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**JUMO Instrument Co. Ltd.**

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**JUMO Process Control, Inc.**

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# Surface-mounting double thermostat

## ATH type series

### Particularities

- Fluid expansion
- Microswitch
- Self-monitoring (STB/STW (STB)) in the event of a pressure drop
- Safety cut-out (STB/STW(STB))
- 2 separate measuring and switching systems
- Tested according to DIN EN 14597
- Pressure Equipment Directive 2014/68/EU

### Brief description

Thermostats are used to control and monitor thermal processes. Surface-mounting double thermostats of the ATH type series consist of two separate measuring and switching systems. The devices are available as temperature controllers TR, temperature monitors TW, safety temperature monitors STW (STB) and safety temperature limiters STB. In the event of a malfunction, the STB switches the monitored machine line to an operationally safe status.

Surface-mounting double thermostats operate according to the fluid expansion principle, a microswitch serves as an electrical switching element.



ATHs-12



ATHf-170

### Switching function

#### Temperature controller TR and temperature monitor TW

If the temperature exceeds the set point value set on the temperature probe, the microswitch will be tripped by the transmission mechanics and the current circuit opened or closed. The microswitch is reset to its original status once the set point value set is gone below (by the hysteresis).

#### Restart lock for the safety temperature limiter STB

If the temperature exceeds the limit value set on the temperature probe, the current circuit is opened and the microswitch mechanically locked.

The microswitch can be manually unlocked, once the dangerous temperature drops by approx. 10 % of the scale range (approx. 15% with a limit value setting  $> + 350$  °C).

#### Use of the safety temperature monitor STW(STB) as a safety temperature limiter STB

Ensure that the switching circuit downstream of the thermostat complies to DIN EN 14597 and VDE 0116.

#### Self-monitoring for the safety temperature limiter STB and safety temperature monitor STW(STB)

If the measuring system is destroyed, i.e. if the expansion fluid escapes, the pressure in the diaphragm of the STB and STW (STB) drops and permanently opens the current circuit. Unlocking is no longer possible. The electrical circuit opens when cooling the probe of STW (STB) and STB down to the negative temperature range, but it then closes again if the temperature rises. The STB must be unlocked manually if the minimum probe temperature is exceeded. The STW (STB) unlocks itself automatically.

### Approvals/approval marks (see Technical Data)



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## Technical Data

### Control ranges and temperature probes

fluid-filled				
Switching function	Control / limit value ranges in °C	max. admissible probe temperature in °C	maximum capillary length in mm	Probe length, dimension "L" in mm Probe ø "d" = 6 mm (Standard)
TR, TW	-20 to + 50	60	5000	141
	-10 to + 40	50		185
	0 to + 50	60		185
	0 to +100	125		107
	+20 to + 90	115		138
	+30 to +110	135		125
	+20 to +120	140		106
	+60 to +130	150		135
	+20 to +150	175		88
	+50 to +200	230		101
	+50 to +250	290		73
	+50 to +300	345		63
	+50 to +350	405		53
STW(STB) and STB	+30 to +110	135	5000	108
	+60 to +130	150		116
	+20 to +150	175		77
	+50 to +250	290		64
	+50 to +300	345		55
gas-filled				
TR, TW	+20 to +400	460	1000	278
	+20 to +500	575	2000	148
	+20 to +500	575	4000	202
STW(STB) and STB	+20 to +400	460	1000	176
	+20 to +500	575	2000	127
	+20 to +500	575	4000	202

### Capillary and temperature probe

Type	Scale limit value	Capillary	Temperature probe	Remarks
ATH.-. .	up to 200 °C	Copper (Cu) ø 1.5mm Material No. Cu-DHP	Copper (Cu) Material No. Cu-DHP hard soldered	-
	up to 350 °C	Copper (Cu) ø 1.5mm Material No. Cu-DHP	Stainless steel (CrNi) Material No. 1.4571 hard soldered	-
	up to 500 °C	Stainless steel (CrNi) ø 1.5mm	Stainless steel (CrNi) Material No. 1.4571 welded	-
	up to 350 °C	Stainless steel (CrNi) ø 1.5mm	Stainless steel (CrNi) Material No. 1.4571 welded	against surcharge
Capillary length	1000 mm, max. 5000 mm as standard			
minimum bending radius of the capillary	5 mm			

### Electrical data

Switching element	TR, TW, STW (STB)	STB (-70)	STB (-70/574)
	Microswitch with change-over contact	Microswitch with N/C contact and restart lock	Microswitch with N/C contact, restart lock and additional signal contact
max. contact rating	AC 230 V +10%, 10 (2) A, cos φ = 1 (0.6), DC 230 V +10%, 0.25A		
	with hysteresis 1.5% and 2% AC 230 V +10%, 6 (1.2) A, cos φ = 1 (0.6)	-	-
	Microswitch gold-plated, extra code 702* (*only with hysteresis 3%, 5%, and 7%) AC / DC 24 V, 0.1 A, contact resistance 2.5 to 10 mΩ		
Contact reliability	To ensure high switching reliability, we recommend a minimum load of:		
	with silver contacts: AC / DC = 24 V, 100 mA	with gold-plated contacts (extra code 702): AC / DC = 10 V, 5 mA	

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**Operating data**

Hysteresis in % of the control / limit value range	Switching function		with fluid-filled measuring system			
			<b>Rated value</b>		<b>Possible actual value</b>	
	<b>TR, TW</b>		3		3 max. 4	
			6		6 max. 8	
			1.5		1 max. 2	
			with gas-filled measuring system			
	<b>TR, TW</b>		5		4 max. 8	
			9		8 max. 12	
			2		1.5 max. 2.5	
			with fluid-filled measuring system			
	<b>STW (STB)</b>		5		4 max. 6	
			9		8 max. 11	
			2		1 max. 3	
with gas-filled measuring system						
7			5 max. 12		standard	
9		8 max. 16		on request		
2		1.5 max. 3		Surcharge		
Switching point accuracy in % of the control/limit value range	TR, TW: in the upper third of the scale $\pm 1.5\%$ , at scale beginning $\pm 6\%$ STB, STW (STB): in the upper third of the scale $+0/-5\%$ , at scale beginning $+0/-10\%$					
Ambient temperature influence based on the control/limit value range	When the ambient temperature on the case deviates from the calibration ambient temperature $22\text{ }^\circ\text{C}$ , a switch point offset occurs. Higher ambient temperatures = lower switching point Lower ambient temperature = higher switching point Surface-mounting thermostats with scale limit value					
	$< 200\text{ }^\circ\text{C}$		$\pm 200\text{ }^\circ\text{C} \leq 350\text{ }^\circ\text{C}$		$> 350\text{ }^\circ\text{C} \leq 500\text{ }^\circ\text{C}$	
	TR / TW	STB/STW (STB)	TR / TW	STB/STW (STB)	TR / TW	STB/STW (STB)
	Influence on the switch head					
	0.08%/K	0.17%/K	0.06%/K	0.13%/K	0.14%/K	0.12%/K
	Influence on the capillary per metre					
	0.047%/K	0.054%/K	0.09%/K	0.11%/K	0.04%/K	0.03%/K
admissible storage temperature	$-50$ to $+80\text{ }^\circ\text{C}$ or up to max. permissible ambient temperature (see nameplate)					
admissible ambient temperature during use	see nameplate					
Rated position	as per DIN 16 257, NL 0 to NL 90 (different rated positions (NL) on request)					

**Case**

<b>serial</b>	Case lid: Polycarbonate, shock resistant Case bottom part: Aluminum die casting, painted	Color: pebble gray RAL 7032 Color: anthracite gray RAL 7015
Extra code "701"	Case lid made of aluminum die casting, painted	Color: pebble gray RAL 7032
Set point value setting	TR: Switching point adjustable from the outside using the rotary knob	TW, TB, STB, STW (STB): The switching point can be adjusted by means of a screwdriver once the case lid has been removed
Protection type	EN 60 529-IP 54	
Cable inlet	As a standard: self-sealing grommet M 20 x 1.5, sealing range 8-10 mm	
Weight	approx. 0.8 kg	

Switch head fastening ATHf- type series . . . with capillary	<b>serial</b>	Screw-connection by means of counter nut M 18 x 1 on the case stud, capillary outlet on the case stud
	Extra code	
	<b>711</b>	with 2 screws through the case bottom part, lateral capillary outlet on the case, lid and bottom part made of plastic
	<b>764</b>	Fastening flange made of steel sheet, capillary outlet on the case stud
	<b>248</b>	Wall stands

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**Process connection\***

Type series ATHs- with rigid shaft	Scale limit value <u>up to</u> 150 °C <b>Protection tube "20"</b>	Scale limit value <u>exceeding</u> 150 °C <b>Protection tube "30"</b>
	Screw-in sleeve with screw-in spigot G 1/2 form A as per DIN 3852/2	Screw-in sleeve with screw-in journal G 1/2 form A as per DIN 3852/2 and intermediate piece, to ensure that the max. admissible ambient temperature of +80 °C is not exceeded on the case
ATHf- type series with capillary	<b>plain cylindrical probe "10"</b> (standard)	
	<b>Protection tube sheath "20"</b> (on request)	
	Screw-in sleeve with screw-in spigot G 1/2 form A as per DIN 3852/2 and clamping piece with locking screw to lock the probe	
Material	<b>Protection tube "20"</b>	<b>Protection tube "30"</b>
	up to +150 °C CuZn as a standard over +150 °C CrNi	over +150 °C CrNi as a standard
Fitting length S	Standard lengths: 100, 120, 150, 200 or 300 mm (different lengths on request)	
Immersion tube Ø	D = 15 mm	

\* For different process connections and protection tube refer to data sheet 606710.

**Approvals/approval marks**

Types		Switching function	DIN registry No.	Test	
with rigid shaft	with capillary				
ATHs-11	ATHf-11	TR / TR	TR / TR 896		DIN EN 14597
ATHs-12	ATHf-12	TR / TW	TR / TW 897		
ATHs-22	ATHf-22	TW / TW	TW / TW 901		
ATHs-120	ATHf-120	TR / STW (STB)	TR / STW (STB) 899 S		DIN EN 14597
ATHs-220	ATHf-220	TW / STW (STB)	TW / STW (STB) 903 S		
ATHs-170	ATHf-170	TR / STB	TR / STB 900		
ATHs-270	ATHf-270	TW / STB	TW / STB 904	<b>DGRL</b>	Pressure Equipment Directive 2014/68/EU
ATHs-2020	ATHf-2020	STW (STB) / STW (STB)	2 x STW (STB) 905 S		
ATHs-2070	ATHf-2070	STW (STB) / STB	STW (STB) / STB 906 S		
ATHs-7070	ATHf-7070	STB / STB	STB / STB 907		
ATH.-....		all	EAC-approval marks <sup>a</sup> TC RU C-DE.AB98.B.00348		Gost Norm AG Technical rules of the customs union Russia/ Belarus/Kazakhstan
You will find Declarations of Conformity on the Internet at: <a href="http://www.jumo.net">www.jumo.net</a>					

<sup>a</sup> Russian documentation upon request

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## Connection diagrams

<p><b>ATH-11, -12, -120</b>  <b>ATH-22, -220, -2020</b></p> <p>System I and II:          with change-over contact          Switching function: TR, TW, STW(STB)</p>		<p><b>ATH-7070</b></p> <p>System I and II:          with N/C contact          and restart lock          Switching function: STB</p>	
<p><b>ATH-170/574, -270/574, -2070/574</b></p> <p>System I: with change-over contact          Switching function: TR, TW, STW(STB)</p> <p>System II: with N/C contact,          restart lock and          additional signal contact</p>		<p><b>ATH-7070/574</b></p> <p>System I and II:          with N/C contact,          restart lock and          additional signal contact          Switching function: STB</p>	
<p><b>ATH-170, -270, -2070</b></p> <p>System I: with change-over contact          Switching function: TR, TW, STW(STB)</p> <p>System II: with N/C contact          and restart lock          Switching function: STB</p>			

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## Dimensions Versions with rigid shaft

<p><b>ATHs-11;</b>            Process connection "20" with screw-in protection tube</p>	<p><b>ATHs-12, ATHs-120;</b>            Process connection "20" with screw-in protection tube</p>
<p><b>ATHs-22, ATHs-2020;</b>            Process connection "20" with screw-in protection tube</p>	<p><b>ATHs-170, ATHs-170/574;</b>            Process connection "20" with screw-in protection tube</p>
<p><b>ATHs-270, ATHs-270/574, ATHs-2070, ATHs-2070/574;</b>            Process connection "20" with screw-in protection tube</p>	<p><b>ATHs-7070, ATHs-7070/574;</b>            Process connection "20" with screw-in protection tube</p>

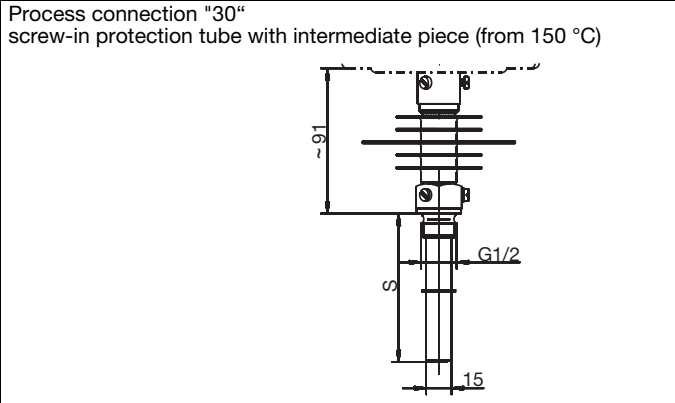
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## Dimensions Versions with rigid shaft



## Stock versions with rigid thermowell

(Delivery within 3 working days after receipt of order)

Part no.	Type	Control / limit value range °C	Hysteresis %	Process connection screw-in tube	Immersion tube Ø x length mm
60001047	ATHs-22	0 to +100	3-4	„20“ G <sup>1</sup> / <sub>2</sub>	15 x 120
60001555	ATHs-22	0 to +100	1.5		15 x 120 CrNi
60000205	ATHs-22	0 to +100	3-4		15 x 150
60000988	ATHs-22	0 to +100	3-4		15 x 200
60000204	ATHs-22	0 to +100	3-4		15 x 300
60000489	ATHs-22	+20 to +150	3-4		15 x 100
60003331	ATHs-22	+50 to +300	3-4	„30“ G <sup>1</sup> / <sub>2</sub>	15 x 150 CrNi
60001479	ATHs-120	+20 to +150	3-4	„20“ G <sup>1</sup> / <sub>2</sub>	15 x 150
60001932	ATHs-120	+20 to +120	3-4		15 x 150
60000195	ATHs-170	+30 to +110	3-4		15 x 150
60000196	ATHs-170	+30 to +110	3-4		15 x 200
60001048	ATHs-170	+20 to +120	3-4		15 x 150
60000989	ATHs-170	+20 to +150	3-4		15 x 150
60000194	ATHs-270	+20 to +150	3-4		15 x 200

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## Dimensions Versions with capillary

<p><b>ATHf-11</b>            Process connection "10" plain cylindrical probe</p>	<p><b>ATHf-12, ATHf-120</b>            Process connection "10" plain cylindrical probe</p>
<p><b>ATHf-22, ATHf-2020</b>            Process connection "10" plain cylindrical probe</p>	<p><b>ATHf-170, ATHf-170/574</b>            Process connection "10" plain cylindrical probe</p>
<p><b>ATHf-270, ATHf-270/574, ATHf-2070, ATHf2070/574</b>            Process connection "10" plain cylindrical probe</p>	<p><b>ATHf-7070, ATHf-7070/574</b>            Process connection "10" plain cylindrical probe</p>



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**Stock versions with capillary**

(Delivery within 3 working days after receipt of order)

Part no.	Type	Control / limit value range °C	Hysteresis %	Capillary	Process connection	Probe ø x length mm
60001046	ATHf-22	0 to +100	3-4	1000 mm	"10" plain cylindrical probe	6 x 107
60001876	ATHf-170	+30 to +110				6 x 125

**Order details****Surface-mounting double thermostat, ATH type series****Order code (1) Basic type**

603026 Surface-mounting double thermostat, ATH type series

**(2) Basic type extensions**

0101	ATH.-11	TR/TR
0102	ATH.-12	TR/TW
0202	ATH.-22	TW/TW
0120	ATH.-120	TR/STW (STB)
0220	ATH.-220	TW/STW (STB)
0170	ATH.-170	TR/STB
0270	ATH.-270	TW/STB
2020	ATH.-2020	STW (STB)/STW (STB)
2070	ATH.-2070	STW (STB)/STB
7070	ATH.-7070	STB/STB

**(3) Design**

1	ATHs	with rigid shaft
2	ATHf	with capillary

**(4) Control / limit value ranges 1 (°C)**

014	-20 to + 50	(only possible with TR and TW)
016	-10 to + 40	(only possible with TR and TW)
021	0 to + 50	
025	0 to +100	
041	+20 to + 90	
042	+20 to +120	
043	+20 to +150	
045	+20 to +400	
046	+20 to +500	
052	+30 to +110	
062	+50 to +200	
063	+50 to +250	
064	+50 to +300	
066	+60 to +130	

**(5) Control / limit value ranges 2 (°C)**

014	-20 to + 50	(only possible with TR and TW)
016	-10 to + 40	(only possible with TR and TW)
021	0 to + 50	
025	0 to +100	
041	+20 to + 90	
042	+20 to +120	
043	+20 to +150	
045	+20 to +400	
046	+20 to +500	
052	+30 to +110	
062	+50 to +200	
063	+50 to +250	
064	+50 to +300	
066	+60 to +130	

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## Order details

### Surface-mounting double thermostat, ATH type series

#### Order code (6) Hysteresis 1

00	without hysteresis	(STB)
15	1.5 % of the scale range	(only for TR + TW)
20	2 % of the scale range	(only for STW (STB))
30	3 % of the scale range	(only for TR + TW)
50	5 % of the scale range	(only for TR + TW + STW (STB))
60	6 % of the scale range	(only for TR + TW)
70	7 % of the scale range	(only for STW (STB))
90	9 % of the scale range	(only for STW (STB))

#### (7) Hysteresis 2

00	without hysteresis	(STB)
15	1.5 % of the scale range	(only for TR + TW)
20	2 % of the scale range	(only for STW (STB))
30	3 % of the scale range	(only for TR + TW)
50	5 % of the scale range	(only for TR + TW + STW (STB))
60	6 % of the scale range	(only for TR + TW)
70	7 % of the scale range	(only for STW (STB))
90	9 % of the scale range	(only for STW (STB))

#### (8) Capillary length 1 (specifications in mm)

0	without capillary
1000	1000 mm
2000	2000 mm
3000	3000 mm
4000	4000 mm
5000	5000 mm
...	(Special length, specifications in plain text)

#### (9) Capillary length 2 (specifications in mm)

0	ATHs without capillary
1000	1000 mm
2000	2000 mm
3000	3000 mm
4000	4000 mm
5000	5000 mm
...	(Special length, specifications in plain text)

#### (10) Capillary material 1

00	ATHs without capillary
40	Cu (Copper)
20	CrNi (stainless steel)

#### (11) Capillary material 2

00	ATHs without capillary
40	Cu (Copper)
20	CrNi (stainless steel)

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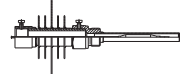
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## Order details

### Surface-mounting thermostats, ATH type series

#### Order code (12) Process connection <sup>1</sup>

- 10 plain cylindrical probe (only for ATH...) 
- 20 Screw-in protection tube 
- 30 Screw-in protection tube with intermediate piece 

#### (13) Thread of process connection <sup>1</sup>

- 00 without thread (process connection "10")
- 13 External thread G 1/2

#### (14) Material of process connection

- 00 only with process connection "10"
- 46 CuZn (brass)
- 20 CrNi (stainless steel 1.4571)

#### (15) Fitting length "S" (immersion tube length)

- 000 ATHf without protection tube
- 100 100 mm
- 120 120 mm
- 150 150 mm
- 200 200 mm
- 300 300 mm
- 400 400 mm
- ... (Special length, specifications in plain text)

#### (16) Diameter "D" (immersion tube diameter)

- 00 ATHf- without protection tube
- 15 15 mm

#### (17) Diameter "d" (probe diameter)

- 6 6 mm

#### (18) Extra codes <sup>2</sup>

- 000 without extra codes
- 248 Wall stands
- 574 Microswitch with changeover contact, restart lock only for STB
- 701 case lid made of aluminum die casting (not with extra code "r")
- 702 Snap-action switch contact, gold-plated (only with switching differential 3 %, 5 %, and 7 % and STB)
- 711 Switch head fastening with 2 screws through the case bottom part, lateral capillary outlet on the case, lid and bottom part made of plastic
- 764 Fastening flange made of steel sheet, capillary outlet on the case stud

<sup>1</sup> For different types of connections and protection tube refer to data sheet 606710.

<sup>2</sup> State extra codes one after another, separated by commas.

#### Order code:

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18)  
 603026 / ... - . - .. - .. - .. - .. - . - ... - .. - .. - .. - .. - .. - ... - ... - . / ... / ...

#### Order example:

603026 / 0101 - 1 - 014 - 14 - 00 - 15 - 0 - 1000 - 00 - 20 - 10 - 13 - 00 - 100 - 00 - 6 / 248<sup>2</sup>

<sup>2</sup> State extra codes one after another, separated by commas.