing	ABS-plastic
Depth of housing	55 mm
Protection class	IP 65
Display	three digit seven segment-and LED-display light emitting diodes for status display
Current consumption at power up	about 140 mA for 100 ms
Operating current consumption	about 30 -70 mA
Supply voltage	24 VDC ±10 %
Output switches	max. 24V / 1A
Ambient temperature	0 - 70 °C
Accuracy	1 % of full scale
Resolution	1 °C / 2 °F
Programming	via three touch keys
Connector in	M12 (4-pol.)
Connector out	AAG2 = 1 x M12 (5-pol.) AAG4 = 2 x M12 (5-pol.)

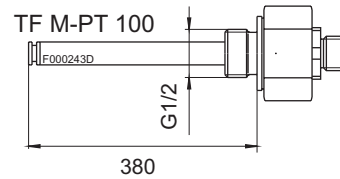
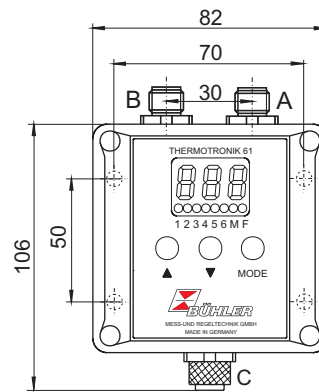
Scope of delivery

connection cable 2 x M12 length 1.5 m

Thermotronik 61-AAG2

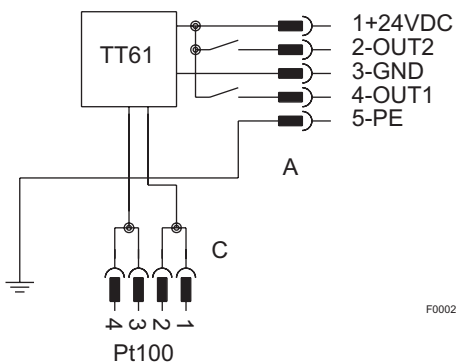


Thermotronik 61-AAG4

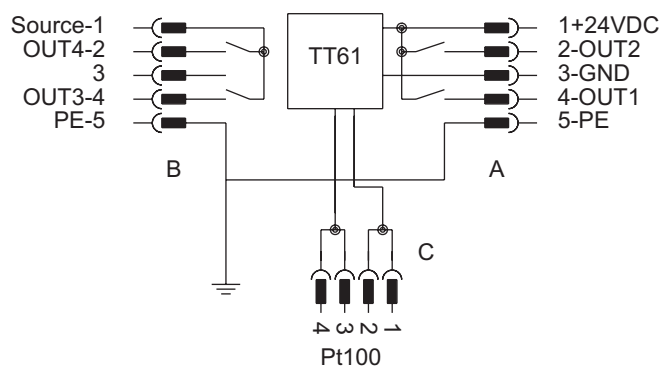


Wiring diagram

Thermotronik 61-AAG2



Thermotronik 61-AAG4



Order Information

Thermotronik 61-AAG2

Part-no.	Length L
1411899	380 mm

Thermotronik 61-AAG4

Part-no.	Length L
1411999	380 mm

Accessories

Part No. 9144050018 Connecting cable M12 x 1 with 5 pole M12 plug cable length: 3 m material: PUR

Display and control unit DTX-P



The Bühler control and display unit DTX-P features a rugged plastic housing and a protection class of IP 65 on the panel side making it an excellent solution for industrial applications.

The 4-20 mA analogue input combines it with our level- and temperature controls like Nivotemp, Nivovent and Thermolog as well as with our Fluidcontrol terminals.

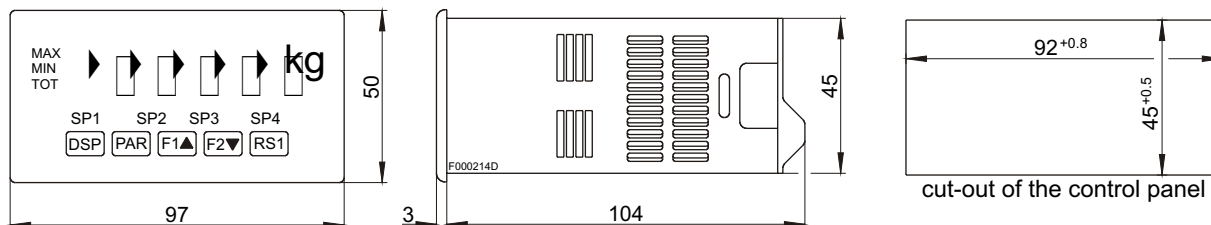
The unit can be adapted to the individual application by inserting special pc boards. These pc boards can be exchanged any time later on if required.

Standard variations for the DTX-P are:
Analogue output 4-20 mA, two change over relays, four NO relays and either four NPN or PNP outputs. An interface PC board for remote programming is also available.

- 5-digit, 14mm LED display back ground illuminated
- Input signals 0-20 mA, 4-20 mA or 0-10v DC optional
- Optional pc boards. Up to four switch points, 0/4-20 mA or 0-10 V analogue outputs, RS 232 interface
- Easy to programme either on site or remotely
- Signal linearisation programmable in 16 steps
- Display front IP 65

technical data

dimensions



housing: dark red, shock-proof plastic housing. Fixing by mounting frame with terminal screw.

display: five-digit display with 14 mm high red LED

signal: The following standard signals are possible. The range will be adjusted in the programming. The accuracy in the following range table is stated in percent of indication value. The protection complies with the maximum permissible input signal.

range	accuracy	Impedance/	protection load	resolution
20 mA	0,03%-0,12%	20 Ω	150 mA	1 μ A
10 VDC	0,03%-0,12%	500 k Ω	300 V	1 mV

user-inputs: 3 programmable inputs are available. They are adjustable by bridges PNP- or NPN-switching. Protection max. 30 V.
NPN: active V < 0,7 VDC; inactive V > 2,5 VDC
PNP: active V < 2,5 VDC; inactive V > 0,7 VDC

power supply: DTX-P-230 : 85 to 250 VAC 50/60 Hz, 15 VA
DTX-P-24 : 11 to 36 VDC, 11 W or 24 VAC \pm 10%, 15 VA

sensor supply: 24 VDC, \pm 5%, regulated, max. 50 mA

connection: stronghold terminal strip

relative humidity: max. 85%. rF, not condensable

ambient temperature: operation: 0...+50°C; with 3 cards

unequipped: 0...+45°C; storage: -40...+60°C

weight: 300 g (without plug-in cards)

Specification plug-in cards

analogue output card: **output** : 0-20 mA or 4-20 mA or 0-10 VDC

DTX-K-AO **accuracy** : 0,17 % to 0,4%

load : 0-10 VDC: min 10 k Ω , 0/4-20 mA: max. 500 Ω

relay output card: **type** : 2 relays with change over contact

2x change over **contact load** : 5 A, 120/240 VAC or 28 VDC. total current at 2 active relays \leq 5 A

DTX-K-2W **lifespan** : minimum 100000 switch cycle at max. load

relay output card: **type** : 4 relays with NO (normally open) contact

4x NO (normally open) **contact load** : 3 A, 120/240 VAC or 28 VDC. total current at 2 active relays \leq 4 A

DTX-K-4S **lifespan** : minimum 100000 switch cycle at max. load

transistor output card: **type** : 4 NPN-open-collector transistors

DTX-K-4N **nominal data** : max. 100 mA at $V_{SAT} = \text{max. } 0,7 \text{ V}$. $V_{max} = 30 \text{ V}$

transistor output card: **type** : 4 PNP-open-collector transistors

DTX-K-4P **nominal data** : Intra supply voltage: 24 VDC \pm 10 %, total load for all 4 outputs: max. 30 mA. external supply: max. 30 VDC, load output: max. 100 mA.

order information

description

Digital indicator (flush-type); 85 to 250 VAC 50/60 Hz

Digital indicator (flush-type); 11 to 36 VDC, 11 W or 24 VAC 50/60 Hz

type

DTX-P-230

DTX-P-24

part-no.

1450099

1450199

accessories

plug-in interface card RS 232

plug-in analogue output card

plug-in relay output card 2x change over

plug-in relay output card 4x NO (normally open)

plug-in transistor output card 4xNPN open-collector transistors

plug-in transistor output card 4xPNP open-collector transistors

programmable software for windows

DTX-K-SER

DTX-K-AO

DTX-K-2W

DTX-K-4S

DTX-K-4N

DTX-K-4P

DTX-S-PC

14500991

14500992

14500993

14500994

14500995

14500996

14500997



**Multi-use device
reduces installation space
and makes maintenance easy**

- Flange dimensions according to DIN 24557 Part 2
- Air breather filter with integrated level and temperature monitoring
- Filling port with quick disconnect device
- Sample port with quick disconnect device
- Visual monitoring of the air breather filter optional

Technical Data

FC-Terminal

Basic

Max. operating pressure	1 bar
Max. operating temperature	80 °C
Dimensions L*	280, 370, 500 (standard) variable (up to 1420)
Weight at L=500 mm	approx. 5 kg

* Please note that the dimensions L for filling port and selected level switch must match each other!

Material

Stilling tube	brass
Flange	steel

Option 1

Sample port	
Hose coupling (DN 5)	PSK
Pressure measuring connectors (test points M16)	PMM

Option 2

Filling port	
Type: Walther (DN 19)	BWA
Type: Stäubli (DN 11)	BST
Plug	BBS

Option 3

Clogging indicator	
Vacuum switch (electr.)	VUS
Plug	VBS

General note

The Fluidcontrolterminal is always composed of two parts. First part is the filling port described in this data sheet and the second part is the level switch. An overview of appropriate level switches is given on page 3. Please refer to the corresponding data sheet of the level switch for detailed information. The following example gives a hint for ordering a specific configuration.

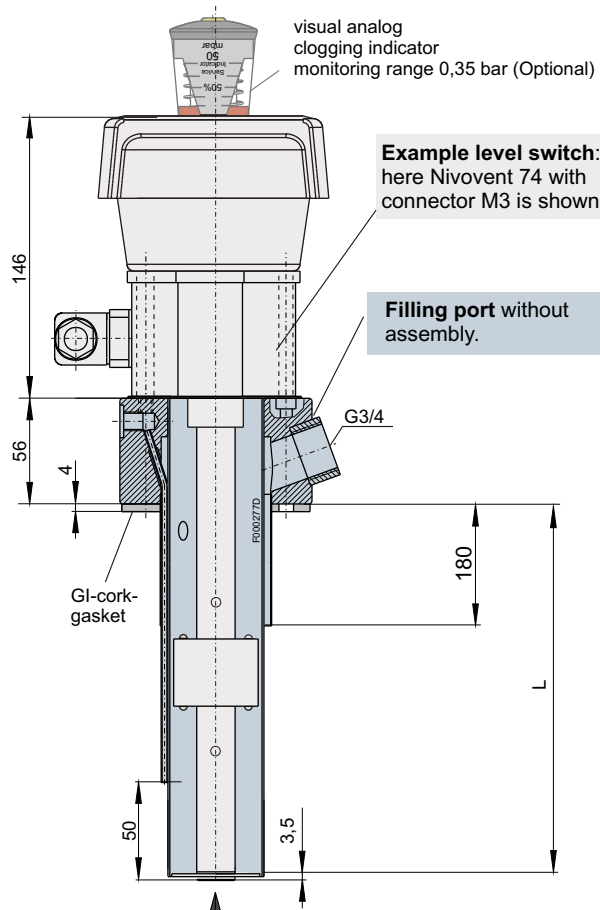
Ordering example:

You need: A **filling port**, length L = 370 mm, with quick disconnect, filling port type Walther and electronic vacuum switch.
The **level switch** should be of type Nivovent 74 made of brass, length 370 mm, connector M12, one level contact at L1 = 190 mm as normally open contact (NO), one temperature contact at 60 °C as normally closed contact (NC) and air breather filter with visual clogging indicator.

You order: Fluidcontrolterminal composed of:

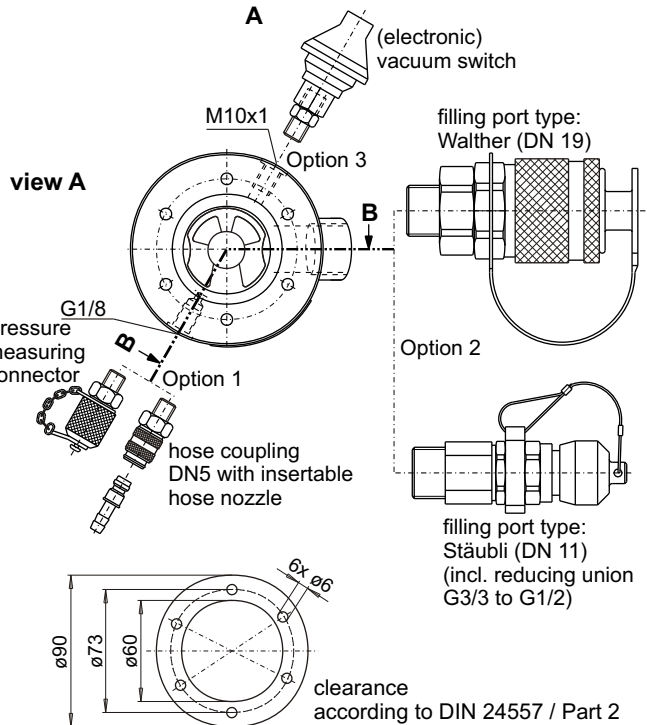
Filling port
FC-T-G3/4-370-PMM-BWA-VUS

and level switch (refer to page 3)
NV 74-HY-MS-M12/370-1K-TK60NC-FCT-VS
L1 = 190 mm NC



Example level switch:
here Nivovent 74 with connector M3 is shown

Filling port without assembly.



Product code for Fluidcontrolterminal

FCT-G3/4

Length mm (max. 1420 mm)
280 / 11
370 / 14.6
500 / 19.7
variable (please specify)

Option 1

PSK hose coupling (DN 5)
PMM quick disconnect (M16)

Option 2

BWA type: Walther (DN 19)
BST type: Stäubli (DN 11)
BBS plug

Option 3

VUS vacuum switch (electr.)
VBS plug

Level switch: NV 74-FCT for Fluidcontrolterminal
- For technical data please refer to data sheet DA 10 0205

- Hydac air breather filter
- Quick and easy adjustable level contacts
- Plug and play system
- Up to 4 contacts
- Bi-metal contacts, Pt 100 or 4-20 mA signal output for temperature
- NV 74D equipped with display and control unit
- Easy operation via 3 keys
- Highly visible LED display
- Up to 4 programmable temperature switching outputs
- Optional continuous temperature output signal, programmable 4-20 mA, 0-10 V or 2-10 V

easyjust



Level switch: NV 71-FCT for Fluidcontrolterminal
- For technical data please refer to data sheet DA 10 0204

- Hydac air breather filter
- Level and/or temperature control
- Up to 4 contacts
- 230 V applicable
- Bi-metal contacts, Pt 100 or 4-20 mA signal output for temperature
- NV 71D equipped with display and control unit
- Easy operation via 3 keys
- Highly visible LED display
- Up to 4 programmable temperature switching outputs
- Optional continuous temperature output signal, programmable 4-20 mA, 0-10 V or 2-10 V



Level switch: NV 73-FCT for Fluidcontrolterminal
- For technical data please refer to data sheet DA 10 0206

- Continuous level measurement
- Hydac air breather filter
- Optional with continuous temperature measurement, 4-20 mA output
- Resolution 5 mm
- Diverse connectors
- Immersion depth up to 1420 mm (longer upon request)



Level switch: NV 77-XP-FCT for Fluidcontrolterminal
- For technical data please refer to data sheet DA 10 0203

- Continuous level measurement
- Hydac air breather filter
- 4-20 mA output
- Resolution 5 mm
- Immersion depth up to 1420 mm
- Display and control unit
- Four switching outputs programmable as level or temperature output
- Optional two switching outputs programmable as level or temperature output plus 1 analogue output each for continuous analog output for level and temperature control
- Analogue output programmable as 4-20 mA, 0-10 V, 2-10 V or 0-5 V
- Display of actual values for level or temperature (switchable)



Off-line filter unit FGM 30 (60) / Pi 2728-57



This mobile off-line filter unit can be used for in-house applications, as a service unit on installation sites, or for after-sales service applications. Due to its compact and light-weight design, it can be transported easily in service vans.

The gerotor pump with either 30 or 60 l/m flow rate emits low noise and contributes to the low weight of the unit.

The compact and lightweight Mahle Pi 270 filter provides two cartridges with large filtration area at long lifetime, resulting in low maintenance costs.

Depending on the application, retention rates between β_3 , β_6 , β_{10} , or β_{25} can be selected according to the required cleanliness.

The Sm-x filter material combines a large spectrum of retention rates with high dirt-holding capacity.

The unit incorporates a drip pan with drain cock and safe storage for suction and pressure hose. The suction hose has a coarse inlet filter to protect the pump from debris. Also a wand is integrated at the outlet.

Two fixed and two swivel castor wheels together with a hinged handle provide good maneuverability.

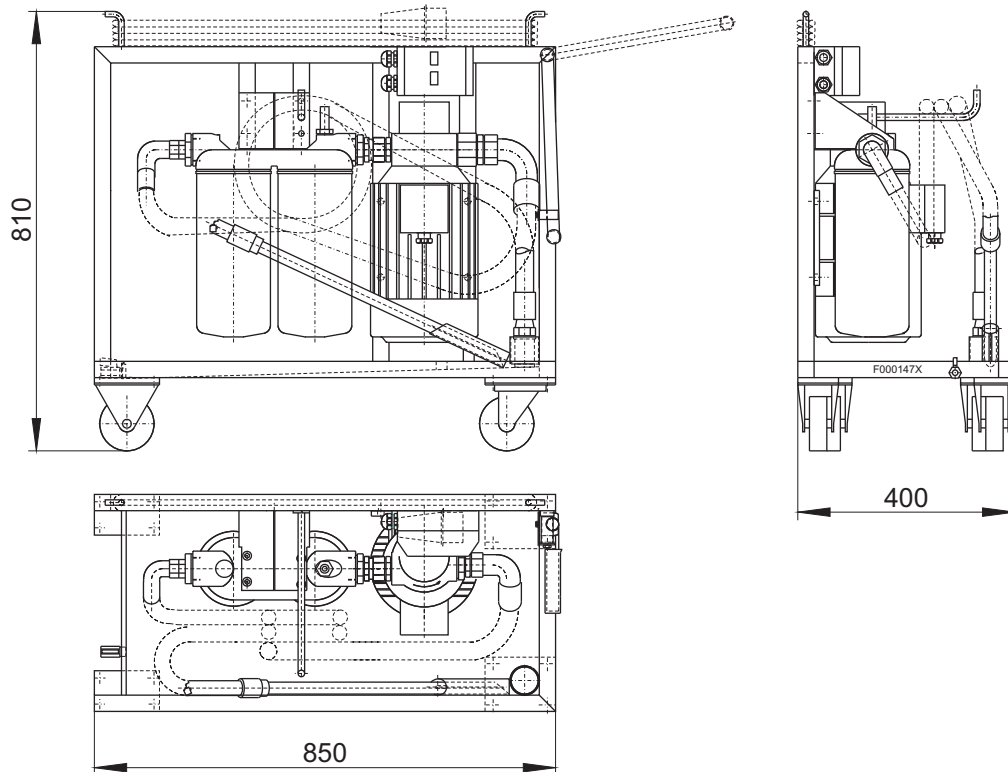
Technical Data

Pump	Dirt-repellent gerotor pump, directly attached to the shaft of the electric motor. Suction hose with coarse strainer.		
Controls	Motor safeguard, 5 m oil resistant cable CEE plug.		
Filter	Mahle PI 2728-57, with optical contamination indicator		
Bypass	Cracking pressure Δp 3.5 bar		
Contamination indicator	Cracking pressure Δp 2.2 bar		
Accessories (included)	30 l/min.	60 l/min.	Length
Suction hose	DN 25	DN 32	2 m
Pressure hose	DN 20	DN 20	2 m
Filter cartridge (not included)	3 μ m, 6 μ m, 10 μ m, 25 μ m		

Motor / Pump unit

	Flow l/min.	Power kW	Voltage V	Rotational speed rpm	Max. pressure bar	Max. viscosity mm ² /s
FGM 30	30	0.75	230/400 V, 50 Hz \pm 5% 276/480 V, 60 Hz \pm 5%	1410	10	300
FGM 60	60	2.2	230/400 V, 50 Hz \pm 5% 276/480 V, 60 Hz \pm 5%	1410	10	300

Dimensions (mm)



Order Information

Part-No.	Model
27002030IE2	FGM 30 / Pi 2728-57
27002020IE2	FGM 60 / Pi 2728-57

Filter cartridges (not part of delivery)

Part-no.	Model	Retention rate
70541536	PX37-13-2	3 μ m
70541537	PX37-13-2	6 μ m
70541538	PX37-13-2	10 μ m
70541539	PX37-13-2	25 μ m

Off-line filter / cooler unit FGSL 15 / FGSL 30



The Reliability and the life time of hydraulic oil and components primarily depend on the cleanliness of the fluid and the limitation of the operating temperature.

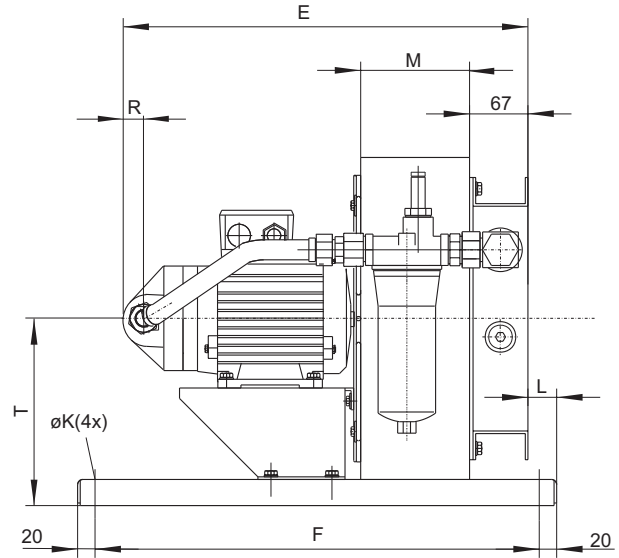
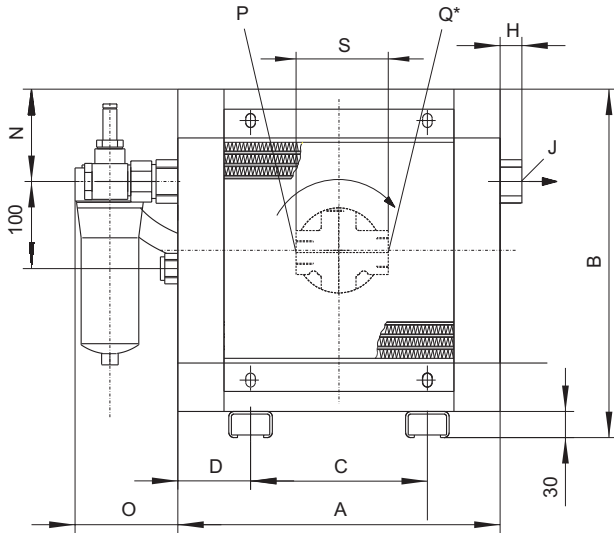
For systems with varying flow rates off-line filter/cooler units are the most appropriate solution.

Due to its compact design, the Bühler FGSL range of off-line units fit well into that segment of applications. Easy integration even allows upgrading of existing systems.

The unit is based on a Bühler BNK off-line air blast cooler with integrated circulation pump. Its low noise emission and easy maintenance are further advantages.

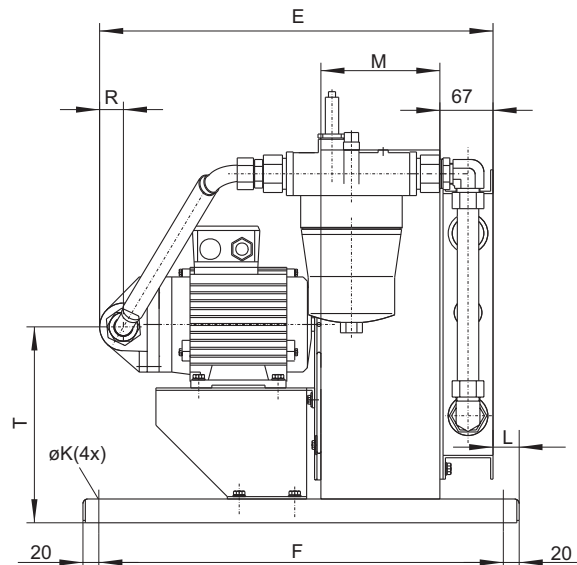
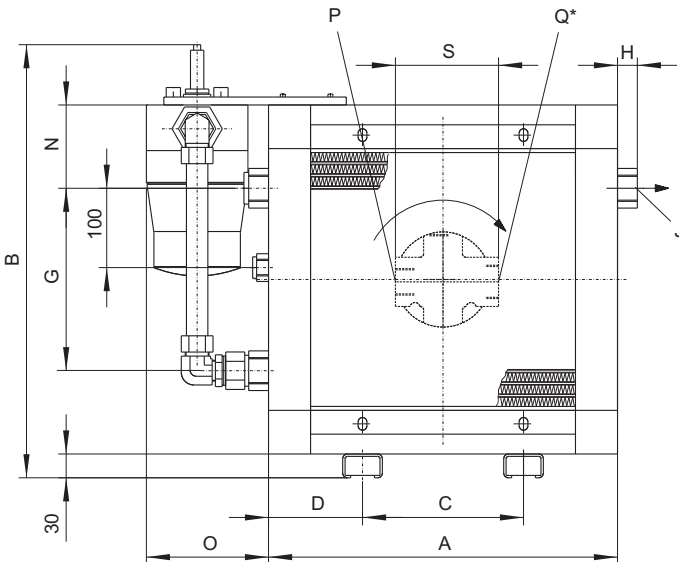
A qualified low pressure filter with broad retention spectrum ensures the required cleanliness class.

FGSL 15



F000005D Q* = Suction side

FGSL 30



F000006D Q* = Suction side

General Data

Part No.	Model	Spec. cooling performance (kW/K)	Cooling performance ETD=40K (kW)	Max. flow rate (l/min)	Power output Poles Full load at 400V	Weight (kg)	Volume (l)	Noise emission db(A)*
27004124IE2	FGSL 15/PI2008-57/BNK 2.4-15	0,09	3,6	15	0,75 kW / 4 / 1,94 A	32	2,3	66
27004086IE2	FGSL 30/PI2008-57/BNK 2.4-30	0,13	5,0	28	0,75 kW / 4 / 1,94 A	35	2,3	66
27004083IE2	FGSL 30/PI2015-57/BNK 3.4-30	0,24	9,6	28	0,75 kW / 4 / 1,94 A	40	2,8	71
27004088IE2	FGSL 30/PI2015-57/BNK 4.4-30	0,32	12,8	28	0,75 kW / 4 / 1,94 A	45	3,3	73

*DIN EN ISO 3744, Class 3

Dimensions (mm)

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
FGSL 15/PI2008-57/BNK 2.4-15	370	400	203	83,5	476	510	-	25	2xG1	9	33	125	106	118	G1	G1 ¼	30	130	199
FGSL 30/PI2008-57/BNK 2.4-30	370	400	203	83,5	474	510	-	25	2xG1	9	33	125	106	118	G1	G1 ¼	30	130	212
FGSL 30/PI2015-57/BNK 3.4-30	440	546	203	118,5	499	510	230	25	3xG1	9	33	150	105	154	G1	G1 ¼	30	130	247
FGSL 30/PI2015-57/BNK 4.4-30	500	595	203	148,5	524	510	230	25	3xG1	9	33	175	104	154	G1	G1 ¼	30	130	277

Accessories:

Filter elements and electrical contamination indicators are not included. Please ask for assistance.

TSM-G1/2, TSE-G1/2

- G1/2" thread connection
- Up to 2 temperature switching points
- Probe length up to 1 m

TSM-G1/2



TSK-G3/4

- G3/4" thread connection
- Up to 2 temperature switching points
- Probe length up to 1 m
- Low hysteresis

TSK-G3/4



TSA

- G1/2" thread connection
- 1 x temperature switching point
- Fixed length 29 mm for e. g. cable installation

TSA



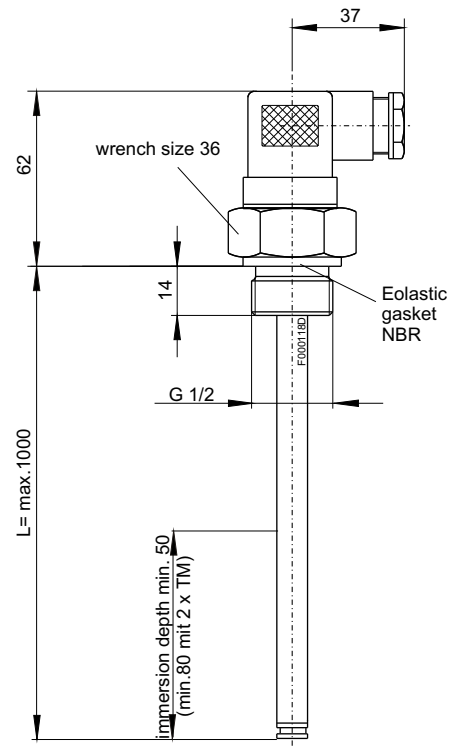
Technical data

TSM / TSE

Type	TSM-G1/2	TSE-G1/2
Design	MS	VA
material probe	brass	1.4571
max. operating pressure	5 bar	10 bar
connection	G1/2	G1/2
operating temperature	-40 °C to +80 °C	
lengths	280, 370, 500 (standard) variable up to max. 1000 mm	
Temperature contact		
TMxx		
switch element	bi-metal	
# contacts	1 or 2	
max. voltage	230 V	
max. current	2 A	
max. contact load	100 VA	
Function		
NC	NO*	
switching point °C	50 / 60 / 70 / 80	50 / 60 / 70 / 80
switching point tolerance	± 5 K	± 5 K
max. hysteresis	18 K ± 5 K	26 / 35 / 40 / 45 K ± 5 K

other temperatures on request

* NC = normally closed / NO = normally open at **low temperature**

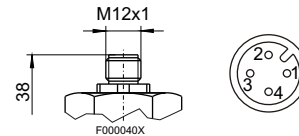
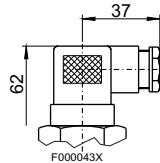


Connector*	M3 (DIN EN 175301-803)
max. voltage	3 pol. + PE
protection class	230 V AC/DC
cable connection	IP 65
	PG 11

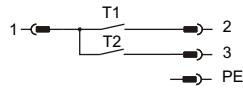
*other connectors on request

M12 (base)
4 pol.
30 V DC
IP 67**

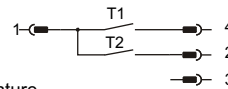
**with casted connector head



Standard pin assignment



T1 = lower temperature / T2 = higher temperature



Product code for Temperature switch TSM / TSE

TSM for design MS
TSE for design VA

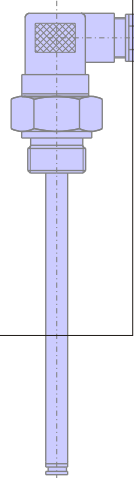
temperature contacts
1 or 2

Design
MS
VA

Connector
M3
M12

Length (max. 1000 mm)
280
370
500
Variable (please quote)

G1/2



T2 (2nd Temperature contact)

NC	NO	
TM50NC	TM50NO	=50 °C
TM60NC	TM60NO	=60 °C
TM70NC	TM70NO	=70 °C
TM80NC	TM80NO	=80 °C

T1 (1st Temperature contact)

NC	NO	
TM50NC	TM50NO	=50 °C
TM60NC	TM60NO	=60 °C
TM70NC	TM70NO	=70 °C
TM80NC	TM80NO	=80 °C

Example for order

You need: Temperature switch brass design, connection G1/2, length L= 300 mm, connector M3
2 x temperature contact: 1st contact 50 °C NC (open), 2nd contact 70 °C NO (closed),

You order: TSM-2-M3 / 300 -TM50NC-TM70NO

Technical data

TSK

Type design	TSK-G3/4	
material probe	MS	VA
max. operating pressure	brass	1.4571
connection	1 bar	5 bar
operating temperature	G3/4	G3/4
lengths	-40 °C to +80 °C	
	280, 370, 500 (standard)	
	variable up to max 1000	

Temperature contact	TKxx	
switch element	bi-metal	
quantity contacts	1 or 2	
max. voltage	230 V	
max. current	2 A	
max. contact load	100 VA	

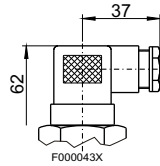
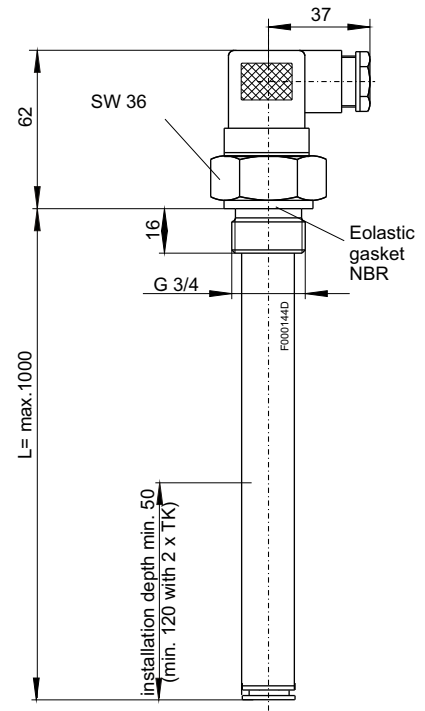
Function	NC / NO*	
switching point °C	40 / 50 / 60 / 70 / 80	
switching point tolerance	± 3 K	
max. hysteresis	10 K ± 5 K	

other temperatures on request

*NC = normally closed / NO = normally open at **low temperature**

Connector*	M3
max. current	3 pol. + PE (DIN EN 175301-803)
	230 V AC/DC
protection class	IP 65
cable connection	PG 11

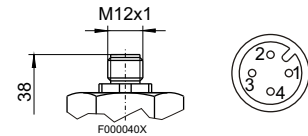
*other connectors on request



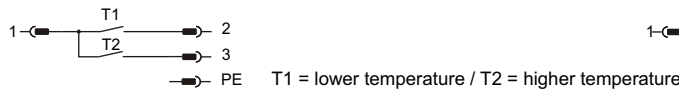
M12 (base)
4 pol.
30 V DC

IP 67**

**with casted connector head



Standard pin assignment



Product code for Temperature switch TSK

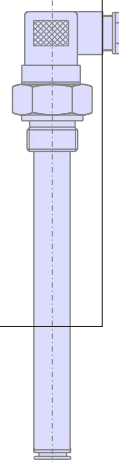
TSK- [] **G3/4** [] [] [] []

temperature contacts
1 or 2

Design	
MS	brass
VA	stainless steel

Connector
M3
M12

Length (max. 1000mm)
280
370
500
Variable (please specify)



T2 (2nd Temperature contact)

NC	NO	
TK40NC	TK40NO	=40°C
TK50NC	TK50NO	=50°C
TK60NC	TK60NO	=60°C
TK70NC	TK70NO	=70°C
TK80NC	TK80NO	=80°C

T1 (1st Temperature contact)

NC	NO	
TK40NC	TK40NO	=40°C
TK50NC	TK50NO	=50°C
TK60NC	TK60NO	=60°C
TK70NC	TK70NO	=70°C
TK80NC	TK80NO	=80°C

Example for order

You need: Temperature switch brass design, connection G3/4, length L= 300 mm, connector M3
2 x temperature contact: 1st contact 50 °C NC (open), 2nd contact 70 °C NO (closed),
You order: TSK-2-M3 / 300 -TK50NC-TK70NO

Technical data

Type	TSA
probe length	29 mm
material probe	aluminium anodized
max. operating pressure	15 bar
operating temperature	- 40 °C to + 80 °C

Temperature contacts

switch element	bi-metal
max. voltage	230 V
max. current	2 A
max. contact load	100 VA
tolerance	± 5 K
switching back difference	15 K ± 3 K

switch function

NO*/NC*

switching point °C 25 / 40 / 50 / 60 / 70 / 80

*NC = normally closed / NO = normally open at **low temperature**

other temperatures on request

Connector

M3 (DIN EN 175301-803)

3 pol. + PE

protection class

IP 65

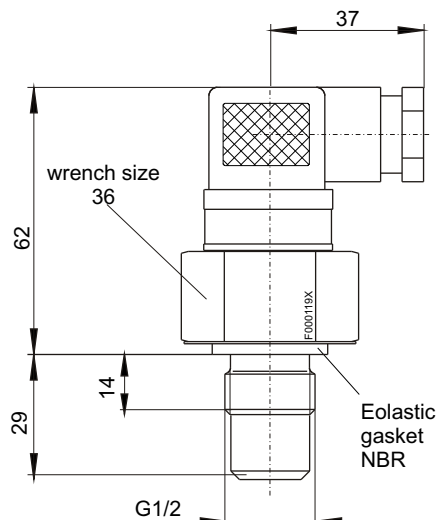
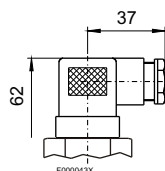
max. voltage

230 V AC/DC

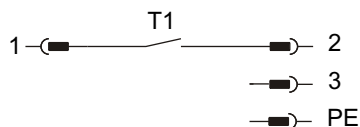
cable connection

PG 11

other connectors on request



Standard pin assignment



Order information

Switch function	NO	.	NC	
Temperature	Type	Part No.	Type	Part No.
25 °C / 77 °F	TSA-25-M3	11 39 699	TÖA-25-M3	11 42 899
40 °C / 104 °F	TSA-40-M3	11 39 599	TÖA-40-M3	11 43 299
50 °C / 122 °F	TSA-50-M3	11 38 599	TÖA-50-M3	11 42 199
60 °C / 140 °F	TSA-60-M3	11 38 699	TÖA-60-M3	11 43 399
70 °C / 158 °F	TSA-70M3	11 38 799	TÖA-70-M3	11 40 299
80 °C / 176 °F	TSA-80-M3	11 39 299	TÖA-80-M3	11 40 899

Example for order:

You need: Temperature contact should be at 50 °C NO, connector Type M3

You order: Part No. 1138599 Temperature switch TSA-50-M3

Level and temperature switch with display NT-MD

- Two fixed switch outputs for liquid level monitoring
- Highly visible LED display indicates the switching outputs, able to rotate 270°
- Menu structure based on VDMA guidelines
- Up to four programmable temperature switching outputs
- Continuous temperature signal (adjustable current or voltage) plus one programmable output
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Min/Max memory, logbook function

Level and temperature switch NT-M

- G3/4" connection thread
- Multiple connector options
- Level and temperature control
- Up to four outputs
- Compact design with small dimensions
- Reliable dynamic float system
- Housing material brass or stainless steel



Technical data

NT-M

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.8 kg/dm ³
standard lengths	mm 280, 370, 500, variable up to max. 1000
weight at L=280 mm	MS VA
	app. 290 g 220 g
plus per 100 mm	app. 15 g 15 g

Material

immersion tube	MS	VA
flange G 3/4	MS	1.4571
float	NBR	NBR

Level contacts

function	K8	W9
min. distance of contacts	NC / NO*	change over
min. operating voltage	40 mm	40 mm
max. operating voltage	230 V	48 V
max. current	0.5 A	0.5 A
max. contact load	10 VA	20 VA

* NC = normally closed / NO = normally open, all figures with empty reservoir

Temperature contact

max. operating voltage	TM	
max. current	230 V	
max. contact load	2 A	
switch-point tolerance	100 VA	
function	± 5 K	
switch-point in °C	NC*	NO*
Hysteresis	50 / 60 / 70 / 80	50/60/70/80
	18 K ± 5 K	26/35/40/45 K ± 5 K

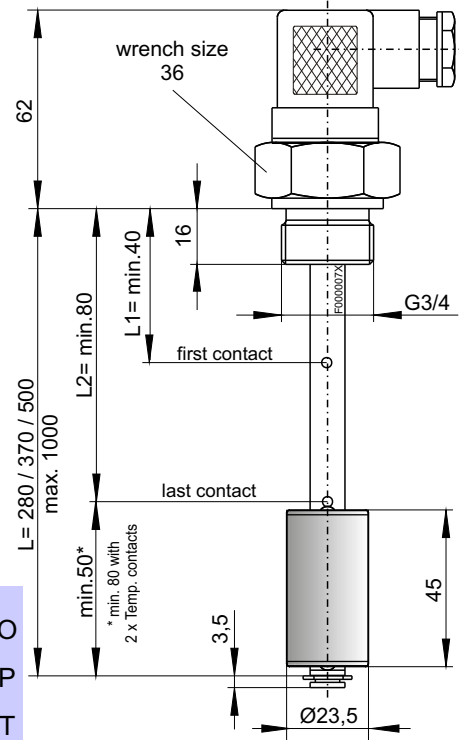
* NC = normally closed / NO = normally open at **low temperature**

(other temperatures on request)

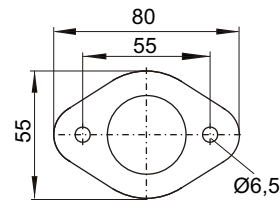
Temperature sensor

tolerance	RTD (Pt 100) class B, DIN EN 60 751
G1	± 0.8 °C
OV	Adapter G3/4 to G1
	Adapter on oval flange incl. gasket and counter nut

Nivotemp NT-M



Adapter on oval flange



Product code for NT-M

NT-M- [] [] [] [] [] **A** **B** []

Series

Nivotemp **NT-M**

Material

MS

VA

Connector

M3

GS4

M12 (accessories see page 4)

C7

Length max. 1000 mm

280

370

500

Variable (please quote)

level contacts

1-4

Level contact type

K = NC/NO

W = change over (max. 2 pieces)

Option

OV = oval flange

G1 = Adapter on G1"

only for double temp. contact

B 2. Temperature contact

NC	NO
TM50NC	TM50NO = 50 °C
TM60NC	TM60NO = 60 °C
TM70NC	TM70NO = 70 °C
TM80NC	TM80NO = 80 °C

A Temperature

Pt 100* = Temperature sensor

Temperature contact

NC	NO
TM50NC	TM50NO = 50 °C
TM60NC	TM60NO = 60 °C
TM70NC	TM70NO = 70 °C
TM80NC	TM80NO = 80 °C

* not available with temperature contact

Example for order

You need: Level switch with connector G3/4, brass design, length L= 500 mm, 2 level contacts, 1st contact 100 mm NC, 2nd contact 450 mm NO

You order: NT-M-MS-M3 / 500-2K L1=100 NC , L2 = 450 NO

Technical data

NT-MD

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.8 kg/dm ³
standard lengths	mm 280, 370, 500, variable up to max. 500

weight at L=280 mm	MS
	app. 390 g
plus per 100 mm	app. 15 g

Material

immersion tube	MS
flange G 3/4	MS
float	PU

Level contacts

function	K8
min. distance of contacts	NC / NO*
min. distance of contacts	40 mm
max. operating voltage	230 V
max. current	0.5 A
max. contact load	10 VA

* NC = normally closed / NO = normally open, all figures with empty reservoir

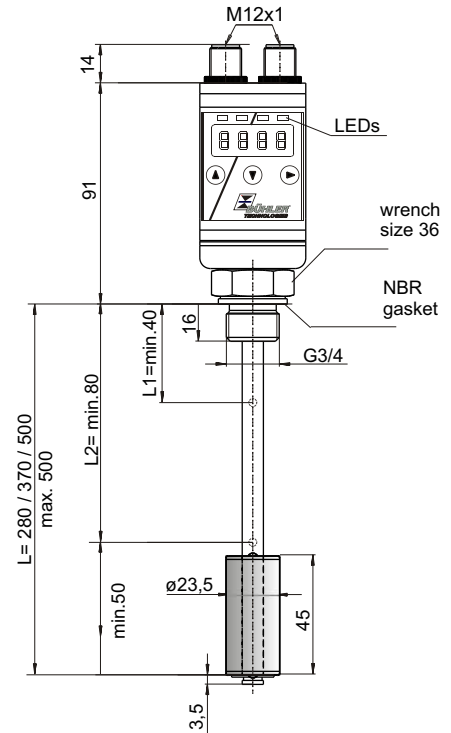
Display

display housing	PA
temperature display range	-20 °C to +120 °C (4 °F to 248 °F)
alarm indicator range	0 °C to 100 °C (32 °F to 178 °F)
accuracy	1%
resolution	0.5 °C (1 °F)
protection class	IP65
display	4 digit 7 segment LED display
operation	3 button keypad
current consumption at power up	approx. 100 mA for 100 ms
operating current consumption	approx. 50 mA
supply voltage (U _B)	10 V to 30 V DC (nominal voltage 24 V DC)

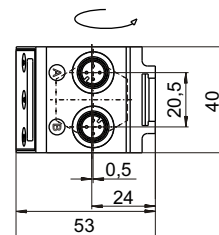
ambient temperature -20 °C to +70 °C

Temperature sensor Pt 100 (RTD) class B DIN / IEC 751

Nivotemp NT-MD



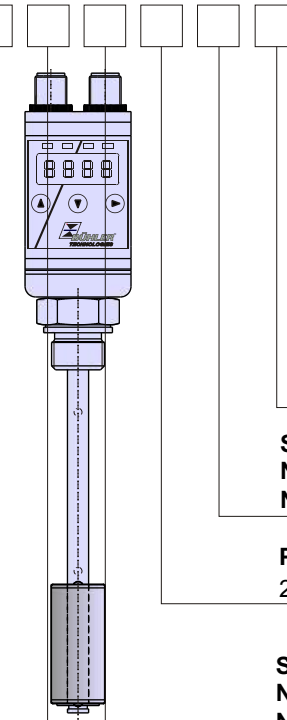
Housing able to rotate 270°



Following output options are available:

Type	-2T	-1T-KT	-4T	O P T I O N S
connector (base)	2 x M12, 4 pole	2x M12, 4 pole	1x M12, 4 pole 1x M12, 8 pole	
PNP transistor output, free programmable	2	1	4	
max. current per output	0.5 A	0.5 A	0.5 A	
sustained short circuit-proof				
max. contact load (overall)	1 A	1 A	1 A	
analogue output		1x 4-20 mA / 2-10 V / 0-10 V / 0-5 V		
load analogue output		max. 500 Ω		

Product code for NT-MD

<p>Series Nivotemp NT-MD</p> <p>Material MS</p> <p>Connector 2 M12</p> <p>Length mm max. 500 280 370 500 Variable (please quote)</p> <p>#level contacts 1K or 2K K = NC/NO not adjustable</p> <p>Position L1=...mm 1st level contact</p>		<p>-2T LED Temperature display 2 x Temperature output</p> <p>4T LED Temperature display 4 x Temperature output</p> <p>1T-KT LED Temperature display 1 x Temperature output 1 x Analogue output</p> <p>Switch function 2nd contact NO = open at low level NC = closed at low level</p> <p>Position L2=...mm 2nd level contact</p> <p>Switch function 1st contact NO = open at low level NC = closed at low level</p>
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Accessories

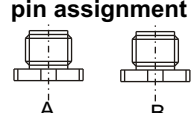

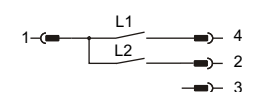
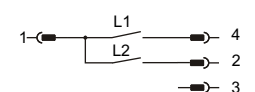
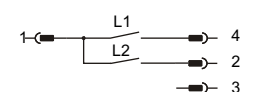

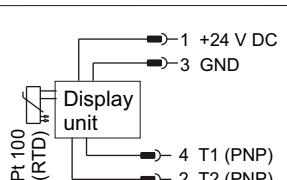
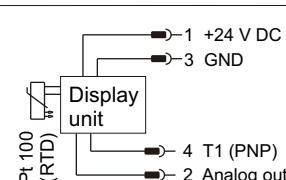
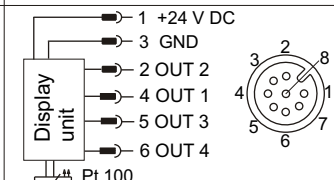
Part-No. 4-pole	Part-No. 8-pole	Connecting Cable
9144 05 0010	9144 05 0048	M12x1, 1.5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0049	M12x1, 3.0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0033	M12x1, 5.0 m, elbow connector (female) and wire

Example for order

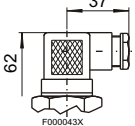
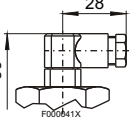
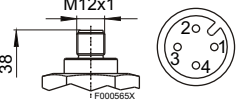
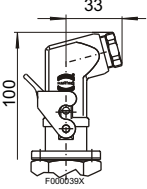
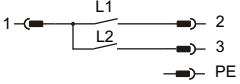
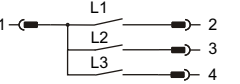
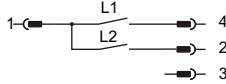
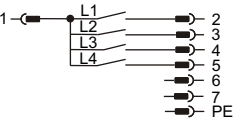
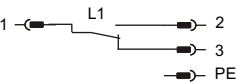
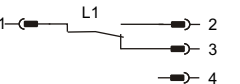
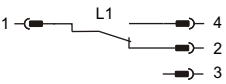
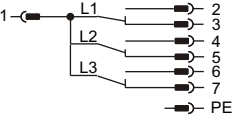
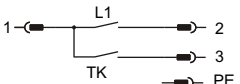
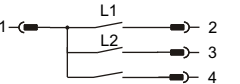
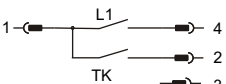
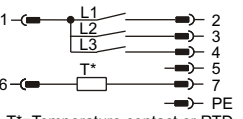
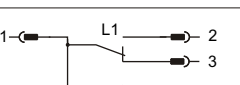
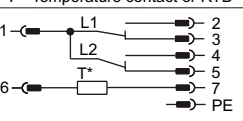
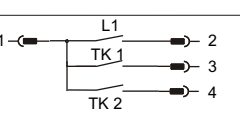
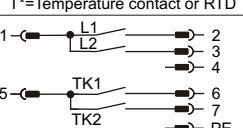
You need: Level switch with connector G3/4, brass design, length L = 500 mm, 2 level contacts, 1st contact 100 mm NC, 2nd contact 450 mm NO, temperature analysis with display and 2 programmable outputs

You order: NT-MD-MS-2M12 / 500-2K-100 NC-450 NO-2T

Nivotemp NT-MD

Standard pin assignment	Type NT-MD-2T Level contact(s) 2 x Temperature output	Type NT-MD-1T-KT Level contact(s) 1 x Temperature output 1 x Analogue output	Type NT-MD-4T Level contact(s) 4 x Temperature output
 <p>A B</p>			
<p>Connector A: Level</p> 			
<p>Connector B: Temperature</p> 			

Nivotemp NT-M

Connector max. voltage protection class cable gland	M3 (DIN EN 175301-803) 3 pol. + PE 230 V* IP 65 PG 11	GS4 4 pol. 30 V IP 65 PG 7	M12 (base) 4 pol. 30 V IP 67**	C7 (DIN EN 175201-804) 7 pol. + PE 230 V* IP 65 PG 11
Standard pin assignment				
level contact(s) only type K8				
level contact(s) only type W9				
level contact(s) K8 and temperature contact (TM)				
level contact(s) W9 and temperature contact (TM)				
level contact(s) K8 and temperature contact (TM)				

* max. 48V at change over contact

** with casted connector head

MDS Mechanical Pressure Switch



Mechanical Pressure Switches with adjustable switching output for monitoring pneumatic or hydraulic pressure

- Robust and compact unit
- Adjustable switching point
- High precision
- Up to 350 bar max. working pressure (more upon request)
- Electromechanical signal transducer
- M12 and M3 plug connection per DIN EN 175301-803
- Changeover contact function
- Long life

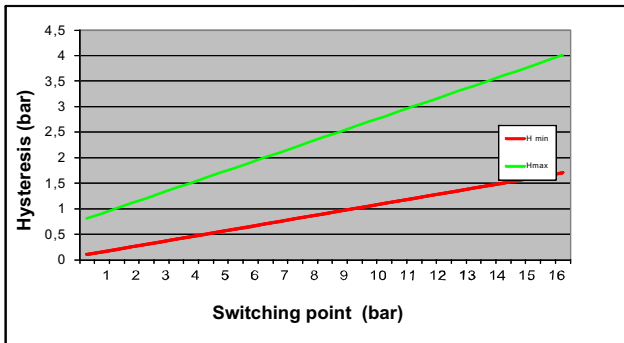


Technical Specifications MDS Series

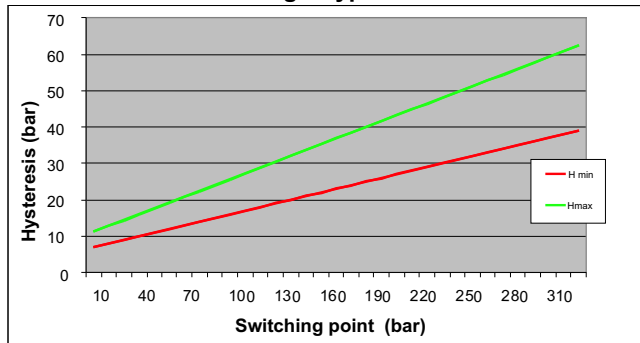
Mediums	self-lubricating fluids like hydraulic oils and lubricants, compressed air		Mounting position	any
			Response	min. velocity of pressure rise 0.01 bar/s
Process connection	G1/8"	G1/4"	Switching point	
Gasket seal	according to DIN3852-E		Accuracy	± 2% of range value at room temperature
Fastening torque	20 Nm	25 Nm	Reproducibility	same as accuracy
Measuring principle	Membrane spring-loaded ≤16 bar,	Plunger spring-loaded ≥ 16 bar	Ambient conditions	
Max. operating pressure	60 bar	350 bar	Temperature range	-20... +80°C
Materials	Membrane: NBR	Plunger: steel	Environment / operation	A-10G / 10-500 Hz
Gasket	---	PTFE, NBR	Vibration resistance	I-100G/6 ms
Housing	Steel, galvanised steel, galvanised		Shock resistance	
Switching output	Changer		Weight	0,15 kg
Number	1			
Switching element	micro switch with silver plated contacts			
Max. switching frequency	100/min			
Switching power with plug	M3	M12		
DC to 28 V	2 A	2 A		
AC to 250 V	4 A	---		

Switch-back difference

Membrane Type



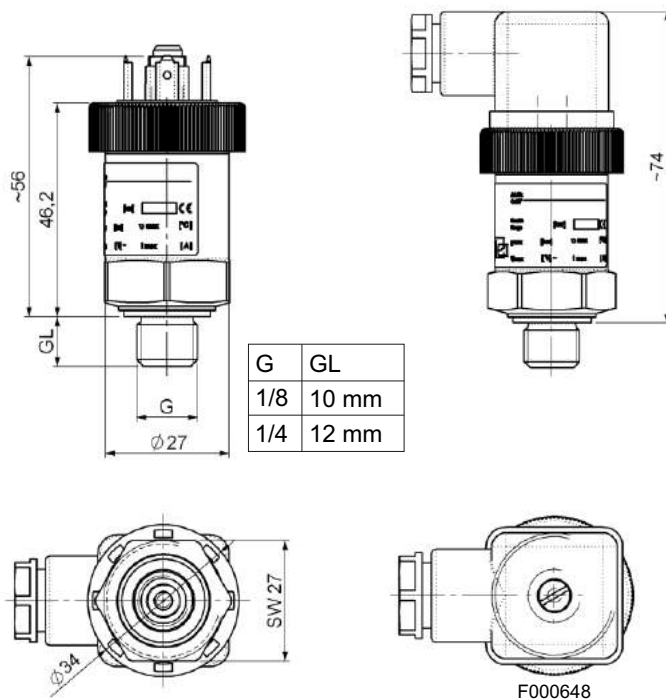
Plunger type



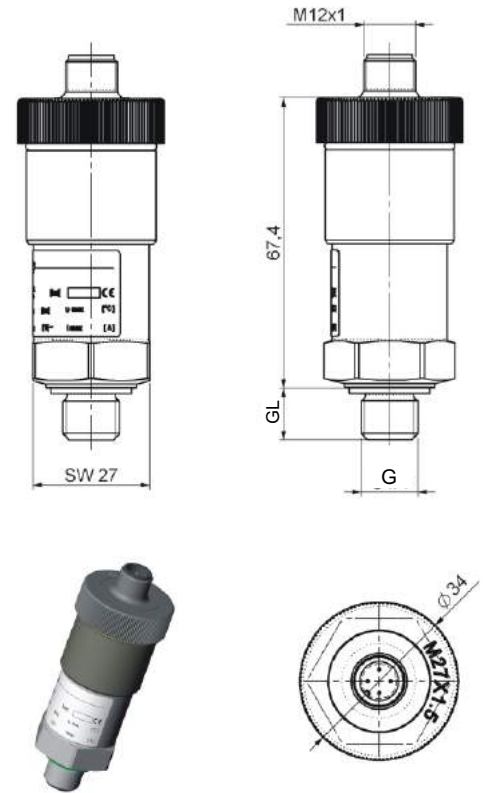
Plug connection	M3 (DIN EN 175301-803) 3 pol. + PE 250V IP65 PG9	M12 (socket) 4 pol. 28V IP67**
Max. voltage		
Protection class		
Cable fitting		**when connected
Pin assignment		

Dimensions

Version M3



Version M12



Accessories: Part no.: 9144050047 Connecting cable M12x1, 4-pin, L = 5m
 Part no.: 9146100159 Contact box M12x1, 90° angle

Product code for MDS

MDS - - - -

Model		Pressure ranges Setting of switching point ¹⁾ (optional)
Connector M3 or M12		Pressure ranges
Fluid Port G1/8" or G1/4"		8: 0,5...8 bar Membrane pressure switch
		16: 1...16 bar Membrane pressure switch
		120: 10...120 bar Piston pressure switch
		250: 20...250 bar Piston pressure switch
		320: 30...320 bar Piston pressure switch

¹⁾ If required, the switching point setting can be executed by the factory. The switching point must be set for rising or falling pressure, i.e. switching point monitoring of 0 bar to switching point (rising) or from max. operating pressure decreasing to switching point (falling). Refer to the following example for the circuitry:

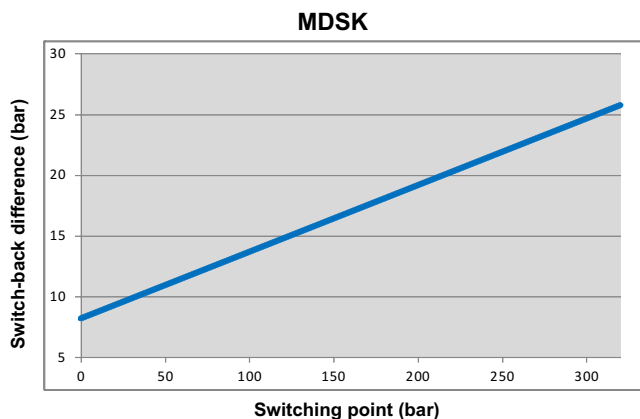
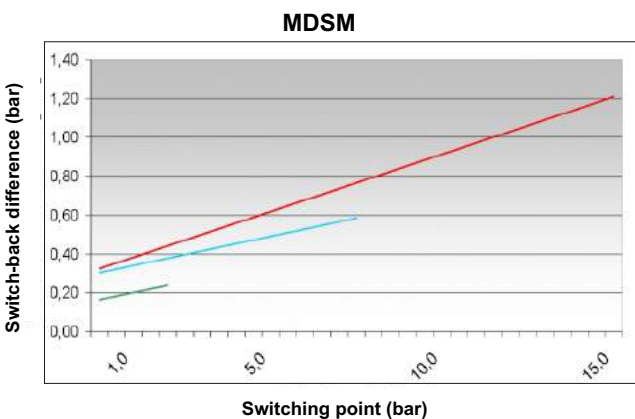
MDS-M3-G1/4-120-80R (switching point 80 bar rising)
 PIN3-2 closed when switching point is reached

MDS-M3-G1/4-120-80F (switching point 80 bar falling)
 PIN3-1 closed when switching point is reached

Technical Specifications MDSM & MDSK Series

	MDSM	MDSK
Mediums	Neutral fluids, compressed air	self-lubricating fluids such as hydraulic oils and lubricants
Process connection	G1/4" inside	G 1/4" rotary, vertical flange DIN ISO 16873 Fastening torque: 25 Nm
Mounting position	any	any
Measuring principle	Spring-loaded membrane	Spring-loaded piston
Max. operating pressure	60 bar	350 bar
Min. velocity of pressure rise	0,01 bar/s	0,01 bar/s
Switching point		
Accuracy/reproducibility	± 2% of range value at room temperature	± 2% of range value at room temperature
Materials		
Measuring element	membrane: NBR	piston: stainless steel 1.4305
Pressure connection	zinc die cast (G1/4" inside)	galvanised steel (G1/4" rotary), zinc die cast (vertical flange)
Housing	zinc die cast	zinc die cast
Switching output		
Number	Changer 1, adjustable with lock	Changer 1, adjustable with lock
Switching element	micro switch with silver plated contacts	micro switch with silver plated contacts
Max. switching frequency	200 / min.	200 / min.
Max. switching power		
with plug	M3 M12	M3 M12
DC to 28V	3 A 3 A	3 A 3 A
AC to 250V	6 A ---	6 A ---
Ambient conditions		
Temperature range		
Environment/operation	-10 °C...+80 °C	-10 °C...+80 °C
Vibration resistance	A-10G/10-500 Hz	A-10G/10-500 Hz
Shock resistance	I-100G/6 ms	I-100G/6 ms
Weight	0,3 kg	0,33 kg

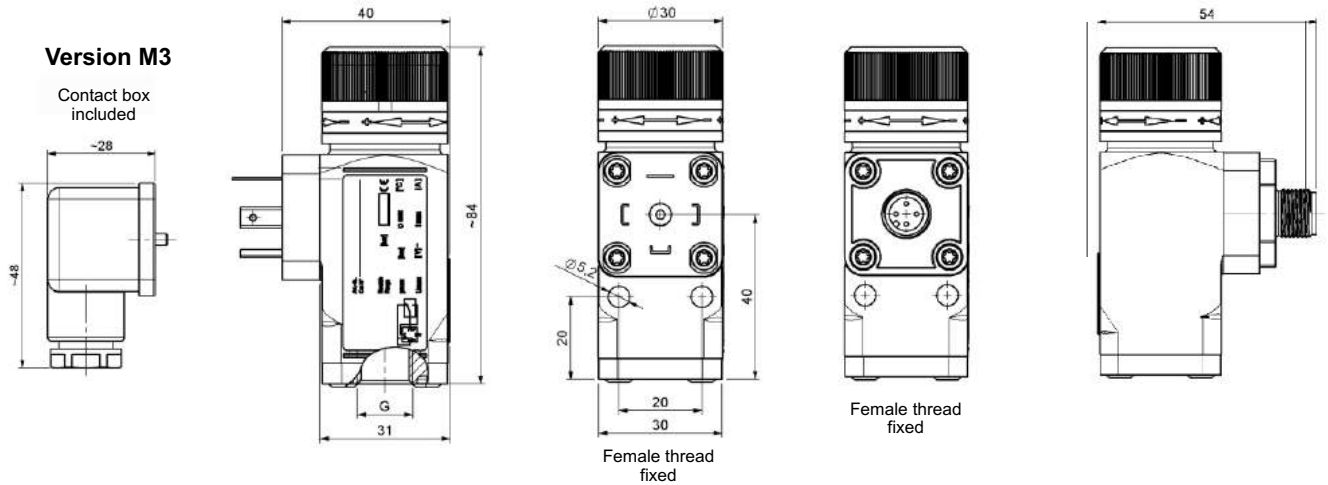
Switch-back difference:



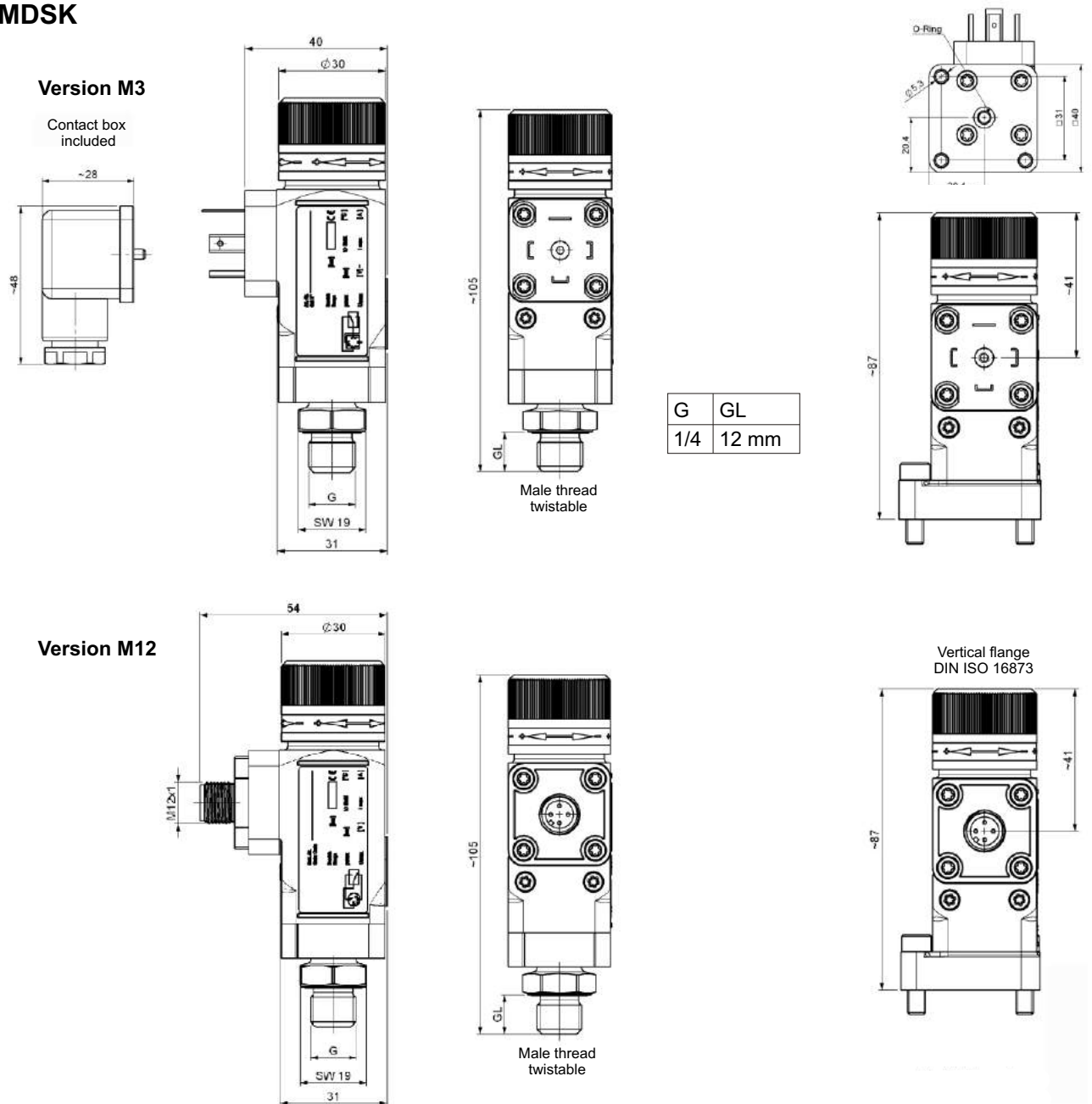
Plug connection	M3 (DIN EN 175301-803) 3 pol. + PE	M12 (Socket) 4 pol.
Max. voltage	250V	28V
Protection class	IP65	IP67**
Cable fitting	PG9	
		**when connected
Pin assignment		

Dimensions

MDSM



MDSK



Accessories: Art-Nr.: 9144050047 Connecting cable M1 2x1, 4-pin plug, L = 5m
 Art-Nr.: 9146100159 Contact box M1 2x1, 90° angle
 Art-Nr.: 9008429 Double nipple G1/4, stainless steel

Product code

MDS - - - -

Model

M MDSM
K MDSK

Plug connection

M3 or M12

G1/4i G1/4" inside (MDSM only)
G1/4d G1/4" twistable (MDSK only)
VF Vertical flange per ISO 16873 (MDSK only)

Pressure ranges

Setting of switching point ¹⁾

Pressure ranges

8 :	0,5...8 bar	MDSM
16:	1...16 bar	MDSM
120:	10...120 bar	MDSK
250:	20...250 bar	MDSK
320:	30...320 bar	MDSK

¹⁾ If required, the switching point setting can be executed by the factory. The switching point must be set for rising or falling pressure, i.e. switching point monitoring of 0 bar to switching point (rising) or from max. operating pressure decreasing to switching point (falling). Refer to the following example for the circuitry:

MDSK-M3-G1/4-120-80R (switching point 80 bar rising)
 PIN1-3 closed when switching point is reached

MDSK-M3-G1/4-120-80F (switching point 80 bar falling)
 PIN1-2 closed when switching point is reached

TF-M/E-G1/2

- Pt 100 (RTD) temperature probe
- Continuous temperature acquisition
- Probe length up to 1 m
- Housing material brass or stainless steel

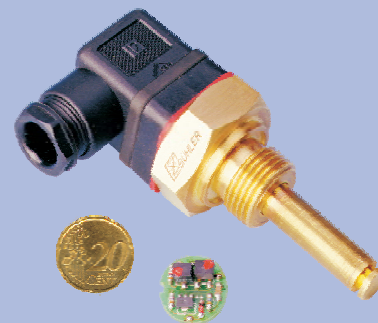
TF-M-G1/2



MK2-G1/2 / EK2-G1/2

- Analog output 4-20 mA
- Continuous temperature acquisition
- Most lengths of cable connections between sensor and control unit
- Probe length up to 1 m
- Housing material brass or stainless steel

MK2-G1/2



Temperature probe Pt 100 with spring

TF-M-VAL

Temperature probe Pt 100 (RTD) with spring

- Pt 100 (RTD) temperature probe
- Continuous temperature acquisition
- Integrated spring for a variable probe length



Technical data

Temperature probe TF with Pt 100

Type design

material probe
max. operating pressure
connector
operating temperature
lengths

TF-M-G1/2 MS

brass
5 bar
G1/2
-40 °C to +100 °C
280, 370, 500 (standard)
variable up to max. 1000 mm

TF-E-G1/2 VA

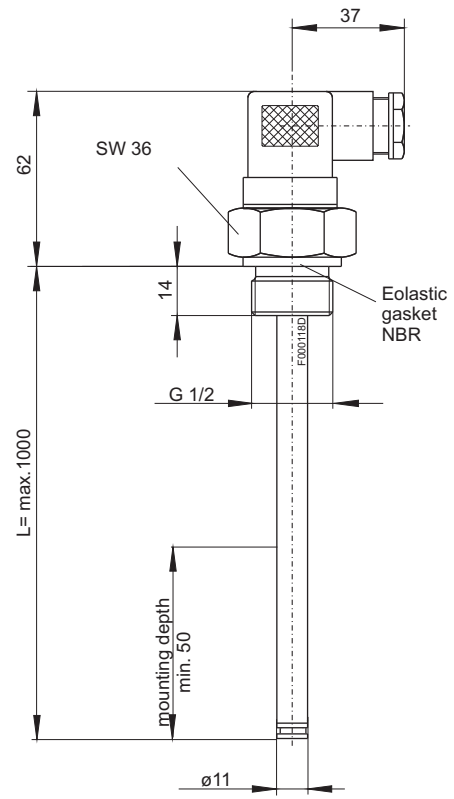
1.4571
10 bar

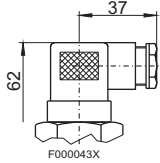
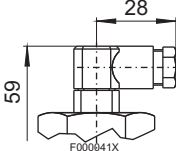
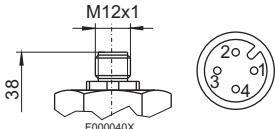
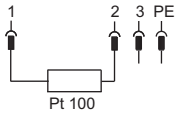
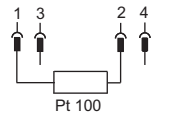
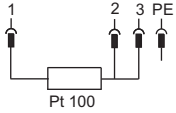
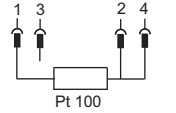
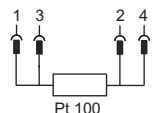
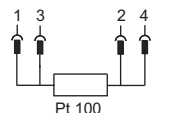
Temperature sensor

sensor element Pt 100 class, B DIN EN 60751
tolerance $\pm 0,8$ °C
sensor wiring 2, 3 or 4 lead

Basic values of the measuring resistors Pt 100

°C	Ohm
0	100,00
10	103,90
20	107,79
30	111,67
40	115,54
50	119,40
60	123,24
70	127,07
80	130,89
90	134,70
100	138,50



Connector*	M3 3 pol. + PE (DIN EN 175301-803) IP 65 PG 11	GS4 4 pol. IP 65 PG 7	M12 (base) 4 pol. IP 67**
protection class cable connection			
*other connectors on request			**with casted connector head
Standard pin assignment			
2 - lead			
3 - lead			
4 - lead			

Product code for Temperature probe TF

G1/2 PT100

TF-M for design MS
TF-E for design VA

Design
MS
VA

Connector

M3
M12
GS4 only for 4-lead-wiring

Length (max. 1000 mm)

280
370
500
Variable (please note)

Switch form

2L = 2 - lead
3L = 3 - lead
4L = 4 - lead

Example for order

You need: Temperature probe brass design, with connector M3, length L= 520 mm, PT 100 in 2-lead circuit, operating pressure 2 bar

You order: Temperature probe TF-M-G1/2-MS-M3-PT100-2L / 520

Technical data

MK2/ EK2 with temperature transmitter

Type design	MK2-G1/2 MS	EK2-G1/2 VA
material probe	brass	1.4571
max. operating pressure	5 bar	10 bar
connector	G1/2	G1/2
operating temperature	-20 °C to +100 °C	
lengths	280, 370, 500 (standard) variable up to max. 1000 mm	

Temperature transmitter

operating voltage (U _B)	10 - 30 V DC
measuring range*	0 °C to +100 °C
tolerance	± 0,8 °C ± 1%FS**

Analogue output

output	4 - 20 mA
load Ω max.	(U _B - 7,5 V) / 0,02 A
tolerance	± 1%FS***

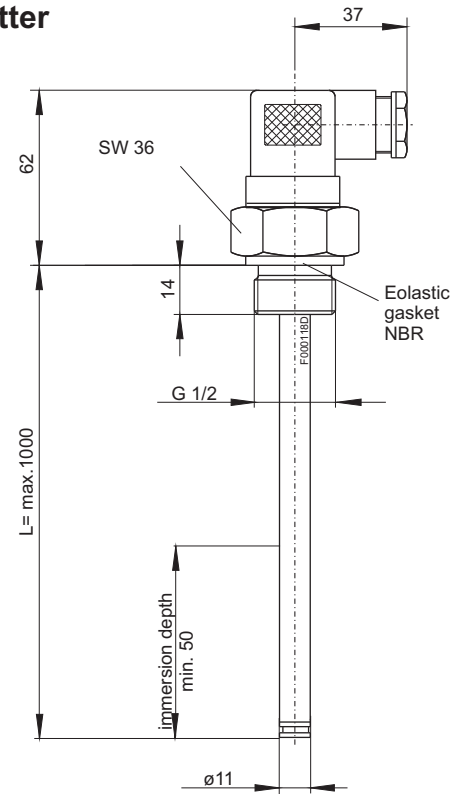
Sensor element

sensor element	Pt 100 class B DIN EN 60751
output Pt 100	± 0,8 °C

* other measuring ranges and outputs on request

** Consisting of sensor element and analog output

*** measuring range (Max - Min)

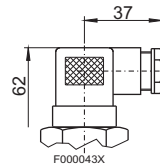


Example for actual medium temperature 50 °C: Deviation Pt100 ±0,8 °C which means tolerance 49,2 °C - 50,8 °C; Deviation analog output ± 1%FS which means ± 1K; Total tolerance: 48,2 °C - 51,8 °C

Connector*

	M3
max. voltage	30 V DC
protection class	IP 65
cable connection	PG 11

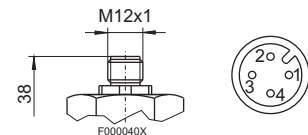
*other connectors on request



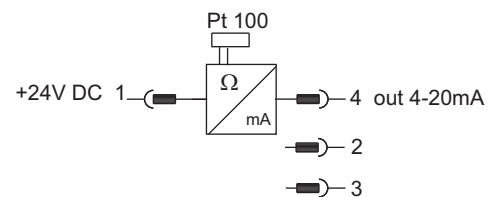
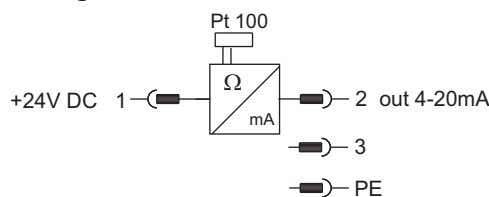
M12 (base)

max. voltage	30 V DC
protection class	IP 67**

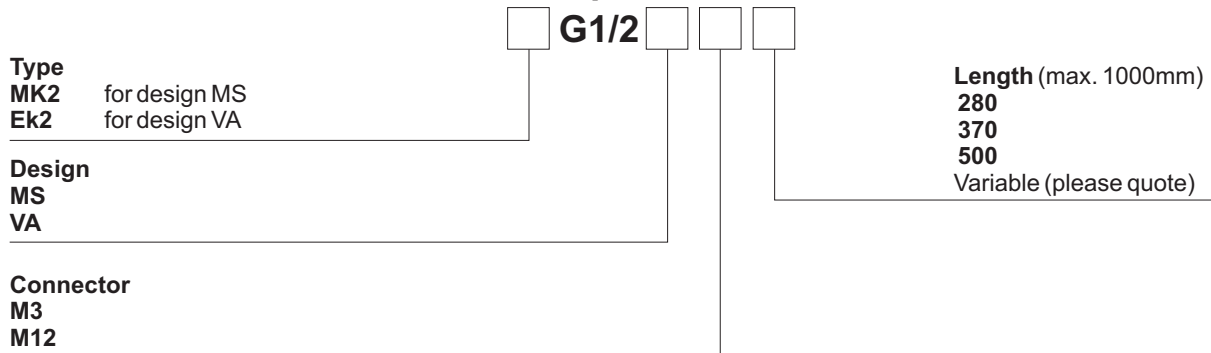
**with casted connector head



Standard pin assignment



Product code for temperature transmitter MK2 / EK2



Example for order

You need: Temperature transmitter brass design, with connector M3, output 0-100 °C = 4-20 mA
length L= 520 mm, operating pressure 2 bar

You order: Temperature transmitter MK2-G1/2-MS-M3 / 520

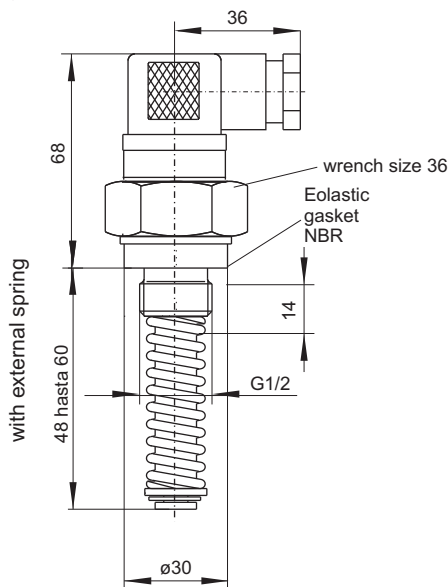
Technical data

Temperature probe Pt 100 with spring TF-M-VAL-G1/2

Design with external spring

length 48 - 60 mm

material probe aluminium anodized / spring steel
 gasket NBR
 max. operating pressure 1 bar
 fitting G1/2
 fastening torque 25 Nm
 operating temperature -40 °C to +100 °C

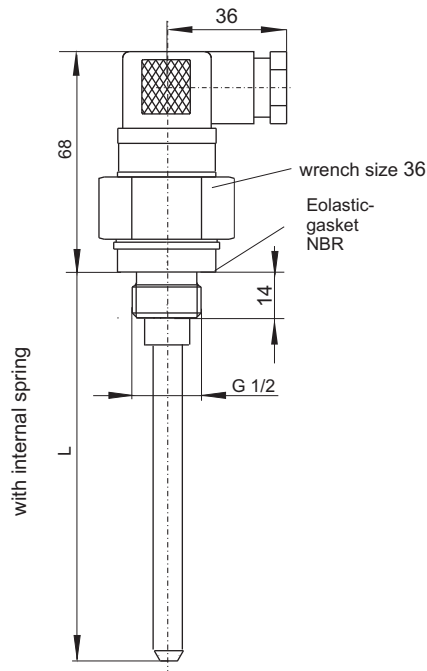


Design with internal spring

lengths L spring deflection
 210 206-215 mm
 330 325-334 mm

material probe brass
 gasket NBR
 max. operating pressure 1 bar
 fitting G1/2

operating temperature -40 °C to +100 °C



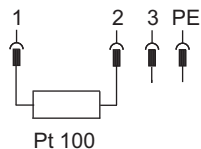
Temperature sensor

sensor element Pt 100 class B, DIN EN 60 751
 tolerance $\pm 0,8^{\circ}\text{C}$
 switching form 2 - lead
 basic values see chart on page 2

Connector* M3 3 pol. + PE (DIN EN 175301-803)
 protection class IP 65
 cable connector PG 11

*on request other connectors

Standard pin assignment



Order information

Temperature probe TF-M-VAL with Pt 100 and spring

Part No.	Length	Type
18 92 599	48-60 mm	TF-M-PT100-VAL-M3/60
18 94 599	206-215 mm	TF-M-PT100-VAL-M3/210
18 95 799	325-334 mm	TF-M-PT100-VAL-M3/330

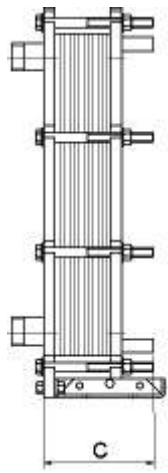
Example for order:

You need: Temperature probe with Pt 100 with spring, length 48-60 mm
 You order: Part No. 18 92 599 temperature probe TF-M-PT100-VAL-M3/60

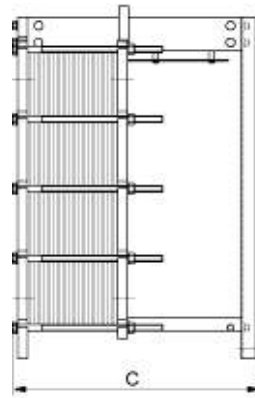
Oil / Water Cooler Series M, GC, GX und GM



- High exchange efficiency
- Equally distributed turbulent flow
- Little installation space required
- High pressure resistance
- Low water consumption
- Maintenance free
- Broad temperature range
- Easy installation



Frametype PI



Frametype N and P

Technical Data

Frame	B	H	D	E	F	C		Max. Surface m ²	Max. Flow m ³ /h	Connection nominal dia. mm
						min	max			
GC- 12 PI	180	510	82	357	60	120	500	3	10	25
GX- 8 PI	180	774	72	640	60	130	510	7	10	25
GL- 13 PI	320	832	140	592	135	260	385	6	40	50
GL- 13 P	320	832	140	592	135	600	1100	18	40	50
GC- 30 PI	250	725	90	555	100	250	375	2	27	40
GC- 30 P	250	725	90	555	100	590	1090	17	27	40
GC- 16 PI	320	832	140	592	135	260	385	9	40	50
GC- 16 P	320	832	140	592	135	600	1100	27	40	50
GX- 26 P	450	1265	220	779	226	717	3117	122	170	100
GC- 26 P	450	1265	220	779	226	717	3117	122	170	100
GX- 42 P	450	1675	220	1188	226	719	3119	200	170	100
GX- 51 P	630	1730	300	1143	300	1168	3168	250	380	150
GC- 51 P	630	1730	300	1143	300	1168	3168	250	380	150
GX- 64 P	626	1910	300	1320	285	1168	3168	295	380	150
GX- 91 P	626	2390	300	1800	285	1168	3168	416	380	150
GX- 118 P	626	2870	300	2280	285	1168	3168	540	380	150
GX- 60 P	825	1700	350	910	420	1517	3218	212	680	200
GX- 100 P	825	2280	260	1490	420	1518	3218	383	680	200
GX- 140 P	825	2860	350	2070	420	1518	3218	540	680	200
GX- 180 P	825	3510	350	2650	420	1518	3218	708	680	200
GX- 85 N/P	1060	1985	360	1140	570	1518	3218	365	1500	300
GX- 145 N/P	1060	2565	360	1720	570	1518	3218	613	1500	300
GX- 205 N/P	1060	3215	360	2300	570	1518	3218	830	1500	300

Standard material:

Plates: SS 1.4301, SS 1.440, Titanium, AVESTA SMO 254

Gaskets: NBR, EPDM, FPM, Hypalon

Other materials like Hasteloy, Incoloy, other nickel alloys as well as palladium stabilised Titanium are available upon request.

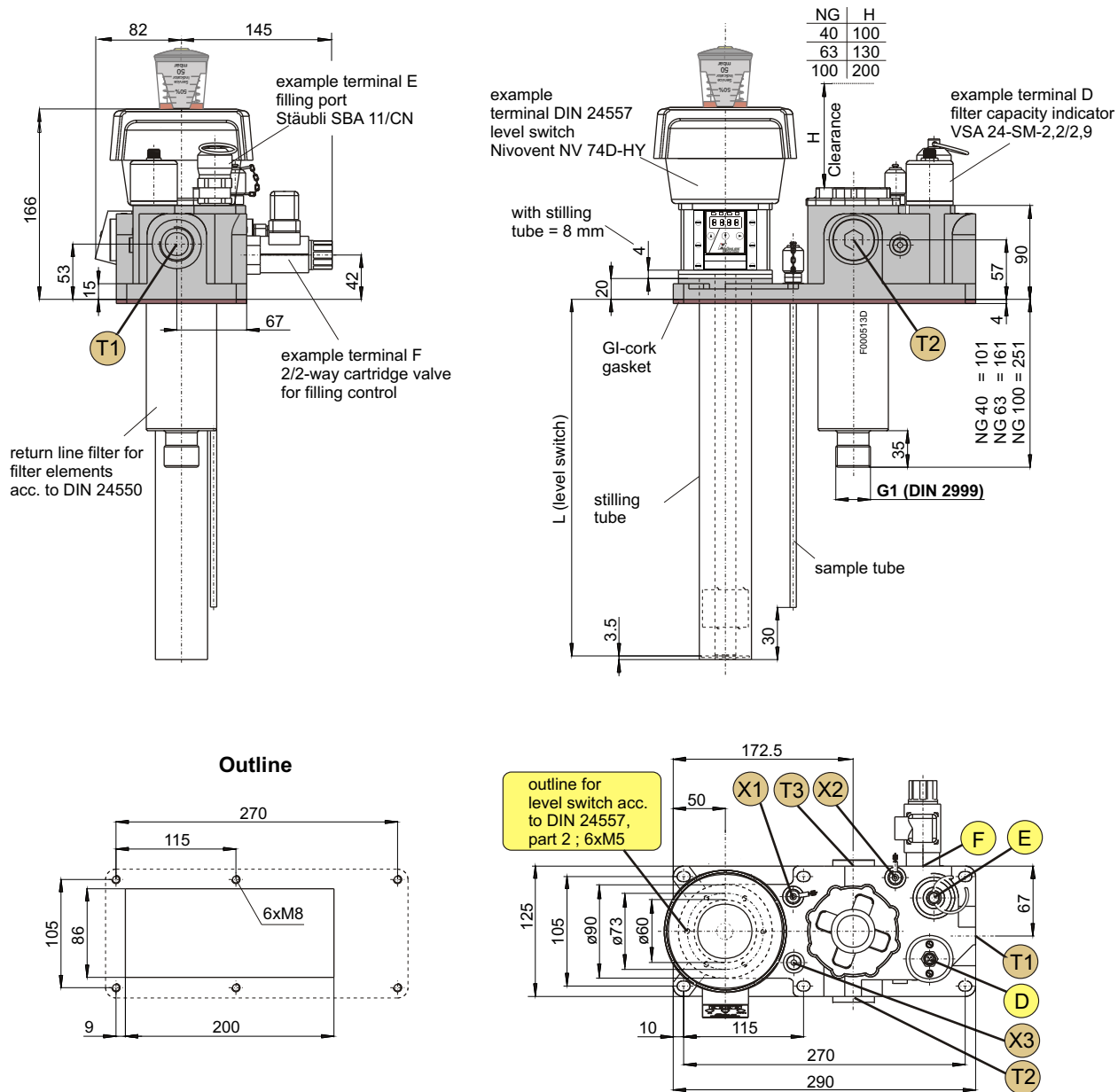


A single installation includes multiple components, greatly reducing the number of necessary tank penetrations resulting in lower overall costs.

- Return filter for DIN elements up to NG 100
- Three ports for return line
- Filling port with quick coupling
- Filling control as option available
- Optical / electronical monitoring of the return filter
- Sample ports inside the vessel and in return line
- Breather with integrated level and temperature control
- Optional optical monitoring of the breather

Note:
The drawing shows an example of a complete unit. Configure the connections D, E, F and DIN 24557 part 2 as per the description "optional connections". The connections T1, T2, T3, X1, X2 and X3 are prefixed as described below. The return-line filter (without filter element) is part of the basic unit and available in three different nominal sizes.

Dimensions (in mm)



Optional terminals

- D = capacity indicator or sealing plug M30x1,5
- E = filling port G1/2
- F = 2/2-way cartridge valve type Flotec or sealing plug M27x2
- DIN 24557/T2 = 2/2-way cartridge valve type Flotec or sealing plug (other types upon request), on your choice.

Fitted terminals:

- T1 = open connection G1 for return-line filter
- T2 / T3 = sealing plug G1 (alternative connection for return-line filter, connection T1)
- X1 = sample port G1/8, minimes with pipe for probe reservoir
- X2 = sample port G1/8, minimes for probe return line
- X3 = sealing plug G1/8 (alternative connection for X1)

(The connections at T1, T2 and T3 as well as X1 and X3 may be configured by the customer.)

Operating pressure

(return line) max. 10 bar
 operating temperature max. 80 °C

Material

base plate GK-AISi12
 gasket GI-cork
 filter cap and -housing plastic

Return filter

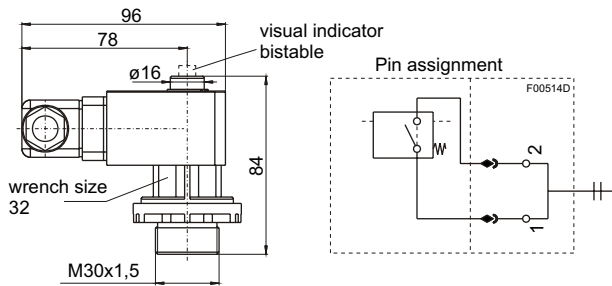
bypass relieve pressure Δp 3.5 bar $\pm 10\%$
 nominal size NG 40, NG 63 or NG 100
 for filter elements according to DIN 24550

Weight

basic unit approx. 3.5 kg

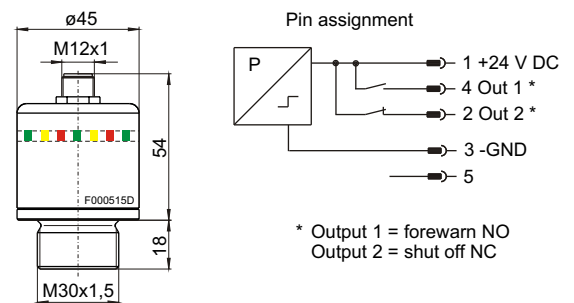
Terminal D - capacity indicator or sealing plug

Type Mahle PIS 3085 / 2,2
 max. operating voltage 250 V AC / 200 V DC
 max. current 1 A
 max. contact load 70 W
 nominal pressure 10 bar /
 temperature range -10 bis +80°C
 indicator setting 2,2 bar
 indication visuall / electrical
 protection class IP65 (plugged)
 contact NO / NC
 connector DIN EN 175301-803, PG11
 material PA 66 / PA 6



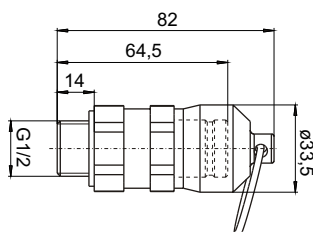
Type Bühler VSA 24-SM-2,2/2,9
 - self-monitoring -
 max. operating voltage 24 V DC $\pm 10\%$
 max. current 1 A at 24 V DC
 max. pressure 10 bar
 indication optical (LED) / electrical
 1. indication (alert) 2.2 bar
 2. indication (shut off) 2.9 bar
 operation temperature -20 °C to 70 °C
 cold start suppression to 30°C (temperature of medium)
 connector M12x1 Socket (5-pol)
 protection class IP67 (with plug installed)
 material Al / PC

See also data sheet DE 13 0002 in chapter 11

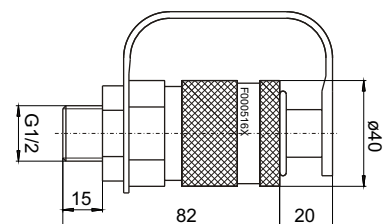


Terminal E - filling port or sealing plug

Type Stäubli SBA 11/CN
 (plug)
 nominal size 11
 thread G 1/2
 material chrome steel / hardened steel



Type Walther MD-012
 (Coupling)
 nominal size 12
 thread G 1/2
 material galv. steel / brownd



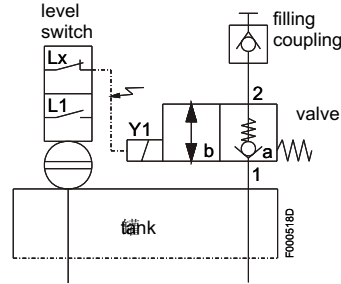
Terminal F - 2/2-way cartridge valve for filling control or sealing plug

General description of filling control:

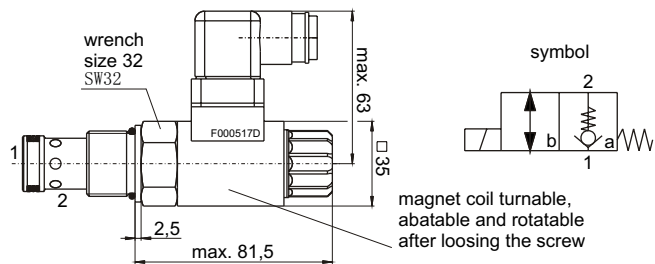
The 2/2-way cartridge valve automatically stops filling at maximum level. This is provided by the highest level contact at Lx. At power-up of the unit the valve position will change to "b". This means the flow path from 2 to 1 is open and filling is in process. When the fluid level reaches the highest level contact (normally open contact at position Lx), the valve will switch to position "a". The path from 2 to 1 is closed now. The valve blocks the flow from the filling port to the reservoir.

During operation a second level contact signals a lack of oil. Using an external control a refill of the tank can be made automatically via the filling terminal or the maintenance personnel can be called to do this. In both cases the filling valve will be reset to position "a" as soon as level Lx is reached.

The controller together with a level switch type NV7x (except NV 73) of your choice can be supplied by Bühler Technologies on request.



Type	Flutec (2/2-way cartridge valve)
Q max.	100 l/min
p max.	280 bar
nominal voltage	24 V DC (-5/+10%)
nominal current	1.04 A
protection class	IP65
temperature range of medium	min. -20 °C, max. +80 °C
viscosity range	min. 10 mm ² /s, max. 380 mm ² /s
connector	DIN EN 175301-803, PG11



For hydraulic oil according to DIN 51524 part 1 and 2.
Max. pollution degree of fluid acc. to NAS 1638 class 10.

Accessories - DIN-Filter Elements

NG 40

Part No.:	Filter element
100 10 040 10	N 0040 RN 10
100 10 040 25	N 0040 RN 25

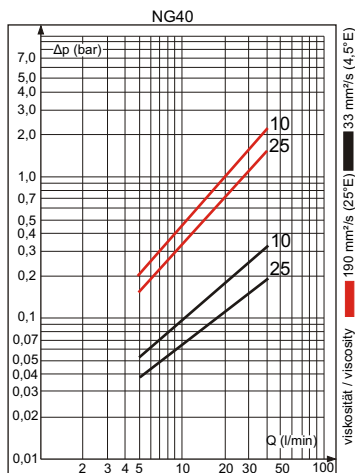
NG 63

Part No.:	Filter element
100 10 063 10	N 0063 RN 10
100 10 063 25	N 0063 RN 25

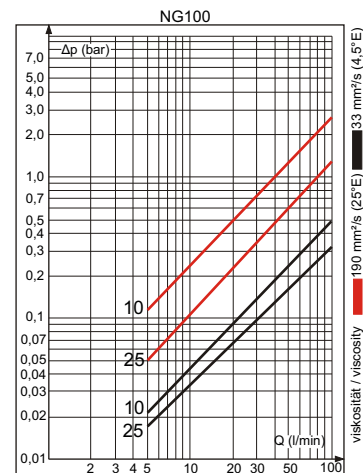
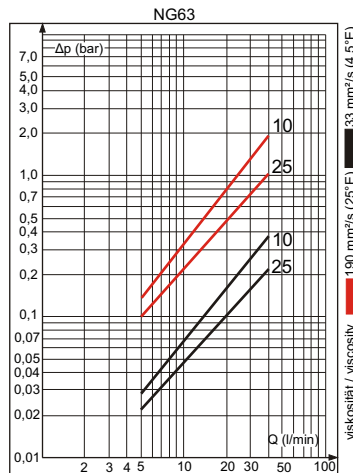
NG 100

Part No.:	Filter element
100 10 100 10	N 0100 RN 10
100 10 100 25	N 0100 RN 25

Performance of return filter



F000525X



Terminal DIN 24557, Part 2

Breather filter or

Level / temperature switch with breather filter

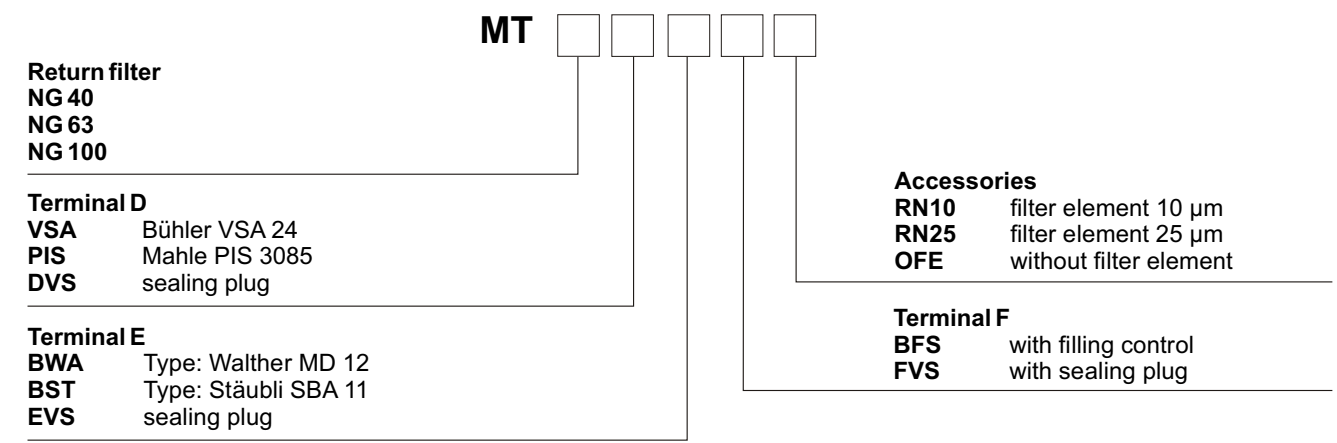
General note

The Multiterminal if equipped with a level & temperature switch at this terminal is always composed of two parts. The part is the Multiterminal MT described in this data sheet and the second part is the level switch of series NV 7 (see example for order below). An overview of appropriate level switches is given on page 6. Please refer to the corresponding data sheet of the level switch for detailed information and configuration. (Integrated filling control on request).

Basic unit Multiterminal equipped as:

Multiterminal block, gasket, connection T1-T3, X1-X3 pre-set as described on page 2

Product code for Multiterminal



Example for order:

You need:

Basic unit Multiterminal NG 63, optional connectors as follows:

Terminal

D (capacity indicator) = Bühler VSA 24-SM-2,2/2,9

E (filling port) = Walther MD-012

F (filling control) = sealing plug M27x2

accessories = Filter element N 0063 RN 10, retention rate 10 µm

You order:

MT NG 63-VSA-BWA-FVS-RN10

Terminal DIN 24557 Teil 2 (level- / temperature switch with breather filter)

Example

Level switch Nivovent NV 74 for Multiterminal, brass, length L = 370 mm (measured from bottom edge of the Multiterminal base plate), connector M12,

one level contact at L1=190 mm NC, one temperature contact at 60°C as NC and breather filter with visual clogging indicator.

You order:

NV 74-HY-MS-M12-/370-1K-TK60NC-MT-VS

L1 = 190 mm NC

Level switch: **NV 74 for Multiterminal**

- For technical data please refer to data sheet DE 10 0205

- Hydac breather filter
- quick and easy adjustable level contacts
- plug and play system
- up to 4 contacts
- bi-metal contacts, Pt 100 or 4-20 mA signal output for temperature
- **NV 74D equipped with display and control unit**
- easy operation via 3 keys
- good visible LED display
- up to 4 programmable temperature switching outputs
- optional continuous temperature output signal, programmable 4-20 mA, 0-10 V or 2-10 V

easyjust



Level switch: **NV 71 for Multiterminal**

- For technical data please refer to data sheet DE 10 0204

- Hydac breathing filter
- Level and/or temperature control
- up to 4 contacts
- 230 V applicable
- bi-metal contacts, Pt 100 or 4-20 mA signal output for temperature
- **NV 71D equipped with display and control unit**
- easy operation via 3 keys
- good visible LED display
- up to 4 programmable temperature switching outputs
- optional continuous temperature output signal, programmable 4-20 mA, 0-10 V or 2-10 V



Level switch: **NV 73 for Multiterminal**

-For technical data please refer to data sheet DE 10 0206

- **continuous level measurement**
- Hydac breathing filter
- alternatively with continuous temperature measurement, 4-20 mA output
- resolution 5 mm
- diverse connectors
- immersion depth up to 1420 mm (longer upon request)



Level switch: **NV 77-XP for Multiterminal**

- For technical data please refer to data sheet DE 10 0203

- **continuous level measurement**
- Hydac breathing filter
- 4-20 mA output
- resolution 5 mm
- immersion depth up to 1420 mm
- **display and control unit**
- 4 switching outputs programmable as level or temperature output
- alternatively 2 switching outputs programmable as level or temperature output plus 1 analogue output each for continuous analogue output for level and temperature control
- analogue output programmable as 4-20 mA, 0-10 V, 2-10 V or 0-5 V
- display of actual values for level or temperature switchable



Display and control unit Multitronik

easyMont



Multifunctional device for display and monitoring of various measurements like level, temperature, and pressure

- Compact design
- Highly visible LED display with status indicator of the switching outputs
- Most lengths of cable connections, between measurement point and display
- Units like cm, inch, °C, °F, bar or psi programmable
- Up to four programmable outputs
- Analogue output (adjustable as current or voltage output) plus one, two or four programmable outputs
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Switching output adjustable as window or hysteresis
- Menu structure based on VDMA guidelines
- Min/max value memory, logbook function

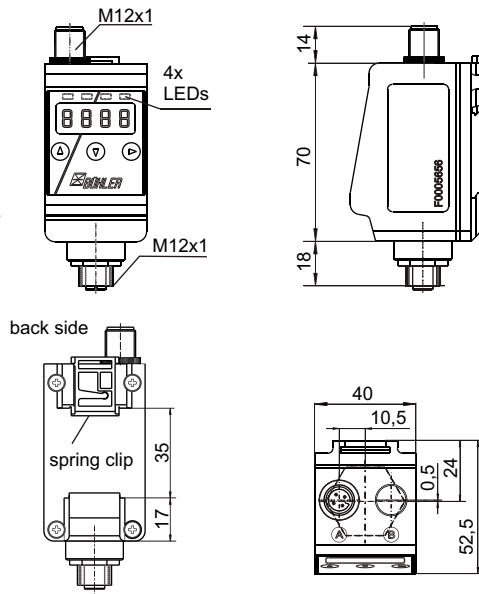


Technical data

Display

display units	4 digit 7 segment LED display b (bar), P (psi), C (°C), F (°F), L (Litre) as well as various other letters and symbols
accuracy	1%
protection system	IP65
operation	3 button keypad
current consumption at power up	approx. 100 mA for 100 ms
Operating current consumption	approx. 50 mA
voltage supply (U _B)	10 V to 30 V DC (nominal voltage 24 V DC)
ambient temperature	-20 °C to +70 °C
weight	approx. 100 g
connector input (female)	M12 - 4 pol.
Mount	35 mm rail mount

Display and control unit

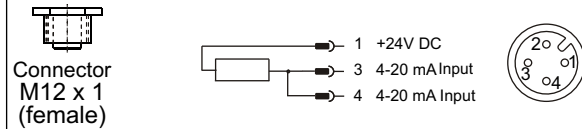


Following temperature outputs are available:

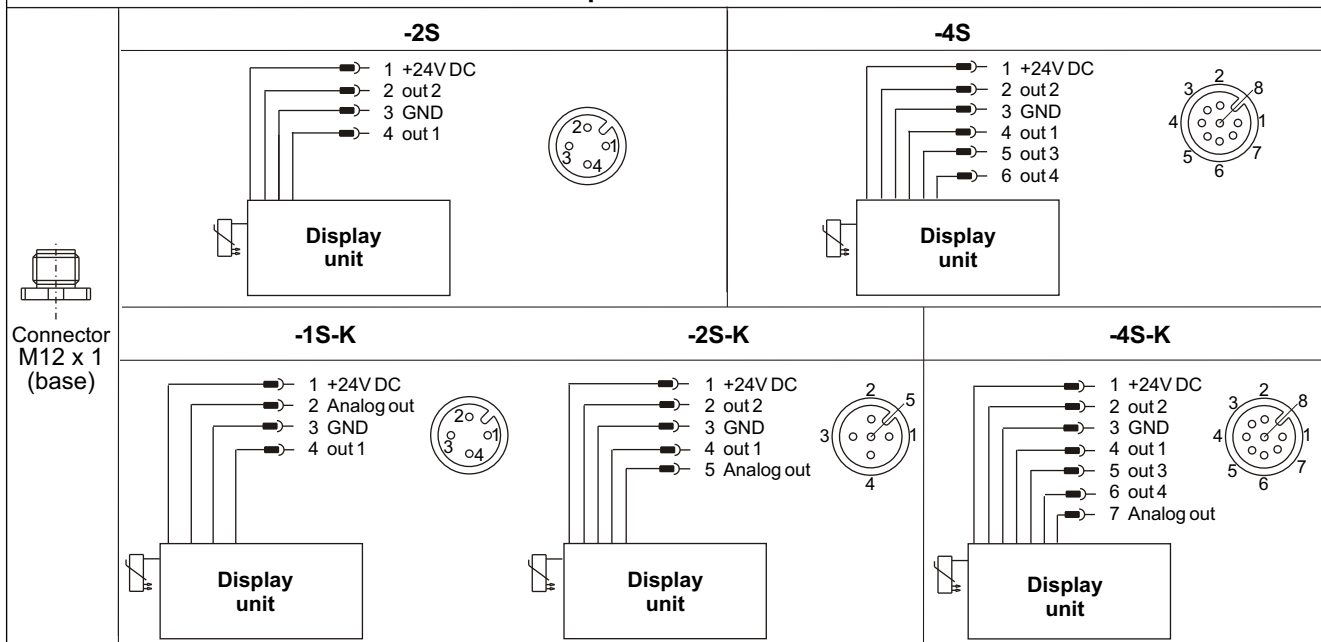
Type	-2S	-4S	-1S-K	-2S-K	-4S-K
PNP transistor output	2 x	4 x	1 x	2 x	4 x
free programmable	yes	yes	yes	yes	yes
max. current per output	0,5 A	0,5 A	0,5 A	0,5 A	0,5 A
contact load max.	1A	1A	1A	1A	1A
analogue output 1 x 4 - 20 mA	no	no	yes	yes	yes
2-10 V, 0-10 V or 0-5 V	-	-	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A
load Ω analogue output	-	-	M12 - 4 pol.	M12 - 5 pol.	M12 - 8 pol.
connector output (base)	M12 - 4 pol.	M12 - 8 pol.	M12 - 4 pol.	M12 - 5 pol.	M12 - 8 pol.
Art-No	18 770 199	18 770 299	18 770 399	xx xx xxx xxx	xx xx xxx xxx

Pin assignment

1. Remote display, supply of the sensor



2. Output Multitronik 770



Accessories

Part-No 4-pole	Part-No 5-pole	Part-No 8-pole	Description
9144 05 0010	9144050016	9144 05 0048	Cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144050017	9144 05 0049	Cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144050018	9144 05 0033	Cable M12x1, 5,0 m, elbow connector (female) and wire

Note

The following Bühler sensors do have a 4-20 mA output and thus are compatible to the display and control unit:

Level measurement

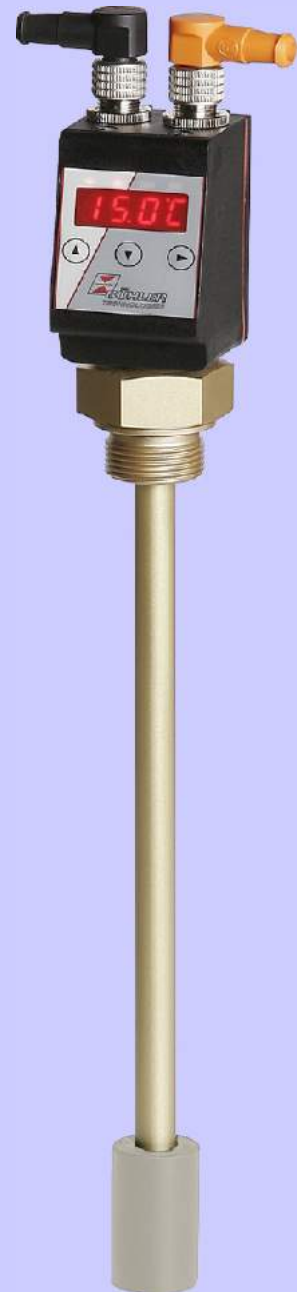
Nivotemp NT 63 (see data sheet DE 10 0210)
Nivovent NV 73 (see data sheet DE 10 0206)

Temperature measurement

Temperature sensor MK2 / EK2 (see data sheet DE 11 0202)
all level switches with option KT

The new generation of level and temperature monitoring

- G3/4" thread
- Combined, continuous monitoring of level and oil temperature
- Highly visible LED display shows the actual temperature in the basic mode, with status indicator of the switching outputs, able to rotate 270°
- Menu structure based on the VDMA guideline 24574
- Up to four programmable switching outputs, selectable as level or temperature signal
- Alternatively continuous signals (current or voltage adjustable) for level and temperature output plus 2 or 4 programmable switching outputs
- Output characteristic for switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Min/Max memory, logbook function
- M12 connector base
- Reliable dynamic float system
- Immersion tube in matched lengths



Technical data

NT M-XP

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C (-4°F to 176°F)
min. spec. density of fluid lengths	0.80 kg/dm ³ 200, 280, 370, 500, 650, 800mm (other lengths on request)

Weight	
at L=280 mm	approx. 390 g
plus per 150 mm	approx. 20 g

Material / Design

Float	MS hard PU
immersion tube	brass
thread G3/4	brass

Level measurement

measuring resistor	reed chain
resolution	10 mm

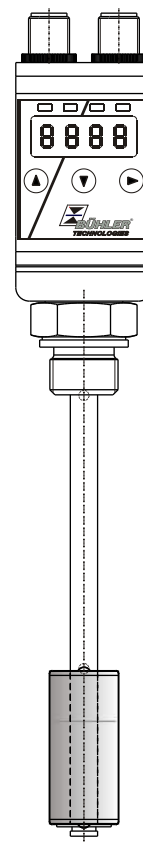
Temperature measurement

measuring resistor	Pt 100 (RTD) class B, DIN EN 60 751
tolerance	± 0,8 °C

Display and control unit

display	XP 4 digit 7 segment LED display
operation	3 button keypad
storage	min. and max. values
current consumption at power up	approx. 100 mA for 100 ms
operating current consumption	approx. 50 mA
supply voltage (U _B)	10 - 32 V DC (nominal voltage 24 V DC)
ambient temperature	-20 °C to +70 °C (-4°F to 158°F)
protection class	IP65

	Level	Temperature
indicating device	%, cm, L, i, Gal	C / F
indicating range	adjustable	-20 °C to +120°C or -4 °F to 248°F
alarm indicator range	e. g. 0-100%	0 °C to 100 °C or 32 °F to 212 °F
accuracy	1% of the final value	



Dimensions and pin assignment
see page 4

Following output options are available

	-2S		-2S-KN-KT
connector (base)	1 x M12 - 4 pol		2 x M12 - 4 pol
PNP transistor output	2 x free programmable optional allocation for e.g. 1 x Level / 1 x Temperature		2 x free programmable with free selectable allocation
alarm memory	1 x PNP output allocable as alarm logbook		1 x PNP output allocable as alarm logbook
max. current	0,5 A per output		0,5 A per output
contact load	max 1 A		max 1 A
			Level
			1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V
			(U _B - 8 V) / 0,02 A
			Temperature
			1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V
			(U _B - 8 V) / 0,02 A
			-4S-KN-KT
			1 x M12 - 8 pol
			4 x free programmable with free selectable allocation
			1 x PNP output allocable as alarm logbook
			0,5 A per output
			sustained short-circuit proof
			max 1 A
			Level
			1 x 4 - 20 mA, 2-10 V, 0-10 V or 0-5 V
			(U _B - 8 V) / 0,02 A
			Temperature
			1 x 4-20 mA, 2-10 V, 0-10 V or 0-5 V
			(U _B - 8 V) / 0,02 A
			Other output options on request

Product code for NT M-XP

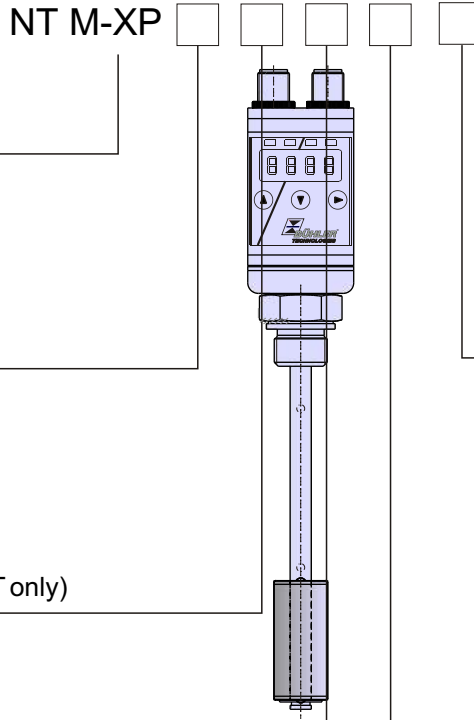
Series
Nivotemp **NT M-XP**
with display and control unit

Design
MS brass

Connector
M12-4-pol. (with option 2S only)
2M12-4-pol.
M12-8-pol. (with option 4S-KN-KT only)

Length (max. 800 mm)

- 200
- 280
- 370
- 500
- 650
- 800



Options
OV = Oval flange
G1 = Adapter to G1"

Card
-2S
2 x PNP transistor output

-4S
4 x PNP transistor output

-2S-KN-KT
2 x PNP transistor output
1 x analogue output level
1 x analogue output temperature

-4S-KN-KT
4 x PNP transistor output
1 x analogue output level
1 x analogue output temperature

O
P
T
I
O
N
S

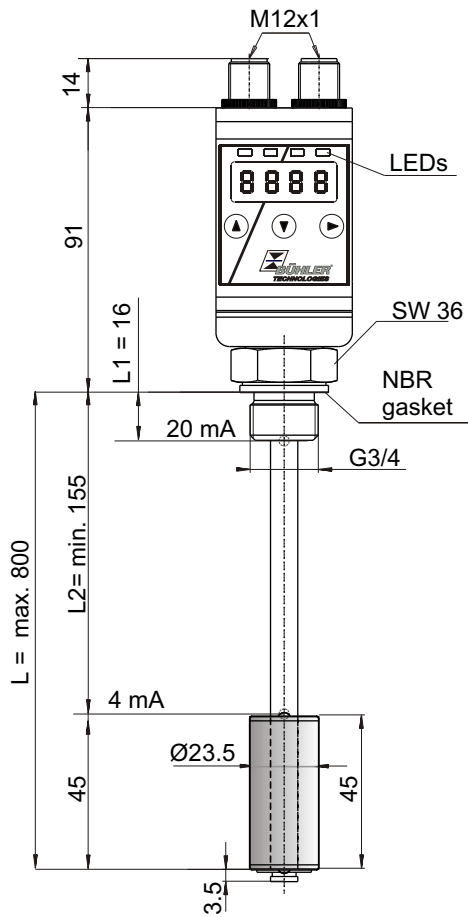
Accessories:

Part No. 4-pol	Part No. 8-pol	Description
9144 05 0010	9144 05 0048	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0049	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0033	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

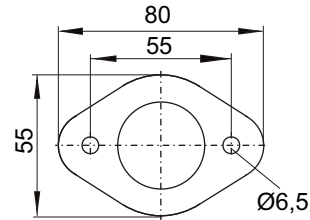
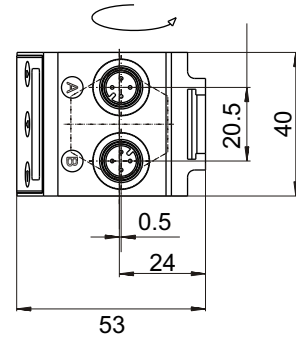
Example for order

You need: Level and temperature measurement, brass design, 2xM12 connector, length L=650mm with 2 programmable PNP - switch-points and analogue output for level and temperature

You order: NT M-XP-MS-2M12 / 650-2S-KN-KT



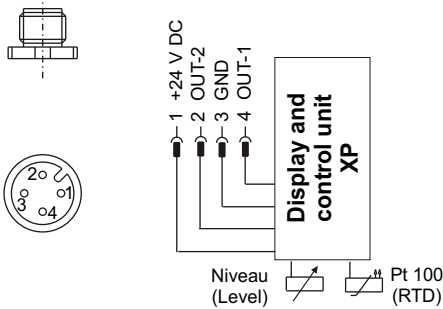
Housing able to rotate 270°



Standard pin assignment NT M-XP

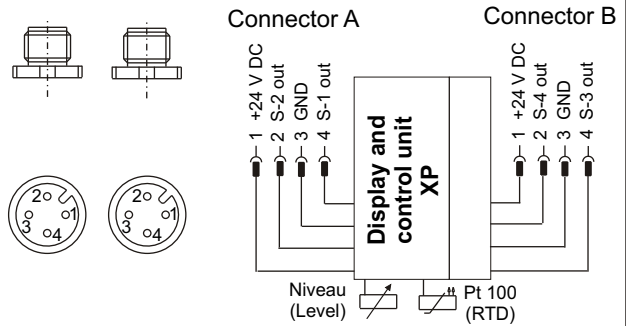
Typ NT M-XP..-2S
2 x PNP - Transistor output
free programmable

Connector 1xM12 (4 - pol)



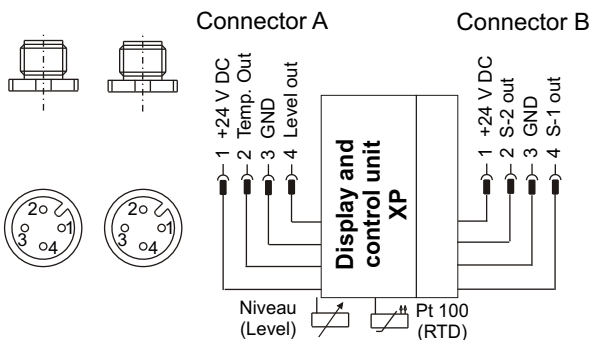
Typ NT M-XP..-4S
4 x PNP - Transistor output
free programmable

Connector 2xM12 (4 - pol)



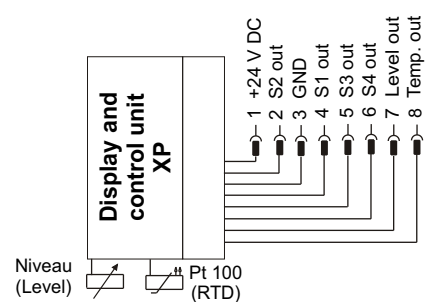
Typ NT M-XP..-2S-KN-KT
2 x PNP-Transistor output
free programmable
1 x Analogue output level
1 x Analogue output temperature

Connector 2xM12 (4 - pol)



Typ NT M-XP..-4S-KN-KT
4 x PNP-Transistor output
free programmable
1 x Analogue output level
1 x Analogue output temperature

Connector 1xM12 (8 - pol)



NS-OM-61/63

NS-OM-61/63

- Visual and electrical liquid level monitoring
- Max. voltage 230 V
- Variable lengths
- Version NS-OM-63 with analog output 4-20 mA for continuous liquid level control



NS-OM-64-EasyJust

NS-OM-64

- Visual and electrical liquid level monitoring
- Easy Just System: user-optimized adjustability of cordless level contacts
- Fixed length 280, 370, 500 mm



NS-OM-VA

NS-OM-VA

- Visual and electrical liquid level monitoring
- Max. supply voltage 230 V
- Stainless steel option for harsh environment
- Level contact mounted and adjustable outside



Technical data

NS OM-61, 63, 64

Basic unit

max. operating pressure 1 bar
 operating temperature -20 °C to +80 °C
 min. spec. gravity 0.80 kg/dm³

Material

float hard PU
 guide bar aluminium
 switching tube brass
 flange (DIN 24557) PA
 stilling tube (option) brass

Type

lengths **61**
 L = 280, 370, 500 (standard)
 variable up to max 1000

Level contacts

function	K10	W11
max. voltage	230 V	48 V
max. current	0.5 A	0.5 A
max. contact load	10 VA	20 VA
min. distance of contact	40 mm	40 mm

*NO = normally open / NC = normally closed, all figures at empty reservoir

easyjust

Type

lengths **64**
 L = 280, 370, 500

Level contacts

function	K = NO / NC* or W = change over
max. voltage	30 V
max. current	0.5 A
max. contact load	10 VA
min. distance of contact	40 mm

*NO = normally open / NC = normally closed, all figures at empty reservoir

Type

lengths **63** (continuous level)
 L = 280, 370, 500, 670, 820 and 970*

measuring resistor

resolution reed-contact
 5 mm

operating voltage (U_B) 10 - 30 V DC

output 4 - 20 mA

load Ω max. = U_B - 7.5 V / (0.02 A)

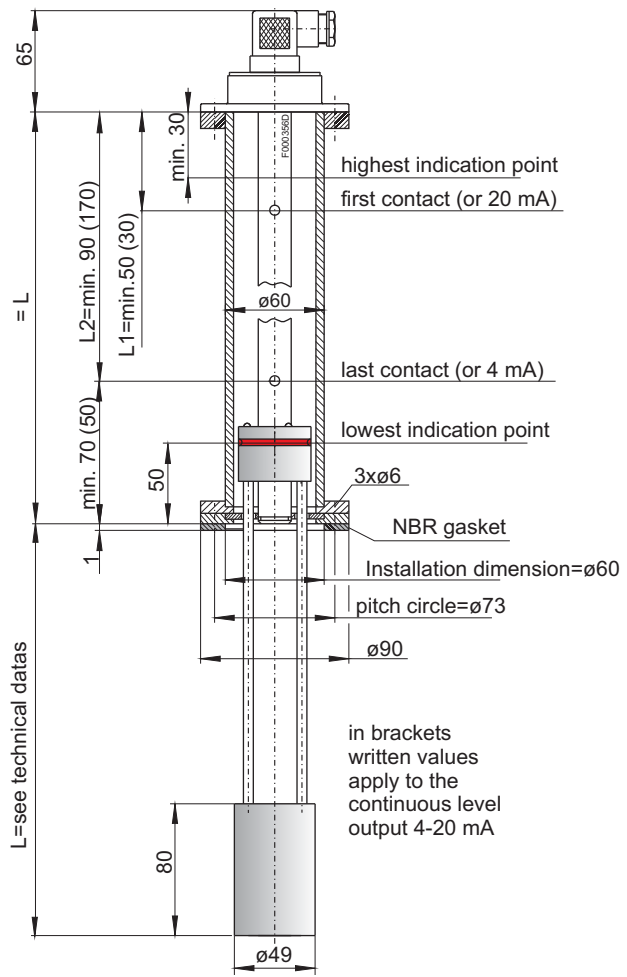
*other lengths on request

Option

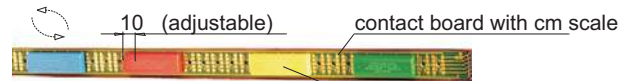
SSR - stilling tube

Included in the delivery

mounting bolts M5 (6 pieces) and GI cork-gasket

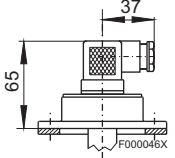
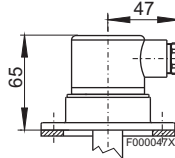
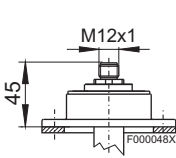
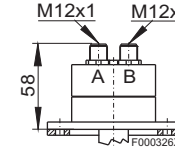
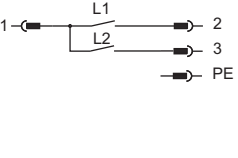
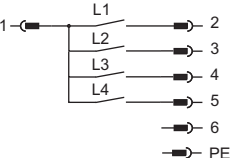
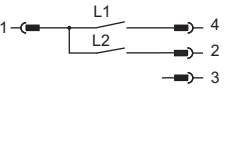
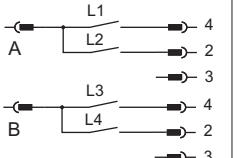
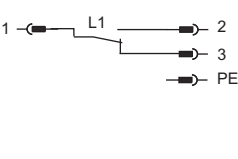
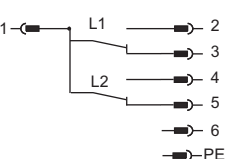
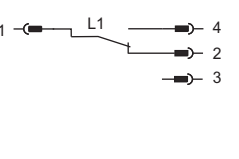
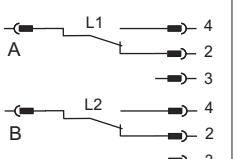
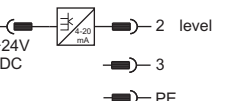
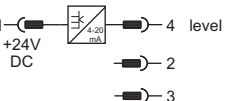


The Easyjust System



changing of contact function
 NO/NC by turning the
 contacts about 180°

wireless (bi-stable) level
 contacts function:
 NO or NC

Connector	M3 (DIN EN 175301-801) 3 pol. + PE 230 V AC/DC* IP 65 PG 11	S6 (DIN EN 175201-804) 6 pol. + PE 230 V AC/DC* IP 65 M20 x 1,5	M12 (base) 4 pol. 30 V DC IP 67**	2 x M12 (base) 2 x 4 pol. 30 V DC IP 67**IP 65 (only NS OM-61)
max. voltage protection class cable connection				
level contact(s) NO / NC				
level contact(s) Wechsler				
NS OM-63-KN (continuous level)				

* max. 48 V for change over contact / max. 30 V for NS-OM 64 / **with casted connector head / other connectors on request

Product code for NS OM-61, 64

NS OM-



Series NS OM-

Typ

61

64 Easy Just

Connector

M3

S6

M12

2x M12 (type 61 only)

Length (mm)

280

370

500

variable (max. 1000 mm only for type 61)

level contacts

1-4

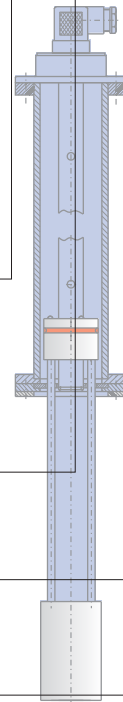
Level contact

K = NO/NC

W = change over

Option

SSR stilling tube



Product code for NS OM-63

NS OM-



Series NS OM-

Typ

63 (continuous level)

Resolution

5 mm

Connector

M3

M12

Length

280

370

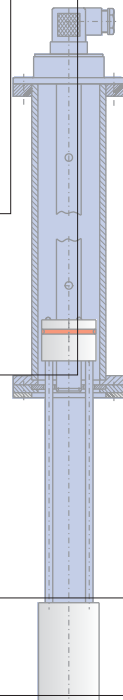
500

820

970

Option

SSR stilling tube



Example for order

You need: Visual and electrical monitoring of level length 600 mm with 2 contacts K10, 1st contact 100 mm NC, 2nd contact 420 mm NOr

You order: NS OM 61-S6-/ 600 - 2K L1=100 NC, L2 = 420 NO

Technical data

NS OM-VA

Basic unit

max. operating pressure	1 bar
operating temperature	-20 °C to +80 °C
min. density of fluid	0.80 kg/dm ³

Material

float SK 903	PU/Al/PP
immersion tube	1.4571
flange	1.4571
stilling tube	1.4571 (included in delivery)
sight glass	PC

Type

lengths mm	MKS 280, 370, 500 variable up to max 820
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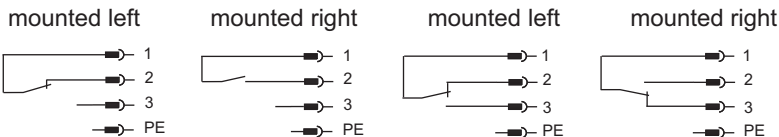
Contacts

type	MKS-1/K	MKS-1/W
function	NC/ NO*	change over
max. voltage	230 V AC/DC	230 V AC/DC
max. current	1 A	1 A
max. contact load	50 VA	40 VA
connector	3 pol. + PE	3 pol. + PE
protection class	M3 (DIN EN 175301-803)	M3 (DIN EN 175301-803)
part no.	IP65	IP65
other contacts on request	288 89 99	288 99 99

*NO = normally open / NC = normally closed, all figures at empty reservoir

MKS-1/K

MKS-1/W

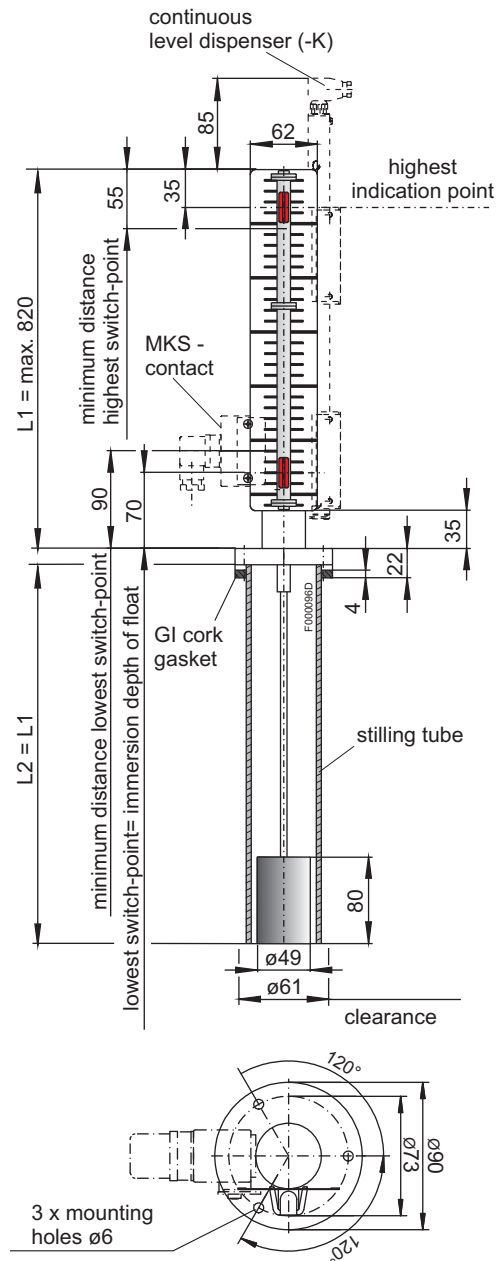
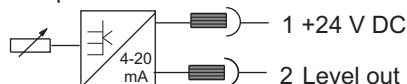


contact position at **empty reservoir**

Type

lengths	mm	K (continuous level measurement) 280, 370, 500, 670, 820*
	inch	11, 14.6, 19.7, 26.4, 32.3*
measuring resistor		reed-contact
resolution		5 or 10 mm (0.2 or 0.4")
operating voltage (U _B)		10 - 30 V DC
output		4 - 20 mA
load Ω max.		=(U _B - 7.5 V) / 0.02 A

*other lengths on request



Product code for NS OM-VA

Type **NS OM-VA-MKS**

Length (max. 820 mm)
280
370
500
 Variable (please specify)

Type **NS OM-VA-K**

5 continuous resolution 5 mm
10 continuous resolution 10 mm

Length (mm)
280
370
500
670
820

Example for order

You need: Visual and electrical level monitoring in stainless steel design (VA), length L= 600 mm and 2 x contact MKS 1/W

You order: NS OM-VA-MKS / 600 + 2 x contact MKS-1W (Part No: 288 99 99)

Pressure switch Pressotronic

easyMont



Pressotronic

- Pressure range up to 600 bar (8700 psi)
- Compact design
- Up to four programmable switching outputs
- Analog output (current or voltage adjustable) plus one, two or four programmable outputs
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)

- Direct or external mounting of the display and control unit
- Almost any length of cable connection between measuring point and display
- Highly visible LED display indicates switching outputs, able to rotate 270° when directly mounted
- Menu structure based on VDMA guidelines
- Min/Max memory, logbook



Technical data

Pressure transmitter

pressure ranges

Pressotronic 700

0 - 10 bar
0 - 25 bar
0 - 100 bar
0 - 250 bar
0 - 400 bar
0 - 600 bar

other pressure ranges on request

pressure terminal

G ¼ male thread, DIN 3852 form E;
pressure tip orifice for standard ≥ 40 bar

overload

2,5 x final value at 10 to 600 bar (max. 900 bar)
higher values on request

burst pressure

2.5 x final value at 6 to 600 bar (max. 900 bar)
patented leakage stop system as prevention of liquid leakage
if the burst pressure range is passed
(>40 bar nominal pressure)

higher burst pressure on request

Material

housing material

1.4305

material with medium contact

ceramics, 1.4305, PPS, FPM

Temperature

medium

-15...+ 125°C

ambient temperature

max. 85°C

temperature influences

in the temperature range of - 40 to +125 °C

TK0 - Temperature zero point error

< $\pm 0.15\%$ FS/10 K < $\pm 0.25\%$ FS/10 K

TKE - Temperature max. value error

< $\pm 0.15\%$ FS/10 K < $\pm 0.15\%$ FS/10 K

response time

< 2 ms / typical 1 ms

supply voltage (U_b)

8 - 33 V DC
(nominal voltage 24 V DC)

output signal

4 - 20 mA

load Ω

= ($U_b - 8$ V) / 0.02 A

connector

connector base M12x1

protection class

IP67

dielectrical strength

500 V DC

weight

approx. 95 g

Accuracy

Parameter

Unit

Tolerance zero

max. % FS $\pm 0,3$

Tolerance full scale

max. % FS $\pm 0,3$

Resolution

% FS 0,1

Sum of linearity, hysteresis
and reproducibility

max. % FS $\pm 0,3$

Long term stability acc. to

DIN EN 60770

% FS $\pm 1,0$

TC zero

max. % FS/10K $\pm 0,15$

TC sensitivity

max. % FS/10K $\pm 0,15$

Test conditions: 25 °C, 45 % rh, supply 24 V DC

TK0/TKE -40 ... +125°C

Pressotronic 700

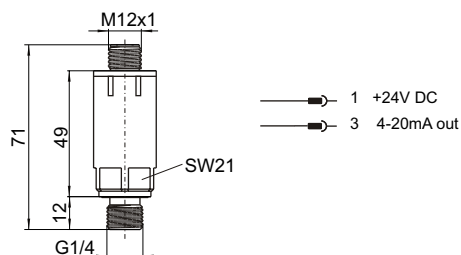
Pressure transmitter with M12 connector

Signal output 4-20 mA

Pin assignment M12x1 Connection

transmitter only

Part No.	Description	Pressure range
137000100	PT 700-010	0 - 10 bar
137000250	PT 700-025	0 - 25 bar
137001000	PT 700-100	0 - 100 bar
137002500	PT 700-250	0 - 250 bar
137004000	PT 700-400	0 - 400 bar
137006000	PT 700-600	0 - 600 bar



Accessories

Part-No. 4-pole Description

9144 05 0010	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Technical data

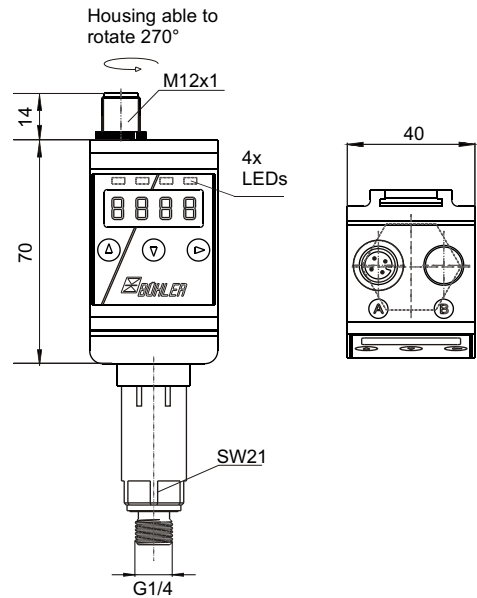
Pressotronik 771

Version with mounted transmitter

Pressure transmitter see page 2

Display

display 4 digit 7 segment LED display
 display range bar, MPa, psi
 accuracy 1%
 protection class IP65
 operation 3 button keypad
 Current consumption at power up approx. 100 mA for 100 ms
 operating current consumption approx. 50 mA
 supply voltage (U_B) 10 V to 30 V DC
 (nominal voltage 24 V DC)
 ambient temperature -20 °C to +70 °C
 weight approx. 500 g
 Mounting: G1/4 / mounted display able to Rotate 270°



Following output configurations are available:

Type	-2S	-4S	-1S-K	-2S-K	-4S-K
PNP transistor output	2 x	4 x	1 x	2 x	4 x
free programmable	yes	yes	yes	yes	yes
max. current per output	0,5 A	0,5 A	0,5 A	0,5 A	0,5 A
contact load max.	1A	1A	1A	1A	1
Analogue output 1 x 4 - 20 mA	no	no	yes	yes	yes
2-10 V, 0-10 V or 0-5 V	-	-	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A
load Ω analogue output	-	-	M12 - 4 pol	M12 - 5 pol	M12 - 8 pol
connector (base)	M12 - 4 pol	M12 - 8 pol	M12 - 4 pol	M12 - 5 pol	M12 - 8 pol

Product code for Pressotronik

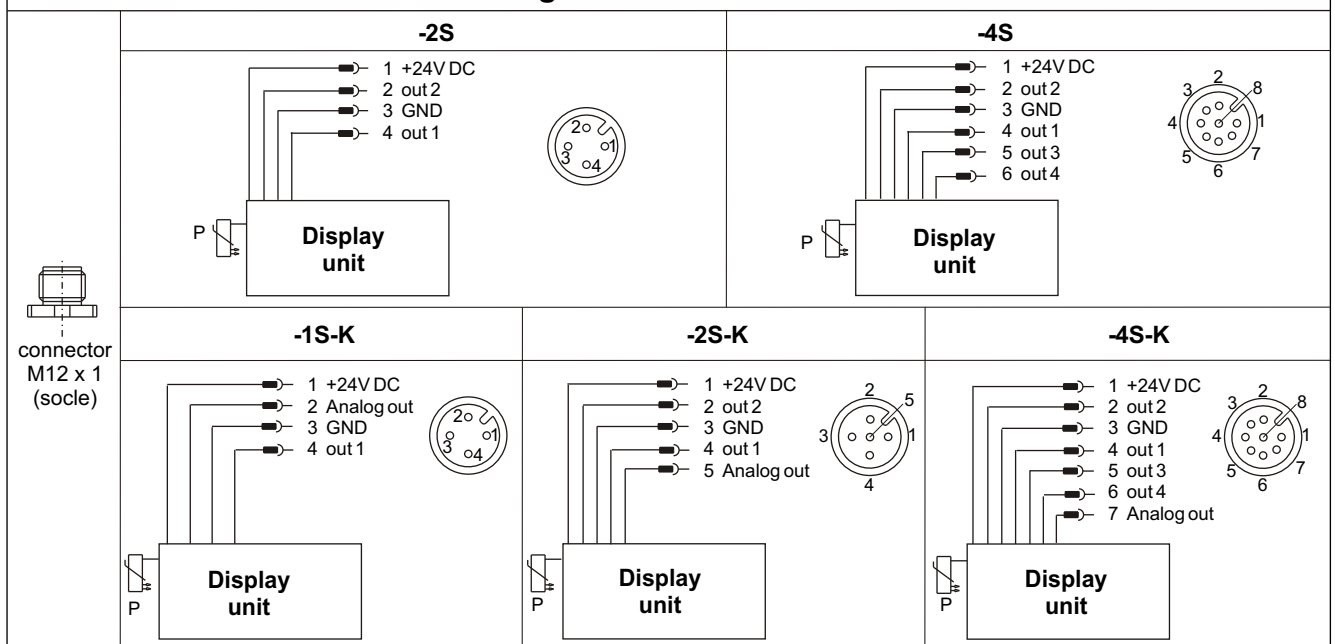
Model **770** Transmitter with remote display
771 Transmitter integrated display

Pressure range only with PT771
010 0-10 bar
025 0-25 bar
100 0-100 bar
250 0-250 bar
400 0-400 bar
600 0-600 bar

Output
-2S 2 x PNP output
-4S 4 x PNP output
-1S-K 1 x PNP output / 1 x Analogue output
-2S-K 2 x PNP output / 1 x Analogue output
-4S-K 4 x PNP output / 1 x Analogue output

Accessories see page 4

Pin assignment Pressotronik 771



Technical data

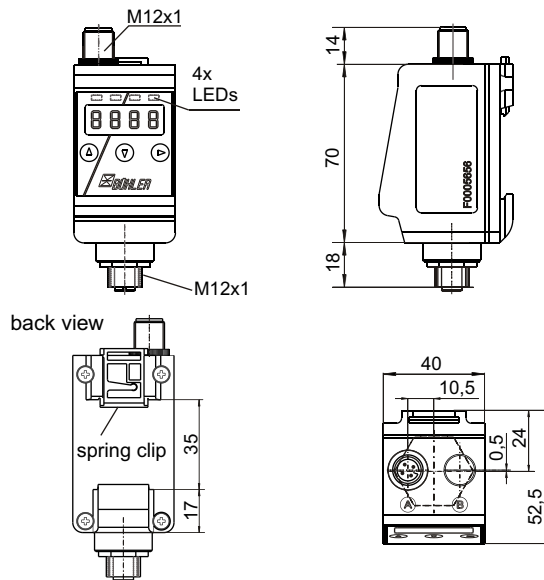
Pressotronik 770

Version with remote display

Pressure transmitter see page 2

Display

display 4 digit 7 segment LED display
 display range bar, MPa, psi
 accuracy 1%
 protection class IP65
 operation 3 button keypad
 current consumption at power up approx. 100 mA for 100 ms
 operating current consumption approx. 50 mA
 supply voltage (U_B) 10 V to 30 V DC
 (nominal voltage 24 V DC)
 Ambient temperature -20 °C to +70 °C
 input signal 4-20 mA
 weight approx. 400 g
 mounting: 35 mm top hat rail mounting

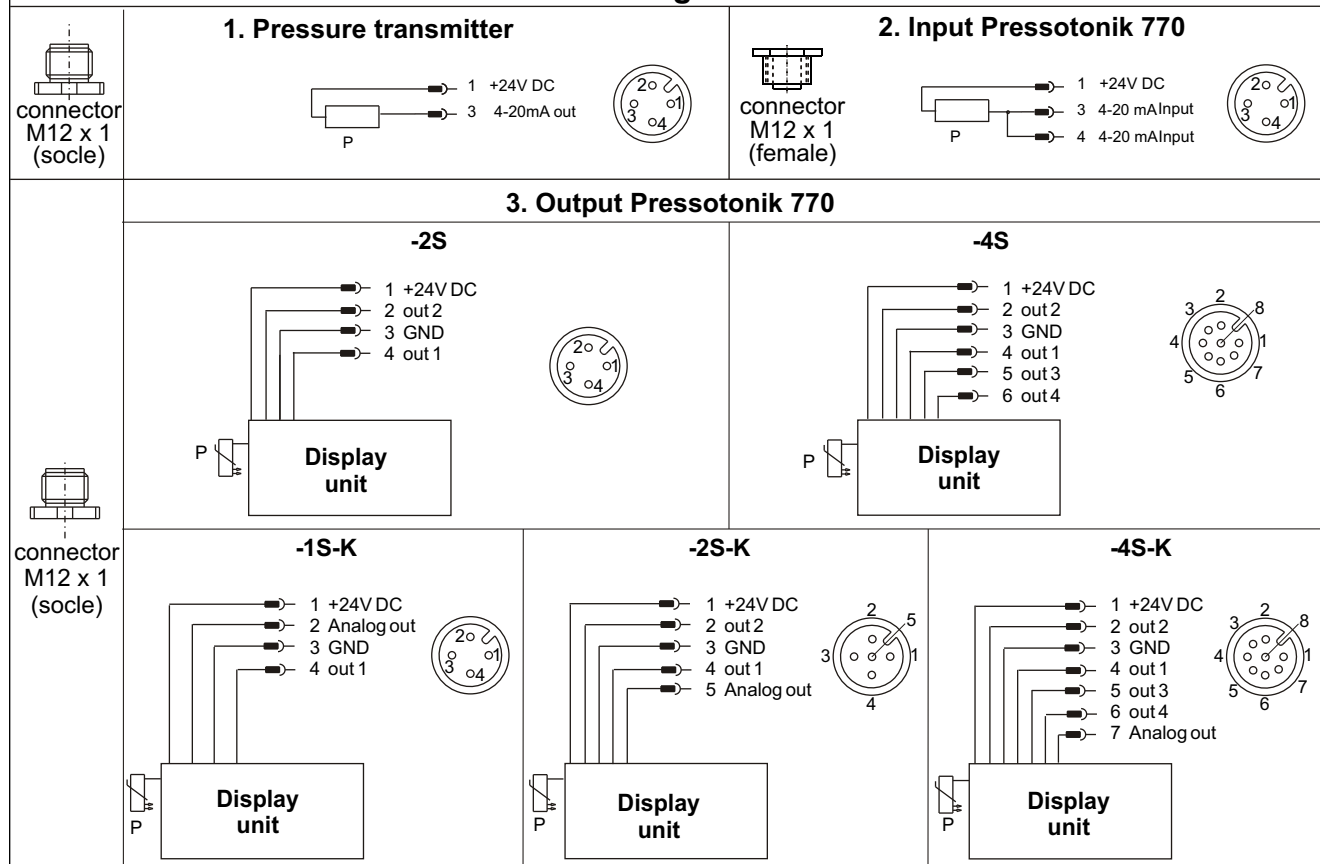


Following output configurations are available:

Type	-2S	-4S	-1S-K	-2S-K	-4S-K
PNP transistor output	2 x	4 x	1 x	2 x	4 x
free programmable	yes	yes	yes	yes	yes
Max. current per output	0,5 A	0,5 A	0,5 A	0,5 A	0,5 A
contact load max.	1A	1A	1A	1A	1A
analogue output 1 x 4 - 20 mA	no	no	yes	yes	yes
2-10 V, 0-10 V or 0-5 V	-	-	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A
load Ω analogue output	-	-	M12 - 4 pol	M12 - 5 pol	M12 - 8 pol
connector output (base)	M12 - 4 pol	M12 - 8 pol	M12 - 4 pol	M12 - 4 pol	M12 - 8 pol
connector input (female)	M12 - 4 pol	M12 - 4 pol	M12 - 4 pol	M12 - 4 pol	M12 - 4 pol

Product code see page 3

Pin assignment

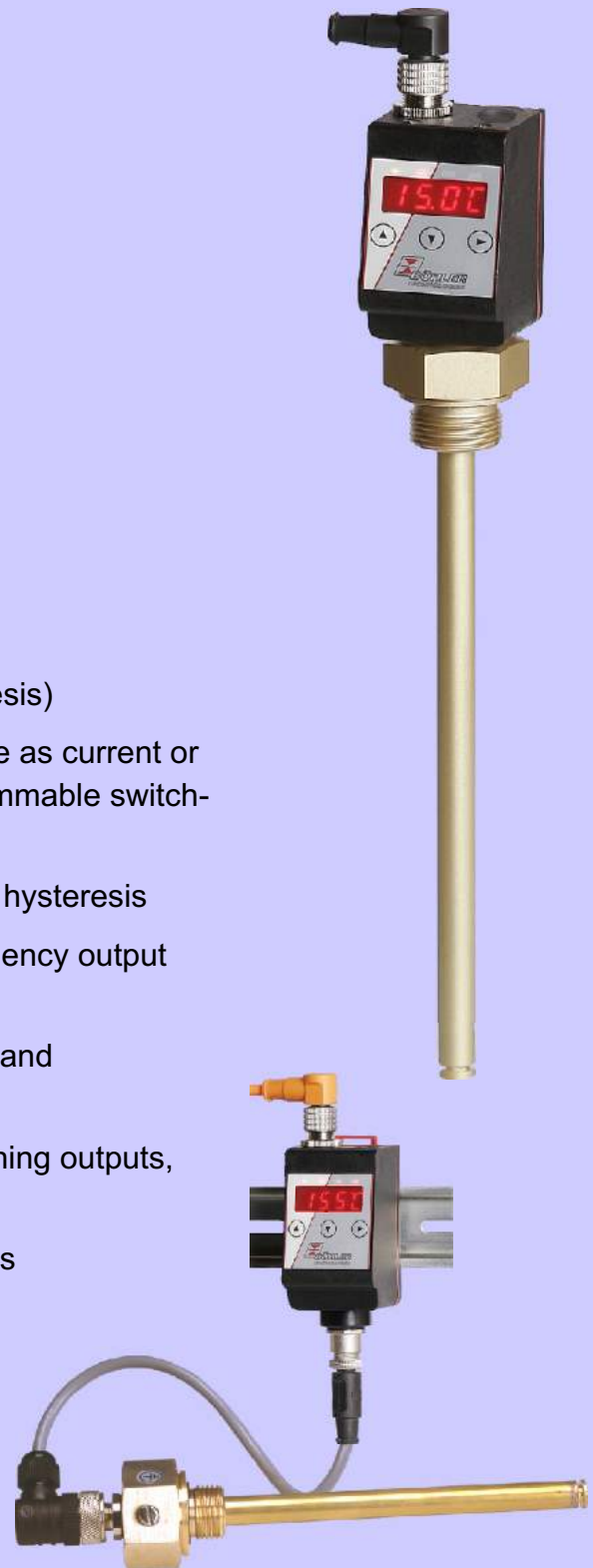


Accessories

Part-No. 4-pole	Part-No. 5-pole	Part-No. 8-pole	Description
9144 05 0010	9144050016	9144 05 0048	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144050017	9144 05 0049	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144050018	9144 05 0033	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Thermotronik TT-77

- Electronic temperature switch
- Up to four programmable outputs (hysteresis)
- Continuous temperature signal (adjustable as current or voltage) plus one, two or four free programmable switching outputs
- Switching output adjustable as window or hysteresis
- Two switching outputs adjustable as frequency output (1 to 100 Hz)
- Direct or external mounting of the display and control unit
- Highly visible LED display indicates switching outputs, able to rotate 270° when directly mounted
- Menu structure based on VDMA guidelines
- Min/Max memory, logbook function
- Probe length up to 1 m



Technical data

Thermotronik TT-77F

Version tank top installation

Design

material probe
max. operating pressure
connection
operating temperature
lengths

MS

brass
5 bar
G1/2
-40 °C to +100 °C
L = 280, 370, 500 (standard)
variable from 70 to 1000 mm

VA

1.4571
10 bar
G1/2

Display

temperature display range
alarm setting range
accuracy
resolution
protection class
display
operation
current consumption at power up
operating consumption
supply voltage (U_B)

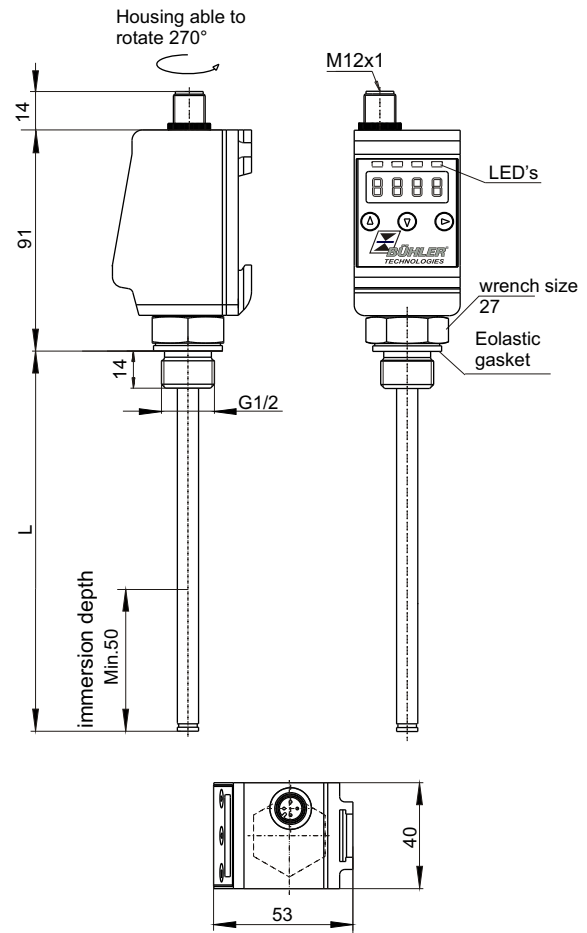
-20 °C to +120 °C (4 °F to 248 °F)
0 °C to 100 °C (32 °F to 178 °F)
1%
0.5 °C (1 °F)
IP65
4 digit 7 segment LED display
over 3 buttons
approx. 100 mA for 100 ms
approx. 50 mA
10 V to 30 V DC
(nominal voltage 24 V DC)

ambient temperature
material display housing

-20 °C to +70 °C
PA

Temperature sensor:

Pt 100 (RTD) class B, DIN EN 60 751



Following temperature outputs are available:

Typ	-2T	-4T	-1T-KT	2T-KT	4T-KT
connector (base)	M12 - 4 pol	M12 - 8 pol.	M12 - 4 pol	M12 - 5 pol	M12 - 8 pol
PNP transistor output	2 x	4 x	1 x	2 x	4 x
free programmable	yes	yes	yes	yes	yes
max. current per output	0,5 A	0,5 A	0,5 A	0,5 A	0,5 A
contact load max.	1A	1A	1A	1A	1A
analogue output 1 x 4 - 20 mA	no	no	yes	yes	yes
2-10 V, 0-10 V or 0-5 V load Ω analogue output			(U _B -8V) / 0,02A	(U _B -8V) / 0,02A	(U _B -8V) / 0,02A

Product code for Thermotronik TT-77 Version Tank top installation

TT-77F-

Design

MS brass
VA stainless steel

ALTERN

-2T 2 x PNP output
-4T 4 x PNP output
-1T-KT 1 x PNP output / 1 x Analogue output
-2T-KT 2 x PNP output / 1 x Analogue output
-4T-KT 4 x PNP output / 1 x Analogue output

Length (max. 1000 mm)

280
370
500
Variable (please specify)

Accessories

Part-No. 4-pol.	Part-No. 5-pol	Part-No. 8-pol.	Description
9144 05 0010	9144 05 0016	9144 05 0048	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0017	9144 05 0049	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0018	9144 05 0033	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Example for order

You need: Electronic controller for tank top installation, design brass, length L= 470 mm,
1 temperature contact and analogue output

You order: Thermotronik TT-77F-MS-1T-KT / 470

Technical data

Thermotronik TT-77W

Temperature probe Pt 100 (RTD)

Design

material probe
max. operating pressure
connection
operating temperature
lengths

connector
probe element
tolerance

Pin assignment

Display

temperature display range
alarm setting range
accuracy
resolution
protection class
display
operation
current consumption at power up
operating current consumption
supply voltage (U_B)

ambient temperature
mounting:

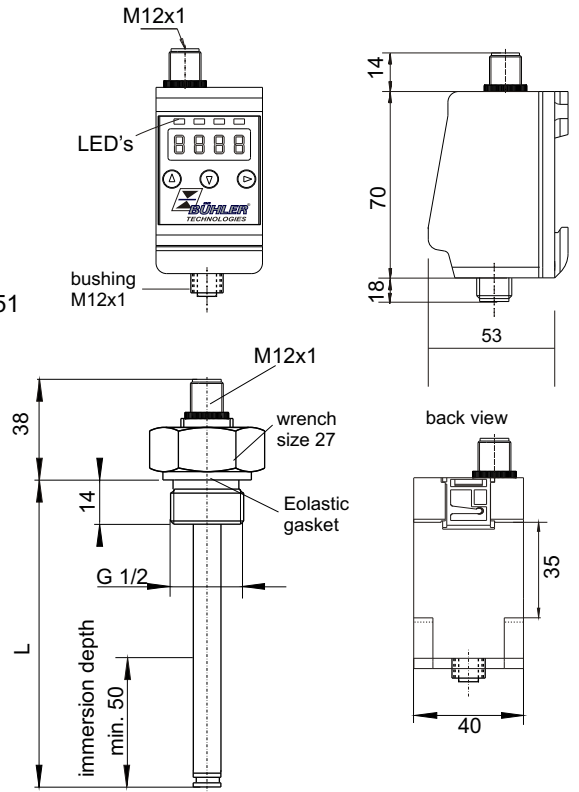
Remote indicator version

MSVA

brass 1.4571
5 bar
G1/2G1/2
-40 °C to +100 °C
L = 280, 370, 500 (standard)
variable from 70 to 1000 mm

M12 (base)
Pt 100 (RTD) class B DIN EN 60 751
± 0.8 °C

-20 °C to +120 °C (4 °F to 248 °F)
0 °C to 100 °C (32 °F to 178 °F)
1%
0.5 °C (1 °F)
IP65
4 digit 7 segment LED display
over 3 buttons
approx. 100 mA for 100 ms
approx. 50 mA
10 V to 30 V DC
(nominal voltage 24 V DC)
-20 °C to +70 °C
35 mm simply rail mount



Following temperature outputs are available:

Typ	-2T	-4T	-1T-KT	2T-KT	4T-KT
connector (female) sensor input	M12 - 4 pol	M12 - 4 pol	M12 - 4 pol	M12 - 4 pol	M12 - 4 pol
connector (base)	M12 - 4 pol	M12 - 8 pol	M12 - 4 pol	M12 - 5 pol	M12 - 8 pol
PNP transistor output	2 x	4 x	1 x	2 x	4 x
free programmable	yes	yes	yes	yes	yes
max. current per output	0,5 A	0,5 A	0,5 A	0,5 A	0,5 A
contact load max.	1A	1A	1A	1A	1A
analogue output 1 x 4 - 20 mA	no	no	yes	yes	yes
2-10 V, 0-10 V or 0-5 V load Ω analogue output			(U_B -8V) / 0,02A	(U_B -8V) / 0,02A	(U_B -8V) / 0,02A

Product code for Thermotronik TT-77 Remote Indicator Version

TT-77W---

Design

MS brass
VA stainless steel

ALTERN

-2T 2 x PNP output
-4T 4 x PNP output
-1T-KT 1 x PNP output / 1 x Analogue output
-2T-KT 2 x PNP output / 1 x Analogue output
-4T-KT 4 x PNP output / 1 x Analogue output

Length (max. 1000 mm)

280
370
500

Variable (please specify)

Accessories


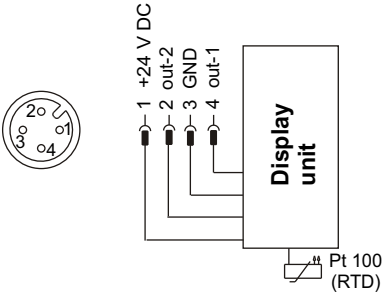
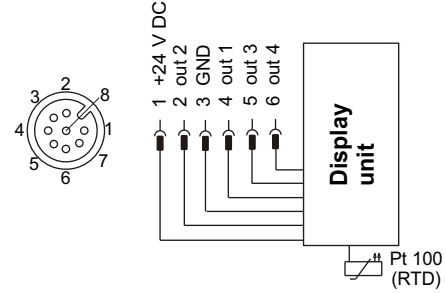

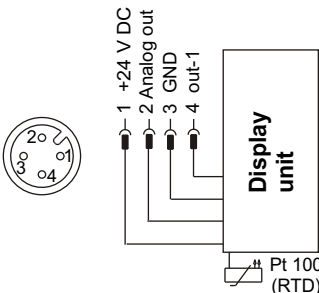
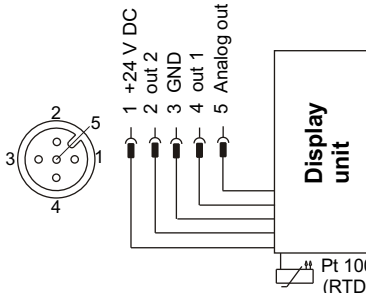
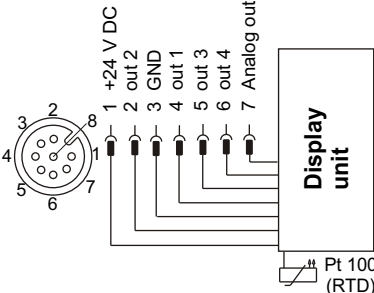
Part-No. 4-pol.	Part-No. 5-pol	Part-No. 8-pol.	Description
9144 05 0010	9144 05 0016	9144 05 0048	Connecting cable M12x1, 1,5 m, elbow connector (female) and straight connector (male)
9144 05 0046	9144 05 0017	9144 05 0049	Connecting cable M12x1, 3,0 m, elbow connector (female) and straight connector (male)
9144 05 0047	9144 05 0018	9144 05 0033	Connecting cable M12x1, 5,0 m, elbow connector (female) and wire

Example for order


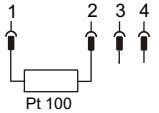
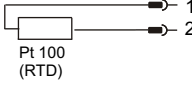

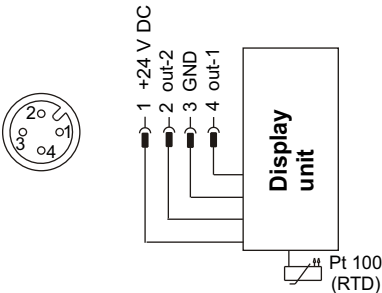
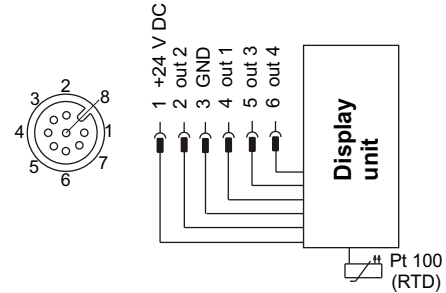

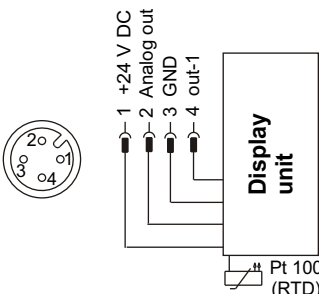
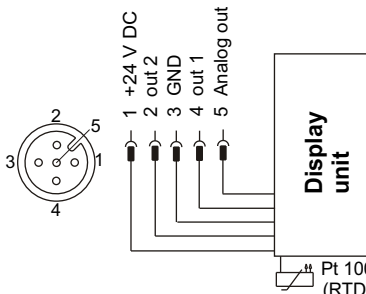
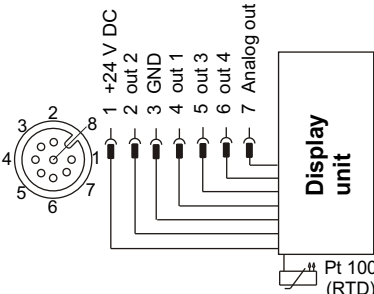
You need: Electronic controller remote indicator version, design brass, length L= 470 mm, 1 temperature contact and analogue output

You order: Thermotronik TT-77W-MS-1T-KT / 470

Pin assignment Thermotronik TT-77F

	TT-77F...-2T	TT-77F...-4T	
 connector M12 x 1 (base)			
	TT-77F...-1T-KT	TT-77F...-2T-KT	TT-77F...-4T-KT
 connector M12 x 1 (base)			

Pin assignment Thermotronik TT-77W

	1. Temperature sensor PT100	2. Sensor input remote display	
 connector M12 x 1 (base)			
	3. Output Thermotronik		
	TT-77W...-2T	TT-77W...-4T	
 connector M12 x 1 (base)			
	TT-77W...-1T-KT	TT-77W...-2T-KT	TT-77W...-4T-KT
 connector M12 x 1 (base)			

Note:
 If the switching output is measured with high-impedance measuring equipment or if the frequency output is used, connect a 10 kΩ resistor between output and ground to avoid faulty measurements.

Water alarm unit WW3 and WW10



The ingress of water into fluid power or lubrication systems reduces the life of oil significantly and causes damage to other components used in the systems .

The most reliable method of detecting water in oil is to measure the interface level between water and oil when the water is separated. The BÜHLER water alarm units have a float which rises in water but sinks in oil. It only takes a build-up of around one litre water in the sight glass to elevate the float and actuate a first contact to signal danger. The secondary contact warns that there is water in the tank.

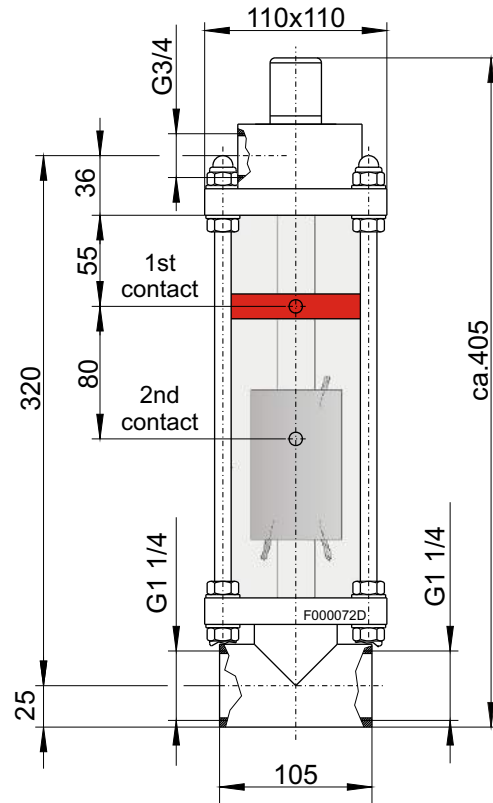
Water alarm units for intank installation are available upon request.

- **Reliable physical measuring system**
- **High sensitivity**
- **Easy installation**
- **Independent of oil chemistry**

Technical Data

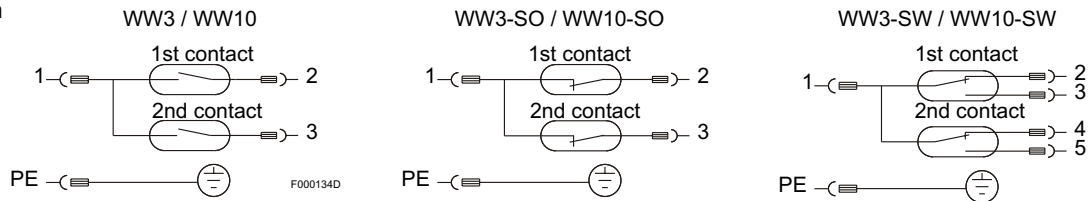
Models	WW3 and WW10
Operating pressure	WW3 = 3 bar max. WW10 = 10 bar max.
Operating temperature	0 ... 80 °C
Max. viscosity	1200 mm ² /s
Density of oil	max 0,86 kg/dm ³
Material	
Housing	WW3 = transparent casing WW10 = steel casing
Float	PP
Contacts	reed contacts, 2 contacts as NC, NO* or change over (see also wiring diagram)
Max. operating voltage	230 V AC/DC
Max. switching capacity	
NC / NO *	50 VA (AC) / 50 W (DC)
Change over	40 VA / 40 W
Max. current	1 A
Connector	S6, 6 pol. + PE DIN 43650
Protection class	IP 65
Cable gland	PG 11
Weight	WW3 = 6 kg WW10 = 8 kg

Dimensions (mm)



*NO=normally open / NC=normally closed

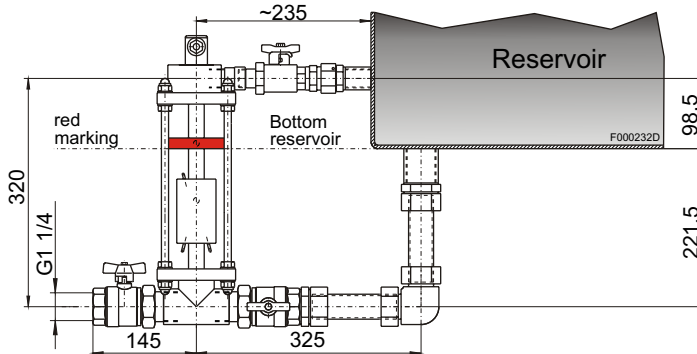
Wiring Diagram



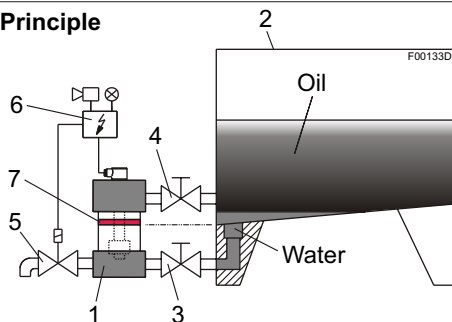
All figures at **empty reservoir** (float on bottom).

Assembly Kit

The assembly kit provides space-saving and easy installation of the water alarm unit to the oil reservoir. The kit comprises all connections, fittings, and shut off valves. The fittings provide a very small dead volume. To be supplied with two welding fittings for installation at reservoir.



Installation Principle

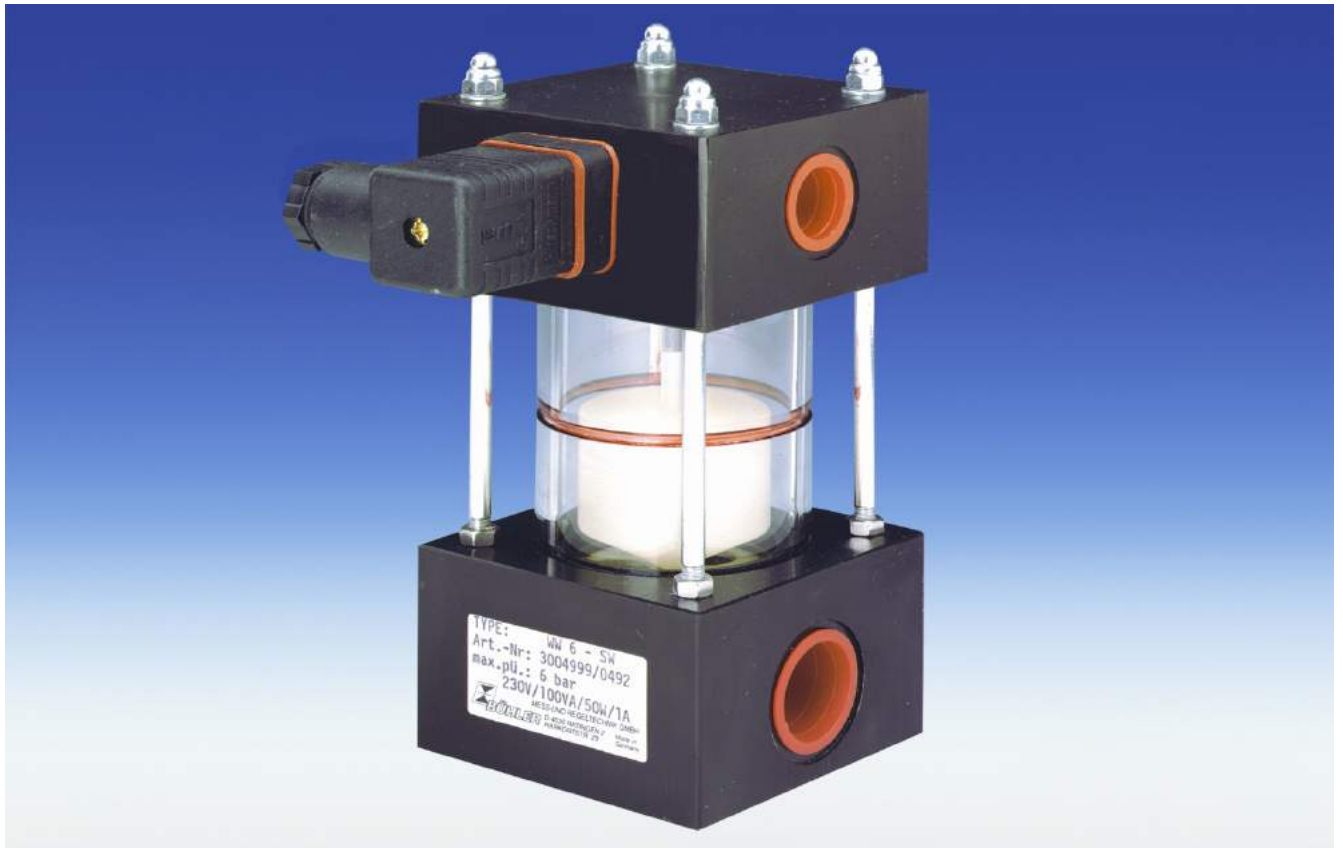


1. Water alarm unit
2. Oil reservoir
3. Lower shut off valve
4. Upper shut off valve
5. Drain valve
6. Control unit / control of signal
7. Red marking

Order Information

Part-No.	Model	Part-No.	Model	Part-No.	Model
30 01 999	WW3	30 05 999	WW10	31 01 999	Assembly kit
30 02 999	WW3-SO	30 06 999	WW10-SO		
30 09 999	WW3-SW	30 00 999	WW10-SW		

Water alarm unit WW6



The entrance of water into fluid power or lubrication systems reduces the life of oil significantly and causes damage to other components used in the systems .

The most reliable method of detecting water in oil is to measure the interface level between water and oil when the water is separated. The BÜHLER water alarm units have a float which rises in water but sinks in oil. It only takes a build-up of around 90 ml of water in the sight glass to elevate the float and actuate a contact to signal danger.

Water alarm units for intank installation as well as with two switching points and higher maximum pressure are available upon request.

- **Reliable physical measuring system**
- **High sensitivity**
- **Easy installation**
- **Independent of oil chemistry**
- **Assembly kit available**

Technical Data

Max. operating pressure	6 bar
Operating temperature	max. 80°C min. 0°C
Max. viscosity	1200 mm ² /s
Density of oil	max 0.86 kg/m ³

Material

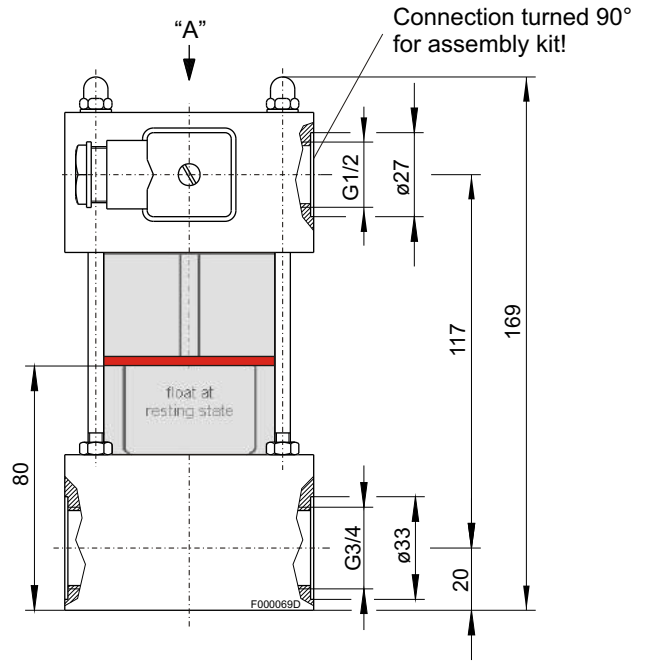
Housing	AL / PC
Float	PP

Type of contacts	reed contacts as NO*- or change over- contact
Max. operating voltage	230 V AC/DC
Max. power	50 VA / 40 VA
Max. current	1 A

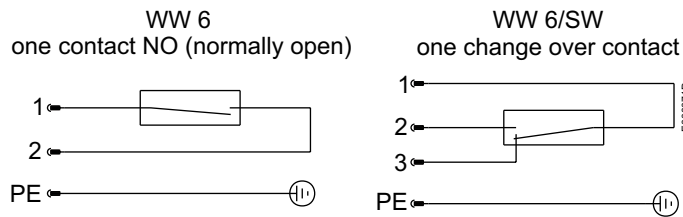
Connector	M3 3pol. + PE DIN EN 175301-803
Protection class	IP 65
Cable gland	PG 11
Weight	approx. 1,35 kg

*NO=normally open

Dimensions (mm)

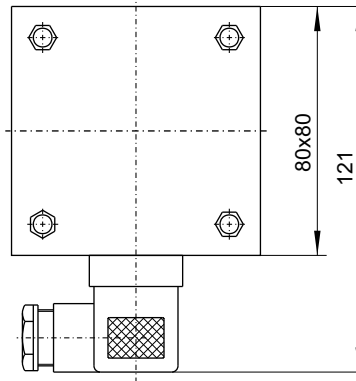


Wiring Diagram



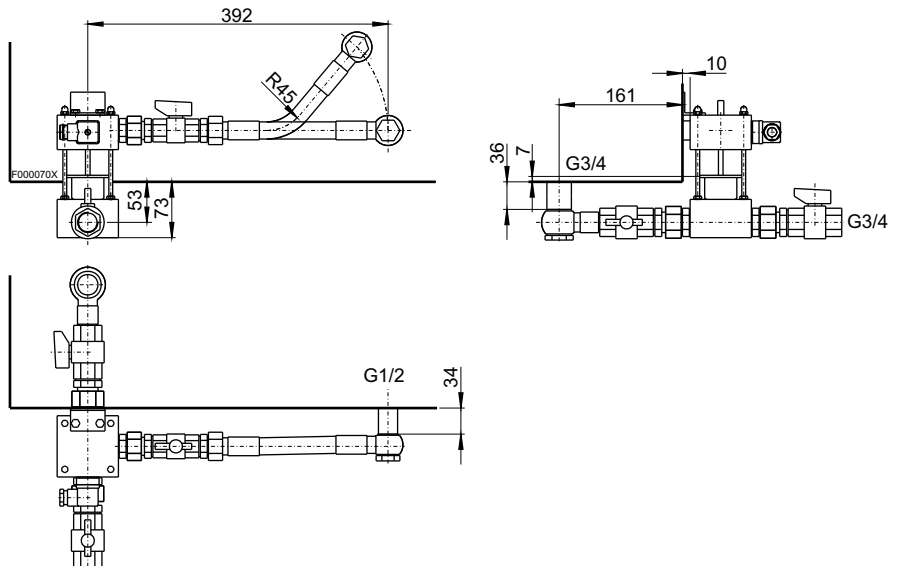
All figures at **empty reservoir** (float on bottom).

VIEW "A"



Assembly kit

The assembly kit enables a compact and easy installation of the water alarm unit to the oil reservoir. The set comprises all connections, fittings and shut off valves. The fittings provide a very small "dead" volume. The upper connection is a flexible hose, thus providing a very simple installation.



Order Information

Part-no.	Description
3003999	Water alarm unit WW6, one contact NO
3016999	Water alarm unit WW6, connection G1/2 turned 90°
3003899	WW6 including assembly kit
3004999	Water alarm unit WW6/SW, one change over contact
3017999	Water alarm unit WW6/SW, connection G1/2 turned 90°
3004699	WW6 including assembly kit
3204999	Assembly kit

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