

Electric Drives  
and Controls

Hydraulics

Linear Motion and  
Assembly Technologies

Pneumatics

Service

**Rexroth**  
Bosch Group

## Float switch with breather filter, level and temperature monitor

**RE 50216/12.07**  
Replaces: AB 31-37

1/18

**Type ABZMS-37**

Component series 1X



H7520\_d

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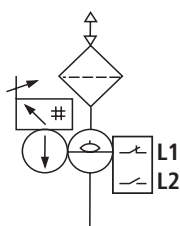
### Features

- Float switches are switching devices which are actuated by a float moved by a fluid. They are used for regulating fill levels in tanks of power units
- Three series are available:
  - Float switch type ...M consisting of a breather filter, level monitor (max./min.) and a temperature measuring and indicating device with two adjustable alarm outputs
  - Float switch type ...N consisting of a breather filter, level monitor (max./min.) and a temperature measuring device with one contact
  - Float switch type ...R consisting of a breather filter, a resistance measuring chain for level, a resistance thermometer for temperature with analog output of 4 to 20 mA, and an analog temperature indicator

## Symbol

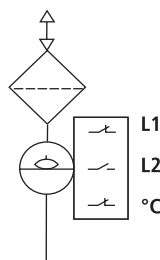
### Type ...M

with two switching contacts, two thermal contacts, temperature indicator and control device



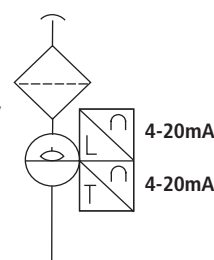
### Type ...N

with two switching contacts and one thermal contact



### Type ...R

with resistance measuring chain/ resistance thermometer



## Ordering code

ABZM S-37-1X/-03- - -K24

### Power unit accessories

Measuring instruments = ABZM

Float switch

= S

### Variant

= 37

Component series 10 to 19

= 1X

(10 to 19: unchanged installation and connection dimensions)

### Ordered length in mm [inch]

L = 370 mm [14.57]

= 0370

L = 500 mm [19.69]

= 0500

L = 800 mm [31.50]

= 0800

L = 1000 mm [39.37]

= 1000

L = 1200 mm [47.24]

= 1200

### Breather filter

Filtration rating 3 µm

= 03

### Order example:

Float switch with flanged connection, with breather filter, with temperature indicator and control device, with two pre-set switching contacts (level and temperature), ordered length 370 mm [14.57 inch], and electrical connection K24 for circular plug M12x1:

**ABZMS-37-1X/0370-03-M-K24**

Material no. **R901113688**

<sup>1)</sup> Mating connectors are not included in the scope of supply and must be ordered separately, if required (see page 4).

<sup>2)</sup> Variant without adapter flange for Fluid Manager (see RE 50230).

### <sup>1)</sup> Electrical connection

**K24** = Connector plug  
04-pin M12x1

### Option

**No code** = With adapter flange

**F** = Without adapter flange <sup>2)</sup>

### Thermal contact

Variant **M**:

**No code** = Without thermal contact

Variant **N**:

**-T60F** = Switching contact normally closed at 60 °C

**-T70F** = Switching contact normally closed at 70 °C

**-T80F** = Switching contact normally closed at 80 °C

Variant **R**:

**No code** = With resistance thermometer

### Functions

**M** = Level: with 2 switching contacts (normally closed/normally open)

Temperature: with 2 switching outputs, with temperature indicator and control device

**N** = Level: with 2 switching contacts (normally closed/normally open)

Temperature: with 1 switching contact (normally closed)

**R** = Level: with resistance measuring chain (analog output 4 to 20 mA)

Temperature: with resistance thermometer (analog output 4 to 20 mA), with temperature indicator

## Selection table

### Variant: M

Ordered length in mm [inch]	Type	Material number	1)
L			
370 [14.57]	ABZMS-37-1X/0370-03-M-K24	R901113688	Δ
500 [19.69]	ABZMS-37-1X/0500-03-M-K24	R901113694	Δ
800 [31.50]	ABZMS-37-1X/0800-03-M-K24	R901113697	
1000 [39.37]	ABZMS-37-1X/1000-03-M-K24	R901113700	
1200 [47.24]	ABZMS-37-1X/1200-03-M-K24	R901113702	

<sup>1)</sup> Δ = standard types

## Selection table

Variant: N	Ordered length in mm [inch]	Type	Material number	1)
	L			
	370 [14.57]	ABZMS-37-1X/0370-03-N-T70F-K24	R901195886	
	500 [19.69]	ABZMS-37-1X/0500-03-N-T70F-K24	R901195887	
	800 [31.50]	ABZMS-37-1X/0800-03-N-T70F-K24	R901195888	
	1000 [39.37]	ABZMS-37-1X/1000-03-N-T70F-K24	R901195889	
	1200 [47.24]	ABZMS-37-1X/1200-03-N-T70F-K24	R901195890	
Variant: R	Ordered length in mm [inch]	Type	Material number	1)
	L			
	370 [14.57]	ABZMS-37-1X/0370-03-R-K24	R901113712	Δ
	500 [19.69]	ABZMS-37-1X/0500-03-R-K24	R901113716	Δ
1) Δ = standard types	800 [31.50]	ABZMS-37-1X/0800-03-R-K24	R901113717	

## Technical data (for applications outside these parameters, please consult us!)

General							
Hydraulic fluid temperature range		°C [°F]	-20 to 80 [-4 to 176]				
Ambient temperature range		°C [°F]	-20 to 80 [-4 to 176]				
Installation position			Vertical ±20 °				
Material	– Sliding tube		CU alloy				
	– Protective tube Ø60.3 mm [2.37 inch]		1.4571				
	– Float		1.4571				
	– Filter housing and flange		PA				
Seal material			FKM				
Maximum switching point L1		mm [inch]	1140 [44.88]				
Weight of ordered length		mm [inch]	370 [14.57]	500 [19.69]	800 [31.50]	1000 [39.37]	1200 [47.24]
		kg [lbs]	1.3 [2.87]	1.8 [3.97] 2)	2.3 [5.07]	2.5 [5.51]	2.7 [5.95]

## Hydraulic

Maximum operating pressure		bar [psi]	1 [14.5]			
Hydraulic fluid						
- Density		g/cm³	> 0.8			
- Resistance						
• Mineral oils			Mineral oil	HLP	to DIN 51524	resistant
• Hardly inflammable hydraulic fluids			Emulsions	HFA-E	to DIN 24320	resistant
			Watery solutions	HFC	to VDMA 24317	resistant
			Phosphate esters	HFD-R		not resistant
			Organic esters	HFD-U		
• Fast bio-degradable hydraulic fluids			Triglycerides (rape oil)	HETG	to VDMA 24568	resistant
			Synthetic esters	HEES		
			Polyglycols	HEPG		

## Electrical

Type of protection to DIN EN 60529	IP 65
Plug-in connection	M12x1; 4-pin (material: metal)

2) Weight from a length of L = 500 mm on, inclusive of protective tube

## Technical data (for applications outside these parameters, please consult us!)

### Reed contacts of float switches with connector plug K24 (M12x1; 4-pin)

Switching voltage range	VDC	10 to 30
Max. switching current	A	0.5
Max. switching capacity	W	10

### Breather filter

Indicating range	bar	up to 0.035 = 100 %
Filtration rating	µm	3 absolute
Air flow	l/min	650
Material:		
– Housing		PA
– Filter element		Paper

### Temperature indicator

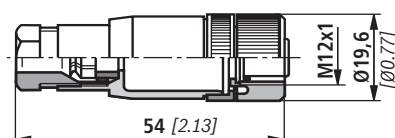
Temperature indicating range	°C [°F]	ca. –20 to +120 [4 to 248]
Alarm temperature adjustment range (type M only)	°C [°F]	0 to +99 [32 to 178]
Max. programmable switching points		2
Housing design		PA, IP 65
Display		4-character seven-segment LED display
Switch-on current consumption		ca. 140 mA over 100 ms
Current consumption during operation	mA	ca. 30 to 50
Supply voltage	VDC	24 ±10 %
Output		PNP
Ambient temperature range	°C [°F]	0 to 70 [32 to 158]
Accuracy		1% of displayed value
Resolution	°C [°F]	1 [2]
Operation		by means of 3 keys
Temperature sensor		PT 100

### Resistance measuring chain and resistance thermometer with connector plug K24 (M12x1; 4-pin)

Switching voltage range	VDC	10 to 30
Output	mA	4 to 20
Resolution of resistance measuring chain	mm	7.5
Max. load Ω		$R = UB - 7.5 \text{ V (0,02 A)}$
Residual ripple content	%	1
Temperature measuring range	°C [°F]	0 to 100 [32 to 212]

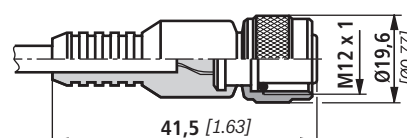
## Mating connectors (dimensions in mm [inch]) – for detailed information, see RE 08006

### Mating connector for connector plug K24



Designation	Material no.
LEITUNGSDOSE 4P Z24 SPEZ	R900031155

### Mating connector for connector plug K24 with molded-on PVC cable, 3 m long



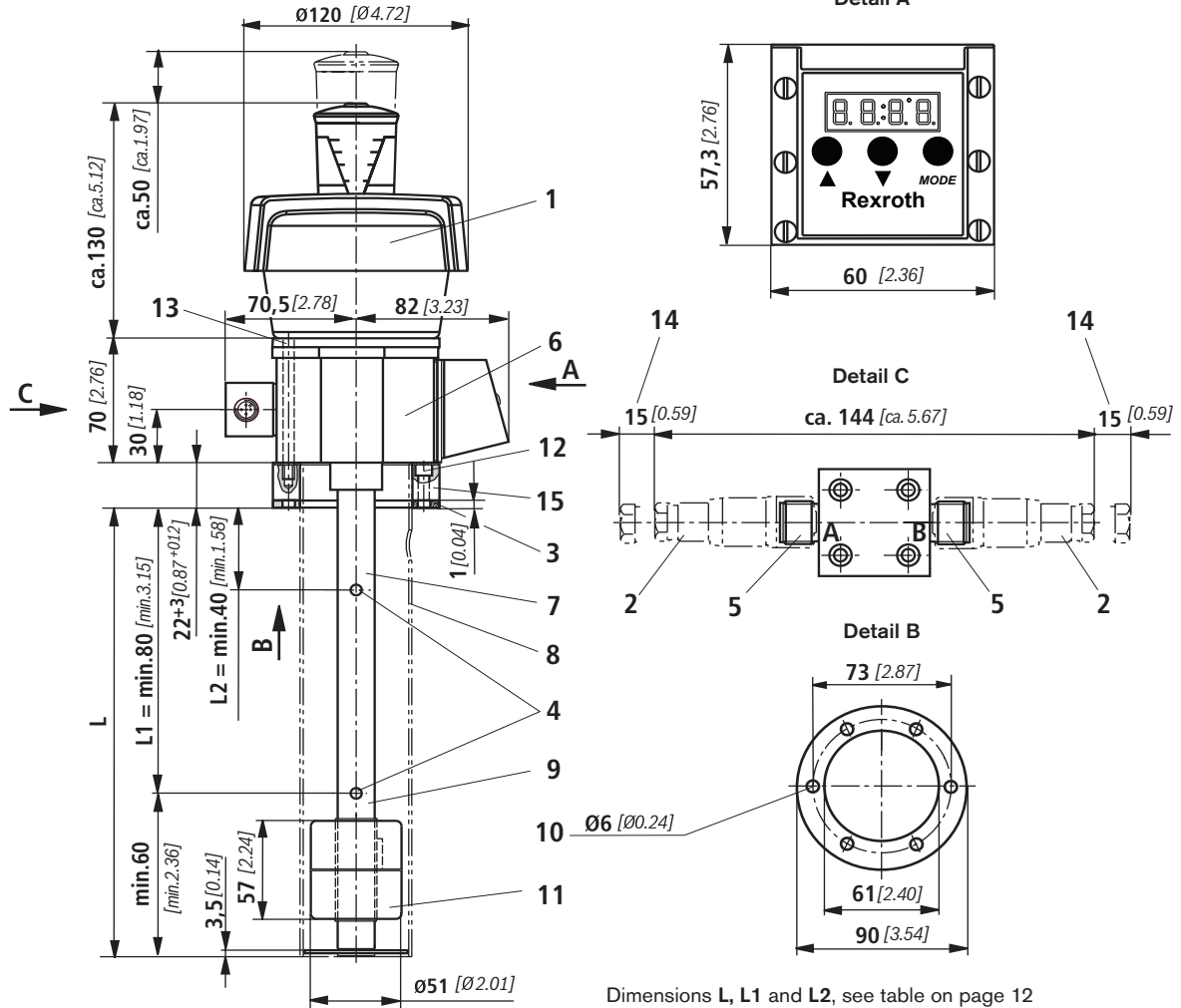
Designation	Material no.
LEITUNGSDOSE 4P Z24M12X1 +3MSPEZ	R900064381

## Float switch type ...M

with breather filter, with two adjustable switching contacts for level, with temperature indicator and two adjustable temperature signals in the control device,

Plug-in connection M12x1, max. 30 VDC

### Unit dimensions (dimensions in mm[inch])



Dimensions L, L1 and L2, see table on page 12

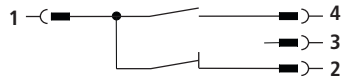
- |   |  |
|---|--|
| 1 Breather filter   | 10 Bore pattern 6x60° to DIN 24557 part 2  |
| 2 Mating connector for plug-in connections K24 (M12x1), see page 4          | 11 Float with permanent magnet, radially magnetized, north pole inside (dimensions: $\varnothing 51 \times 57$ [2.01x2.24]; Material 1.4571) |
| 3 Flat seal   | 12 Mounting screw M5x20 (adapter flange to tank)   |
| 4 Switching points  | 13 Mounting screw M5x80 (float switch to adapter flange)   |
| 5 Connector plug "K24" 04-pin 12x1  | 14 Space required to remove mating connector   |
| 6 Nameplate   | 15 Adapter flange (not required when mounted on Fluid Manager ABZMF...)  |
| 7 Float switch variant L up to 370 mm [14.57 inch] without protective tube  |  |
| 8 Float switch variant L 500 mm [19.69 inch] or longer with protective tube |  |
| 9 Tube $\varnothing 20$ mm [0.79 inch]                                      |  |

## Float switch type ...M

### Pinout

Switching function with plug-in connection M12x1

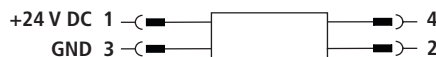
M12 plug-in connector A



#### Pinout

- 1 = max. 30 VDC
- 4 = level / L2
- 2 = level / L1

M12 plug-in connector B



#### Pinout

- 1 = max. 30 VDC
- 4 = temperature switching point 1  
(freely adjustable from 0 to 100 °C)
- 2 = temperature switching point 2  
(freely adjustable from 0 to 100 °C)
- 3 = GND

L1 = Normally closed contact at min. value, falling

L2 = Normally open contact as early warning, falling

### Tank venting function

Breather filter with filtration rating of 3 µm absolute.

The visual analog clogging indicator shows the increase in the degree of contamination of the filter element in percent.

### Temperature display

The current temperature is shown on a clearly visible LED display, which also signals status messages. The temperature is displayed in °C or °F.

### Level switch function

Two reed contacts are provided in the sliding tubes (normally closed contact and normally open contact), which are switched by the permanent magnet installed in the float.

When the float reaches the switching points while the oil level is falling, the contacts are operated by magnetic force. The positions of the contacts are maintained until the float passes the switching points again when the oil level is rising.

The switching points are factory-set (for values, see table on page 12).

As a standard, switching point L1 is installed as a normally closed contact, and switching point L2 as a normally open contact.

The switching points can be adjusted within the device (for instructions, see page 12).

The switching function can be changed by rotating the contacts through 180°; the normally closed contact becomes a normally open contact and vice versa.

### Temperature signal function

Temperature is sensed by a PT 100.

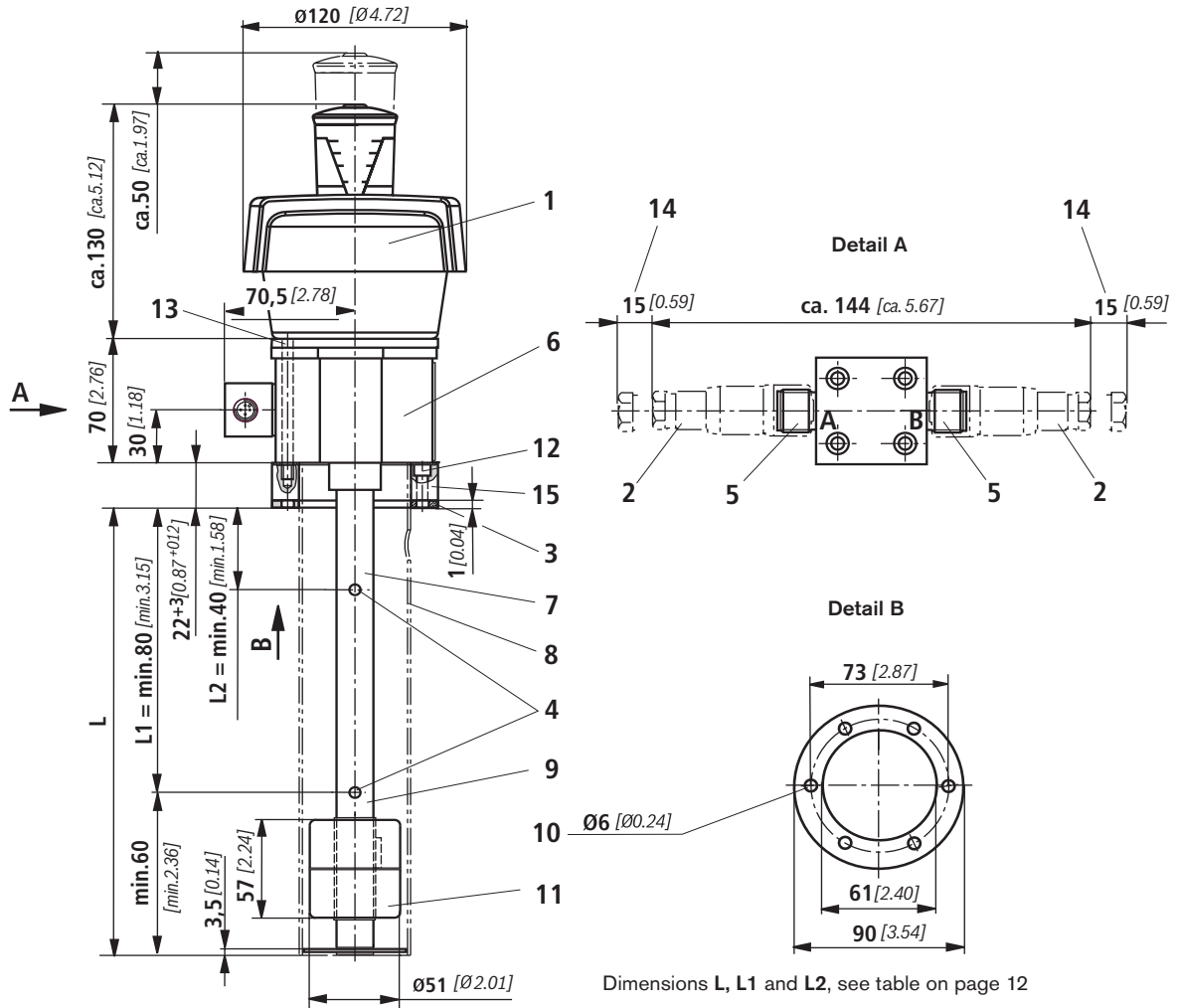
The two temperature signals can be adjusted by means of the three keys provided on the control device.

The settings are protected against unauthorized access through programming guidance (see operating and installation instructions on page 15).

## Float switch type ...N

with breather filter, one thermal contact and two adjustable switching contacts for level, plug-in connection M12x1, max. 30 VDC

### Unit dimensions (dimensions in mm [inch])



- 1 Breather filter
- 2 Mating connector for plug-in connections K24 (M12x1), see page 4
- 3 Flat seal
- 4 Switching points
- 5 Connector plug "K24" 04pol 12x1
- 6 Nameplate
- 7 Float switch variant L up to 370 mm [14.57 inch] **without** Protective tube
- 8 Float switch variant L 500 mm [19.69 inch] or longer **with** Protective tube
- 9 Tube  $\varnothing$  20 mm [0.79 inch]

- 10 Bore pattern 6x60° to DIN 24557 part 2
- 11 Float with permanent magnet, radially magnetized, north pole inside (dimensions:  $\varnothing 51 \times 57$  [2.01x2.24]; Material 1.4571)
- 12 Mounting screw M5x20 (adapter flange to tank)
- 13 Mounting screw M5x80 (float switch to adapter flange)
- 14 Space required to remove mating connector
- 15 Adapter flange (not required when mounted on Fluid Manager ABZMF...)

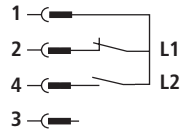
Dimensions L, L1 and L2, see table on page 12

## Float switch type ...N

### Pinout

Switching function with plug-in connection M12x1

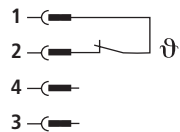
M12 plug-in connector A



### Pinout

- 1 = max. 30 VDC
- 4 = level / L2
- 2 = level / L1

M12 plug-in connector B



### Pinout

- 1 = max. 30 VDC
- 2 = thermal contact

### Tank venting function

Breather filter with filtration rating 3 µm absolute.

The visual analog clogging indicator shows the increase in the degree of contamination of the filter element in percent.

### Temperature signal function

Temperature is sensed by a PT 100.

A bimetal plate, which is influenced by temperature, switches when the firmly set response temperature is reached.

### Level switch function

Two reed contacts are provided in the sliding tubes (normally closed contact and normally open contact), which are switched by the permanent magnet installed in the float.

When the float reaches the switching points when the oil level is falling, the contacts are operated by magnetic force. The positions of the contacts are maintained until the float passes the switching points again when the oil level is rising.

The switching points are factory-set (for values, see table on page 12).

As a standard, switching point L1 is installed as a normally closed contact, and switching point L2 as a normally open contact.

The switching points can be adjusted within the device (for instructions, see page 12).

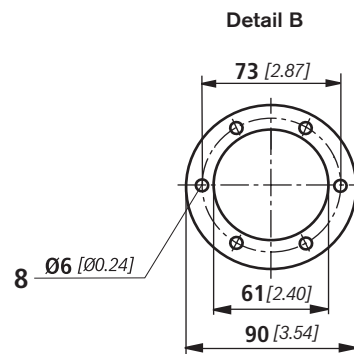
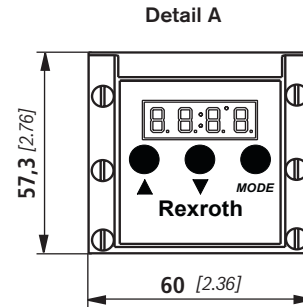
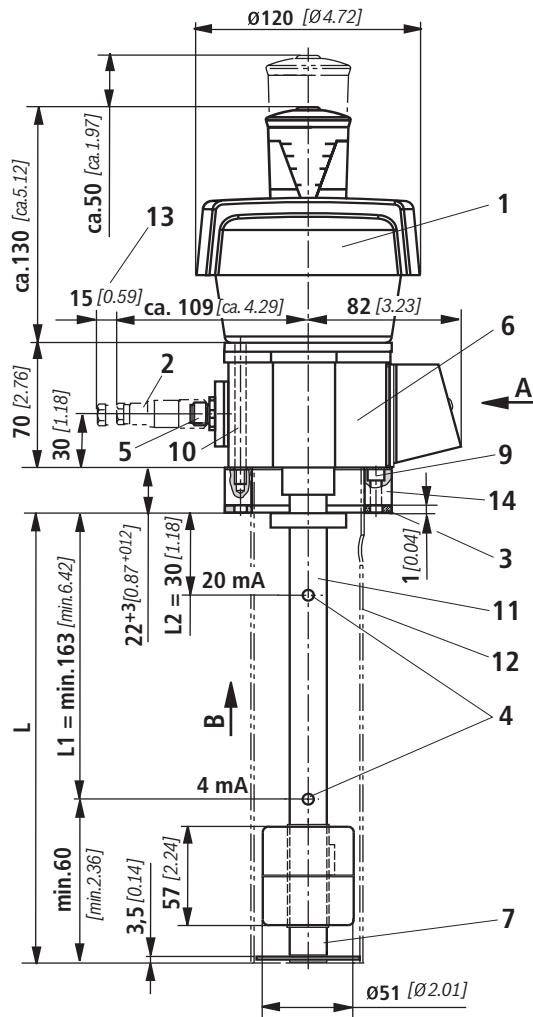
The switching function can be changed by rotating the contacts through 180°; the normally closed contact becomes a normally open contact and vice versa.



## Float switch type ...R

with breather filter, with resistance measuring chain (level), with temperature indicator and resistance thermometer (temperature)  
with two analog outputs 4 to 20 mA,  
plug-in connection M12x1, max. 30 VDC

**Unit dimensions** (dimensions in mm [inch])



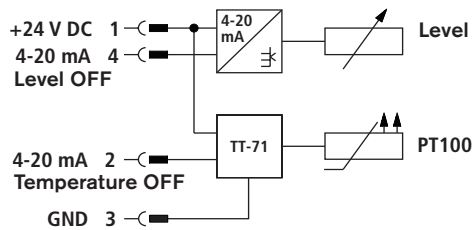
Dimensions L, L1 and L2, see table on page 12

- |  |  |
|--|--|
| 1 Breather filter  | 10 Mounting screw M5x80 (float switch to adapter flange)                           |
| 2 Mating connector for plug-in connections K24 (M12x1), see page 4 | 11 Float switch variant L up to 370 mm [14.57 inch] <b>without</b> protective tube |
| 3 Flat seal  | 12 Float switch variant L from 500 mm [19.69 inch] <b>on with</b> protective tube  |
| 4 Switching points   | 13 Space required to remove mating connector                                       |
| 5 Connector plug "K24" 04-pin12x1                                  | 14 Adapter flange (not required for mounted on Fluid Manager ABZMF...)             |
| 6 Nameplate  |  |
| 7 Resistance thermometer (PT100)                                   |  |
| 8 Bore pattern 6x60° to DIN 24557 part 2                           |  |
| 9 Mounting screw M5x20 (adapter flange to tank)                    |  |

## Float switch type ...R

### Pinout

Switching function with plug-in connection M12x1



### Pinout

- 1 = supply voltage max. 30 VDC
- 2 = output temperature 4 to 20 mA
- 4 = output level 4 to 20 mA

### Tank venting function

Breather filter with filtration rating 3  $\mu$ m absolute.

The visual analog clogging indicator indicates the increase in the degree of contamination of the filter element in percent.

### Temperature display

A clearly visible LED display indicates the current temperature. The temperature is shown in  $^{\circ}$ C or  $^{\circ}$ F (how to change the indication is described on page 17).

### Level switch and temperature signal function

The sliding tube accommodates the resistance measuring chain with a resolution of 7.5 mm for continuous monitoring of the fill levels.

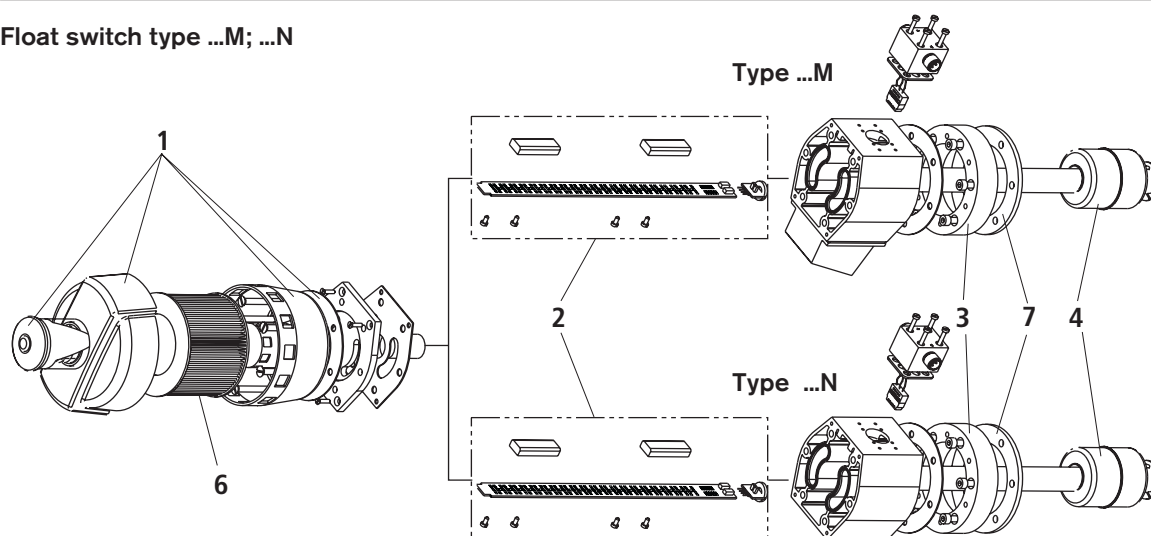
Permanent magnets installed in the float switch the contacts and activate a resistance.

The resistance thermometer (PT100) for temperature sensing is also integrated in the sliding tube.

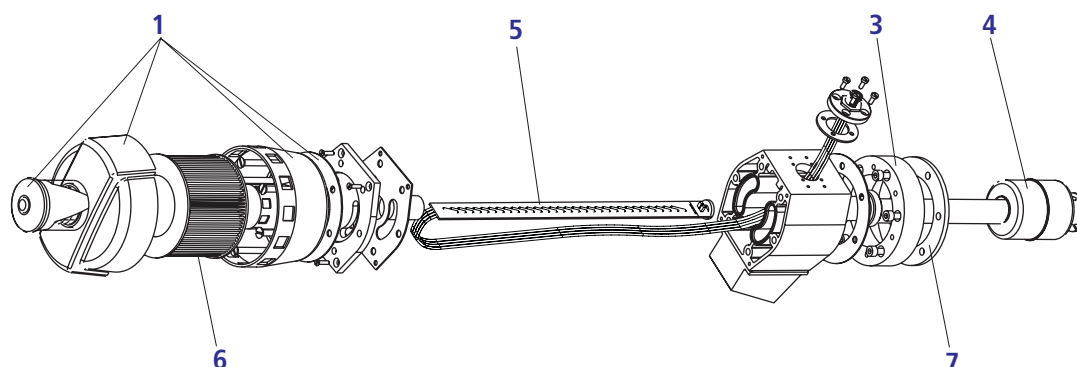
A measuring transducer, which is integrated in the connected housing, converts the level- and temperature-related signal into a linear current change of 4 to 20 mA.

## Spare parts

### Float switch type ...M; ...N



### Float switch type ...R



- 1 Filter housing incl. cover and clogging indicator
- 2 For contact strip, see table below
- 3 Adapter flange
- 4 Float
- 5 Resistance measuring chain and resistance thermometer (when worn out, replace complete device)
- 6 Air filter element, see on the right-hand side
- 7 Seal, see on the right-hand side

### Air filter element

Designation: **FILTERELEMENT 0007 L 003 P**

Material no. **R900031069**

### Miscellaneous

Designation: **DICHTUNG 1,0X90X62- 6X 6,0 FKM**

Material no. **R901129333**

### Electrical insert

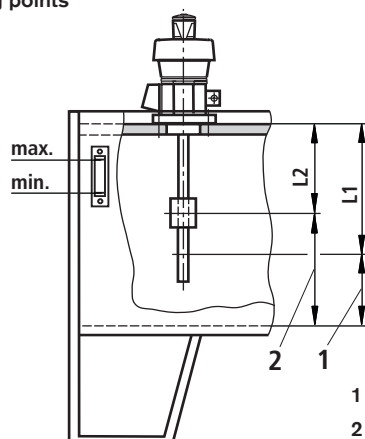
Contact strip, complete

Designation Type ...M	Material no.	Length in mm
KONTAKTLEISTE ABZMS-37-1X/0370-M	R901129321	370
KONTAKTLEISTE ABZMS-37-1X/0500-M	R901129324	500
KONTAKTLEISTE ABZMS-37-1X/0800-M	R901129326	800
KONTAKTLEISTE ABZMS-37-1X/1000-M	R901129328	1000
KONTAKTLEISTE ABZMS-37-1X/1200-M	R901129329	1200

Designation Type ...N	Material no.	Length in mm
KONTAKTLEISTE ABZMS-37-1X/0370-N	R901197068	370
KONTAKTLEISTE ABZMS-37-1X/0500-N	R901197069	500
KONTAKTLEISTE ABZMS-37-1X/0800-N	R901197070	800
KONTAKTLEISTE ABZMS-37-1X/1000-N	R901197072	1000
KONTAKTLEISTE ABZMS-37-1X/1200-N	R901197073	1200

## Oil volume indication for float switches

Types ...M and ...N with factory-set switching points



### Attention!

Before commissioning, adjust the upper and lower switching contact according to the relevant operating conditions.

- 1 Residual amount at switching point L1 <sup>1)</sup>
- 2 Residual amount at switching point L2 <sup>1)</sup>

Float switch Ordered length "L" in mm [inch]	Switching point preset		Residual amount of hydraulic fluid at switching point		
	Dimensions in mm [inch]		AB 40-40, AB 40-43, AB 40-44		
	L1	L2	Size	L1 <sup>1)</sup> in liters [US gal]	L2 <sup>1)</sup> in liters [US gal]
370 [14.57]	220 [8.66]	140 [5.51]	63	28 [7.40]	42 [11.10]
			100	45 [11.89]	67 [17.70]
			160	74 [19.55]	100 [26.42]
			250	120 [31.70]	174 [45.97]
			400	190 [50.19]	277 [73.18]
			630	365 [96.42]	475 [125.48]
			800	460 [121.52]	600 [158.50]
500 [19.69]	280 [11.02]	160 [6.30]	1000	490 [129.44]	740 [195.49]
			1250	780 [206.05]	1030 [272.10]
			1600	990 [261.53]	1310 [346.07]
			2000	1380 [364.56]	1730 [457.02]
800 [31.50]	600 [23.62]	400 [15.75]			
1000 [39.37]	700 [27.56]	500 [19.69]			
1200 [47.24]	800 [31.50]	600 [23.62]			

### Adjustment of the switching height

- Interrupt the power supply
- Remove filter cover and take filter element out
- Loosen six mounting screws and remove filter reservoir
- Loosen four screws of the flange cover and remove cover with cover seal
- Carefully remove adapter plug from contact strip  
(Attention! Some cables of the adapter plug are firmly soldered to the control device).
- Carefully take out contact strip to the top
- Loosen the plastic screws at the contacts and re-position contacts with the help of the cm scale, which is provided at the rear of the contact strip. The height can be adjusted

in 1 cm increments. Tighten the plastic screws for contact mounting hand-tight.

- During the assembly, take care that the adapter plug is plugged correctly onto the contact strip. The correct direction is shown by the red marking on the adapter plug and the contact strip.

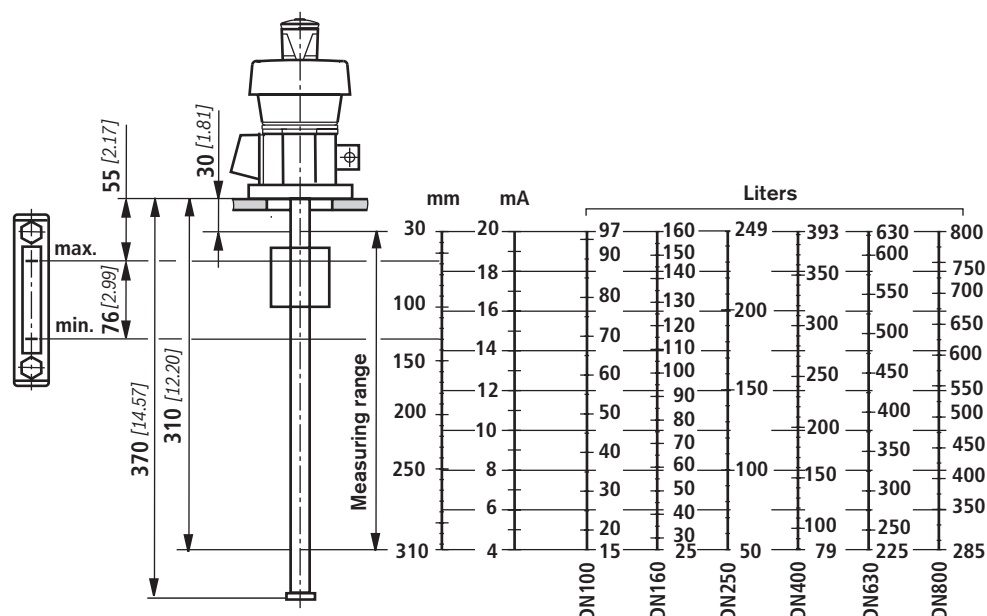
As a standard, the contacts for switching point L1 are installed as normally closed contact, and for switching point L2 as normally open contact. Since these are bistable contacts, the contact function of the normally open contact and the normally closed contact can be changed by rotating the contacts around 180°.

## Oil volume indication for float switches

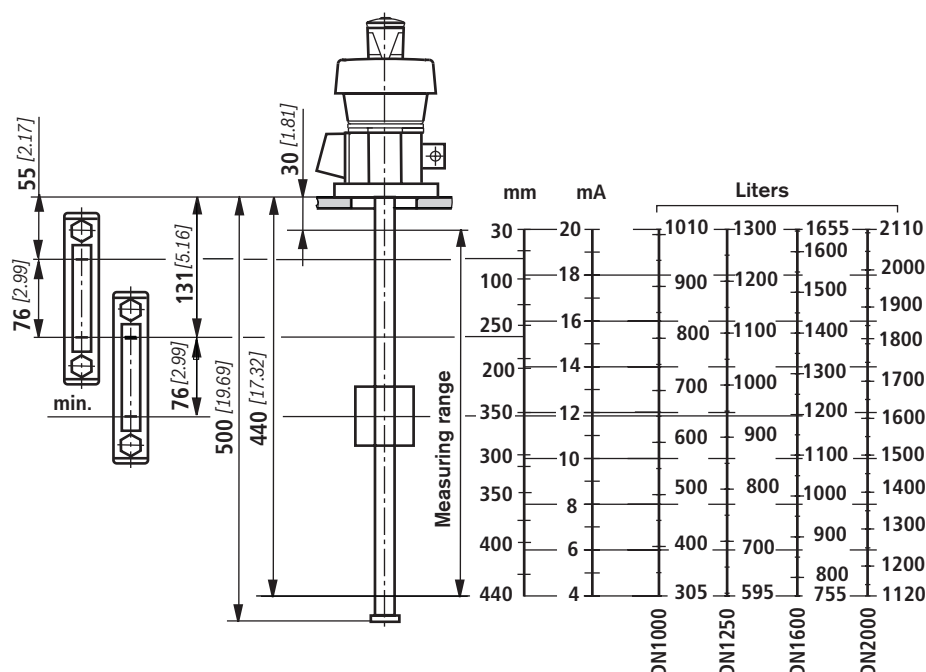
### Type ...R

in tanks according to AB 40-40, AB 40-43 and AB 40-44

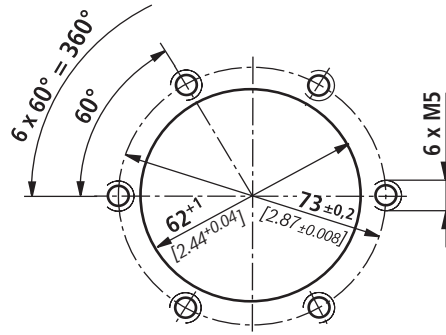
Tank sizes from DN100 to 800



Tank sizes from DN1000 to 2000



## Mounting opening of tank cover (dimensions in mm [inch])



Standard cutout AB 03-39.73 according to DIN 24557 part 2

Mounting screws:

6 pcs ZYLINDERSCHRAUBE ISO4762-M5X18-8.8-A2P

Material no. R900202612

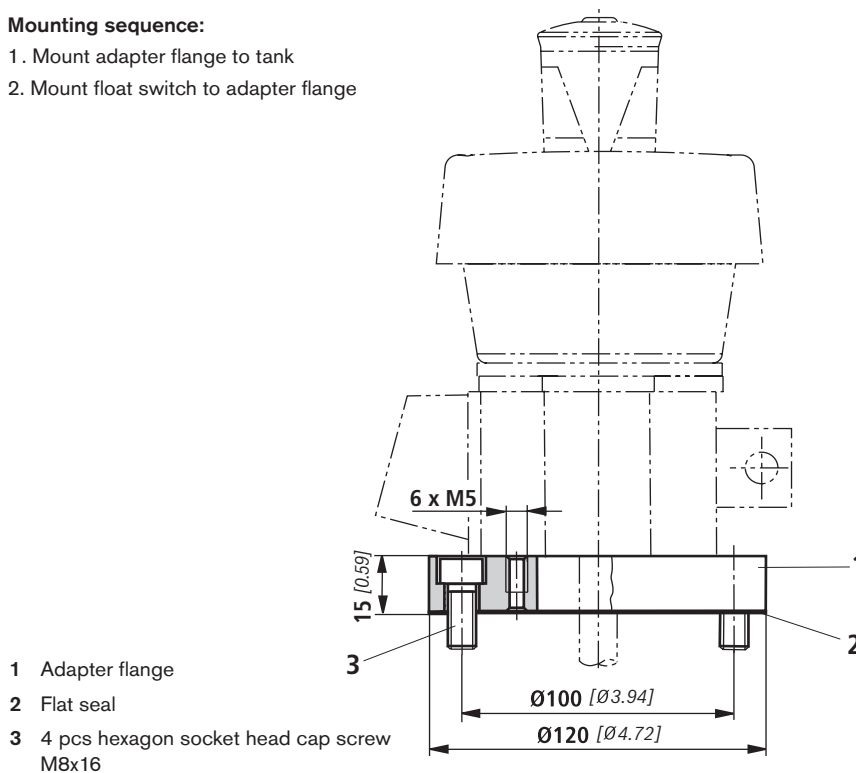
## Adapter for float switch AB 31-04 (dimensions in mm [inch])

If float switches according to RE 50216 are to be installed as substitute for float switches according to AB 31-04 an adapter – consisting of items 1 to 3 – is required.

ADAPTER AB31-04/AB31-36 BG Material no. R901078947

### Mounting sequence:

1. Mount adapter flange to tank
2. Mount float switch to adapter flange



1 Adapter flange

2 Flat seal

3 4 pcs hexagon socket head cap screw  
M8x16

## Installation notes

- Vertical installation according to technical data on page 3
- Avoid flows
- The switches must not be exposed to strong impacts or bends
- Avoid external magnetic fields. They could affect the function of the reed contacts.

### Electrical connections:

- Electrical connections may only be established by specialist personnel
- Before working on electrical parts, disconnect the power supply
- After having connected circular plug-in connectors M12x1 or mating connectors, bolt them down
- Only plug circular plug-in connectors M12x1 or mating connectors when disconnected from the power supply
- Do not overload contacts (see technical data)
- **In the case of inductive loads, provide protective circuit!**

## Use in potentially explosive atmospheres according to Directive 94/9/EC (ATEX)

Float switches ABZMS-37 are **not** suitable for use in potentially explosive atmospheres.

## Operating and installation instructions for float switch type ...M with control device

### General operating notes

The temperature switching points can be changed or adjusted by means of three keys (  $\Delta$  ) + (  $\nabla$  ) + ( **MODE** ).

To this end you have to select the individual menu items by pressing key ( **MODE** ) and one of the keys (  $\Delta$  ) or (  $\nabla$  ).

When you navigate through the menus, the relevant menu name is shown on the display.

You can change the values in the relevant menu item by pressing key (  $\Delta$  ) or (  $\nabla$  ). When you press the key ( **MODE** ) alone, the active place in the display changes over (units to tens digit and vice versa). This possibility was provided to simplify the entry of parameters. The active digit is marked by a flashing dot.

If you scroll beyond the end of the menu (upwards or downwards), the display changes back to the normal operating mode.

If no key is pressed and/or no parameter changed for 15 seconds, the menu is exited automatically and the display changes over to the normal operating mode. To return to the menu, you have to press the two keys (  $\Delta$  ) + ( **MODE** ) again.

After the menu was exited, all new parameters are automatically and permanently saved. All parameters are written to an internal EEPROM and are retained even in the case of a power failure.

### Adjustment of the switching points (only for display with switching outputs)

Each switching output are assigned TWO parameter menus in the menu. For the first switching output, these can be, for example, menus **100** and **101**. **100** refers to the switching back point (RESET) of output 1, and **101** the switching-on point (SET) of output 1. Due to the separate input of both parameters, it is possible to set an almost optionally great switching hysteresis for the corresponding switching output. In addition, it is possible to change the switching function of the output from a normally open contact to a normally closed contact by exchanging the values of the switching-on point (SET) and the switching-off point (RESET).

#### Example 1:

For **100** (RESET) a value of 40 is set.

For **101** (SET) a value of 45 is set.

#### Result:

Output 1 closes at 45° when the temperature is rising, and only opens when the temperature has fallen to 40°.

**Switching function: Normally open contact at rising temperature**

#### Example 2:

For **100** (RESET) a value of 45 is set.

For **101** (SET) a value of 40 is set.

#### Result:

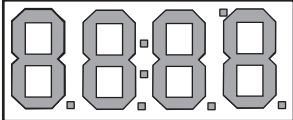
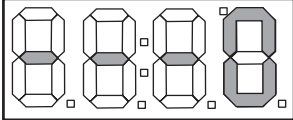

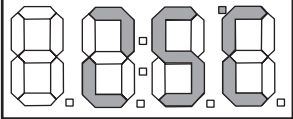
Output 1 opens at 45° when the temperature is rising and only closes again when the temperature has dropped to 40°.

**Switching function: Normally closed contact while the temperature is rising.**

## Operating and installation instructions for float switch type ...M with control device

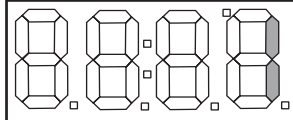
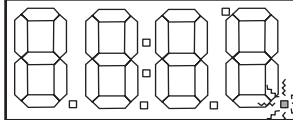
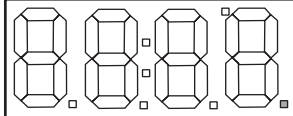
### Switching the device on

After connection of the supply voltage the device runs some self-tests. These are shown on the display.

Display	Status displays
	First, all segments of the display are switched on for checking purposes.
	The following indication means that all memory contents, e.g. for switching points or calibration of the 4-20 mA output, are OK. The last place on the display shows another value depending on the variant.
	Finally, the software version of the control device is displayed.
	The control device is now in the normal operating mode. The actual temperature is displayed.

### Status indicator lamps of the device

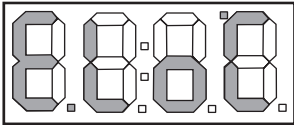
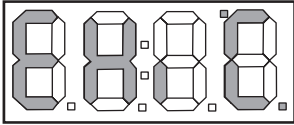
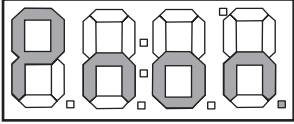
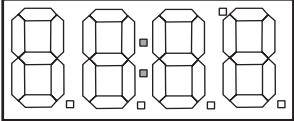
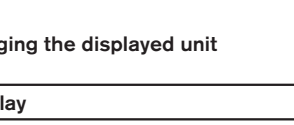
During normal operation, the status indicators light up in addition to the temperature indication.

Display	Status displays
	The two LED segments on the right flash when the corresponding switching temperature of the relevant output has been reached (only for switching devices with switching outputs).
	During normal operation, the dot in the bottom right corner flashes. It serves as ready indicator and shows that the device functions properly.
	If you are in the adjustment or calibration menu, the point is permanently on until you exit the menu again.

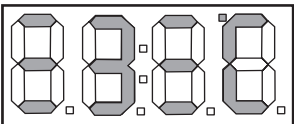
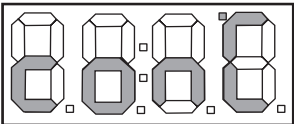
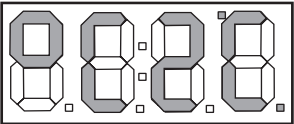


## Operating and installation instructions for float switch type ...M with control device

### Faults

Display	Cause	Remedy
No function	No operating voltage	Check operating voltage
	Short-circuit in cable or PT100	Replace contact strip
	PT 100 defective	Replace contact strip
	Cable connection is interrupted	Connect cable connection
	General malfunction.  In this case, all functions of the control device are inoperable.	Contact our Service: Tel. +49 93 52 18-11 64
	The two central dots are flashing during normal operation when the memory contents may be damaged.	Check the settings. If required, contact our Service: Tel. +49 93 52 18-11 64

### Changing the displayed unit

Display	Operation
	Unlock keylock. Press ( Δ ) + (MODE) SIMULTANEOUSLY. In the first and third place, 3 horizontal dots are displayed, while the second place counts down from 9 to 0.
	Then, the display on the left appears.  The keys can now be released.
	On the current display you can change the temperature indication from degrees Celsius to degrees Fahrenheit by pressing the ( ∇ ) key.

## Operating and installation instructions for float switch variant "M" with control device

### Adjustment of the switching points

Display	Status displays
	To go to the adjustment menu for the switching-off point of the first output, press the <b>(MODE)</b> + <b>(Δ)</b> keys.  After having released the <b>(MODE)</b> key you can change the values with the help of keys <b>(Δ)</b> + <b>(▽)</b> .
	To go to the adjustment menu for the switching-on point of the first output, press the <b>(MODE)</b> + <b>(Δ)</b> keys.  After having released the <b>(MODE)</b> key you can change the values with the help of keys <b>(Δ)</b> + <b>(▽)</b> .
	To go to the adjustment menu for the switching-off point of the second output, press the <b>(MODE)</b> + <b>(Δ)</b> keys.  After having released the <b>(MODE)</b> key you can change the values with the help of keys <b>(Δ)</b> + <b>(▽)</b> .
	To go to the adjustment menu for the switching-on point of the second output, press the <b>(MODE)</b> + <b>(Δ)</b> keys.  After having released the <b>(MODE)</b> key you can change the values with the help of keys <b>(Δ)</b> + <b>(▽)</b> .

### Normative cross-reference

AB 03-39.73	Normdurchbruch, Einfülladapter für VW und DB-Norm	DIN 51524	Pressure fluids; hydraulic oils
AB 24-02	Kabelsätze und Verteiler	ISO 4762	Hexagon socket head cap screws
RE 50212	Float switches with two switching contacts and one thermal contact	VDMA 24317	Fluidtechnik; biologisch schnell abbaubare Druckflüssigkeiten; Technische Mindestanforderungen
RE 50214	Float switches with two switching contacts and with one thermal contact, with resistance measuring chain/resistance thermometer	VDMA 24568	Fluidtechnik; biologisch schnell abbaubare Druckflüssigkeiten; Technische Mindestanforderungen
AB 40-40	Steel reservoirs, form AN, cover form C, drip tray to WHG	94/9/EC (ATEX)	Directive 94/9EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres
AB 40-43	Steel reservoirs, cover form C		
AB 40-44	Steel reservoirs, with base frame		
RE 08006	Cable sockets for controlling electrically operated valves and sensors		
DIN 24320	Fire resistant fluids; hydraulic fluids of category HFAE, properties, requirements		
DIN 24557-2	Fluid power; breather filters; connecting dimensions		