

# THERMOSTATS

Pressure and temperature monitoring solutions

Pressure transmitters



Pressure switches



trafford



# Trafag – Sensors and monitoring instruments for pressure and temperature

Trafag, a Swiss-based company founded in 1942, is supported by a broad sales and service network in over 40 countries across the world. This allows Trafag to offer customers personalised and competent advice and ensures the best possible service. High-performance development and production departments not only guarantee the fast and reliable delivery of our high-quality and high-precision products, but also ensure that customisations can be implemented in a short time.



## Competent and customer-oriented

Technological competence, manufacturing expertise and customer-orientation form the three cornerstones of Trafag as a company. Trafag is a completely independent company with headquarters in Bubikon, Switzerland, and further manufacturing companies in Germany and the Czech Republic. A fifth of its employees in Switzerland are involved in the fields of research and development, production technology or applications engineering.

## Application and solution-oriented

The direct availability of these resources enables Trafag to be extremely flexible in the areas of development and production as well as in its perception and implementation of customer requirements. Thanks to modular engineering, Trafag is able to efficiently adapt its standard products to the specific needs of customers and to develop special OEM solutions.

## Market-oriented and always within reach

Trafag maintains an active presence in over 40 countries. A great number of customers in diverse industrial sectors such as mechanical engineering, hydraulics, engine manufacturing, shipbuilding, railway technology or high-voltage technology appreciate the cooperation offered by our technically competent customer advisory service.

## Adaptable and efficient

The ability to develop and manufacture its strategically important components in-house means that Trafag can both mass-produce and manufacture on a small scale at short notice. Rigorous quality management in accordance with ISO 9001, state of the art production facilities under clean room conditions and stringently monitored production processes ensure that Trafag meets the highest quality demands.



# Content

## Thermostats and accessories



For 70 years Trafag thermostats have proven their robustness in order to withstand the most adverse environmental conditions. Industry usage ranges from air conditioning applications to engine and ship manufacturing and even to offshore oil and gas platform production. The appeal of Trafag thermostats lies in their high switching point precision even after decades of operation under harsh conditions without maintenance. Various sensor and casing designs cover a wide range of temperatures and possible applications. Thermostats are available with Ex- and ship approvals as well as with railway conformity.

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# Our products are at home where you are



## Shipbuilding



- Propulsion
- Pumps
- Ballast water treatment
- Steering
- Separators
- Tank level



## Hydraulics



- Construction machinery
- Agricultural machinery
- Injection molding machines
- Community vehicles
- Elevators



## Engines



- Common rail injection
- Cooling water
- Oil pressure
- Fuel pressure
- Turbo charger



## Railways

- Brake systems
- Pantograph
- Air compressors



## Water treatment

- Drinking water
- Waste water
- Desalination
- Pools
- Sluice steering
- Level control



## Various

- Chemical industry
- Mining
- Process technology
- Oil and gas
- Machine building industry
- HVAC



# Thermostats

For 70 years Trafag thermostats have proven their robustness in order to withstand the most adverse environmental conditions. Industry usage ranges from air conditioning applications to engine and ship manufacturing and even to offshore oil and gas platform production. The appeal of Trafag thermostats lies in their high switching point precision even after decades of operation under harsh conditions without maintenance. Various sensor and casing designs cover a wide range of temperatures and possible applications. Thermostats are available with Ex- and ship approvals as well as with railway conformity.

## Measurement principle

A capillary tube filled with liquid reacts to a temperature change as a result of the principle of thermal expansion. This expansion is detected using a precision structure which switches one or multiple microswitches.



## Design variations

- With internal or external temperature set-point adjustment
- Internal or external measuring scale
- With or without a manual reset switch
- With or without switching differential adjustment
- Switch designs for inside or outside applications
- Optional capillary tube safeguard
- Single or double-step circuit
- CE, EX or ship certifications

## Sensor systems and accessories

- Sensors that are fixed or can be mounted freely
- Copper (Cu), Cu nickel-plated or stainless steel sensor material
- Nickel-plated bronze or stainless steel protective sensor tube
- Additional capillary tube protection





# Accessories

Trafag offers a wide range of original accessories which are ideally matched to our products. These include devices for monitoring or configuring transmitters such as hand pumps with precision pressure gauge or the Sensor Communicator, a handheld device which provides direct access to the calibration values of the transmitter in the Trafag ASIC. Trafag also offers a wide range of accessories meet specific application requirements and also make installation easier. They include diagnostic valve manifolds, snubbers and pressure peak damping elements for measuring pressure, or protective pipes for thermostats.

## Accessories for thermostats

- Protection tubes for direct mounting and remote sensors
- Duct mounting bracket
- Capillary tube holder
- Mounting brackets
- Screwed cable glands, ship approved, for retrofit















# Overview thermostats

	A/AS/ASE 645/650	ADS 319	A2/A2S 198/199	IA/IAS 409/419	MSK 624/634	MP/MSP 663/664	
	page 15	page 20	page 25	page 30	page 35	page 40	
							
<b>Designation of application</b>	Room thermostat	Double room thermostat	Multistage room thermostat	Industrial room thermostat	Duct thermostat	Pipe mounting thermostat	
<b>Measuring range</b>	-45°C ... +15°C to 0°C ... +60°C	-30°C ... +30°C to 0°C ... +60°C	-45°C ... +15°C to 0°C ... +60°C	-30°C ... +30°C to 0°C ... +60°C	-30°C ... +40°C to +20°C ... +110°C	-10°C ... +35°C to +20°C ... +110°C	
<b>Output signal</b>	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	
<b>Switching differential</b>	Adjustable / not adjustable	Adjustable / not adjustable	Not adjustable	Adjustable / not adjustable	Adjustable / not adjustable	Adjustable / not adjustable	
<b>Ambient temperature</b>	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	
<b>Protection</b>	IP54	IP54	IP54	IP65	IP54	IP54	
<b>Applications</b>	HVAC Refrigeration	HVAC Refrigeration	HVAC Refrigeration	HVAC	HVAC	Process technology Water treatment	
<b>Approval / conformity</b>	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	
<b>Type of protection</b>							
<b>Data sheet</b>	<a href="http://www.trafag.com/H72170">www.trafag.com/H72170</a>	<a href="http://www.trafag.com/H72146">www.trafag.com/H72146</a>	<a href="http://www.trafag.com/H72137">www.trafag.com/H72137</a>	<a href="http://www.trafag.com/H72116">www.trafag.com/H72116</a>	<a href="http://www.trafag.com/H72177">www.trafag.com/H72177</a>	<a href="http://www.trafag.com/H72175">www.trafag.com/H72175</a>	
<b>Instructions</b>	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>	<a href="http://www.trafag.com/H73170">www.trafag.com/H73170</a>	<a href="http://www.trafag.com/H70311">www.trafag.com/H70311</a>	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>	<a href="http://www.trafag.com/H73663">www.trafag.com/H73663</a>	

MST 624/634	M/MS 624/634	MS...R 630/632	F/F...R 990/991/992/993	GS 657/658	D...R 302	M2S 104/114
page 45	page 50	page 56	page 61	page 65	page 70	page 75
						
Direct mounting thermostat	Remote sensing thermostat	Remote sensing thermostat with limiter	Frost protection thermostat	Remote sensing thermostat	Double thermostat with remote sensor and limiter	Multistage thermostat with remote sensor
-30°C ... +40°C to +70°C ... +350°C	-30°C ... +40°C to +70°C ... +350°C	-30°C ... +40°C to +70°C ... +350°C	-5°C ... +15°C	+5°C ... +95°C and +20°C ... +150°C	-30°C ... +40°C to +70°C ... +350°C	-30°C ... +40°C to +70°C ... +350°C
Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact
Adjustable / not adjustable	Adjustable / not adjustable	Not adjustable	Not adjustable	Not adjustable	Adjustable / not adjustable	Not adjustable
-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	Max. operating temperature: +70°C Min. operating temperature: switch point + 2°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C
IP54	IP54	IP54	IP 54	IP54	IP54	IP54
Machine tools HVAC Process technology Water treatment	Railways Machine tools HVAC Refrigeration Process technology	Railways Machine tools HVAC Refrigeration Process technology	HVAC Refrigeration	Process technology	HVAC Refrigeration	Machine tools HVAC Refrigeration Process technology
EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN 60730-1/ EN 60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H
<a href="http://www.trafag.com/H72174">www.trafag.com/H72174</a>	<a href="http://www.trafag.com/H72172">www.trafag.com/H72172</a>	<a href="http://www.trafag.com/H72173">www.trafag.com/H72173</a>	<a href="http://www.trafag.com/H72123">www.trafag.com/H72123</a>	<a href="http://www.trafag.com/H72179">www.trafag.com/H72179</a>	<a href="http://www.trafag.com/H72142">www.trafag.com/H72142</a>	<a href="http://www.trafag.com/H72139">www.trafag.com/H72139</a>
<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>	<a href="http://www.trafag.com/H70821">www.trafag.com/H70821</a>	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>	<a href="http://www.trafag.com/H73170">www.trafag.com/H73170</a>	<a href="http://www.trafag.com/H70311">www.trafag.com/H70311</a>

# Overview thermostats

	L/LF 736/754	L...R 755	I/IS 404/414	IS...R 410/412	ISN/ISNT 471/472	 ISP/ISPT 474	
	page 81	page 86	page 91	page 97	page 103	page 109	
							
<b>Designation of application</b>	Remote sensing thermostat, skeleton type	Remote sensing thermostat with limiter, skeleton type	Industrial thermostat with remote sensor	Industrial thermostat with remote sensor and limiter	Thermostat for shipbuilding	Compact thermostat for shipbuilding	
<b>Measuring range</b>	-30°C ... +40°C to +70°C ... +350°C	-30°C ... +40°C to +70°C ... +350°C	-30°C ... +40°C to +70°C ... +350°C	-30°C ... +40°C to +70°C ... +350°C	+20°C ... +110°C to +40°C ... +300°C	+5°C ... +95°C to +20°C ... +150°C	
<b>Output signal</b>	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact	
<b>Switching differential</b>	Adjustable / not adjustable	Not adjustable	Adjustable / not adjustable	Not adjustable	Not adjustable	Not adjustable	
<b>Ambient temperature</b>	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	-30°C ... +70°C	
<b>Protection</b>	IP00	IP00	IP65	IP65	IP65	IP65	
<b>Applications</b>	Machine tools	Machine tools	Railways Machine tools	Machine tools Process technology	Shipbuilding Engine manufacturing Railways	Shipbuilding Engine manufacturing Railways Hydraulics HVAC	
<b>Approval / conformity</b>	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	EN60730-1/ EN60730-2-9: Typ 2.B.H	ABS, BV, CCS, DNV, GL, KRS, LRS, RINA, RMRS EN60730-1/ EN60730-2-9: Typ 2.B.H	ABS, BV, CCS, DNV, GL, KRS, LRS, NKK, RINA, RMRS EN60730-1/ EN60730-2-9: Typ 2.B.H	
<b>Type of protection</b>							
<b>Data sheet</b>	<a href="http://www.trafag.com/H72122">www.trafag.com/H72122</a>	<a href="http://www.trafag.com/H72124">www.trafag.com/H72124</a>	<a href="http://www.trafag.com/H72110">www.trafag.com/H72110</a>	<a href="http://www.trafag.com/H72138">www.trafag.com/H72138</a>	<a href="http://www.trafag.com/H72111">www.trafag.com/H72111</a>	<a href="http://www.trafag.com/H72113">www.trafag.com/H72113</a>	
<b>Instructions</b>	<a href="http://www.trafag.com/H70211">www.trafag.com/H70211</a>	<a href="http://www.trafag.com/H70211">www.trafag.com/H70211</a>	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>	<a href="http://www.trafag.com/H73113">www.trafag.com/H73113</a>	

EXS 404/414	EXAS 409/419	«Simple Apparatus» conformity to ATEX	«Simple Apparatus» conformity to ATEX
page 115	page 121	page 126	page 132
			
Ex Industrial thermostat with remote sensor	Ex Industrial room thermostat	Industrial room thermostat with remote sensor	Industrial room thermostat
-30°C ... +40°C to +70°C ... +350°C	-30°C ... +30°C to 0°C ... +60°C	-30°C ... +40°C to +70°C ... +350°C	-30°C ... +30°C to 0°C ... +60°C
Floating change-over contact	Floating change-over contact	Floating change-over contact	Floating change-over contact
Not adjustable	Not adjustable	Not adjustable	Not adjustable
-30°C ... +70°C	-30°C ... +60°C	-30°C ... +70°C	-30°C ... max. +65°C
IP65	IP65	IP65	IP65
Ex II 2 G / D	Ex II 2 G / D	Potentially hazardous areas	Potentially hazardous areas
SEV 15 ATEX 0156 X IECEX SEV 17.0010X	SEV 15 ATEX 0156 X IECEX SEV 17.0010X	EN60730-1/ EN60730-2-9: Typ 2.B.H EN60079-0, EN60079-11 Zone 1 and 2, 21 and 22	EN60730-1/ EN60730-2-9: Typ 2.B.H EN60079-0, EN60079-11 Zone 1 and 2, 21 and 22
Areas with gas explosion hazards: II 2 G Ex db eb IIC T6 Gb; Areas with dust explosion hazards: II 2 D Ex tb IIIC T80°C Db	Areas with gas explosion hazards: II 2 G Ex db eb IIC T6 Gb; Areas with dust explosion hazards: II 2 D Ex tb IIIC T80°C Db		
<a href="http://www.trafag.com/H72108">www.trafag.com/H72108</a>	<a href="http://www.trafag.com/H72128">www.trafag.com/H72128</a>	<a href="http://www.trafag.com/H72183">www.trafag.com/H72183</a>	<a href="http://www.trafag.com/H72182">www.trafag.com/H72182</a>
<a href="http://www.trafag.com/H73172">www.trafag.com/H73172</a>	<a href="http://www.trafag.com/H73172">www.trafag.com/H73172</a>	<a href="http://www.trafag.com/H73173">www.trafag.com/H73173</a>	<a href="http://www.trafag.com/H73173">www.trafag.com/H73173</a>

# Pressure measurement instruments

## Pressure transmitters



Trafag pressure transmitters and electronic pressure switches are used for measuring and evaluating pressure. Over the decades, they have proven themselves in a multitude of demanding applications in harsh environments. Superior technology and precise manufacturing ensure that the transmitters work perfectly, especially in areas where high requirements are placed on long-term stability, vibration resistance, electromagnetic compatibility, shock resistance or temperature insensitivity. Trafag pressure transmitters and electronic pressure switches are available in many different designs to suit pressure and electrical connections, measuring procedures, electrical output signals. They are available with Ex- and ship approvals as well as with railway conformity.

Pressure transmitters



## Pressure switches



Trafag's electromechanical pressure switches provide high vibration resistance and switch point precision in combination with an extremely robust and durable design. This results in switches that can be operated for decades without requiring maintenance, even under harsh conditions. Various designs with bellows, membrane and piston sensors cover a wide variety of pressure ranges, media and load profiles for many different applications. Pressostats are available with Ex- and ship approvals as well as with railway conformity.

Pressure switches



# AMBISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- HVAC
- Refrigeration

## Features

- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Room thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-45°C ... +15°C to 0°C ... +60°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XX
<b>Custom build code</b>	External adjustment	645					
	Internal adjustment	650					
<b>Microswitch</b>	Small switching differential, not adjustable		10				
	Average switching differential, not adjustable		11				
	With gold plated contacts, not adjustable		21				
	Adjustable large switching differential		24				
	Adjustable standard switching differential		25				
<b>Range</b>	<b>Range [°C]</b>	<b>Operating temperature [°C]</b>					
	-45 ... +15 <sup>1)</sup>	-45 ... +30		05			
	-30 ... +30	-30 ... +40		02			
	-20 ... +40 <sup>1)</sup>	-30 ... +50		06			
	0 ... +30	-30 ... +50		03			
	+10 ... +40	-30 ... +70		04			
	0 ... +60	-30 ... +70		12			
<b>Sensor</b>	Stainless steel (1.4435 / AISI316L)				401		
	Copper				402		
	Copper nickel plated				403		
<b>Fixing <sup>2)</sup></b>	Console					19	
<b>Accessories</b>	Switchpoint locking <sup>1)</sup>						15
	Switchpoint fixed and sealed upon customer's request <sup>1)</sup>						88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>1)</sup>						83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing						
	Railway version IEC 61373, category 2						28
	Outdoor application (vented)						44
	Cover with window						77

<sup>1)</sup> Only with type 650 internal adjustment

<sup>2)</sup> See data sheet H72106

## Standard products (extra short lead time)

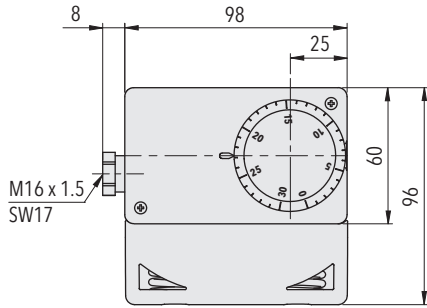
Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Operating temperature [°C]
A30	645 2503 402 19	0 ... +30	0.7 ... 6 (adjustable)	-30 ... +50
A33	645 2502 402 19	-30 ... +30	0.7 ... 6 (adjustable)	-30 ... +40
A40	645 2504 402 19	+10 ... +40	0.7 ... 6 (adjustable)	-30 ... +70
A60	645 2512 402 19	0 ... +60	0.7 ... 6 (adjustable)	-30 ... +70
AS30	650 2503 402 19	0 ... +30	0.7 ... 6 (adjustable)	-30 ... +50
AS33	650 2502 402 19	-30 ... +30	0.7 ... 6 (adjustable)	-30 ... +40
AS40	650 2504 402 19	+10 ... +40	0.7 ... 6 (adjustable)	-30 ... +70
AS60	650 2512 402 19	0 ... +60	0.7 ... 6 (adjustable)	-30 ... +70
ASE40	650 2404 402 19 0000 0000 00 00 00 01	+10 ... +40	5 (fixed)	-30 ... +70



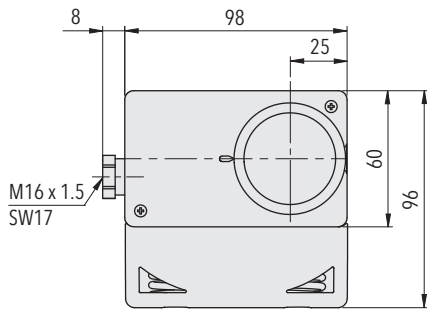
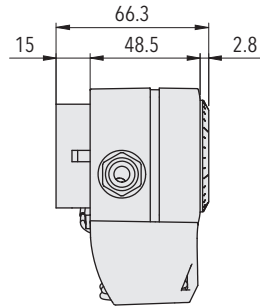
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	see table
<b>Environmental conditions</b>	Ambient temperature	see ordering information
	Storage temperature	Range < +40°C: -30...+50°C Range > +40°C: -30...+85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	see ordering information
	Filling	Liquid
	Housing	PC/ABS-Blend V0
	Screwed cable gland	PA, Polyamid
	Installation	any position
	Weight	~ 300 g
<b>Microswitch</b>	Rating	see table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles Microswitch 24: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable-Ø 4...9 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72170">www.trafag.com/H72170</a>
	Instructions	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>
	Flyer	<a href="http://www.trafag.com/H70961">www.trafag.com/H70961</a>

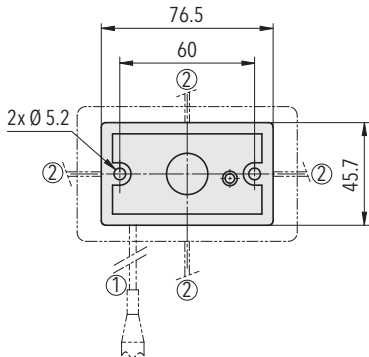
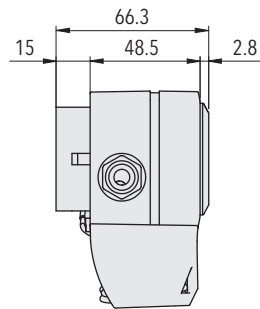
## Dimensions



645.XXXX.XXX.XX.XX



650.XXXX.XXX.XX.XX

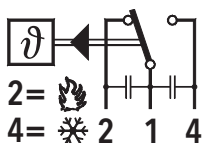


6XX.XXXX.XXX.19.XX

Switching differential typ.		
<b>Range</b>	[°C]	-45 ... +15 -30 ... +30 -20 ... +40 0 ... +30 +10 ... +40 0 ... +60
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 24</b> Switching differential (adjustable value)	[°C]	3 ... 10
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 6

Electrical data switch			
Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A
<b>24</b>	Adjustable large switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

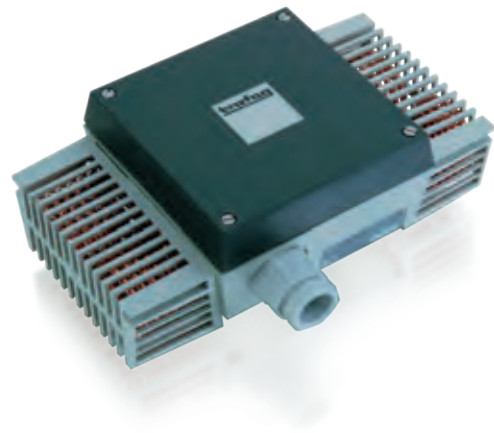
## Electrical Connection



645/650

# AMBI DUOSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- HVAC
- Refrigeration

## Features

- With 2 individual measuring systems
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Double room thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +30°C to 0°C ... +60°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		319 .	XX	XX	XXX	XX	XX
<b>Microswitch</b>	Small switching differential, not adjustable		10				
	Average switching differential, not adjustable		11				
	With gold plated contacts, not adjustable		21				
	Adjustable standard switching differential		25				
<b>Range</b>	<b>Range</b> [°C]	<b>Operating temperature</b> [°C]					
	-30 ... +30	-30 ... +40			02		
	-20 ... +40	-30 ... +50			06		
	0 ... +30	-30 ... +50			03		
	+10 ... +40	-30 ... +70			04		
	0 ... +60	-30 ... +70			12		
<b>Sensor</b>	Stainless steel (1.4435 / AISI316L)				401		
	Copper				402		
	Copper nickel plated				403		
<b>Fixing <sup>2)</sup></b>	Console						19
<b>Accessories</b>	Signal lamp						14
	Switchpoint locking						15
	Switchpoint fixed and sealed upon customer's request						88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy						83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing						
	Railway version IEC 61373, category 2						28
	Outdoor application (vented)						44

<sup>2)</sup> See data sheet H72106

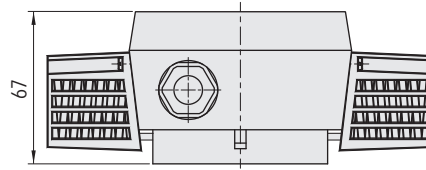
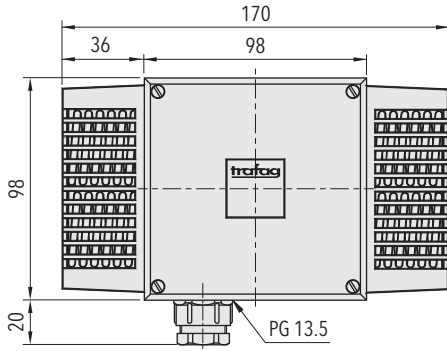
## Standard products (extra short lead time)

Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Operating temperature [°C]
ADS30	319 2503 402 19	0 ... +30	0.7 ... 6 (adjustable)	-30 ... +50
ADS33	319 2502 402 19	-30 ... +30	0.7 ... 6 (adjustable)	-30 ... +40
ADS60	319 2512 402 19	0 ... +60	0.7 ... 6 (adjustable)	-30 ... +70

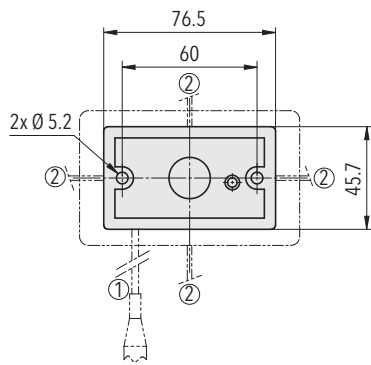
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	see table
<b>Environmental conditions</b>	Ambient temperature	see ordering information
	Storage temperature	Range < +40°C: -30...+50°C Range > +40°C: -30...+85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	see ordering information
	Filling	Liquid
	Housing	Noryl
	Screwed cable gland	PA, Polyamid
	Installation	any position
	Weight	~ 220 g
<b>Microswitch</b>	Rating	see table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles
<b>Electrical connection</b>	Cable gland	PG13.5 Cable-Ø 5...12.5 mm
	Terminal screw	3 x 1...2.5 mm²

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72146">www.trafag.com/H72146</a>
	Instructions	<a href="http://www.trafag.com/H73170">www.trafag.com/H73170</a>
	Flyer	<a href="http://www.trafag.com/H70960">www.trafag.com/H70960</a>

## Dimensions



319.XXXX.XXX.XX.XX



319.XXXX.XXX.19.XX

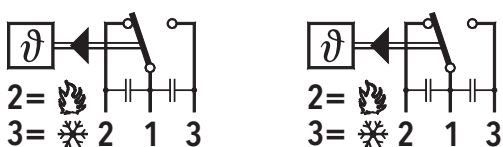
## Switching differential typ.

<b>Range</b>	[°C]	-30 ... +30 -20 ... +40 0 ... +30 +10 ... +40 0 ... +60
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 6

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1(0.1)A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1(0.1)A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A

## Electrical Connection



319



# ALTERO AMBISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- HVAC
- Refrigeration

## Features

- With 1 adjustable step between 2 stages
- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Multistage room thermostat	Switching differential	Not adjustable
Measuring range	-45°C ... +15°C to 0°C ... +60°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XX
<b>Custom build code</b>	Internal adjustment	198					
	External adjustment	199					
<b>Microswitch</b>	Small switching differential, not adjustable		10				
	Average switching differential, not adjustable		11				
	With gold plated contacts, not adjustable		21				
<b>Range</b>	<b>Range [°C]</b>	<b>Operating temperature [°C]</b>					
	-45 ... +15	-45 ... +30		05			
	-30 ... +30	-30 ... +40		02			
	-20 ... +40	-30 ... +50		06			
	0 ... +30	-30 ... +50		03			
	+10 ... +40	-30 ... +70		04			
	0 ... +60	-30 ... +70		12			
<b>Sensor</b>	Stainless steel (1.4435 / AISI316L)				401		
	Copper				402		
	Copper nickel plated				403		
<b>Fixing <sup>2)</sup></b>	Console						19
<b>Accessories</b>	Signal lamp						14
	Switchpoint locking <sup>1)</sup>						15
	Switchpoint fixed and sealed upon customer's request <sup>1)</sup>						88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>1)</sup>						83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing						
	Railway version IEC 61373, category 2						28
	Outdoor application (vented)						44
	Desired stage difference to be indicated when ordering (without indication = switches synchronous) Switch 1 on scale, difference switch 2 to scale -6°C ... +15°C						
	Minimum distance between switches: Switch 10: ±1°C Switch 11/21: ±2°C						

<sup>1)</sup> Only with type 198, internal adjustment

<sup>2)</sup> See data sheet H72106

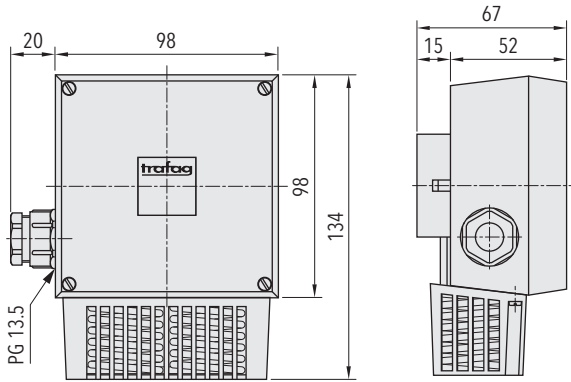
## Standard products (extra short lead time)

Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Smallest stage difference [°C]	Largest stage difference [°C]	Operating temperature [°C]
A230	199 1103 402 19	0 ... +30	0.7 (fixed)	-6	15	-30 ... +50
A233	199 1102 402 19	-30 ... +30	0.7 (fixed)	-6	15	-30 ... +40
A260	199 1112 402 19	0 ... +60	0.7 (fixed)	-6	15	-30 ... +70
A2S30	198 1103 402 19	0 ... +30	0.7 (fixed)	-6	15	-30 ... +50
A2S33	198 1102 402 19	-30 ... +30	0.7 (fixed)	-6	15	-30 ... +40
A2S60	198 1112 402 19	0 ... +60	0.7 (fixed)	-6	15	-30 ... +70

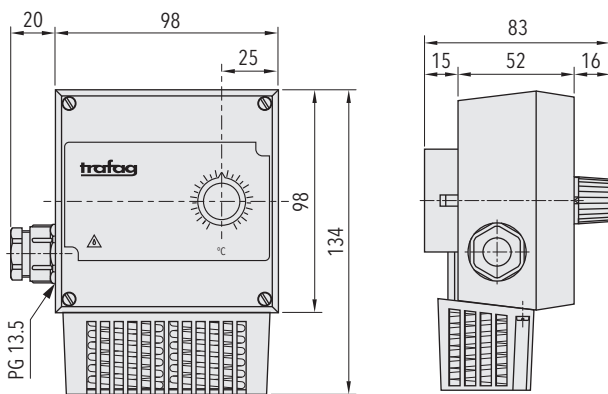
Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5\%$ FS typ.
	Scale accuracy typ.	$\pm 2\%$ FS typ.
	Switching differential	see table
<b>Environmental conditions</b>	Ambient temperature	see ordering information
	Storage temperature	Range $< +40^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $> +40^{\circ}\text{C}$ : $-30\dots+85^{\circ}\text{C}$
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	see ordering information
	Filling	Liquid
	Housing	Noryl
	Screwed cable gland	PA, Polyamid
	Installation	any position
	Weight	$\sim 480\text{ g}$
<b>Microswitch</b>	Rating	see table
	Resistance of insulation	$> 2\text{ M}\Omega$
	Dielectric strength	$U \leq 250\text{V}$ : 1.45 kV $U \leq 500\text{V}$ : 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles
<b>Electrical connection</b>	Cable gland	PG13.5 Cable- $\emptyset$ 5...12.5 mm
	Terminal screw	$6 \times 1\dots 2.5\text{ mm}^2$

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72137">www.trafag.com/H72137</a>
	Instructions	<a href="http://www.trafag.com/H70311">www.trafag.com/H70311</a>
	Flyer	<a href="http://www.trafag.com/H70962">www.trafag.com/H70962</a>

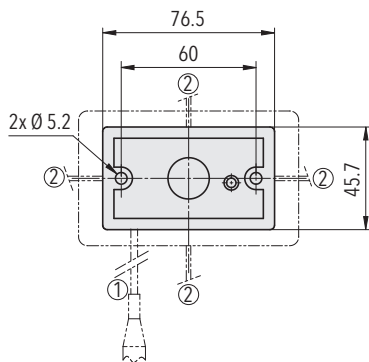
## Dimensions



198.XXXX.XXX.XX.XX



199.XXXX.XXX.XX.XX



19X.XXXX.XXX.19.XX

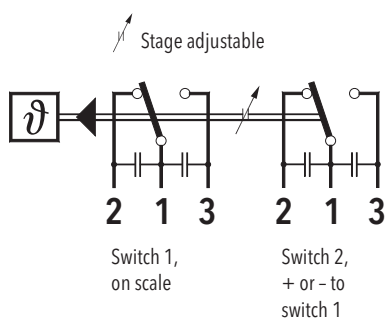
## Switching differential typ.

<b>Range</b>	[°C]	-45 ... +15 -30 ... +30 -20 ... +40 0 ... +30 +10 ... +40 0 ... +60
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A

## Electrical Connection



# INDU AMBISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature.



## Applications

- HVAC

## Features

- Compact design
- Rugged housing
- Protection IP65
- Any mounting position possible

### Technical Data

Designation of application	Industrial room thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +30°C to 0°C ... +60°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXXXXXXXXX	XX
<b>Custom build code</b>	External adjustment	409				
	Internal adjustment	419				
<b>Microswitch</b>	Small switching differential, not adjustable		10			
	Average switching differential, not adjustable		11			
	With gold plated contacts, not adjustable		21			
	Adjustable standard switching differential		25			
<b>Range</b>	<b>Range</b> [°C]	<b>Operating temperature</b> [°C]				
	-30 ... +30	-30 ... +40			02	
	-20 ... +40	-30 ... +50			06	
	+5 ... +35	-30 ... +70			10	
	0 ... +60	-30 ... +70			12	
<b>Sensor <sup>1)</sup> / Fixing <sup>2)</sup></b>	Sensor: Copper; Fixation: Bracket (open sensor coil)					522.27
	Sensor: Copper nickel plated; Fixation: Bracket (open sensor coil)					523.27
	Sensor: Copper; Fixation: Bracket, with protection tube L=215mm, steel nickel plated					422.27.2743.0215
	Sensor: Copper nickel plated; Fixation: Bracket, with protection tube L=215mm, steel nickel plated					423.27.2743.0215
<b>Accessories</b>	Signal lamp					14
	Switchpoint locking <sup>3)</sup>					15
	Switchpoint fixed and sealed upon customer's request <sup>3)</sup>					88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>3)</sup>					83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing					
	Railway version IEC 61373, category 2					28
	Outdoor application (vented)					44

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Only with type 419, internal adjustment

## Standard products (extra short lead time)

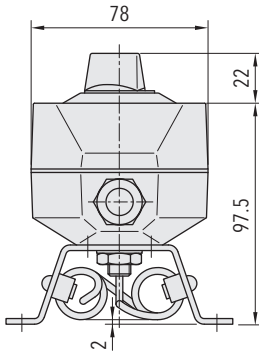
Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Operating temperature [°C]
IA33	409 2502 522 27	-30 ... +30	0.7 ... 6 (adjustable)	-30 ... +40
IA35	409 2510 522 27	+5 ... +35	0.7 ... 6 (adjustable)	-30 ... +50
IA60	409 2512 522 27	0 ... +60	0.7 ... 6 (adjustable)	-30 ... +70
IAS33	419 2502 522 27	-30 ... +30	0.7 ... 6 (adjustable)	-30 ... +40
IAS35	419 2510 522 27	+5 ... +35	0.7 ... 6 (adjustable)	-30 ... +50
IAS60	419 2512 522 27	0 ... +60	0.7 ... 6 (adjustable)	-30 ... +70

Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	See table
<b>Environmental conditions</b>	Ambient temperature	see ordering information
	Storage temperature	Range ≤ +40°C: -30 ... +50°C Range > +40°C: -30 ... +85°C
	Protection	IP65
	Humidity	Max. 95% relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Brass nickel plated
	Installation	any position
	Weight	~ 950 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV / U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable-Ø 4...10 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

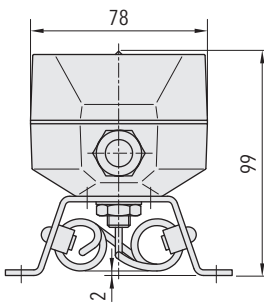
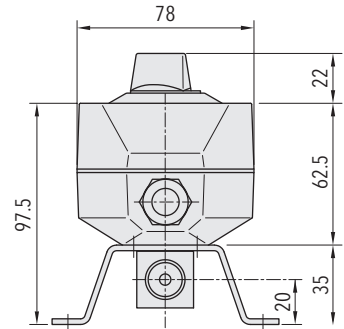
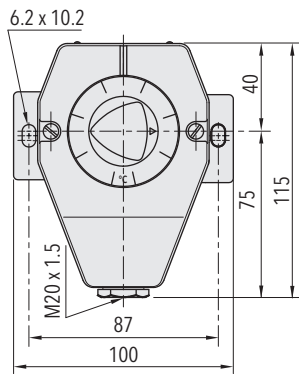
Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72116">www.trafag.com/H72116</a>
	Instructions	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>
	Flyer	<a href="http://www.trafag.com/H70964">www.trafag.com/H70964</a>



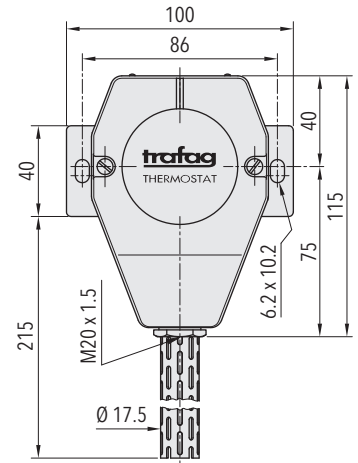
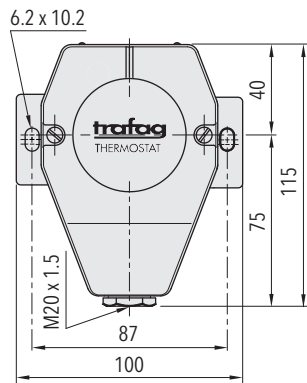
## Dimensions



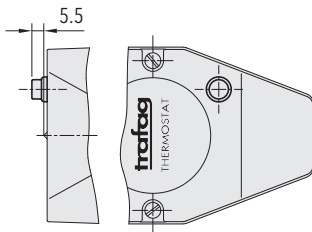
409.XXXX.52X.27...



419.XXXX.52X.27...



4X9.XXXX.42X.27.2743.0215



Accessory 14

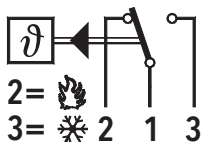
## Switching differential typ.

<b>Range</b>	[°C]	-30 ... +30 -20 ... +40 +5 ... +35 0 ... +60
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 6

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1(0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1(0.1) A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A

## Electrical Connection



409 / 419

# DUCT THERMOSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- HVAC

## Features

- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Duct thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +40°C to +20°C ... +110°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XX
<b>Custom build code</b>	External adjustment	624					
	Internal adjustment	634					
<b>Microswitch</b>	Small switching differential, not adjustable		10				
	Average switching differential, not adjustable		11				
	With gold plated contacts, not adjustable		21				
	Adjustable large switching differential		24				
	Adjustable standard switching differential		25				
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]					
	-30 ... 40	45		01			
	-10 ... 25 <sup>3)</sup>	50		07			
	0 ... 35	50		09			
	15 ... 30	60		17			
	10 ... 45	85		11			
	10 ... 80 <sup>3)</sup>	100		13			
	5 ... 95	105		20			
	20 ... 110 <sup>3)</sup>	115		23			
<b>Sensor<sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>	
	20,23	Ø7	Copper	322	01, 07, 09, 11, 13, 17	Ø7	Copper
	20,23	Ø9	Copper	332	01, 07, 09, 11, 13, 17	Ø9	Copper
<b>Fixing<sup>2)</sup></b>	With spring tube and flange, for direct mounting, Ø 16.5 x 200mm						30
<b>Accessories</b>	Switchpoint locking <sup>3)</sup>						15
	Switchpoint fixed and sealed upon customer's request <sup>3)</sup>						88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>3)</sup>						83
	Switchpoint adjustment please indicate when ordering:						
	- Switchpoint [°C]						
	- Increasing or decreasing						
	Condensator over Pin 1-2						12
	Condensator over Pin 1-3						13
	Condensators over Pin 1-2 / 1-3						23
	Railway version IEC 61373, category 2						28
	Outdoor application (vented)						44
Cover with window						77	

<sup>1)</sup> See data sheet H72114/H72163

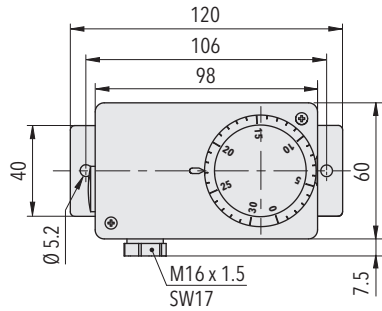
<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Only with type 634 internal adjustment

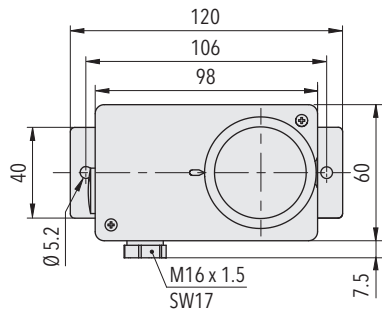
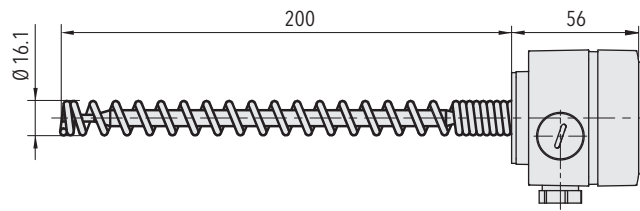
## Standard products (extra short lead time)

Product No.	Type Code	Sensor material	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
MSK35	634 2509 432 30	Copper	0 ... +35	0.7 ... 10 (adjustable)	50
MSK40	634 2501 432 30	Copper	-30 ... +40	0.7 ... 10 (adjustable)	45
MSK80	634 2513 432 30	Copper	+10 ... +80	0.7 ... 10 (adjustable)	100

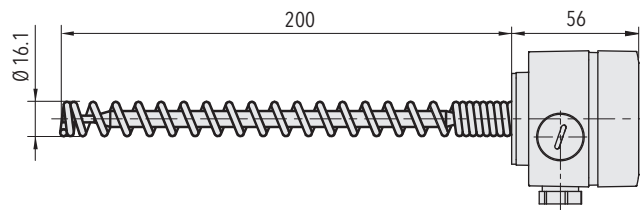
## Dimensions



624.XXXX.XXX.XX.XX



634.XXXX.XXX.XX.XX



Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	see table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	-30 ... +70°C (important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range ≤ +45°C: -30...+50°C Range > +45°C: -30...+85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	PC/ABS-Blend V0
	Screwed cable gland	PA, Polyamid
	Installation	Any position
	Weight	~ 220 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microrupteur 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles Microswitch 24: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable-Ø 4...9 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72177">www.trafag.com/H72177</a>
	Instructions	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>
	Flyer	<a href="http://www.trafag.com/H70957">www.trafag.com/H70957</a>

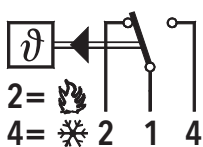
## Switching differential typ.

<b>Range</b>	[°C]	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	+5 ... +95 +20 ... +110
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3	0.8
<b>Microswitch 11/21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7	2
<b>Microswitch 24</b> Switching differential (adjustable value)	[°C]	4 ... 21	5.5 ... 26
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 10	2 ... 12

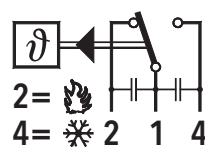
## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1(0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1(0.1) A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A
<b>24</b>	Adjustable large switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



624/634



with accessory 23

# PIPE MOUNTING THERMOSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Process technology
- Water treatment

## Features

- For pipe or barrel mounting
- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Pipe mounting thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-10°C ... +35°C to +20°C ... +110°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change



## Ordering information/type code

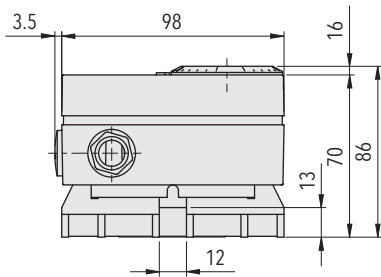
		XXX	XX	XX	XXX	XX	XX
<b>Custom build code</b>	External adjustment	663					
	Internal adjustment	664					
<b>Microswitch</b>	Small switching differential, not adjustable		10				
	Average switching differential, not adjustable		11				
	Adjustable standard switching differential		25				
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]					
	-10 ... 35	50		94			
	-10 ... 80 <sup>1)</sup>	85		95			
	0 ... 45 <sup>1)</sup>	85		93			
	10 ... 55 <sup>1)</sup>	85		22			
	5 ... 95	105		20			
	20 ... 110 <sup>1)</sup>	115		23			
<b>Sensor</b>	Copper				502		
	Copper nickel plated				503		
<b>Fixing</b>	Standard with strap					00	
<b>Accessories</b>	Switchpoint locking <sup>1)</sup>						15
	Switchpoint fixed and sealed upon customer's request <sup>1)</sup>						88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>1)</sup>						83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing						
	Condensator over Pin 1-2						12
	Condensator over Pin 1-3						13
	Condensators over Pin 1-2 / 1-3						23
	Outdoor application (vented)						44
	Cover with window						77

<sup>1)</sup> Only with type 664 internal adjustment

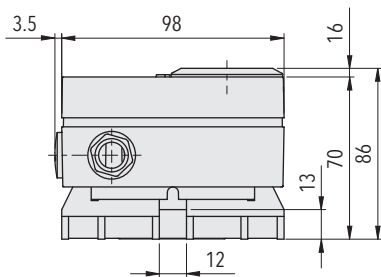
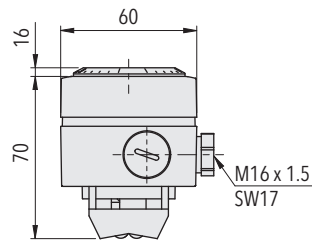
## Standard products (extra short lead time)

Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
MSP35	664 2594 502 00	-10 ... +35	3.7 ... 14 (adjustable)	50
MSP80	664 2595 502 00	-10 ... +80	3.7 ... 14 (adjustable)	85
MSP95	664 2520 502 00	+5 ... +95	3.7 ... 14 (adjustable)	105
MSP110	664 2523 502 00	+20 ... +110	3.7 ... 14 (adjustable)	115

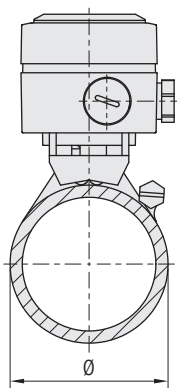
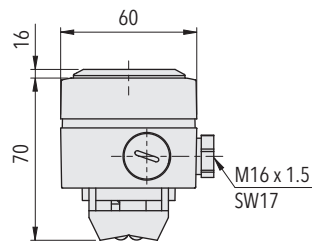
## Dimensions



663.XXXX.XXX.XX.XX



664.XXXX.XXX.XX.XX



The supplied strap (500mm) is sufficient for double winding upto pipe diameter of 65mm (2"), single winding upto pipe diameter 160mm.

Determination of strap length:

Strap length [mm]

$$= 180 \text{ [mm]} + 5 \times \varnothing_{\text{Pipe}} \text{ [mm]} \text{ (twice wound)}$$

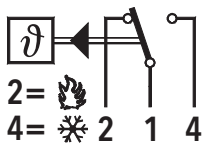
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	Microswitch 10 (not adjustable): 2.5oC 11 (not adjustable): 3.7oC 25 (adjustable): 3.7...14oC
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	-30 ... +70°C (important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range ≤ +45°C: -30...+50°C Range > +45°C: -30...+85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	PC/ABS-Blend V0
	Screwed cable gland	PA, Polyamid
	Installation	Any position
	Weight	~ 220 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	20 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable-Ø 4...9 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72175">www.trafag.com/H72175</a>
	Instructions	<a href="http://www.trafag.com/H73663">www.trafag.com/H73663</a>
	Flyer	<a href="http://www.trafag.com/H70958">www.trafag.com/H70958</a>

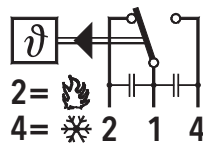
## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
10	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
11	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
25	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A

## Electrical Connection



663/664



with accessory 23

# MINISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature.



## Applications

- Machine tools
- HVAC
- Process technology
- Water treatment

## Features

- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Direct mounting thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XXXXXXXXXX	XXXX	XXXX	XX
<b>Custom build code</b>	External adjustment	624					
	Internal adjustment	634					
<b>Microswitch</b>	Small switching differential, not adjustable		10				
	Average switching differential, not adjustable		11				
	With gold plated contacts, switching differential not adjustable		21				
	Adjustable large switching differential		24				
	Adjustable standard switching differential		25				
<b>Range</b>	<b>Sensor material</b>	<b>Sensor diameter [mm]</b>	<b>Range [°C]</b>	<b>Sensor max. [°C]</b>			
	Cu	7	-30...+40	45	01.422.12		
	Cu <sup>2)</sup>	7	-10...+25	50	07.422.12		
	Cu	7	0...+35	50	09.422.12		
	Cu	7	+10...+45	85	11.422.12		
	Cu	7	+10...+80	100	13.422.12		
	Cu	7	+15...+30	60	17.422.12		
	Cu	7	-10...+35	50	94.322.12		
	Cu <sup>2)</sup>	7	-10...+80	85	95.322.12		
	Cu	7	+5...+95	105	20.322.12		
	Cu <sup>2)</sup>	7	+20...+110	115	23.322.12		
	Cu	7	+20...+150	165	31.322.12		
	Cu	7	+20...+230	250	24.122.35		
	Cu <sup>2)</sup>	7	+30...+300	330	53.122.35		
	Cu	7	+70...+350	380	54.122.35		
<b>Protection tube</b>	For fixing option 12, brass nickel plated, G1/2" <sup>1)</sup>				1216		
	For fixing option 12, stainless steel, G1/2" <sup>1)</sup>				1211		
	For fixing option 35, brass nickel plated, G1/2" <sup>1)</sup>				8316		
	For fixing option 35, stainless steel, G1/2" <sup>1)</sup>				8411		
<b>Protection tube length</b>	<b>Suitable for sensor</b>			<b>Protection tube length [mm]</b>			
	XX.122.XX <sup>1)</sup>			110		0110	
	XX.122.XX; XX.322.XX <sup>1)</sup>			150		0150	
	XX.122.XX; XX.322.XX; XX.422.XX <sup>1)</sup>			200		0200	
	XX.122.XX; XX.322.XX; XX.422.XX <sup>1)</sup>			400		0400	
<b>Accessories</b>	Switchpoint locking <sup>2)</sup>						15
	Switchpoint fixed and sealed upon customer's request <sup>2)</sup>						88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>2)</sup>						83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing						
	Condensator over Pin 1-2						12
	Condensator over Pin 1-3						13
	Condensators over Pin 1-2 / 1-3						23
	Railway version IEC 61373, category 2						28
	Outdoor application (vented)						44
	Cover with window						77

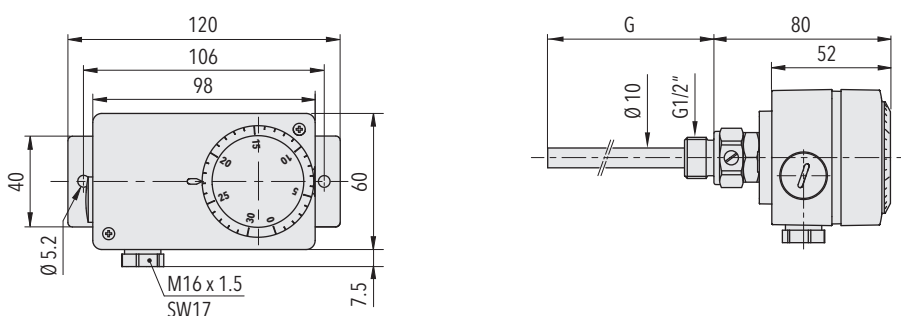
<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> Only with type 634 internal adjustment

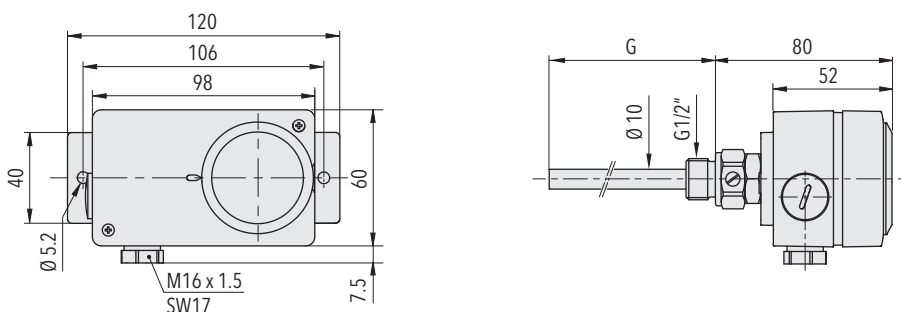
## Standard products (extra short lead time)

Product No.	Type Code	Temperature range [°C]	Protection tube length [mm]	Switching differential [°C]	Sensor max. [°C]
MST8015	634 2595 322 12 1216 0150	-10 ... +80	150	2 ... 12 (adjustable)	85
MST8040	634 2595 322 12 1216 0400	-10 ... +80	400	2 ... 12 (adjustable)	85
MST9511	634 2520 332 12 1217 0110	+5 ... +95	110	2 ... 12 (adjustable)	105
MST9515	634 2520 322 12 1216 0150	+5 ... +95	150	2 ... 12 (adjustable)	105
MST9540	634 2520 322 12 1216 0400	+5 ... +95	400	2 ... 12 (adjustable)	105
MST15015	634 2531 322 12 1216 0150	+20 ... +150	150	2.5 ... 16 (adjustable)	165
MST15040	634 2531 322 12 1216 0400	+20 ... +150	400	2.5 ... 16 (adjustable)	165

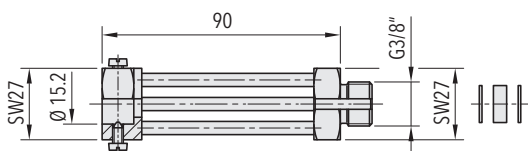
## Dimensions



624.XXXX.X22.12...



634.XXXX.X22.12...



Fixation 35

Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range ≤ +45°C: -30°C ... +50°C Range +45°C ... +250°C: -30°C ... +70°C Range > + 250°C: -10°C ... +70°C (Important: Temperature at sensor may not exceed maximum sensortemperature)
	Storage temperature	Range ≤ +45°C: -30°C ... +50°C Range > +45°C: -30°C ... +85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Protection tube	See ordering information
	Housing	PC/ABS-Blend V0
	Screwed cable gland	Polyamide (PA)
	Installation	any position
	Weight	~ 430 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles Microswitch 24: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable-Ø 4...9 mm
	Terminal screw	3 x 1 ... 2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72174">www.trafag.com/H72174</a>
	Instructions	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>
	Flyer	<a href="http://www.trafag.com/H70955">www.trafag.com/H70955</a>



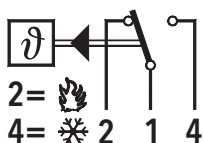
## Switching differential typ.

<b>Measuring range</b>	[°C]	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 10:</b> Switching differential not adjustable	[°C]	0.3	0.8	1	1.2	2
<b>Microswitch 11/21:</b> Switching differential not adjustable	[°C]	0.7	2	2.5	3	4
<b>Microswitch 24:</b> Switching differential adjustable	[°C]	4 ... 21	5.5 ... 26	7 ... 34	15 ... 65	18 ... 84
<b>Microswitch 25:</b> Switching differential adjustable	[°C]	0.7 ... 10	2 ... 12	2.5 ... 16	3 ... 32	4 ... 40

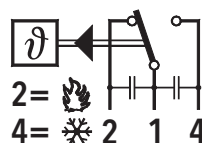
## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1(0.1)A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1(0.1)A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A
<b>24</b>	Adjustable large switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



624/634



with accessory 23

# MINISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Railways
- Machine tools
- HVAC
- Refrigeration
- Process technology

## Features

- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Remote sensing thermostat	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Custom build code</b>	External adjustment	624								
	Internal adjustment	634								
<b>Microswitch</b>	Small switching differential, not adjustable			10						
	Average switching differential, not adjustable			11						
	With gold plated contacts, not adjustable			21						
	Adjustable large switching differential			24						
	Adjustable standard switching differential			25						
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]		<b>Range</b> [°C]	<b>Sensor max.</b> [°C]					
	-30 ... 40	45	01	-10 ... 80 <sup>4)</sup>	85	95				
	-10 ... 25 <sup>4)</sup>	60	07	5 ... 95	105	20				
	0 ... 35	70	09	20 ... 110 <sup>4)</sup>	115	23				
	10 ... 45	85	11	20 ... 150	165	31				
	10 ... 80 <sup>4)</sup>	100	13	20 ... 230	250	24				
	15 ... 30	60	17	40 ... 300 <sup>4)</sup>	330	53				
	-10 ... 35	70	94	70 ... 350	380	54				
<b>Sensor<sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>		<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>			
	24, 53, 54	Ø4.7	Stainless steel	111	01, 07, 09, 11, 13, 17	Ø4.7	Copper	412		
	24, 53, 54	Ø7	Stainless steel	121	01, 07, 09, 11, 13, 17	Ø7	Copper	422		
	24, 53, 54	Ø9	Stainless steel	131	01, 07, 09, 11, 13, 17	Ø9	Copper	432		
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	311	24, 53, 54	Ø4.7	Copper nickel plated	113		
	94, 95, 20, 23, 31	Ø7	Stainless steel	321	24, 53, 54	Ø7	Copper nickel plated	123		
	94, 95, 20, 23, 31	Ø9	Stainless steel	331	24, 53, 54	Ø9	Copper nickel plated	133		
	01, 07, 09, 11, 13, 17	Ø7	Stainless steel	421	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	313		
	24, 53, 54	Ø4.7	Copper	112	94, 95, 20, 23, 31	Ø7	Copper nickel plated	323		
	24, 53, 54	Ø7	Copper	122	94, 95, 20, 23, 31	Ø9	Copper nickel plated	333		
	24, 53, 54	Ø9	Copper	132	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	413		
	94, 95, 20, 23, 31	Ø4.7	Copper	312	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	423		
	94, 95, 20, 23, 31	Ø7	Copper	322	01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated	433		
	94, 95, 20, 23, 31	Ø9	Copper	332						
	<b>Fixing<sup>2)</sup></b>	Nut M10 (for remote sensing version)								10
		Captive nut (for direct mounting version)								14
		Grubscrew locked, lateral (direct mounting version)								12
		Console (for remote sensing version)								17
		Grubscrew locked with thermal distance piece (for direct mounting version)								18
		Console (for remote sensing version)								19
<b>Protection tube</b>	See data sheet H72114/H72163							XXXX.XXXX		

	XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX
<b>Accessories</b>	Switchpoint locking <sup>4)</sup>							15
	Switchpoint fixed and sealed upon customer's request <sup>4)</sup>							88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>4)</sup>							83
	Switchpoint adjustment please indicate when ordering:							
	- Switchpoint [°C]							
	- Increasing or decreasing							
	Condensator over Pin 1-2							12
	Condensator over Pin 1-3							13
	Condensators over Pin 1-2 / 1-3							23
	Railway version IEC 61373, category 2							28
	Outdoor application (vented)							44
	Cover with window							77
	Capillary tube protection: Flexible metal tube, brass nickel plated							90
	Capillary tube protection: Flexible metal tube 1.4541/N2A							91
Capillary tube protection: PVC tube							92	
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>							

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

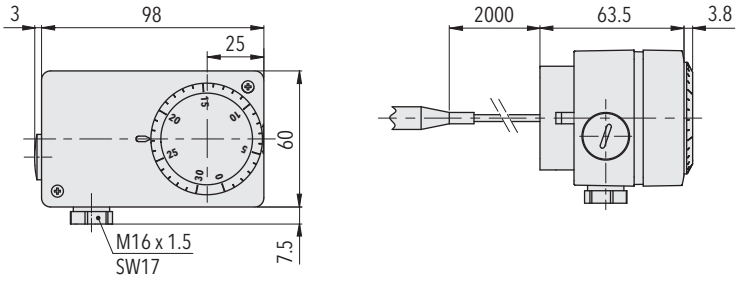
<sup>4)</sup> Only with type 634 internal adjustment

Standard products (extra short lead time)					
Product No.	Type Code	Sensor material	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
M35	624 2509 422 19	Copper	0 ... +35	0.7 ... 10 (adjustable)	70
M40	624 2501 422 19	Copper	-30 ... +40	0.7 ... 10 (adjustable)	45
M95	624 2520 322 19	Copper	+5 ... +95	2 ... 12 (adjustable)	105
M150	624 2531 322 19	Copper	+20 ... +150	2.5 ... 16 (adjustable)	165
M230S	624 2524 121 19	1.4435/316L	+20 ... +230	3 ... 32 (adjustable)	250
M350S	624 2554 121 19	1.4435/316L	+70 ... +350	4 ... 40 (adjustable)	380
MS35	634 2509 422 19	Copper	0 ... +35	0.7 ... 10 (adjustable)	70
MS40	634 2501 422 19	Copper	-30 ... +40	0.7 ... 10 (adjustable)	45
MS95	634 2520 322 19	Copper	+5 ... +95	2 ... 12 (adjustable)	105
MS150	634 2531 322 19	Copper	+20 ... +150	2.5 ... 16 (adjustable)	165
MS230S	634 2524 121 19	1.4435/316L	+20 ... +230	3 ... 32 (adjustable)	250
MS350S	634 2554 121 19	1.4435/316L	+70 ... +350	4 ... 40 (adjustable)	380

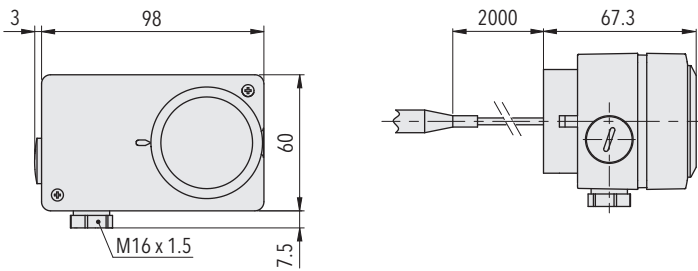
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	see table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range ≤ +45°C: -30...+50°C Range +45...+250°C: -30...+70°C Range > + 250°C: -10...+70°C (Important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range ≤ +45°C: -30 ... +50°C Range > +45°C: -30 ... +85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	PC/ABS-Blend V0
	Screwed cable gland	PA, Polyamid
	Installation	Any position
	Weight	~ 380 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles Microswitch 24: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable-Ø 4...9 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72172">www.trafag.com/H72172</a>
	Instructions	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>
	Flyer	<a href="http://www.trafag.com/H70954">www.trafag.com/H70954</a>

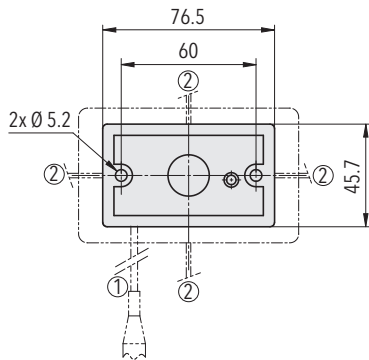
## Dimensions



624.XXXX.XXX.XX...



634.XXXX.XXX.XX...



6X4.XXXX.XXX.19...

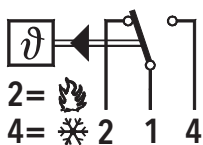
## Switching differential typ.

Range	[°C]	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3	0.8	1	1.2	2
<b>Microswitch 11/21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7	2	2.5	3	4
<b>Microswitch 24</b> Switching differential (adjustable value)	[°C]	4 ... 21	5.5 ... 26	7 ... 34	15 ... 65	18 ... 84
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 10	2 ... 12	2.5 ... 16	3 ... 32	4 ... 40

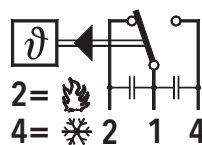
## Electrical data switch

Type	Features	Rating Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A
<b>24</b>	Adjustable large switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



624/634



with accessory 23

# MINI LIMISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Railways
- Machine tools
- HVAC
- Refrigeration
- Process technology

## Features

- External or internal resetting
- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Remote sensing thermostat with limiter	Switching differential	Not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change



## Ordering information/type code

		XXX . XX	XX	XXX	XX	XXXXXXXXXX	XX	XX
<b>Custom build code</b>	For increasing temperatures, internal resetting	630 . 12						
	For increasing temperatures, external resetting	632 . 12						
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]						
	-30 ... 40	45	<b>01</b>	-10 ... 80	85	<b>95</b>		
	-10 ... 25	60	<b>07</b>	5 ... 95	105	<b>20</b>		
	0 ... 35	70	<b>09</b>	20 ... 110	115	<b>23</b>		
	10 ... 45	85	<b>11</b>	20 ... 150	165	<b>31</b>		
	10 ... 80	100	<b>13</b>	20 ... 230	250	<b>24</b>		
	15 ... 30	60	<b>17</b>	40 ... 300	330	<b>53</b>		
	-10 ... 35	70	<b>94</b>	70 ... 350	380	<b>54</b>		
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>		
	01, 07, 09, 11, 13, 17 94, 95, 20, 23, 31	Ø7	Stainless steel	24, 53, 54	Ø4.7	Copper	<b>112</b>	
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	24, 53, 54	Ø7	Copper	<b>122</b>	
	94, 95, 20, 23, 31	Ø7	Stainless steel	24, 53, 54	Ø9	Copper	<b>132</b>	
	94, 95, 20, 23, 31	Ø7	Stainless steel	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	<b>413</b>	
	94, 95, 20, 23, 31	Ø9	Stainless steel	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	<b>423</b>	
	24, 53, 54	Ø4.7	Stainless steel	01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated	<b>433</b>	
	24, 53, 54	Ø7	Stainless steel	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	<b>313</b>	
	24, 53, 54	Ø9	Stainless steel	94, 95, 20, 23, 31	Ø7	Copper nickel plated	<b>323</b>	
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	94, 95, 20, 23, 31	Ø9	Copper nickel plated	<b>333</b>	
	01, 07, 09, 11, 13, 17	Ø7	Copper	24, 53, 54	Ø4.7	Copper nickel plated	<b>113</b>	
	01, 07, 09, 11, 13, 17	Ø9	Copper	24, 53, 54	Ø7	Copper nickel plated	<b>123</b>	
	94, 95, 20, 23, 31	Ø4.7	Copper	24, 53, 54	Ø9	Copper nickel plated	<b>133</b>	
	94, 95, 20, 23, 31	Ø7	Copper					
	94, 95, 20, 23, 31	Ø9	Copper					
<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)						<b>10</b>	
	Mounting bracket (for remote sensing version)						<b>19</b>	
	Grubscrew locked, lateral (direct mounting version)						<b>12</b>	
	Cap nut (for direct mounting version)						<b>14</b>	
	Grubscrew locked with spacer (cooling element) (for direct mounting version)						<b>18</b>	
<b>Protection tube</b>	See data sheet H72114/H72163							XXXX.XXXX
<b>Accessories</b>	Switchpoint locking	<b>15</b>	Condensators over Pin 1-2 / 1-3	<b>23</b>				
	Switchpoint fixed and sealed upon customer's request	<b>88</b>	Railway version IEC 61373, category 2	<b>28</b>				
	Switchpoint preset upon customer's request, no guarantee on switching accuracy	<b>83</b>	Outdoor application (vented)	<b>44</b>				
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C]		Cover with window	<b>77</b>				
	- Increasing or decreasing		Capillary tube protection: Flexible metal tube, brass nickel plated	<b>90</b>				
	Condensator over Pin 1-2	<b>12</b>	Capillary tube protection: Flexible metal tube 1.4541/V2A	<b>91</b>				
	Condensator over Pin 1-3	<b>13</b>	Capillary tube protection: PVC tube	<b>92</b>				
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>							

<sup>1)</sup> See data sheet H72114/H72163

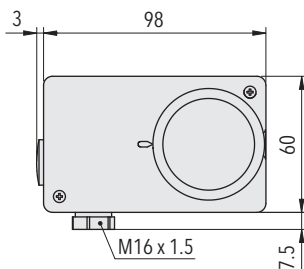
<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

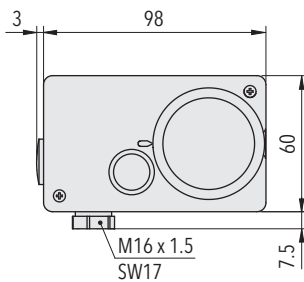
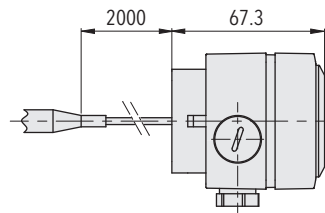
## Standard products (extra short lead time)

Product No.	Type Code	Sensor material	Temperature range [°C]	Sensor max. [°C]
MS95R	632 1220 322 19	Copper	+5 ... +95	105
MS150R	632 1231 322 19	Copper	+20 ... +150	165
MS230SR	632 1224 121 19	1.4435 (AISI316L)	+20 ... +230	250
MS350SR	632 1254 121 19	1.4435 (AISI316L)	+70 ... +350	380

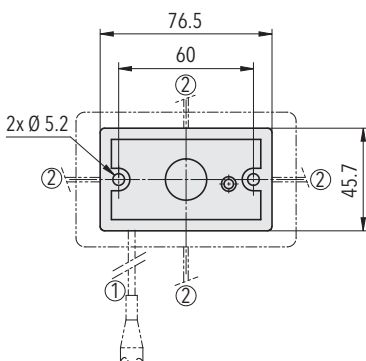
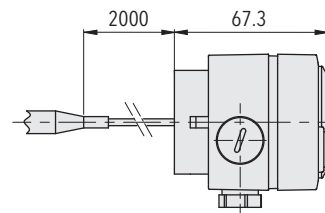
## Dimensions



630.12XX.XXX.XX...



632.12XX.XXX.XX...



63X.12XX.XXX.19...

Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5\%$ FS typ.
	Scale accuracy typ.	$\pm 2\%$ FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range $\leq +45^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $+45\dots+250^{\circ}\text{C}$ : $-30\dots+70^{\circ}\text{C}$ Range $> +250^{\circ}\text{C}$ : $-10\dots+70^{\circ}\text{C}$ (Important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range $\leq +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +50^{\circ}\text{C}$ Range $> +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +85^{\circ}\text{C}$
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	PC/ABS-Blend V0
	Screwed cable gland	Polyamide (PA)
	Installation	any position
	Weight	$\sim 250\text{ g}$
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2\text{ M}\Omega$
	Dielectric strength	2 kV terminal ground
	Life time (mechanical)	0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable- $\varnothing$ 4...9 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72173">www.trafag.com/H72173</a>
	Instructions	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>
	Flyer	<a href="http://www.trafag.com/H70956">www.trafag.com/H70956</a>

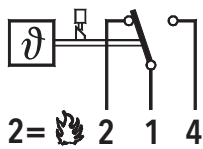
## Switching differential typ.

<b>Measuring range</b>	<b>[°C]</b>	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 12:</b> Switching differential not adjustable	<b>[°C]</b>	2.0	6.0	7.5	9.0	12.0

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>12</b>	Average switching differential, high vibration resistance	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

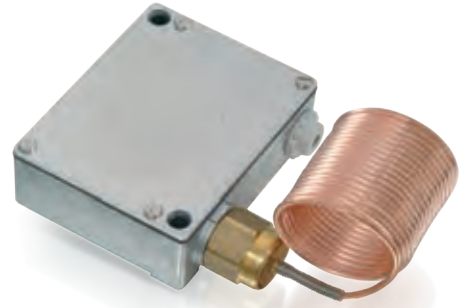
## Electrical connection



630/632

# FROSTSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for measurement of pressure and temperature. The Froststat was specifically designed as single stage temperature controller for monitoring temperature around 0°C, i. e. to prevent ice build-up on air heaters.



## Applications

- HVAC
- Refrigeration

## Features

- Rugged aluminium housing
- Short response time
- Protection IP54
- Electrical connection on terminal screw

Technical Data			
Designation of application	Frost protection thermostat	Switching differential	Not adjustable
Measuring range	-5°C ... +15°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX . XXXX	XXXXXX
<b>Custom build code</b>	Sensor 3m	990 . 1299	
	Sensor 6m	991 . 1299	
	Sensor 3m, limiter	992 . 1299	
	Sensor 6m, limiter	993 . 1299	
<b>Accessories</b>	Protection level IP65		20
	6 pcs. Capillary holder		K80140

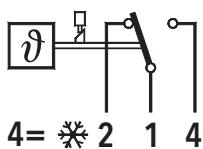
## Standard products (extra short lead time)

Product No.	Type Code	Sensor material	Set point adjustment
F15	991 1299 000	Copper capillary tube, L=6m	Internal setpoint adjustment
F153	990 1299	Copper capillary tube, L=3m	Internal setpoint adjustment
F15R	993 1299 000	Copper capillary tube, L=6m	Internal setpoint adjustment and external reset knob
F153R	992 1299	Copper capillary tube, L=3m	Internal setpoint adjustment and external reset knob

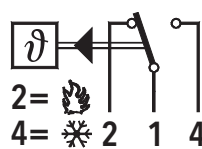
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 1.5 % FS typ.
	Switching differential	2.0°C typ.
<b>Environmental conditions</b>	Media temperature	Sensor temperature max.: 140°C Sensor reponse length : ~ 30 cm
	Ambient temperature	Max. operating temperature: +70°C Min. operating temperature: switch point + 2°C
	Storage temperature	-30°C ... +70°C
	Protection	IP 54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	Copper (Cu)
	Filling	Liquid
	Housing	AlSi9Pb3
	Screwed cable gland	PE, Polyethylen
	Installation	any position
	Weight	~ 850 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	2 kV terminal ground
	Life time (mechanical)	0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable-Ø 8...13 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Electrical data switch			
Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
12	Average switching differential, high vibration resistance	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3(0.2) A 125 V, 0.75(0.4) A 30 V, 15(1.5) A 14 V, 15 (1.5) A

## Electrical Connection

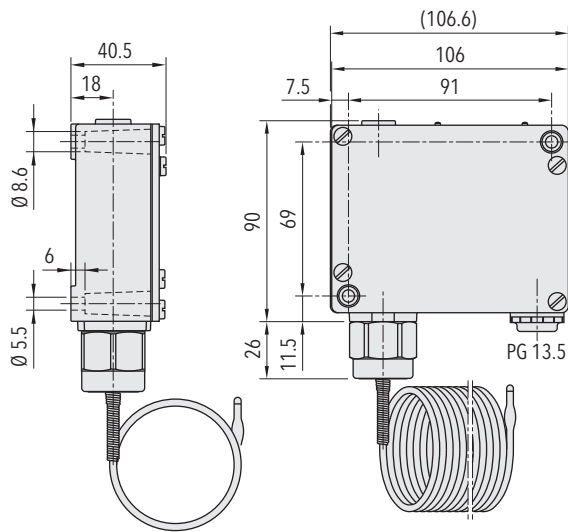


992/993  
Limiter, decreasing

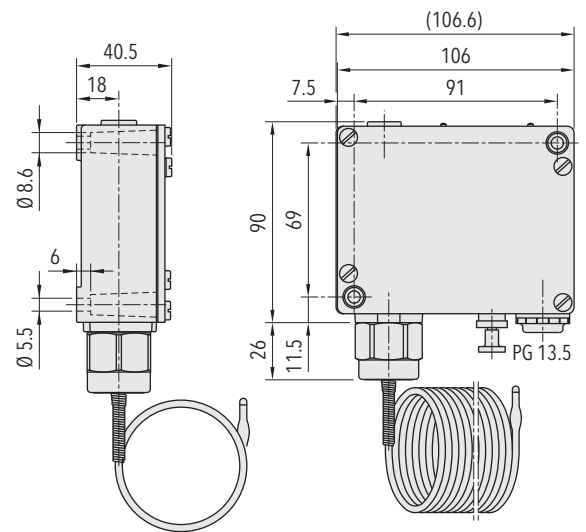


990/991

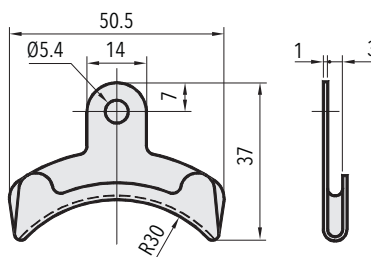
## Dimensions



990/991.XXXX.XX



992/993.XXXX.XX



99X.XXXX.K80140

### Additional information

#### Documents

Data sheet	<a href="http://www.trafag.com/H72123">www.trafag.com/H72123</a>
Instructions	<a href="http://www.trafag.com/H70821">www.trafag.com/H70821</a>
Flyer	<a href="http://www.trafag.com/H70952">www.trafag.com/H70952</a>



# GALVANOSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Process technology

## Features

- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Remote sensing thermostat	Switching differential	Not adjustable
Measuring range	+5°C ... +95°C and +20°C ... +150°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XX	XX
<b>Custom build code</b>	External adjustment	657						
	Internal adjustment	658						
<b>Microswitch</b>	Small switching differential, not adjustable		10					
	Average switching differential, not adjustable		11					
	With gold plated contacts, not adjustable		21					
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]						
	+5 ... +95	105		20				
	+20 ... +150	165		31				
<b>Sensor</b>	Copper with protection tube Teflon FEP				326			
<b>Fixing</b>	Angle PVC					26		
<b>Accessories</b>	Switchpoint locking <sup>2)</sup>							15
	Switchpoint fixed and sealed upon customer's request <sup>2)</sup>							88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>2)</sup>							83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C]							
	- Increasing or decreasing							
	Condensator over Pin 1-2							12
	Condensator over Pin 1-3							13
	Condensators over Pin 1-2 / 1-3							23
	Outdoor application (vented)							44
	Cover with window							77
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>1)</sup>							

<sup>1)</sup> Overlengths upon request

<sup>2)</sup> Only with type 658, internal adjustment

## Standard products (extra short lead time)

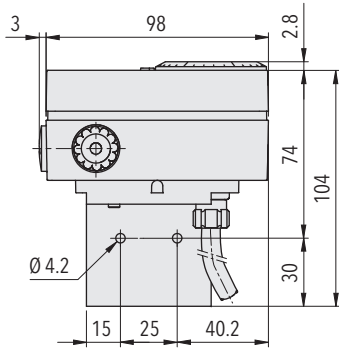
Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
GS95	658 1120 326 26	+5 ... +95	2.5 (fixed)	105
GS150	658 1131 326 26	+20 ... +150	3.0 (fixed)	165

Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5\%$ FS typ.
	Scale accuracy typ.	$\pm 3\%$ FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	-30°C ... 70°C
	Storage temperature	-30°C ... 85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	PC/ABS-Blend V0
	Screwed cable gland	PE, Polyethylene
	Installation	Any position
	Weight	~ 380 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2\text{ M}\Omega$
	Dielectric strength	U $\leq$ 250V: 1.45 kV U $\leq$ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles
<b>Electrical connection</b>	Cable gland	M16x1.5 Cable-Ø 4...9 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

#### Additional information

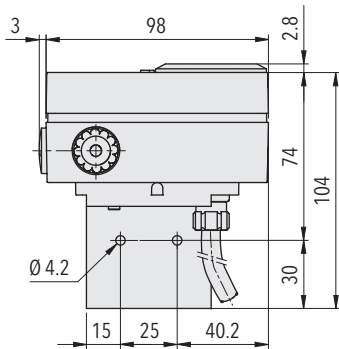
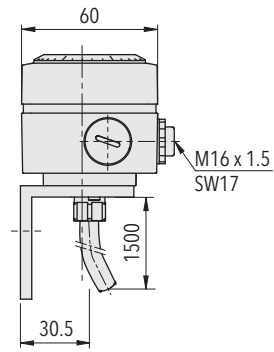
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72179">www.trafag.com/H72179</a>
	Instructions	<a href="http://www.trafag.com/H73624">www.trafag.com/H73624</a>
	Flyer	<a href="http://www.trafag.com/H70959">www.trafag.com/H70959</a>

## Dimensions



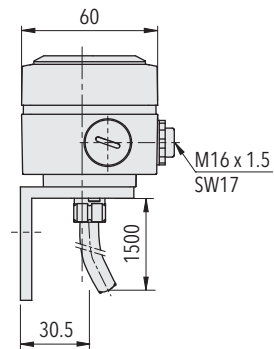
657.XXXX.326.26...

G...



658.XXXX.326.26...

GS...



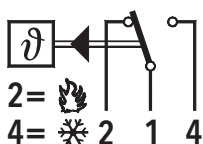
## Switching differential typ.

Range	[°C]	+5 ... +95	+20 ... +150
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3	0.8
<b>Microswitch 11/21</b> Switching differential (fixed value, not adjustable)	[°C]	2.5	3.0

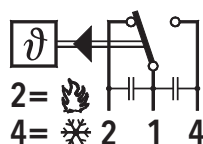
## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1(0.1) A 12 V, 1 (1) A 5 V, 2 (2) A

## Electrical Connection



657/658



with accessory 23

# DUO LIMISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- HVAC
- Refrigeration

## Features

- With 2 individual measuring systems
- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Double thermostat with remote sensor and limiter	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		302 . XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Microswitch</b>	Small switching differential, not adjustable (Microswitch 10, Limiter Switch 12)	38							
	Standard switching differential, not adjustable (Microswitch 11, Limiter Switch 12)	37							
	Adjustable standard switching differential (microswitch 25, limiter switch 12)	58							
<b>Range</b>	<b>Temperature controller and limiter [°C]</b>	<b>Sensor max. [°C]</b>	<b>Temperature controller [°C]</b>	<b>Limiter [°C]</b>					
	-30 ... +40	+50			01				
	-10 ... +25	+60			07				
	0 ... +35	+70			09				
	+10 ... +45	+85			11				
	+10 ... +80	+100			13				
	+15 ... +30	+60			17				
	-10 ... +35	+70			94				
	-10 ... +80	+85			95				
	+5 ... +95	+105			20				
	+20 ... +110	+115			23				
	+20 ... +150	+165			31				
	+20 ... +230	+250			24				
	+40 ... +300	+330			53				
	+70 ... +350	+380			54				
			+5 ... +95	+20 ... +110	36				
			+20 ... +150	+35 ... +175	42				
		+40 ... +300	+70 ... +350	39					
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter [mm]</b>	<b>Sensor material</b>	<b>Range</b>	<b>Sensor diameter [mm]</b>	<b>Sensor material</b>			
	01, 07, 09, 11, 13, 17	Ø7	Stainless steel	24, 53, 54	Ø7	Copper	122		
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	24, 53, 54	Ø5.5/11	Copper	162		
	94, 95, 20, 23, 31	Ø7	Stainless steel	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	413		
	24, 53, 54	Ø4.7	Stainless steel	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	423		
	24, 53, 54	Ø7	Stainless steel	01, 07, 09, 11, 13, 17	Ø5.5/11	Copper nickel plated	463		
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	313		
	01, 07, 09, 11, 13, 17	Ø7	Copper	94, 95, 20, 23, 31	Ø7	Copper nickel plated	323		
	01, 07, 09, 11, 13, 17	Ø5.5/11	Copper	94, 95, 20, 23, 31	Ø5.5/11	Copper nickel plated	363		
	94, 95, 20, 23, 31	Ø4.7	Copper	24, 53, 54	Ø4.7	Copper nickel plated	113		
	94, 95, 20, 23, 31	Ø7	Copper	24, 53, 54	Ø7	Copper nickel plated	123		
	94, 95, 20, 23, 31	Ø5.5/11	Copper	24, 53, 54	Ø5.5/11	Copper nickel plated	163		
	94, 95, 20, 23, 31	Ø4.7	Copper						
	94, 95, 20, 23, 31	Ø7	Copper						
	94, 95, 20, 23, 31	Ø5.5/11	Copper						
	24, 53, 54	Ø4.7	Copper						
	<b>Fixing <sup>2)</sup></b>	For remote sensing version						19	
		For direct mounting version						21	
<b>Protection tube</b>	See specification H72114/H72163						XXXX.XXXX		

302 . XX XX XXX XX XXXXXXXX XX XX

<b>Accessories</b>	Signal lamp	14
	Condensator over Pin 1-2	12
	Condensator over Pin 1-3	13
	Condensators over Pin 1-2 / 1-3	23
	Railway version IEC 61373, category 2	28
	Outdoor application (vented)	44
	Capillary tube protection: Flexible metal tube, brass nickel plated	90
	Capillary tube protection: Flexible metal tube 1.4541/V2A	91
	Capillary tube protection: PVC tube	92
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>	

<sup>1)</sup> See data sheet H72114/H72163

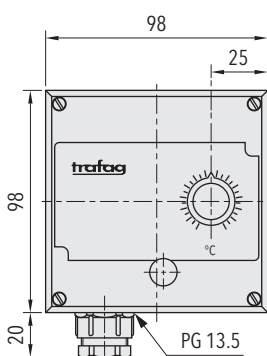
<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

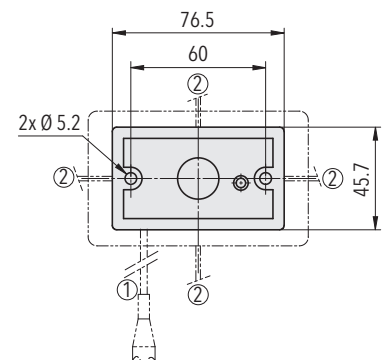
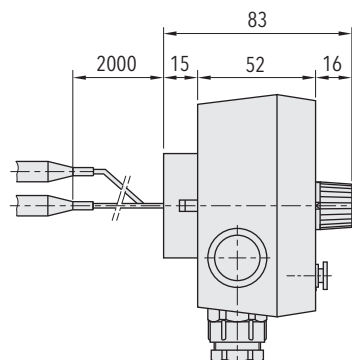
## Standard products (extra short lead time)

Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Measuring range limiter [°C]	Sensor max. [°C]
D95R	302 5836 362 19	+5 ... +95	2 ... 12 (adjustable)	+20 ... +110	105
D150R	302 5842 362 19	+20 ... +150	2.5 ... 16 (adjustable)	+35 ... +175	165
D300R	302 5839 162 19	+40 ... +300	4 ... 40 (adjustable)	+70 ... +350	380

## Dimensions



302.XXXX.XXXX.XX...



Fixation 19



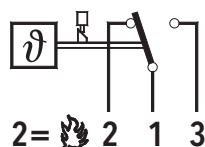
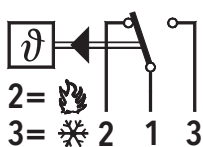
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range ≤ +45°C: -30...+50°C Range +45...+250°C: -30...+70°C Range > + 250°C: -10...+70°C (Important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range < +45°C: -30...+50°C Range > +45°C: -30...+85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	Noryl
	Screwed cable gland	PA, Polyamid
	Installation	Any position
	Weight	~ 620 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 12: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	PG13.5 Cable-Ø 5...12.5 mm
	Terminal screw	6 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72142">www.trafag.com/H72142</a>
	Instructions	<a href="http://www.trafag.com/H73170">www.trafag.com/H73170</a>
	Flyer	<a href="http://www.trafag.com/H70963">www.trafag.com/H70963</a>

Switching differential typ.						
<b>Range</b>	[°C]	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3	0.8	1	1.2	2
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	0.7	2	2.5	3	4
<b>Microswitch 12</b> Switching differential (fixed value, not adjustable)	[°C]	2	6	7.5	9	12
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 10	2 ... 12	2.5 ... 16	3 ... 32	4 ... 40

Electrical data switch			
Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>12</b>	Large switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3(0.2) A 125 V, 0.75(0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25(0.03) A 125 V, 0.5(0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A

## Electrical Connection



# ALTEROSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Machine tools
- HVAC
- Refrigeration
- Process technology

## Features

- With 1 adjustable step between 2 stages
- Short response time
- Protection IP54
- Electrical connection on terminal screw

### Technical Data

Designation of application	Multistage thermostat with remote sensor	Switching differential	Not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX
<b>Custom build code</b>	External adjustment	104							
	Internal adjustment	114							
<b>Microswitch</b>	Small switching differential, not adjustable	10							
	Average switching differential, not adjustable	11							
	With gold plated contacts, switching differential not adjustable	21							
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]		<b>Range</b> [°C]	<b>Sensor max.</b> [°C]				
	-30 ... +40	45	01	-10 ... +80	85	95			
	-10 ... +25	60	07	+5 ... +95	105	20			
	0 ... +35	70	09	+20 ... +110	115	23			
	+10 ... +45	85	11	+20 ... +150	165	31			
	+10 ... +80	100	13	+20 ... +230	250	24			
	+15 ... +30	60	17	+40 ... +300	330	53			
	-10 ... +35	70	94	+70 ... +350	380	54			
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>			
	01, 07, 09, 11, 13, 17	Ø7	Stainless steel	24, 53, 54	Ø4.7	Copper	112		
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	24, 53, 54	Ø7	Copper	122		
	94, 95, 20, 23, 31	Ø7	Stainless steel	24, 53, 54	Ø9	Copper	132		
	94, 95, 20, 23, 31	Ø9	Stainless steel	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	413		
	94, 95, 20, 23, 31	Ø9	Stainless steel	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	423		
	24, 53, 54	Ø4.7	Stainless steel	01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated	433		
	24, 53, 54	Ø7	Stainless steel	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	313		
	24, 53, 54	Ø9	Stainless steel	94, 95, 20, 23, 31	Ø7	Copper nickel plated	323		
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	94, 95, 20, 23, 31	Ø9	Copper nickel plated	333		
	01, 07, 09, 11, 13, 17	Ø7	Copper	24, 53, 54	Ø4.7	Copper nickel plated	113		
	01, 07, 09, 11, 13, 17	Ø9	Copper	24, 53, 54	Ø7	Copper nickel plated	123		
	94, 95, 20, 23, 31	Ø4.7	Copper	24, 53, 54	Ø9	Copper nickel plated	133		
	94, 95, 20, 23, 31	Ø7	Copper						
	94, 95, 20, 23, 31	Ø9	Copper						
<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)						10		
	Angle bracket (for remote sensing version)						17		
	Mounting bracket (for remote sensing version)						19		
	Grubscrew locked, lateral (direct mounting version)						12		
	Cap nut (for direct mounting version)						14		
	Grubscrew locked with spacer (cooling element) (for direct mounting version)						18		
<b>Protection tube</b>	See data sheet H72114/H72163						XXXX.XXXX		

XXX XX XX XXX XX XXXXXXXXXX XX XX

<b>Accessories</b>	Signal lamp	14
	Switchpoint locking <sup>4)</sup>	15
	Switchpoint fixed and sealed upon customer's request <sup>4)</sup>	88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>4)</sup>	83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing	
	Condensator over Pin 1-2	12
	Condensator over Pin 1-3	13
	Condensators over Pin 1-2 / 1-3	23
	Railway version IEC 61373, category 2	28
	Outdoor application (vented)	44
	Capillary tube protection: Flexible metal tube, brass nickel plated	90
	Capillary tube protection: Flexible metal tube 1.4541/N2A	91
	Capillary tube protection: PVC tube	92
	<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>
<b>Steps between stages</b>	Desired stage difference to be indicated when ordering (without indication = switches synchronous) Switch 1 on scale, difference switch 2 to scale -6°C ... +15°C Minimum distance between switches: Switch 10: ±1°C Switch 11/21: ±2°C	

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

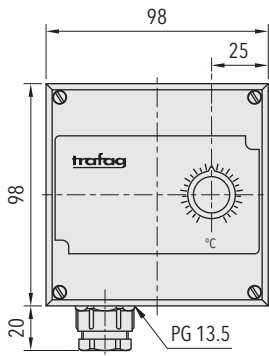
<sup>4)</sup> Only with type 114, internal adjustment

Standard products (extra short lead time)						
Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Smallest stage difference [°C]	Largest stage difference [°C]	Sensor max. [°C]
M2S40	114 1101 422 19	-30 ... +40	1.8 (fixed)	0.8	25	45
M2S35	114 1109 422 19	0 ... +35	1.8 (fixed)	0.8	15	50
M2S95	114 1120 322 19	+5 ... +95	2.5 (fixed)	1.2	35	105
M2S150	114 1131 322 19	+20 ... +150	3 (fixed)	1.5	40	165
M2S230S	114 1124 121 19	+20 ... +230	4.5 (fixed)	2	70	250
M2S350S	114 1154 121 19	+70 ... +350	5 (fixed)	2.5	80	380

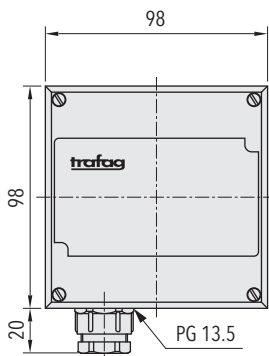
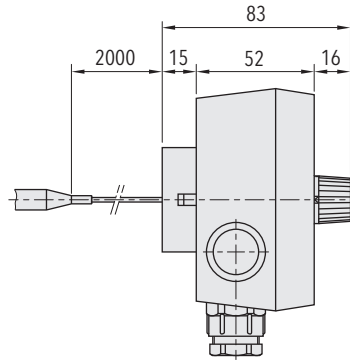
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range ≤ +45°C: -30°C ... +50°C Range +45°C ... +250°C: -30°C ... +70°C Range > + 250°C: -10°C ... +70°C (Important: Temperature at sensor may not exceed maximum sensortemperature)
	Storage temperature	Range ≤ +45°C: -30°C ... +50°C Range > +45°C: -30°C ... +85°C
	Protection	IP54
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	Noryl
	Screwed cable gland	Polyamide (PA)
	Installation	any position
	Weight	~ 480 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	U ≤ 250V: 1.45 kV U ≤ 500V: 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles
<b>Electrical connection</b>	Cable gland	PG13.5 Cable-Ø 5...12.5 mm
	Terminal screw	6 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72139">www.trafag.com/H72139</a>
	Instructions	<a href="http://www.trafag.com/H70311">www.trafag.com/H70311</a>
	Flyer	<a href="http://www.trafag.com/H70965">www.trafag.com/H70965</a>

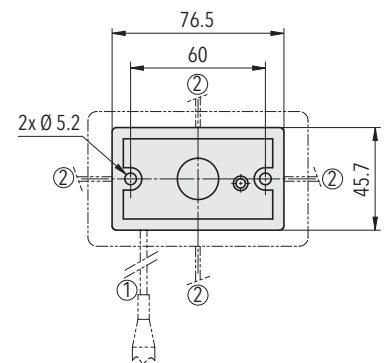
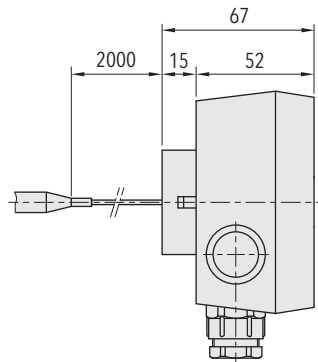
## Dimensions



104.XXXX.XXXX.XX...

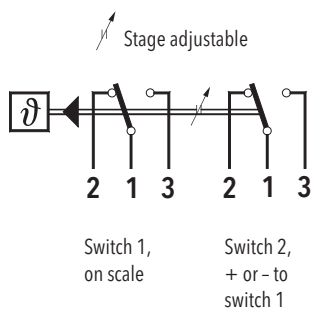


114.XXXX.XXXX.XX...



Fixation 19

## Electrical connection



Switching differential typ.					
<b>Measuring range</b>	[°C]	-30 ... +40 +10 ... +80	-10 ... +25 0 ... +35 +10 ... +45	+15 ... +30	-10 ... +35
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.7	0.7	0.7	1.5
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	1.8	1.8	1.8	2.5
<b>Microswitch 21</b> Switching differential (fixed value, not adjustable)	[°C]	1.8	1.8	1.8	2.5
Steps between stages from switch S2 to switch S1 (S1 on scale): <b>S1 &lt; S2</b>	[°C]	0.8 ... 25	0.8 ... 15	0.8 ... 10	1.2 ... 25
Steps between stages from switch S2 to switch S1 (S1 on scale): <b>S1 &gt; S2</b>	[°C]	0.8 ... 12	0.8 ... 6	0.8 ... 4	1.2 ... 8
<b>Measuring range</b>	[°C]	-10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	1.5	1.8	2	2.5
<b>Microswitch 11</b> Switching differential (fixed value, not adjustable)	[°C]	2.5	3	4.5	5
<b>Microswitch 21</b> Switching differential (fixed value, not adjustable)	[°C]	2.5	3	4.5	5
Steps between stages from switch S2 to switch S1 (S1 on scale): <b>S1 &lt; S2</b>	[°C]	1.2 ... 35	1.5 ... 40	2 ... 70	2.5 ... 80
Steps between stages from switch S2 to switch S1 (S1 on scale): <b>S1 &gt; S2</b>	[°C]	1.2 ... 15	1.5 ... 20	2 ... 30	2.5 ... 40

Electrical data switch			
Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A



# LABORSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Machine tools

## Features

- Without housing
- Short response time
- Electrical connection on terminal screw

### Technical Data

Designation of application	Remote sensing thermostat, skeleton type	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Custom build code</b>	Front panel mounting, screw terminal	736								
	Screw terminal	754								
<b>Microswitch</b>	Small switching differential, not adjustable		10							
	Average switching differential, not adjustable		11							
	With gold plated contacts, not adjustable		21							
	Adjustable large switching differential		24							
	Adjustable standard switching differential		25							
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]		<b>Range</b> [°C]	<b>Sensor max.</b> [°C]					
	-30 ... +40	45	01	+20 ... +110	115	23				
	-10 ... +80	85	95	+20 ... +150	165	31				
	0 ... +35	70	09	+20 ... +230	250	24				
	+5 ... +95	105	20	+40 ... +300	330	53				
	+10 ... +45	85	11	+70 ... +350	380	54				
<b>Sensor<sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>	<b>Range</b>	<b>Sensor diameter</b> [mm]	<b>Sensor material</b>				
	01, 09, 11	Ø7	Stainless steel	421	24, 53, 54	Ø4.7	Copper	112		
	95, 20, 23, 31	Ø4.7	Stainless steel	311	24, 53, 54	Ø7	Copper	122		
	95, 20, 23, 31	Ø7	Stainless steel	321	24, 53, 54	Ø9	Copper	132		
	95, 20, 23, 31	Ø9	Stainless steel	331	01, 09, 11	Ø4.7	Copper nickel plated	413		
	24, 53, 54	Ø4.7	Stainless steel	111	01, 09, 11	Ø7	Copper nickel plated	423		
	24, 53, 54	Ø7	Stainless steel	121	01, 09, 11	Ø9	Copper nickel plated	433		
	24, 53, 54	Ø9	Stainless steel	131	95, 20, 23, 31	Ø4.7	Copper nickel plated	313		
	01, 09, 11	Ø4.7	Copper	412	95, 20, 23, 31	Ø7	Copper nickel plated	323		
	01, 09, 11	Ø7	Copper	422	95, 20, 23, 31	Ø9	Copper nickel plated	333		
	01, 09, 11	Ø9	Copper	432	24, 53, 54	Ø4.7	Copper nickel plated	113		
	95, 20, 23, 31	Ø4.7	Copper	312	24, 53, 54	Ø7	Copper nickel plated	123		
	95, 20, 23, 31	Ø7	Copper	322	24, 53, 54	Ø9	Copper nickel plated	133		
	95, 20, 23, 31	Ø9	Copper	332						
<b>Fixing<sup>2)</sup></b>	Nut M10 (for remote sensing version) <sup>4)</sup>							10		
	Console (for remote sensing version) <sup>4)</sup>							17		
	Bracket (for remote sensing version) <sup>4)</sup>							27		
	Grubscrew locked, lateral (direct mounting version) <sup>4)</sup>							12		
	Captive nut (for direct mounting version) <sup>4)</sup>							14		
	Grubscrew locked with thermal distance piece (for direct mounting version) <sup>4)</sup>							18		
	Standard directly mounted on protection tube, only for type 736							00		
<b>Protection tube</b>	See data sheet H72114/H72163							XXXX.XXXX		
<b>Accessories</b>	Switchpoint locking <sup>4)</sup>	15		Condensators over Pin 1-2 / 1-3				23		
	Switchpoint fixed and sealed upon customer's request <sup>4)</sup>	88		Railway version IEC 61373, category 2				28		
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>4)</sup>	83		Capillary tube protection: Flexible metal tube, brass nickel plated				90		
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C]			Capillary tube protection: Flexible metal tube 1.4541/V2A				91		
	- Increasing or decreasing			Capillary tube protection: PVC tube				92		
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>									

<sup>1)</sup> See data sheet H72114/H72163

<sup>3)</sup> Overlengths upon request

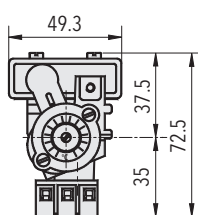
<sup>2)</sup> See data sheet H72106

<sup>4)</sup> Only for type 754

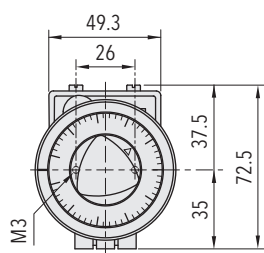
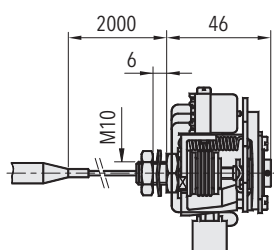
## Standard products (extra short lead time)

Product No.	Type Code	Sensor material	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
L35	754 2509 422 10	Copper	0 ... +35	0.7 ... 10 (adjustable)	60
L40	754 2501 422 10	Copper	-30 ... +40	0.7 ... 10 (adjustable)	45
L95	754 2520 322 10	Copper	+5 ... +95	2 ... 12 (adjustable)	105
L150	754 2531 322 10	Copper	+20 ... +150	2.5 ... 16 (adjustable)	165
L230S	754 2524 121 10	1.4435/316L	+20 ... +230	3 ... 32 (adjustable)	250
L350S	754 2554 121 10	1.4435/316L	+70 ... +350	4 ... 40 (adjustable)	380

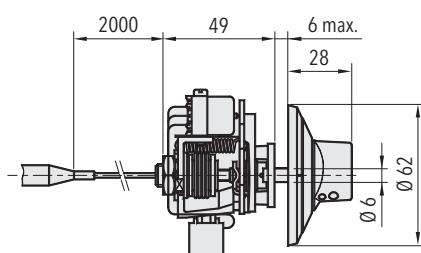
## Dimensions



754.XXXX.XXX.XX...



736.XXXX.XXX.XX...



Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5\%$ FS typ.
	Scale accuracy typ.	$\pm 2\%$ FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental Conditions</b>	Ambient temperature	Range $\leq +45^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $+45\dots+250^{\circ}\text{C}$ : $-30\dots+70^{\circ}\text{C}$ Range $> +250^{\circ}\text{C}$ : $-10\dots+70^{\circ}\text{C}$ (Important: Temperature at sensor may not exceed maximum sensortemperature)
	Storage temperature	Range $\leq +45^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $> +45^{\circ}\text{C}$ : $-30\dots+85^{\circ}\text{C}$
	Protection	IP00
	Humidity	Max. 95% relative
<b>Mechanical Data</b>	Housing	See ordering information
	Filling	Liquid
	Installation	Any position
	Weight	754: $\sim 250\text{ g}$ 736: $\sim 300\text{ g}$
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2\text{ M}\Omega$
	Dielectric strength	$U \leq 250\text{V}$ : 1.45 kV $U \leq 500\text{V}$ : 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles Microswitch 24: 0.3 Mio. cycles
<b>Electrical connection</b>	Terminal screw	$3 \times 1\dots 2.5\text{ mm}^2$

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72122">www.trafag.com/H72122</a>
	Instructions	<a href="http://www.trafag.com/H70211">www.trafag.com/H70211</a>
	Flyer	<a href="http://www.trafag.com/H70967">www.trafag.com/H70967</a>

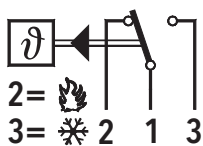
## Switching differential typ.

Range	[°C]	-30 ... +40 0 ... +35 +10 ... +45	-10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3	0.8	1	1.2	2
<b>Microswitch 11/21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7	2	2.5	3	4
<b>Microswitch 24</b> Switching differential (adjustable value)	[°C]	4 ... 21	5.5 ... 26	7 ... 34	15 ... 65	18 ... 84
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 10	2 ... 12	2.5 ... 16	3 ... 32	4 ... 40

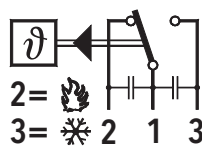
## Electrical data switch

Type	Features	Rating Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A
<b>24</b>	Adjustable large switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



736/754



with accessory 23

# LABOR LIMISTAT

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## Applications

- Machine tools

## Features

- Without housing
- Short response time
- Electrical connection on terminal screw

### Technical Data

Designation of application	Remote sensing thermostat with limiter, skeleton type	Switching differential	Not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		L...R . XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Custom build code</b>	For increasing temperatures, screw terminal	755 . 12							
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]							
	-30 ... +40	45	<b>01</b>	-10 ... +80	85	<b>95</b>			
	-10 ... +25	60	<b>07</b>	+5 ... +95	105	<b>20</b>			
	0 ... +35	70	<b>09</b>	+20 ... +110	115	<b>23</b>			
	+10 ... +45	85	<b>11</b>	+20 ... +150	165	<b>31</b>			
	+10 ... +80	100	<b>13</b>	+20 ... +230	250	<b>24</b>			
	+15 ... +30	60	<b>17</b>	+40 ... +300	330	<b>53</b>			
	-10 ... +35	70	<b>94</b>	+70 ... +350	380	<b>54</b>			
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diame- ter</b> [mm]	<b>Sensor material</b>		<b>Range</b>	<b>Sensor diame- ter</b> [mm]	<b>Sensor material</b>		
	01, 07, 09, 11, 13, 17 94, 95, 20, 23, 31	Ø7	Stainless steel	<b>421</b>	24, 53, 54	Ø4.7	Copper	<b>112</b>	
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	<b>311</b>	24, 53, 54	Ø7	Copper	<b>122</b>	
	94, 95, 20, 23, 31	Ø7	Stainless steel	<b>321</b>	24, 53, 54	Ø9	Copper	<b>132</b>	
	94, 95, 20, 23, 31	Ø9	Stainless steel	<b>331</b>	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	<b>413</b>	
	24, 53, 54	Ø4.7	Stainless steel	<b>111</b>	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	<b>423</b>	
	24, 53, 54	Ø7	Stainless steel	<b>121</b>	01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated	<b>433</b>	
	24, 53, 54	Ø9	Stainless steel	<b>131</b>	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	<b>313</b>	
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	<b>412</b>	94, 95, 20, 23, 31	Ø7	Copper nickel plated	<b>323</b>	
	01, 07, 09, 11, 13, 17	Ø7	Copper	<b>422</b>	94, 95, 20, 23, 31	Ø9	Copper nickel plated	<b>333</b>	
	01, 07, 09, 11, 13, 17	Ø9	Copper	<b>432</b>	24, 53, 54	Ø4.7	Copper nickel plated	<b>113</b>	
	94, 95, 20, 23, 31	Ø4.7	Copper	<b>312</b>	24, 53, 54	Ø7	Copper nickel plated	<b>123</b>	
	94, 95, 20, 23, 31	Ø7	Copper	<b>322</b>	24, 53, 54	Ø9	Copper nickel plated	<b>133</b>	
	94, 95, 20, 23, 31	Ø9	Copper	<b>332</b>					
	<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)							<b>10</b>
		Angle bracket (for remote sensing version)							<b>17</b>
		Bracket (for remote sensing version)							<b>27</b>
		Grubscrew locked, lateral (direct mounting version)							<b>12</b>
		Cap nut (for direct mounting version)							<b>14</b>
		Grubscrew locked with spacer (cooling element) (for direct mounting version)							<b>18</b>
<b>Protection tube</b>	See data sheet H72114/H72163							XXXX.XXXX	
<b>Accessories</b>	Switchpoint locking		<b>15</b>	Condensator over Pin 1-3				<b>13</b>	
	Switchpoint fixed and sealed upon customer's request		<b>88</b>	Condensators over Pin 1-2 / 1-3				<b>23</b>	
	Switchpoint preset upon customer's request, no guarantee on switching accuracy		<b>83</b>	Railway version IEC 61373, category 2				<b>28</b>	
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C]			Capillary tube protection: Flexible metal tube, brass nickel plated				<b>90</b>	
	- Increasing or decreasing			Capillary tube protection: Flexible metal tube 1.4541/V2A				<b>91</b>	
	Condensator over Pin 1-2		<b>12</b>	Capillary tube protection: PVC tube				<b>92</b>	
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>								

<sup>1)</sup> See data sheet H72114/H72163

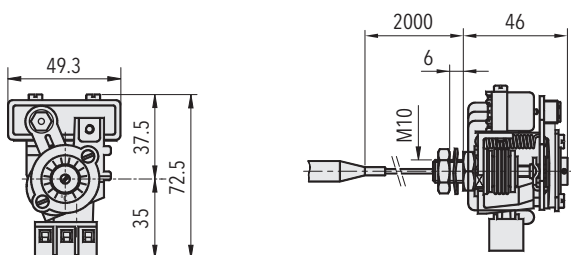
<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

## Standard products (extra short lead time)

Product No.	Type Code	Sensor material	Temperature range [°C]	Sensor max. [°C]
L95R	755 1220 322 10	Copper	+5 ... +95	105
L150R	755 1231 322 10	Copper	+20 ... +150	165
L230SR	755 1224 121 10	1.4435 (AISI316L)	+20 ... +230	250
L350SR	755 1254 121 10	1.4435 (AISI316L)	+70 ... +350	380

## Dimensions



755.12XX.XXX.XX...



Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5$ % FS typ.
	Scale accuracy typ.	$\pm 2$ % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range $\leq +45^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $+45\dots+250^{\circ}\text{C}$ : $-30\dots+70^{\circ}\text{C}$ Range $> +250^{\circ}\text{C}$ : $-10\dots+70^{\circ}\text{C}$ (Important: Temperature at sensor may not exceed maximum sensortemperature)
	Storage temperature	Range $\leq +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +50^{\circ}\text{C}$ Range $> +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +85^{\circ}\text{C}$
	Protection	IP00
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Filling	Liquid
	Housing	See ordering information
	Installation	any position
	Weight	$\sim 250$ g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2$ M $\Omega$
	Dielectric strength	2 kV terminal ground
	Life time (mechanical)	0.3 Mio. cycles
<b>Electrical connection</b>	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72124">www.trafag.com/H72124</a>
	Instructions	<a href="http://www.trafag.com/H70211">www.trafag.com/H70211</a>
	Flyer	<a href="http://www.trafag.com/H70968">www.trafag.com/H70968</a>

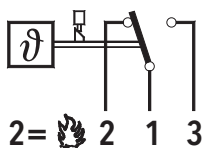
## Switching differential typ.

<b>Measuring range</b>	<b>[°C]</b>	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 12:</b> Switching differential not adjustable	<b>[°C]</b>	2.0	6.0	7.5	9.0	12.0

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>12</b>	Average switching differential, high vibration resistance	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



755.12

# INDUSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Railways
- Machine tools

## Features

- Compact design
- Rugged housing
- Protection IP65
- Any mounting position possible

### Technical Data

Designation of application	Industrial thermostat with remote sensor	Switching differential	Adjustable / not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Custom build code</b>	External adjustment	404								
	Internal adjustment	414								
<b>Microswitch</b>	Small switching differential, not adjustable		10							
	Average switching differential, not adjustable		11							
	With gold plated contacts, not adjustable		21							
	Adjustable large switching differential		24							
	Adjustable standard switching differential		25							
<b>Range</b>	<b>Range</b>	<b>Sensor max.</b>		<b>Range</b>	<b>Sensor max.</b>					
	[°C]	[°C]		[°C]	[°C]					
	-30 ... 40	50	01	-10 ... 80	85	95				
	-10 ... 25	60	07	5 ... 95	105	20				
	0 ... 35	70	09	20 ... 110	115	23				
	10 ... 45	85	11	20 ... 150	165	31				
	10 ... 80	100	13	20 ... 230	250	24				
	15 ... 30	60	17	40 ... 300	330	53				
-10 ... 35	70	94	70 ... 350	380	54					
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter</b>	<b>Sensor material</b>	<b>Range</b>	<b>Sensor diameter</b>	<b>Sensor material</b>				
		[mm]			[mm]					
	01, 07, 09, 11, 13, 17	Ø7	Stainless steel	94, 95, 20, 23, 31	Ø9	Copper	332			
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	313			
	01, 07, 09, 11, 13, 17	Ø7	Copper	94, 95, 20, 23, 31	Ø7	Copper nickel plated	323			
	01, 07, 09, 11, 13, 17	Ø9	Copper	94, 95, 20, 23, 31	Ø9	Copper nickel plated	333			
	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	24, 53, 54	Ø4.7	Stainless steel	111			
	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	24, 53, 54	Ø7	Stainless steel	121			
	01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated	24, 53, 54	Ø9	Stainless steel	131			
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	24, 53, 54	Ø4.7	Copper	112			
	94, 95, 20, 23, 31	Ø7	Stainless steel	24, 53, 54	Ø7	Copper	122			
	94, 95, 20, 23, 31	Ø9	Stainless steel	24, 53, 54	Ø9	Copper	132			
	94, 95, 20, 23, 31	Ø4.7	Copper	24, 53, 54	Ø4.7	Copper nickel plated	113			
	94, 95, 20, 23, 31	Ø7	Copper	24, 53, 54	Ø7	Copper nickel plated	123			
	94, 95, 20, 23, 31	Ø9	Copper	24, 53, 54	Ø9	Copper nickel plated	133			
	<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)								10
		Flange (for remote sensing version)								16
		Angle bracket (for remote sensing version)								17
		Bracket (for remote sensing version)								27
		Grubscrew locked, lateral (direct mounting version)								12
Cap nut (for direct mounting version)									13	
Cap nut (for direct mounting version)									14	
Grubscrew locked with spacer (cooling element) (for direct mounting version)									18	
<b>Protection tube</b>	See data sheet H72114/H72163								XXXX.XXXX	

	XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Accessories</b>	Signal lamp							14	
	Switchpoint locking <sup>4)</sup>							15	
	Switchpoint fixed and sealed upon customer's request <sup>4)</sup>							88	
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>4)</sup>							83	
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing								
	Condensator over Pin 1-2							12	
	Condensator over Pin 1-4							13	
	Condensators over Pin 1-2 / 1-4							23	
	Railway version IEC 61373, category 2							28	
	Outdoor application (vented)							44	
	Capillary tube protection: Flexible metal tube, brass nickel plated							90	
	Capillary tube protection: Flexible metal tube 1.4541/V2A							91	
	Capillary tube protection: PVC tube							92	
	<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>							

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

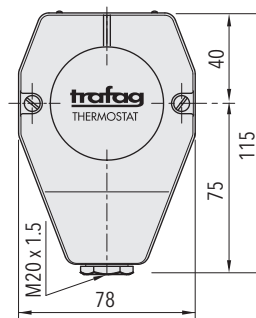
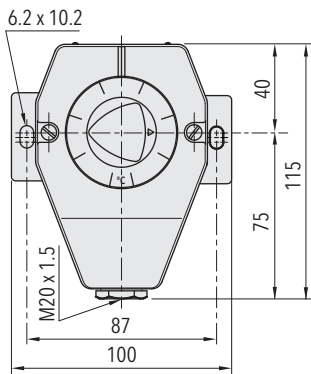
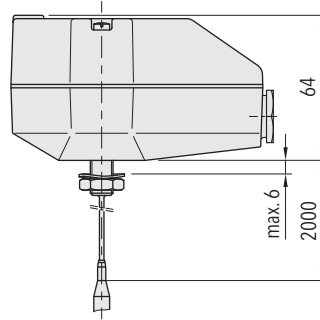
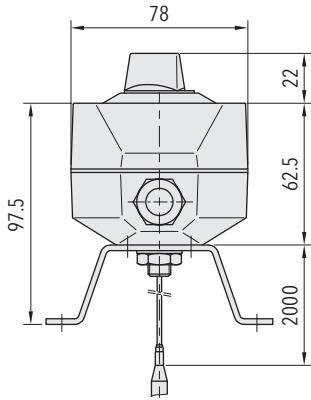
<sup>4)</sup> Only with type 414, internal adjustment

Standard products (extra short lead time)					
Product No.	Type Code	Sensor material	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
I35	404 2509 422 27	Copper	0 ... +35	0.7 ... 10 (adjustable)	60
I40	404 2501 422 27	Copper	-30 ... +40	0.7 ... 10 (adjustable)	45
I95	404 2520 322 27	Copper	+5 ... +95	2 ... 12 (adjustable)	105
I150	404 2531 322 27	Copper	+20 ... +150	2.5 ... 16 (adjustable)	165
I230S	404 2524 121 27	1.4435/316L	+20 ... +230	3 ... 32 (adjustable)	250
I350S	404 2554 121 27	1.4435/316L	+70 ... +350	4 ... 40 (adjustable)	380
IS35	414 2509 422 27	Copper	0 ... +35	0.7 ... 10 (adjustable)	60
IS40	414 2501 422 27	Copper	-30 ... +40	0.7 ... 10 (adjustable)	45
IS95	414 2520 322 27	Copper	+5 ... +95	2 ... 12 (adjustable)	105
IS150	414 2531 322 27	Copper	+20 ... +150	2.5 ... 16 (adjustable)	165
IS230S	414 2524 121 27	1.4435/316L	+20 ... +230	3 ... 32 (adjustable)	250
IS350S	414 2554 121 27	1.4435/316L	+70 ... +350	4 ... 40 (adjustable)	380

Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5$ % FS typ.
	Scale accuracy typ.	$\pm 2$ % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range $\leq +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +50^{\circ}\text{C}$ Range $+45^{\circ}\text{C} \dots +250^{\circ}\text{C}$ : $-30 \dots +70^{\circ}\text{C}$ Range $> +250^{\circ}\text{C}$ : $-10^{\circ}\text{C} \dots +70^{\circ}\text{C}$ (Important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range $\leq +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +50^{\circ}\text{C}$ Range $> +45^{\circ}\text{C}$ : $-30^{\circ}\text{C} \dots +85^{\circ}\text{C}$
	Protection	IP65
	Humidity	Max. 95 % relative
	Vibration	5...25 Hz: $\pm 1.6$ mm 25...100 Hz: 4g
	Shock	50g/ 11 ms
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Brass nickel plated
	Installation	any position
	Weight	$\sim 950$ g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2$ M $\Omega$
	Dielectric strength	$U \leq 250\text{V}$ : 1.45 kV / $U \leq 500\text{V}$ : 2 kV terminal ground
	Life time (mechanical)	Microswitch 10/11/25: 20 Mio. cycles Microswitch 21: 0.5 Mio. cycles Microswitch 24: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable- $\varnothing$ 4...10 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

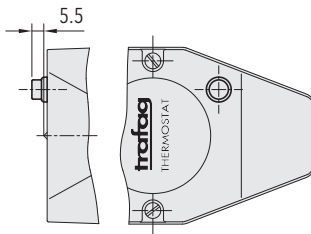
Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72110">www.trafag.com/H72110</a>
	Instructions	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>
	Flyer	<a href="http://www.trafag.com/H70951">www.trafag.com/H70951</a>

## Dimensions



404.XXXX.XXX.27.XXXX.XXXX.XX

414.XXXX.XXX.10.XXXX.XXXX.XX



Accessory 14

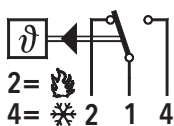
## Switching differential typ.

Range	[°C]	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 10</b> Switching differential (fixed value, not adjustable)	[°C]	0.3	0.8	1	1.2	2
<b>Microswitch 11/21</b> Switching differential (fixed value, not adjustable)	[°C]	0.7	2	2.5	3	4
<b>Microswitch 24</b> Switching differential (adjustable value)	[°C]	4 ... 21	5.5 ... 26	7 ... 34	15 ... 65	18 ... 84
<b>Microswitch 25</b> Switching differential (adjustable value)	[°C]	0.7 ... 10	2 ... 12	2.5 ... 16	3 ... 32	4 ... 40

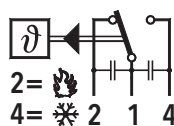
## Electrical data switch

Type	Features	Rating Resistive Load (Inductive Load)	
		AC	DC
<b>10</b>	Small switching differential, not adjustable	125 V, 10 (1.5) A 250 V, 10 (1.25) A	250 V, 0.2 (0.02) A 125 V, 0.4 (0.03) A 30 V, 2 (1) A 14 V, 15 (2.5) A
<b>11</b>	Average switching differential, not adjustable	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (1.5) A
<b>21</b>	Gold plated contacts, not adjustable	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A	24 V, 0.1 (0.1) A 12 V, 1 (1) A 5 V, 2 (2) A
<b>25</b>	Adjustable standard switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.25 (0.03) A 125 V, 0.5 (0.05) A 30 V, 6 (1.5) A 14 V, 15 (2.5) A
<b>24</b>	Adjustable large switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



404/414



with accessory 23



# INDU LIMISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Machine tools
- Process technology

## Features

- Compact design
- Rugged housing
- Protection IP65
- Any mounting position possible

### Technical Data

Designation of application	Industrial thermostat with remote sensor and limiter	Switching differential	Not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX . XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Custom build code</b>	For increasing temperatures., internal resetting	410 . 12							
	For increasing temperatures, external resetting	412 . 12							
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]							
	-30 ... +40	45	01						
	-10 ... +25	60	07						
	0 ... +35	70	09						
	+10 ... +45	85	11						
	+10 ... +80	100	13						
	+15 ... +30	60	17						
	-10 ... +35	70	94						
	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]							
	-10 ... +80	85	95						
	+5 ... +95	105	20						
	+20 ... +110	115	23						
	+20 ... +150	165	31						
	+20 ... +230	250	24						
	+40 ... +300	330	53						
	+70 ... +350	380	54						
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diame- ter</b> [mm]	<b>Sensor material</b>						
	01, 07, 09, 11, 13, 17	Ø7	Stainless steel	421					
	01, 07, 09, 11, 13, 17	Ø12	Stainless steel	441					
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	311					
	94, 95, 20, 23, 31	Ø7	Stainless steel	321					
	94, 95, 20, 23, 31	Ø9	Stainless steel	331					
	24, 53, 54	Ø4.7	Stainless steel	111					
	24, 53, 54	Ø7	Stainless steel	121					
	24, 53, 54	Ø9	Stainless steel	131					
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	412					
	01, 07, 09, 11, 13, 17	Ø7	Copper	422					
	01, 07, 09, 11, 13, 17	Ø9	Copper	432					
	01, 07, 09, 11, 13, 17	Ø12	Copper	442					
	94, 95, 20, 23, 31	Ø4.7	Copper	312					
	94, 95, 20, 23, 31	Ø7	Copper	322					
					<b>Range</b>	<b>Sensor diame- ter</b> [mm]	<b>Sensor material</b>		
					94, 95, 20, 23, 31	Ø9	Copper	332	
					24, 53, 54	Ø4.7	Copper	112	
					24, 53, 54	Ø7	Copper	122	
					24, 53, 54	Ø9	Copper	132	
				01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated	413		
				01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated	423		
				01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated	433		
				01, 07, 09, 11, 13, 17	Ø12	Copper nickel plated	443		
				94, 95, 20, 23, 31	Ø4.7	Copper nickel plated	313		
				94, 95, 20, 23, 31	Ø7	Copper nickel plated	323		
				94, 95, 20, 23, 31	Ø9	Copper nickel plated	333		
				24, 53, 54	Ø4.7	Copper nickel plated	113		
				24, 53, 54	Ø7	Copper nickel plated	123		
				24, 53, 54	Ø9	Copper nickel plated	133		
<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)						10		
	Flange (for remote sensing version)						16		
	Console (for remote sensing version)						17		
	Bracket (for remote sensing version)						27		
	Grubscrew locked, lateral (direct mounting version)						12		
	Captive nut (for direct mounting version)						14		
	Grubscrew locked with thermal distance piece (for direct mounting version)						18		
<b>Protection tube</b>	See data sheet H72114/H72163							XXXX.XXXX	

	XXX . XX	XX	XXX	XX	XXXXXXXXXX	XX	XX
<b>Accessories</b>	Signal lamp	14	Condensator over Pin 1-3	13			
	Switchpoint locking	15	Condensators over Pin 1-2 / 1-3	23			
	Switchpoint fixed and sealed upon customer's request	88	Railway version IEC 61373, category 2	28			
	Switchpoint preset upon customer's request, no guarantee on switching accuracy	83	Outdoor application (vented)	44			
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C]		Capillary tube protection: Flexible metal tube, brass nickel plated	90			
	- Increasing or decreasing		Capillary tube protection: Flexible metal tube 1.4541/V2A	91			
	Condensator over Pin 1-2	12	Capillary tube protection: PVC tube	92			
	<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>					

<sup>1)</sup> See data sheet H72114/H72163

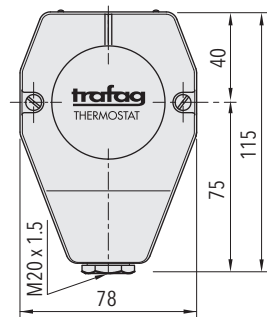
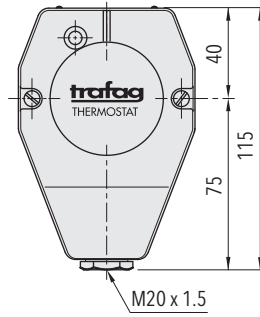
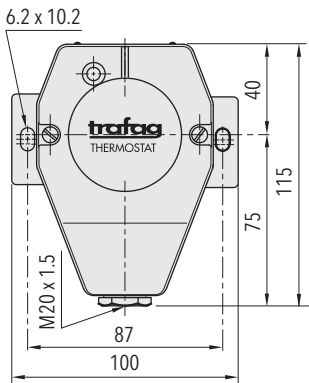
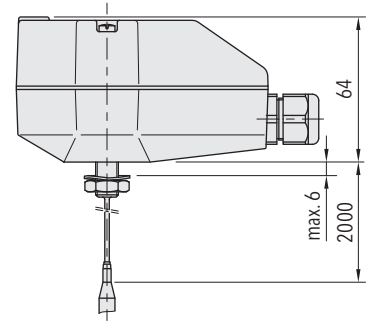
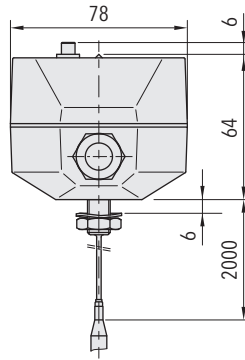
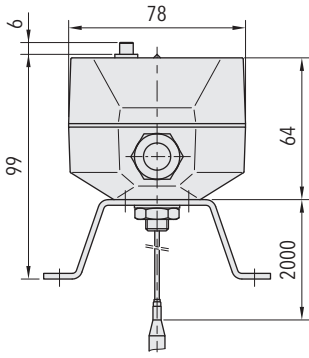
<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

Standard products (extra short lead time)				
Product No.	Type Code	Sensor material	Temperature range [°C]	Sensor max. [°C]
IS95R	412 1220 322 27	Copper	+5 ... +95	105
IS150R	412 1231 322 27	Copper	+20 ... +150	165
IS230SR	412 1224 121 27	1.4435/316L	+20 ... +230	250
IS350SR	412 1254 121 27	1.4435/316L	+70 ... +350	380

Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5 \% \text{ FS typ.}$
	Scale accuracy typ.	$\pm 2 \% \text{ FS typ.}$
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range $\leq +45^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $+45\dots+250^{\circ}\text{C}$ : $-30\dots+70^{\circ}\text{C}$ Range $> +250^{\circ}\text{C}$ : $-10\dots+70^{\circ}\text{C}$ (Important: Temperature at sensor may not exceed maximum sensor temperature)
	Storage temperature	Range $< +45^{\circ}\text{C}$ : $-30\dots+50^{\circ}\text{C}$ Range $> +45^{\circ}\text{C}$ : $-30\dots+85^{\circ}\text{C}$
	Protection	IP65
	Humidity	Max. 95 % relative
	Vibration	5...25 Hz: $\pm 1.6 \text{ mm}$ 25...100 Hz: 4g
	Shock	50g/ 11ms
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Brass nickel plated
	Installation	Any position
	Weight	$\sim 950 \text{ g}$
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2 \text{ M}\Omega$
	Dielectric strength	2 kV terminal ground
	Life time (mechanical)	0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable- $\varnothing$ 4...10 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

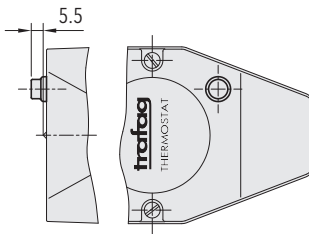
## Dimensions



412.12XX.XXX.27...

412.12XX.XXX.10...

410.12XX.XXX.10...



Accessory 14

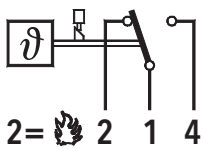
## Switching differential typ.

<b>Range</b>	<b>[°C]</b>	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 12</b> Switching differential (fixed value, not adjustable)	<b>[°C]</b>	2.0	6.0	7.5	9.0	12.0

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
<b>12</b>	High vibration resistance, medium switching differential	125 V, 15 (1.5) A 250 V, 15 (1.25) A 500 V, 10 (0.75) A	250 V, 0.3 (0.2) A 125 V, 0.75 (0.4) A 30 V, 15 (1.5) A 14 V, 15 (1.5) A

## Electrical Connection



410/412.12

Limiter for increasing temperatures

## Additional information

<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72138">www.trafag.com/H72138</a>
	Instructions	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>
	Flyer	<a href="http://www.trafag.com/H70966">www.trafag.com/H70966</a>

# NAVISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Shipbuilding
- Engine manufacturing
- Railways

## Features

- Compact design
- Rugged housing
- High repeatability
- Protection IP65
- Any mounting position possible

Technical Data			
Designation of application	Thermostat for shipbuilding	Switching differential	Not adjustable
Measuring range	+20°C ... +110°C to +40°C ... +300°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	ABS, BV, CCS, DNV, GL, KRS, LRS, RINA, RMRS EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		XXX . XX	XX	XXX	XX	XXXX	XXXX	XX	XX
<b>Custom build code</b>	Controller, increased vibration resistance	471 . 23							
	Controller, high vibration resistance <sup>1)</sup>	471 . 26							
	Temperature switch with locking, high vibration resistance <sup>2)</sup>	472 . 12							
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]							
	+20 ... 110	115							23
	+20 ... 150	165							31
	+40 ... 300	330							53
<b>Sensor</b>	<b>Range</b> [°C]	<b>Sensor diameter</b> [mm]							
	+20 ... 110	Ø7							322
	+20 ... 150	Ø9							332
	+20 ... 150	Ø12							342
	+40 ... 300	Ø7							122
	+40 ... 300	Ø9							132
+40 ... 300	Ø12							142	
<b>Fixing</b>	Version B (remote sensing version)								27
	Version K (direct mounting version)								14
<b>Protection tube</b>	<b>Suitable for sensor</b>	<b>Protection tube diameter</b> [mm]	<b>Protection tube length</b> [mm]	<b>Electrical connection</b>					
	322	10/8	min. 150	K, Stainless steel					1411
	332	12/10	min. 110	K, Stainless steel					1412
	342	15/13	min. 65	K, Stainless steel					1414
	322	10/8	min. 150	K, Brass nickel plated					1416
	332	12/10	min. 110	K, Brass nickel plated					1417
	342	15/13	min. 65	K, Brass nickel plated					1419
	322	10/8	min. 150	B, Brass nickel plated					8316
	122	10/8	min. 110	B, Brass nickel plated					8317
	332	12/10	min. 110	B, Brass nickel plated					8317
	132	12/10	min. 90	B, Brass nickel plated					8317
	342	15/13	min. 65	B, Brass nickel plated					8319
	142	15/13	min. 65	B, Brass nickel plated					8319
	322	10/8	min. 150	B, Stainless steel					8411
	122	10/8	min. 110	B, Stainless steel					8411
332	12/10	min. 110	B, Stainless steel					8412	
132	12/10	min. 90	B, Stainless steel					8412	
342	15/13	min. 65	B, Stainless steel					8414	
142	15/13	min. 65	B, Stainless steel					8414	
<b>Protection tube length</b>	Length G, see data sheet H72114/H72163								XXXX
<b>Accessories</b>	Switchpoint fixed and sealed upon customer's request								88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy								83
	Switchpoint adjustment please indicate when ordering:								
	- Switchpoint [°C]								
	- Increasing or decreasing								
	Screwed cable gland M20x1.5 (EN 50262)								07
	Screwed cable gland M24x1.5 (DIN 89280)								27
	Screwed cable gland M18x1.5 (DIN 89280)								40
Capillary tube protection: Flexible metal tube, brass nickel plated								90	
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L = XXXX								
	Standard length: L = 3000 mm with flexible metal tube								

<sup>1)</sup> Without ship approval GL

<sup>2)</sup> Without ship approval LRS

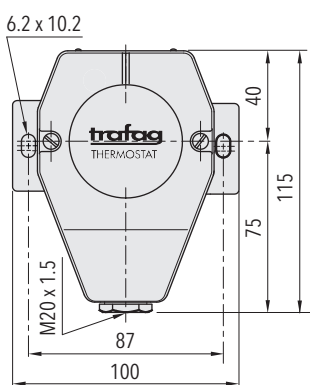


## Standard products (extra short lead time)

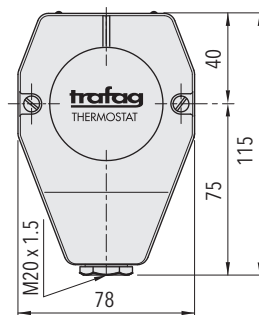
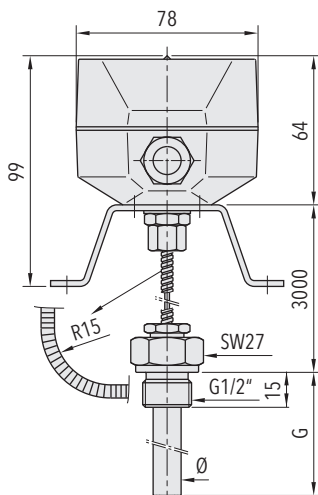
Product No.	Type Code	Temperature range [°C]	Protection tube diameter [mm]	Protection tube length [mm]	Switching differential [°C]	Sensor max. [°C]
ISN11011	471 2323 332 27 8317 0110 90	+20 ... +110	12	110	4.5 (fixed)	115
ISN11015	471 2323 322 27 8316 0150 90	+20 ... +110	10	150	4.5 (fixed)	115
ISN11065	471 2323 342 27 8319 0065 90	+20 ... +110	15	65	4.5 (fixed)	115
ISN15011	471 2331 332 27 8317 0110 90	+20 ... +150	12	110	5 (fixed)	165
ISN15015	471 2331 322 27 8316 0150 90	+20 ... +150	10	150	5 (fixed)	165
ISN15065	471 2331 342 27 8319 0065 90	+20 ... +150	15	65	5 (fixed)	165
ISNT11011	471 2323 332 14 1417 0110	+20 ... +110	12	110	4.5 (fixed)	115
ISNT11015	471 2323 322 14 1416 0150	+20 ... +110	10	150	4.5 (fixed)	115
ISNT11065	471 2323 342 14 1419 0065	+20 ... +110	15	65	4.5 (fixed)	115
ISNT15011	471 2331 332 14 1417 0110	+20 ... +150	12	110	5 (fixed)	165
ISNT15015	471 2331 322 14 1416 0150	+20 ... +150	10	150	5 (fixed)	165
ISNT15065	471 2331 342 14 1419 0065	+20 ... +150	15	65	5 (fixed)	165

Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Stability typ.	± 1 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	see table
	Switching point	Temperatur compensated with bimetal switch lever
<b>Environmental Conditions</b>	Ambient temperature	Range ≤ +45°C: -30 ... +50°C Range +45 ... +250°C: -30 ... +70°C Range > +250°C: -10 ... +70°C
	Storage temperature	-40°C ... +85°C
	Protection	IP65
	Humidity	Max. 95% relative
	Vibration	5...25 Hz: ±1.6 mm 25...100 Hz: 4g
	Shock	50g/ 11ms
<b>Mechanical Data</b>	Housing	Copper (Cu)
	Filling	Liquid
	Protection tube	See ordering information
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Brass nickel plated
	Installation	Any position
	Weight	~ 950 g
<b>Microswitch</b>	Rating	see table
	Resistance of insulation	> 10 MΩ
	Dielectric strength	2 kV terminal ground
	Life time (mechanical)	Microswitch 12/23/26: 0.3 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable-Ø 4...10 mm
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

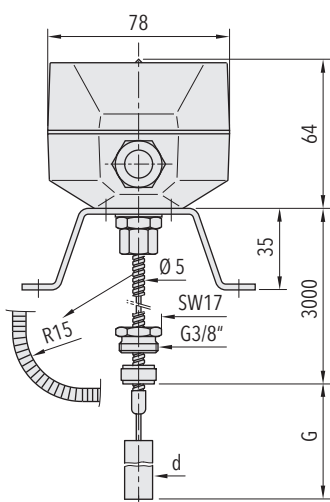
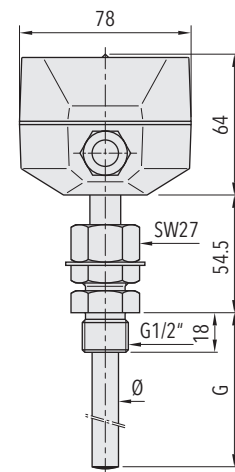
## Dimensions



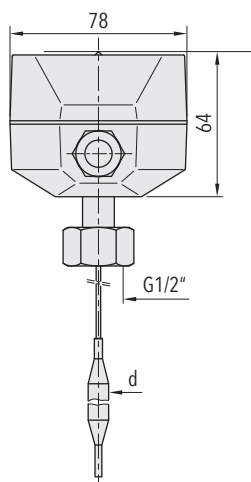
47X.XXXX.XXX.27.831X.XX



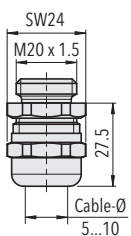
47X.XXXX.XXX.14.141X.XX



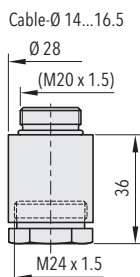
Version B / without protection tube



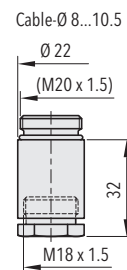
Version K / without protection tube



47X.XXXX.XXX.XX.XXXX.XXXX.07  
M 20x1.5



47X.XXXX.XXX.XX.XXXX.XXXX.27  
M 24x1.5



47X.XXXX.XXX.XX.XXXX.XXXX.40  
M 18x1.5

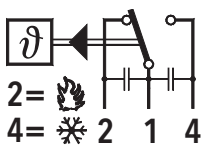
## Switching differential typ.

Range	[°C]	+20 ... +110	+20 ... +150	+40 ... +300
Sensor max.	[°C]	115	165	330
Switching differential micro switch 23 (fixed value, not adjustable)	[°C]	4.5	5	8
Switching differential micro switch 26 (fixed value, not adjustable)	[°C]	7.5	8	14
Switching differential micro switch 12 (limiter)	[°C]	(7.5)	(8)	(14)

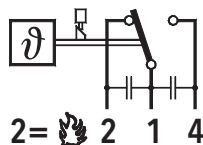
## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
12	Temperature switch with locking	125 V 15 (1.5) A 250 V 15 (1.25) A 500 V 10 (0.75) A	250 V 0.3 (0.2) A 125 V 0.75 (0.4) A 30 V 15 (1.5) A 14 V 15 (1.5) A
23	Controller; average switching differential	125 V 15 (1.5) A 250 V 15 (1.25) A 500 V 10 (0.75) A	250 V 0.3 (0.05) A 125 V 0.6 (0.1) A 30 V 15 (1.5) A 14 V 15 (1.5) A
26	Controller; large switching differential	125 V 15 (1.5) A 250 V 15 (1.25) A 500 V 10 (0.75) A	250 V 0.3 (0.2) A 125 V 0.75 (0.4) A 30 V 15 (1.5) A 14 V 15 (1.5) A

## Electrical Connection



Switch 23/26



Switch 12/Limiter

## Additional information

Documents		
	Data sheet	<a href="http://www.trafag.com/H72111">www.trafag.com/H72111</a>
	Instructions	<a href="http://www.trafag.com/H73111">www.trafag.com/H73111</a>
	Flyer	<a href="http://www.trafag.com/H70950">www.trafag.com/H70950</a>

# PICOTHERM

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Shipbuilding
- Engine manufacturing
- Railways
- Hydraulics
- HVAC



## Features

- Compact design
- Rugged housing
- High repeatability
- Protection IP65
- Any mounting position possible

### Technical Data

Designation of application	Compact thermostat for shipbuilding	Switching differential	Not adjustable
Measuring range	+5°C ... +95°C to +20°C ... +150°C	Repeatability	± 1 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	ABS, BV, CCS, DNV, GL, KRS, LRS, NKK, RINA, RMRS EN60730-1/ EN60730-2-9: Typ 2.B.H

Subject to change

## Ordering information/type code

		474 .	XX	XX	XXX	XX	XXXX	XXXX	XX	XX
<b>Micro-switch</b>	Standard, switching differential not adjustable	03								
<b>Range</b>	<b>Range</b> [°C]	<b>Sensor max.</b> [°C]								
	+5 ... +95	100	20							
	+20 ... +110	115	23							
	+20 ... +150	165	31							
<b>Sensor</b>	<b>Sensor diameter</b> [mm]									
	Ø7		322							
	Ø12		342							
<b>Fixing</b> <sup>2)</sup>	Flange connection (for remote sensing version)					00				
	Captive nut (for direct mounting version)					14				
<b>Protection tube</b>	<b>Mounting</b>	<b>Suitable for sensor</b>	<b>Protection tube diameter</b> [mm]	<b>Protection tube length</b> [mm]						
	For direct mounting version	322	10	150	1416					
	For direct mounting version	342	15	65	1419					
	For remote sensing version	322	10	150	8316					
	For remote sensing version	342	15	65	8319					
<b>Protection tube length</b>	<b>Protection tube length</b> [mm]									
	65				0065					
	150				0150					
<b>Accessories</b>	Female electrical connector EN175301-803-A (DIN43650-A)									58
	Capillary tube protection: Flexible metal tube, brass nickel plated									90
	Fixing set									V3
	Cover with window									77
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L = XXXX Standard length: L = 3000 mm with flexible metal tube									

<sup>2)</sup> See data sheet H72106

## Standard products (extra short lead time)

Product No.	Type Code	Temperature range [°C]	Protection tube diameter [mm]	Protection tube length [mm]	Switching differential [°C]	Sensor max. [°C]
ISPT9515	474 0320 322 14 1416 0150 58 V3	+5 ... +95	10	150	4 (fixed)	100
ISPT9565	474 0320 342 14 1419 0065 58 V3	+5 ... +95	15	65	4 (fixed)	100
ISPT11015	474 0323 322 14 1416 0150 58 V3	+20 ... +110	10	150	4 (fixed)	115
ISPT11065	474 0323 342 14 1419 0065 58 V3	+20 ... +110	15	65	4 (fixed)	115
ISPT15015	474 0331 322 14 1416 0150 58 V3	+20 ... +150	10	150	5 (fixed)	165
ISPT15065	474 0331 342 14 1419 0065 58 V3	+20 ... +150	15	65	5 (fixed)	165
ISP9515	474 0320 322 00 8316 0150 58 90 V3	+5 ... +95	10	150	4 (fixed)	100
ISP9565	474 0320 342 00 8319 0065 58 90 V3	+5 ... +95	15	65	4 (fixed)	100
ISP11015	474 0323 322 00 8316 0150 58 90 V3	+20 ... +110	10	150	4 (fixed)	115
ISP11065	474 0323 342 00 8319 0065 58 90 V3	+20 ... +110	15	65	4 (fixed)	115
ISP15015	474 0331 322 00 8316 0150 58 90 V3	+20 ... +150	10	150	6 (fixed)	165
ISP15065	474 0331 342 00 8319 0065 58 90 V3	+20 ... +150	15	65	6 (fixed)	165

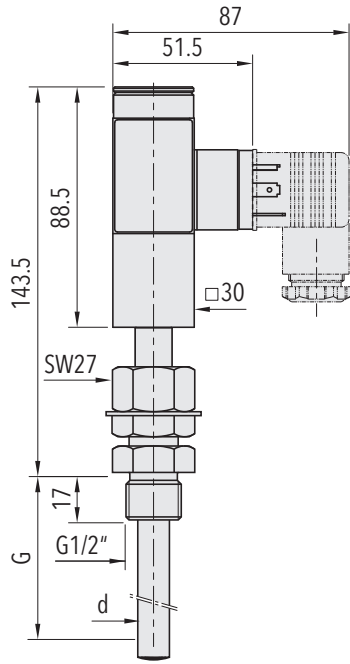
Specifications		
<b>Accuracy</b>	Repeatability	± 1 % FS typ.
	Stability typ.	± 1 % FS typ.
	Scale accuracy typ.	± 4 % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental Conditions</b>	Ambient temperature	-30 ... +70°C
	Storage temperature	-40°C ... 85°C
	Protection	IP65
	Humidity	Max. 95% relative
	Vibration	5...25 Hz: ±1.6 mm 25...100 Hz: 4g
	Shock	50g/ 11ms
<b>Mechanical Data</b>	Housing	Copper (Cu)
	Filling	Liquid
	Protection tube	Brass nickel plated
	Housing	AlMgSi1 anodized
	Male electrical plug	Polyamid, (PA)
	Installation	Any position
	Weight	~ 260 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 10 MΩ
	Dielectric strength	2 kV terminal ground
	Life time (mechanical)	10 Mio. cycles
<b>Electrical connection</b>	Cable gland	Cable-Ø: 6...13 mm
	Terminal screw	4 x 0.5...1.5 mm <sup>2</sup>

#### Additional information

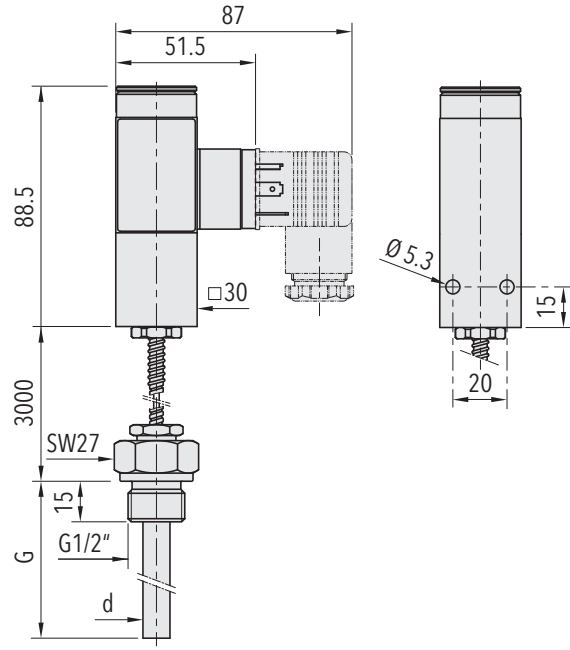
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72113">www.trafag.com/H72113</a>
	Instructions	<a href="http://www.trafag.com/H73113">www.trafag.com/H73113</a>
	Flyer	<a href="http://www.trafag.com/H70953">www.trafag.com/H70953</a>



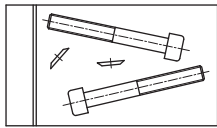
## Dimensions



474.XXXX.XXX.14.14XX...



474.XXXX.XXX.00.83XX...



M5x40 ISO4762

474...V3

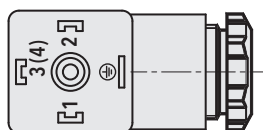
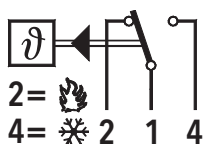
## Switching differential typ.

Measuring range	[°C]	+5 ... +95	+20 ... +110	+20 ... +150
Sensor max.	[°C]	100	115	165
Microswitch 03: Switching differential not adjustable	[°C]	4.0	4.0	6.0

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
03	Silver contacts	250 V, 3 (1) A	250 V, 0.1 (0.05) A 220 V, 0.25 (0.2) A 110 V, 0.5 (0.3) A 24 V, 2.0 (1.0) A

## Electrical Connection



DIN 43650-A

# EX INDUSTRISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Ex II 2 G / D

## Features

- Compact design
- Rugged housing
- Any mounting position possible
- Ex db eb IIC T6 Gb
- Ex tb IIIC T80°C Db

### Technical Data

Designation of application	Ex Industrial thermostat with remote sensor	Switching differential	Not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	SEV 15 ATEX 0156 X IECEX SEV 17.0010X

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX
<b>Custom build code</b>	External adjustment	404							
	Internal adjustment	414							
<b>Microswitch</b>	Standard, switching differential not adjustable		91						
<b>Range</b>	<b>Range [°C]</b>	<b>Sensor max. [°C]</b>		<b>Range [°C]</b>	<b>Sensor max. [°C]</b>				
	-30 ... +40	50	01	-10 ... +80	85	95			
	-10 ... +25	60	07	+5 ... +95	105	20			
	0 ... +35	70	09	+20 ... +110	115	23			
	+10 ... +45	85	11	+20 ... +150	165	31			
	+10 ... +80	100	13	+20 ... +230	250	24			
	+15 ... +30	60	17	+40 ... +300	330	53			
	-10 ... +35	70	94	+35 ... +175	200	56			
	+10 ... +70	85	59	+20 ... +270	330	55			
	+20 ... +85	100	58	+70 ... +350	380	54			
	+20 ... +115	130	57						
	<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter [mm]</b>	<b>Sensor material</b>					
01, 07, 09, 11, 13, 17, 58, 59		Ø7	Stainless steel	421					
94, 95, 20, 23, 31, 56, 57		Ø4.7	Stainless steel	311					
94, 95, 20, 23, 31, 56, 57		Ø7	Stainless steel	321					
94, 95, 20, 23, 31, 56, 57		Ø9	Stainless steel	331					
24, 53, 54, 55		Ø4.7	Stainless steel	111					
24, 53, 54, 55		Ø7	Stainless steel	121					
24, 53, 54, 55		Ø9	Stainless steel	131					
01, 07, 09, 11, 13, 17, 58, 59		Ø4.7	Copper	412					
01, 07, 09, 11, 13, 17, 58, 59		Ø7	Copper	422					
01, 07, 09, 11, 13, 17, 58, 59		Ø9	Copper	432					
94, 95, 20, 23, 31, 56, 57		Ø4.7	Copper	312					
94, 95, 20, 23, 31, 56, 57		Ø7	Copper	322					
94, 95, 20, 23, 31, 56, 57		Ø9	Copper	332					
24, 53, 54, 55		Ø4.7	Copper	112					
24, 53, 54, 55		Ø7	Copper	122					
24, 53, 54, 55		Ø9	Copper	132					
01, 07, 09, 11, 13, 17, 58, 59		Ø4.7	Copper nickel plated	413					
01, 07, 09, 11, 13, 17, 58, 59		Ø7	Copper nickel plated	423					
01, 07, 09, 11, 13, 17, 58, 59		Ø9	Copper nickel plated	433					
94, 95, 20, 23, 31, 56, 57		Ø4.7	Copper nickel plated	313					
94, 95, 20, 23, 31, 56, 57		Ø7	Copper nickel plated	323					
94, 95, 20, 23, 31, 56, 57		Ø9	Copper nickel plated	333					
24, 53, 54, 55		Ø4.7	Copper nickel plated	113					
24, 53, 54, 55		Ø7	Copper nickel plated	123					
24, 53, 54, 55		Ø9	Copper nickel plated	133					
<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)					10			
	Bracket (for remote sensing version)					27			
	Grubscrew locked, lateral (direct mounting version)					12			
	Cap nut (for direct mounting version)					14			
	Grubscrew locked with spacer (cooling element) (for direct mounting version)					18			

	XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Protection tube</b>	See data sheet H72114/H72163						XXXX.XXXX		
<b>Accessories</b>	Switchpoint locking <sup>4)</sup>							15	
	Switchpoint fixed and sealed upon customer's request <sup>4)</sup>							88	
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>4)</sup>							83	
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing								
	Capillary tube protection: Flexible metal tube, brass nickel plated							90	
	Capillary tube protection: Flexible metal tube 1.4541/V2A							91	
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>								

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

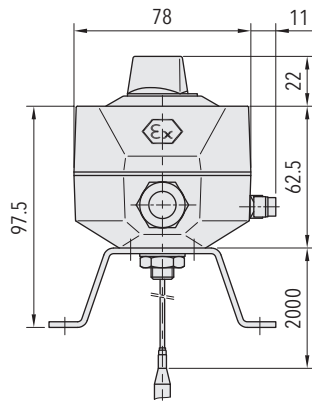
<sup>4)</sup> Only with type 414, internal adjustment

## Standard products (extra short lead time)

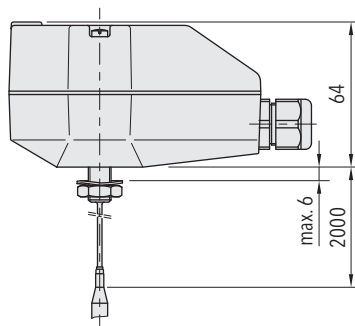
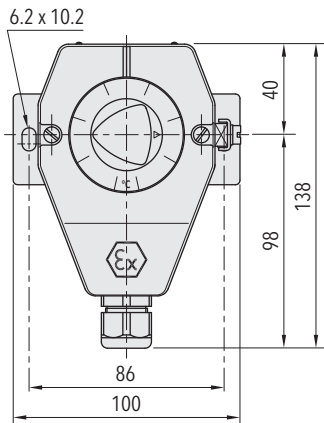
Product No.	Type Code	Sensor material	Temperature range [°C]	Switching differential [°C]	Sensor max. [°C]
EXS35	414 9109 423 27 0000 0000 02	Copper nickel plated	0 ... +35	2.5 (fixed)	50
EXS40	414 9101 423 27 0000 0000 02	Copper nickel plated	-30 ... +40	2.5 (fixed)	45
EXS95	414 9120 323 27 0000 0000 02	Copper nickel plated	+5 ... +95	3.5 (fixed)	105
EXS150	414 9131 323 27 0000 0000 02	Copper nickel plated	+20 ... +150	5.5 (fixed)	165
EXS230S	414 9124 121 27 0000 0000 02	1.4435/316L	+20 ... +230	8 (fixed)	250
EXS350S	414 9154 121 27 0000 0000 02	1.4435/316L	+70 ... +350	10 (fixed)	380

Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	See table
	Switching point	Temperature compensated with bimetal switch lever
<b>Environmental conditions</b>	Ambient temperature	Range ≤ +45°C: -30°C ... +50°C Range +45°C ... +250°C: -30°C ... +60°C Range > + 250°C: -10°C ... +60°C
	Storage temperature	Range ≤ +45°C: -30°C ... +50°C Range > +45°C: -30°C ... +60°C
	Protection	IP65
	Humidity	Max. 95 % relative
	Vibration	5...25 Hz: ±1.6 mm 25...100 Hz: 4 g
	Shock	50 g / 11 ms
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Polyamide (PA)
	Installation	any position
	Weight	~ 950 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	1.5 kV
	Life time (mechanical)	1 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5/SW24 Cable-Ø 5.5...13 mm Approval: PTB 99 ATEX 3128 X
	Terminal screw	3 x 1 ... 2.5 mm <sup>2</sup>

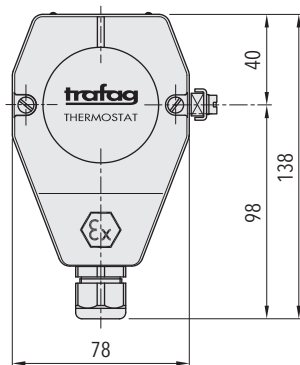
## Dimensions



404.XXXX.XXX.27...



414.XXXX.XXX.10...



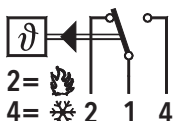
## Switching differential typ.

Range	[°C]	-30 ... +40	-10 ... +35	+20 ... +150	+35 ... +175	+40 ... +300
		-10 ... +25	-10 ... +80		+20 ... +230	+70 ... +350
		0 ... +35	+5 ... +95			
		+15 ... +30	+20 ... +110			
		+10 ... +45	+20 ... +115			
		+10 ... +70				
		+10 ... +80				
		+20 ... +85				
<b>Microswitch 91</b>	[°C]	2.5	3.5	5.5	8	10
Switching differential (fixed value, not adjustable)						

## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
91	Standard Ex	250V 5(5) A 125V 5(5) A	250 V 0.25 (0.03) A 125 V 0.5 (0.06) A 75 V 0.75 (0.25) A 50 V 1 (1) A 30 V 5 (3) A 15 V 5 (3) A

## Electrical connection



404 / 414

## Additional information

Documents		
	Data sheet	<a href="http://www.trafag.com/H72108">www.trafag.com/H72108</a>
	Instructions	<a href="http://www.trafag.com/H73172">www.trafag.com/H73172</a>
	Flyer	<a href="http://www.trafag.com/H70970">www.trafag.com/H70970</a>



# EX INDU AMBISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Ex II 2 G / D

## Features

- Compact design
- Rugged housing
- Protection IP65
- Ex db eb IIC T6 Gb
- Ex tb IIIC T80°C Db

Technical Data			
Designation of application	Ex Industrial room thermostat	Switching differential	Not adjustable
Measuring range	-30°C ... +30°C to 0°C ... +60°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	SEV 15 ATEX 0156 X IECEx SEV 17.0010X

Subject to change

## Ordering information/type code

		XXX	XX	XX	XXXXXX	XX
<b>Custom build code</b>	External adjustment	409				
	Internal adjustment	419				
<b>Microswitch</b>	Standard, not adjustable		91			
<b>Range</b>	<b>Range [°C]</b>	<b>Operating temperature [°C]</b>				
	-30 ... +30	-30 ... +40		02		
	+5 ... +35	-30 ... +50		10		
	0 ... +60	-30 ... +60		12		
<b>Sensor<sup>1)</sup> / Fixing<sup>2)</sup></b>	Sensor: Copper; Fixation: Bracket (open sensor coil)				522.27	
	Sensor: Copper nickel plated; Fixation: Bracket (open sensor coil)				523.27	
<b>Accessories</b>	Switchpoint locking <sup>3)</sup>					15
	Switchpoint fixed and sealed upon customer's request <sup>3)</sup>					88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy <sup>3)</sup>					83
	Switchpoint adjustment please indicate when ordering: - Switchpoint [°C] - Increasing or decreasing					

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

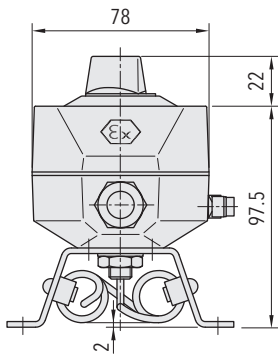
<sup>3)</sup> Only with type 419, internal adjustment

## Standard products (extra short lead time)

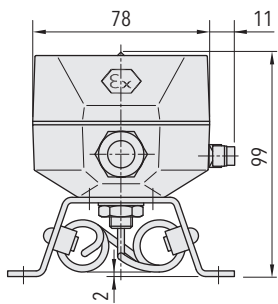
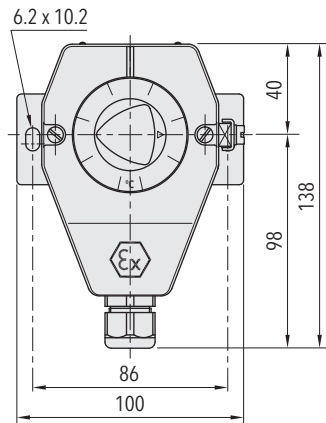
Product No.	Type Code	Temperature range [°C]	Switching differential [°C]	Operating temperature [°C]
EXAS33	419 9102 523 27 0000 0000 02	-30 ... +30	2.5 (fixed)	-30 ... +40
EXAS35	419 9110 523 27 0000 0000 02	+5 ... +35	2.5 (fixed)	-30 ... +50
EXAS60	419 9112 523 27 0000 0000 02	0 ... +60	2.5 (fixed)	-30 ... +60

Specifications		
<b>Accuracy</b>	Repeatability	$\pm 0.5\%$ FS typ.
	Scale accuracy typ.	$\pm 2\%$ FS typ.
	Switching differential	2.5°C (not adjustable)
<b>Environmental conditions</b>	Ambient temperature	-30°C ... +60°C
	Storage temperature	Range $\leq +45^\circ\text{C}$ : -30°C ... +50°C Range $> +45^\circ\text{C}$ : -30°C ... +60°C
	Protection	IP65
	Humidity	Max. 95 % relative
	Vibration	5...25 Hz: $\pm 1.6$ mm 25...100 Hz: 4 g
	Shock	50g/ 11ms
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Polyamide
	Installation	any position
	Weight	~ 950 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	$> 2\text{ M}\Omega$
	Dielectric strength	1.5 kV
	Life time (mechanical)	1 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5/SW24 Cable- $\varnothing$ 5.5...13 mm Approval: PTB 99 ATEX 3128 X
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

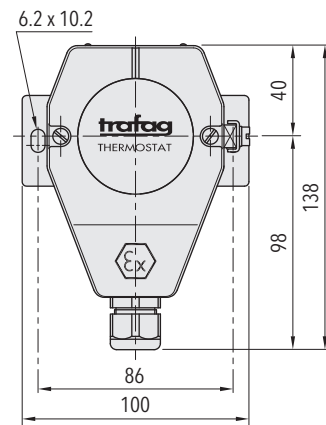
## Dimensions



409.91XX.XXX.27...



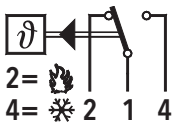
419.91XX.XXX.27...



## Electrical data switch

Type	Features	Rating	
		Resistive Load (Inductive Load)	
		AC	DC
91	Standard Ex	250V 5(5) A 125V 5(5) A	250 V 0.25 (0.03) A 125 V 0.5 (0.06) A 75 V 0.75 (0.25) A 50 V 1 (1) A 30 V 5 (3) A 15 V 5 (3) A

## Electrical connection



409/419

## Additional information

Documents		
	Data sheet	<a href="http://www.trafag.com/H72128">www.trafag.com/H72128</a>
	Instructions	<a href="http://www.trafag.com/H73172">www.trafag.com/H73172</a>
	Flyer	<a href="http://www.trafag.com/H70969">www.trafag.com/H70969</a>

# INDUSTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Hazardous area

## Features

- Compact design
- Rugged housing
- Protection IP65
- Any mounting position possible
- May be used as „simple apparatus“ in zones at risk of explosions

Technical Data			
Designation of application	Industrial room thermostat with remote sensor	Switching differential	Not adjustable
Measuring range	-30°C ... +40°C to +70°C ... +350°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H EN60079-0, EN60079-11 Zone 1 and 2, 21 and 22

Subject to change

# «Simple Apparatus» conformity to ATEX 414

## Ordering information/type code

		XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX
<b>Custom build code</b>	Internal adjustment	414							
<b>Microswitch</b>	With gold plated contacts, switching differential not adjustable		71						
<b>Range</b>	<b>Range [°C]</b>	<b>Sensor max. [°C]</b>							
	-30 ... +40	50							01
	-10 ... +25	60							07
	0 ... +35	70							09
	+10 ... +45	85							11
	+10 ... +80	100							13
	+15 ... +30	60							17
	-10 ... +35	70							94
	-10 ... +80	85							95
	+5 ... +95	105							20
	+20 ... +110	115							23
	+20 ... +150	165							31
	+20 ... +230	250							24
	+40 ... +300	330							53
	+70 ... +350	380							54
<b>Sensor <sup>1)</sup></b>	<b>Range</b>	<b>Sensor diameter [mm]</b>	<b>Sensor material</b>		<b>Range</b>	<b>Sensor diameter [mm]</b>	<b>Sensor material</b>		
	01, 07, 09, 11, 13, 17	Ø7	Stainless steel	421	24, 53, 54	Ø4.7	Copper		112
	94, 95, 20, 23, 31	Ø4.7	Stainless steel	311	24, 53, 54	Ø7	Copper		122
	94, 95, 20, 23, 31	Ø7	Stainless steel	321	24, 53, 54	Ø9	Copper		132
	94, 95, 20, 23, 31	Ø7	Stainless steel	331	01, 07, 09, 11, 13, 17	Ø4.7	Copper nickel plated		413
	94, 95, 20, 23, 31	Ø9	Stainless steel	331	01, 07, 09, 11, 13, 17	Ø7	Copper nickel plated		423
	24, 53, 54	Ø4.7	Stainless steel	111	01, 07, 09, 11, 13, 17	Ø9	Copper nickel plated		433
	24, 53, 54	Ø7	Stainless steel	121	94, 95, 20, 23, 31	Ø4.7	Copper nickel plated		313
	24, 53, 54	Ø9	Stainless steel	131	94, 95, 20, 23, 31	Ø7	Copper nickel plated		323
	01, 07, 09, 11, 13, 17	Ø4.7	Copper	412	94, 95, 20, 23, 31	Ø9	Copper nickel plated		333
	01, 07, 09, 11, 13, 17	Ø7	Copper	422	24, 53, 54	Ø4.7	Copper nickel plated		113
	01, 07, 09, 11, 13, 17	Ø9	Copper	432	24, 53, 54	Ø7	Copper nickel plated		123
	94, 95, 20, 23, 31	Ø4.7	Copper	312	24, 53, 54	Ø9	Copper nickel plated		133
	94, 95, 20, 23, 31	Ø7	Copper	322					
	94, 95, 20, 23, 31	Ø9	Copper	332					
<b>Fixing <sup>2)</sup></b>	Nut M10 (for remote sensing version)								10
	Flange (for remote sensing version)								16
	Console (for remote sensing version)								17
	Bracket (for remote sensing version)								27
	Grubscrew locked, lateral (direct mounting version)								12
	Captive nut (for direct mounting version)								13
	Captive nut (for direct mounting version)								14
	Grubscrew locked with thermal distance piece (for direct mounting version)								18

# «Simple Apparatus» conformity to ATEX 414

	XXX	XX	XX	XXX	XX	XXXXXXXXXX	XX	XX	
<b>Protection tube</b>	See data sheet H72114/H72163						XXXX.XXXX		
<b>Accessories</b>	Switchpoint locking							15	
	Switchpoint fixed and sealed upon customer's request							88	
	Switchpoint preset upon customer's request, no guarantee on switching accuracy							83	
	Switchpoint adjustment please indicate when ordering:								
	- Switchpoint [°C]								
	- Increasing or decreasing								
	Capillary tube protection: Flexible metal tube, brass nickel plated							90	
	Capillary tube protection: Flexible metal tube 1.4541/V2A							91	
<b>Capillary tube length</b>	Capillary tube length up to 5000 mm (no specification required for direct mounting on protection tube) L=XXXX <sup>3)</sup>								

<sup>1)</sup> See data sheet H72114/H72163

<sup>2)</sup> See data sheet H72106

<sup>3)</sup> Overlengths upon request

## Optional accessories of third party supplier

Ex-i barriers are suitable for intrinsically safe applications. The device transmits binary signals from the hazardous area into the safe area.

Ex-i-barriers: 24 VDC $U_0 = 10.5 \text{ V} / I_0 = 13 \text{ mA} / P_0 = 34 \text{ mW}$	ZEN24VDC
Ex-i-barriers: 230 VAC $U_0 = 10.6 \text{ V} / I_0 = 19.1 \text{ mA} / P_0 = 51 \text{ mW}$	ZEN230VAC



**i** Thermostats, when combined with a certified Ex-barrier (see "optional accessories of third party supplier"), can be used as "simple electrical apparatus" in Zone 1 and 2, as well as in Zone 21 and 22, according to IEC/EN 60079-14. These thermostats are not suitable for Zone 0 and Zone 20. Use in safety relevant applications (approved electrical apparatus) is not permitted.

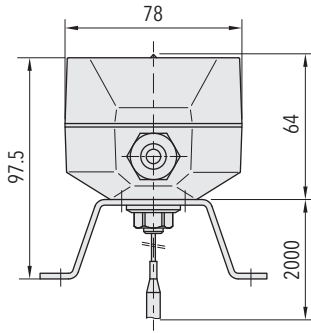


# «Simple Apparatus» conformity to ATEX 414

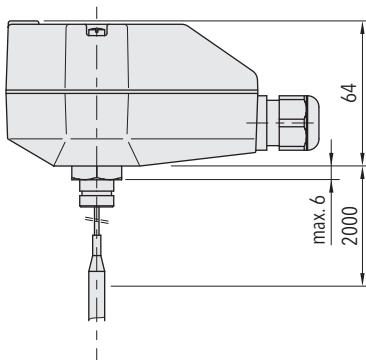
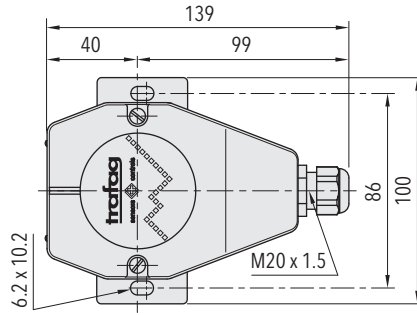
Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	See table
<b>Environmental conditions</b>	Ambient temperature	Range ≤ +45°C: -30°C ... +50°C Range > +45°C: -30°C ... +65°C (important: Temperature at sensor may not exceed maximum sensortemperature)
	Storage temperature	Range ≤ +45°C: -30°C ... +50°C Range > +45°C: -30°C ... +70°C
	Protection	IP65
	Humidity	Max. 95 % relative
	Vibration	5...25 Hz: ±1.6 mm 25...100 Hz: 4g
	Shock	50g/ 11ms
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	Polyamide (PA), light blue
	Installation	Any position Recommendation: screwage pointing downwards
	Weight	~ 950 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	1.25 kV terminal ground
	Life time (mechanical)	1 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable-Ø 4...10 mm, max. cable length according to EN60079-11
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

# «Simple Apparatus» conformity to ATEX 414

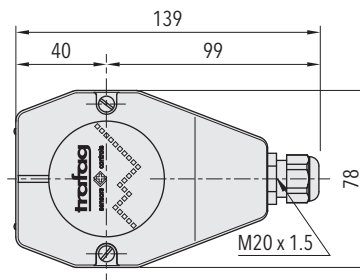
## Dimensions



414.71.XX.XXX.XX.XX...



414.71.XX.XXX.XX.XX...

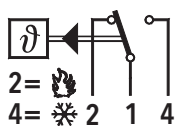


# «Simple Apparatus» conformity to ATEX 414

Switching differential typ.						
<b>Range</b>	<b>[°C]</b>	-30 ... +40 -10 ... +25 0 ... +35 +15 ... +30 +10 ... +45 +10 ... +80	-10 ... +35 -10 ... +80 +5 ... +95 +20 ... +110	+20 ... +150	+20 ... +230	+40 ... +300 +70 ... +350
<b>Microswitch 71</b> Switching differential (fixed value, not adjustable)	<b>[°C]</b>	0.7	2	2.5	3	4

Electrical data switch		
Type	Features	Rating
71	With gold plated contacts, switching differential not adjustable	$U_0 = 24\text{ V}$ $I_0 = 100\text{ mA}$ $P_0 = 600\text{ mW}$

## Electrical connection



Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72183">www.trafag.com/H72183</a>
	Instructions	<a href="http://www.trafag.com/H73173">www.trafag.com/H73173</a>
	Flyer	<a href="http://www.trafag.com/H70971">www.trafag.com/H70971</a>

# AMBISTAT

Swiss based Trafag is a leading international supplier of high quality sensors and monitoring instruments for the measurement of pressure and temperature.



## Applications

- Potentially explosive atmosphere

## Features

- Compact design
- Rugged housing
- Protection IP65
- Any mounting position possible
- May be used as „simple apparatus“ in zones at risk of explosions

### Technical Data

Designation of application	Industrial room thermostat	Switching differential	Not adjustable
Measuring range	-30°C ... +30°C to 0°C ... +60°C	Repeatability	± 0.5 % FS typ.
Output signal	Floating change-over contact	Approval / conformity	EN60730-1/ EN60730-2-9: Typ 2.B.H EN60079-0, EN60079-11 Zone 1 and 2, 21 and 22

Subject to change

# «Simple Apparatus» conformity to ATEX 419

## Ordering information/type code

		XXX	XX	XX	XXXXXX	XX
<b>Custom build code</b>	Internal adjustment	419				
<b>Microswitch</b>	With gold plated contacts, switching differential not adjustable		71			
<b>Range</b>	<b>Range [°C]</b>	<b>Operating temperature [°C]</b>				
	-30 ... +30	-30 ... +40			02	
	-20 ... +40	-30 ... +50			06	
	+5 ... +35	-30 ... +50			10	
	0 ... +60	-30 ... +65			12	
<b>Sensor / Fixing</b>	Sensor: Copper; Fixation: Bracket (open sensor coil)				522.27	
	Sensor: Copper nickel plated; Fixation: Bracket (open sensor coil)				523.27	
<b>Accessories</b>	Switchpoint locking					15
	Switchpoint fixed and sealed upon customer's request					88
	Switchpoint preset upon customer's request, no guarantee on switching accuracy					83
	Switchpoint adjustment please indicate when ordering:					
	- Switchpoint [°C]					
	- Increasing or decreasing					

### Optional accessories of third party supplier

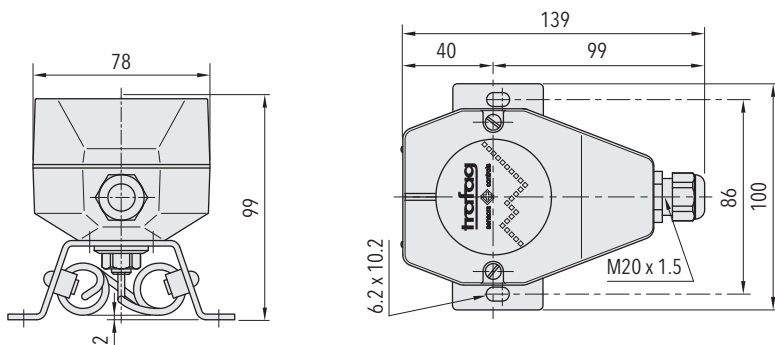
Ex-i barriers are suitable for intrinsically safe applications. The device transmits binary signals from the hazardous area into the safe area.

Ex-i-barriers: 24 VDC $U_0 = 10.5 \text{ V} / I_0 = 13 \text{ mA} / P_0 = 34 \text{ mW}$	ZEN24VDC
Ex-i-barriers: 230 VAC $U_0 = 10.6 \text{ V} / I_0 = 19.1 \text{ mA} / P_0 = 51 \text{ mW}$	ZEN230VAC



**i** Thermostats, when combined with a certified Ex-barrier (see "optional accessories of third party supplier"), can be used as "simple electrical apparatus" in Zone 1 and 2, as well as in Zone 21 and 22, according to IEC/EN 60079-14. These thermostats are not suitable for Zone 0 and Zone 20. Use in safety relevant applications (approved electrical apparatus) is not permitted.

## Dimensions



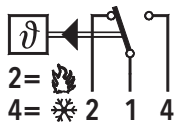
419.71.XX.52X.27.XX

# «Simple Apparatus» conformity to ATEX 419

Specifications		
<b>Accuracy</b>	Repeatability	± 0.5 % FS typ.
	Scale accuracy typ.	± 2 % FS typ.
	Switching differential	0.7°C (not adjustable)
<b>Environmental conditions</b>	Ambient temperature	-30°C ... max. +65°C
	Storage temperature	Range ≤ +40°C: -30 ... +50°C Range > +40°C: -30 ... +70°C
	Protection	IP65
	Humidity	Max. 95 % relative
<b>Mechanical Data</b>	Sensor housing	See ordering information
	Filling	Liquid
	Housing	AlSi9Cu3, coated
	Screwed cable gland	PA, Polyamide, light blue
	Installation	Any position Recommendation: screwage pointing downwards
	Weight	~ 950 g
<b>Microswitch</b>	Rating	See table
	Resistance of insulation	> 2 MΩ
	Dielectric strength	500 V AC terminal ground
	Life time (mechanical)	1 Mio. cycles
<b>Electrical connection</b>	Cable gland	M20x1.5 Cable-Ø 4...10 mm, max. cable length according to EN60079-11
	Terminal screw	3 x 1...2.5 mm <sup>2</sup>

Electrical data switch		
Type	Features	Rating
71	Gold plated contacts	U <sub>0</sub> = 24 V I <sub>0</sub> = 100 mA P <sub>0</sub> = 600 mW

## Electrical connection



Additional information		
<b>Documents</b>	Data sheet	<a href="http://www.trafag.com/H72182">www.trafag.com/H72182</a>
	Instructions	<a href="http://www.trafag.com/H73173">www.trafag.com/H73173</a>
	Flyer	<a href="http://www.trafag.com/H70972">www.trafag.com/H70972</a>

# Safety temperature limiter KTSB

PTB 09  
ATEX 1027



## Features

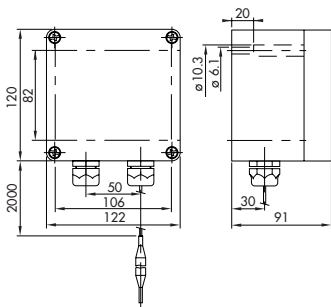
- High current ratings 16 A
- With mechanical reset
- Internal switchpoint adjustment

## Technical Data

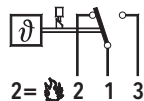
Sensor technology	Capillary tube with remote sensor
Sensor material	1.4435/316L
Output signal	Microswitch
Electrical connection	Screw terminal

## Standard products (extra short lead time)

Product No.	Range T [°C]	Operating temperature [°C]	Media temperature [°C]	Capillary tube length [m]
KTSB150S	+20 ... +150	-50 ... +60	max. 165	2
KTSB230S	+20 ... +230	-50 ... +60	max. 250	2
KTSB350S	+70 ... +350	-50 ... +60	max. 380	2



AC 400 V, 16 A



- Areas with gas explosion hazards EX II 2 G Ex d e IIC T6
- Areas with dust explosion hazards EX II 2 D Ex tD A21 IP 66 T80°C



Data sheet

[www.trafag.com/H72181](http://www.trafag.com/H72181)

# Marine transmitter for PT100 sensors T...



## Features

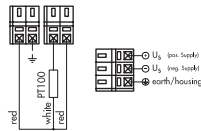
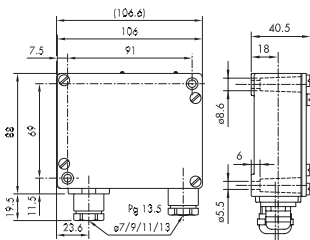
- For shipbuilding
- 4 ... 20 mA
- Protection IP65

## Technical Data

Sensor type	PT100
Operating temperature	-40 ... +85 °C
Electrical connection	Screw terminal
Output signal	4 ... 20 mA

## Standard products (extra short lead time)

Product No.	Type code	Range T [°C]	Supply [VDC]	Product No.	Type code	Range T [°C]	Supply [VDC]
T50	8100 01 0003 01	-50 ... +50	12 ... 30	T200	8100 05 0003 01	0 ... +200	12 ... 30
T100	8100 02 0003 01	0 ... +100	12 ... 30	T400	8100 06 0003 01	0 ... +400	12 ... 30



Data sheet  
Instructions

[www.trafag.com/H72102](http://www.trafag.com/H72102)  
[www.trafag.com/H73102](http://www.trafag.com/H73102)

# Temperature sensor PT100



## Features

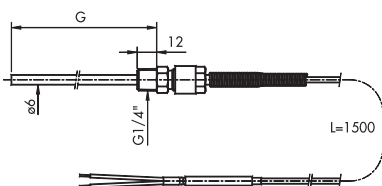
- 2-wire temperature sensor
- Incl. mounting stopper
- Protection IP65

## Technical Data

Sensor type	PT100 (IEC751)
Protection tube material	1.4435/316L
Immersion	Adjustable
Electrical connection	2 wires

## Standard products (extra short lead time)

Product No.	Range T [°C]	Protection tube length G [mm]	Class (IEC751)
PT100L15	-50 ... +250	150	B





# Temperature sensor PT100/1000



## Features

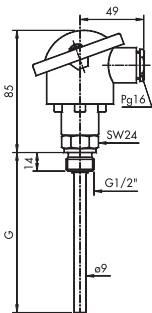
- 3-wire temperature sensor in DIN B head
- Protection IP65

## Technical Data

Sensor type	PT100 (IEC751) or 1000
Protection tube material	1.4435/316L
Immersion	Adjustable
Electrical connection	3 wires

## Standard products (extra short lead time)

Product No.	Range T [°C]	Protection tube length G [mm]	Class (IEC751)	Product No.	Range T [°C]	Protection tube length G [mm]	Class (IEC751)
PT100L12	-50 ... +250	120	B	PT100L40	-50 ... +250	400	B
PT1000L12	-50 ... +250	120	B				



# Temperature sensor



## Features

- High Precision
- Compliant with DIN 43760
- Measuring current 5 mA

## Technical Data

Sensor material	Nickel thin film on ceramic
Temperature range	-60°C ... +200°C
Response time water flow	0.3 s (@ 0.2m/s)
Response time airflow	27 s (@ 0.2m/s)

## Description

Resistivity R <sub>0</sub> @ 0°C [Ohm]	Electrical connection
100	lead frames
1000	lead frames

# Electronic thermostat with display and relay LTR



## Features

- 1 Panel mounting
- Single stage thermostat with display
- 1 Relay (SPDT)
- Protection IP54

## Technical Data

Sensor type	PTC1000
Output signal	1 Relay
Electrical connection	Screw terminal
Operating temperature	-10°C... +50°C

## Standard products (extra short lead time)

Product No.	Range T [°C]	Relay Output	U-Supply [VAC]	Dimensions [mm]	Cutout of panel
LTR5TSRE	-50 ... +150	240V/16 (4)A	240	76 x 35 x 77	71 x 29

# Electronic controller with display ATR



## Features

- Supply voltage: 24 ... 230 VAC/VDC
- 17 Sensor inputs to select
- 2 Relays and 1 SSR output, configurable

## Technical Data

Inputs (to be selected)	Thermocouples: K,S,R,J Thermoresistors: PT100, PT500, PT1000, NI100, PTC, NTC, Potentiometers Linear signals: 0...10V, 0...20mA, 4...20mA, 0...40mV
Protection	IP65 front panel (with gasket) IP30 housing IP20 terminals
Operating temperature	0°C ... +45°C

## Standard products (extra short lead time)

Product No.	Output signal	Supply voltage	Dimensions [mm]	Cutout of panel [mm]
ATR142	Relay 1: 8A - 250 VAC Resistive Load Relay 2: 5A - 250 VAC Resistive Load SSR 1: Configurable as command output and / or alarm output 12 VDC, 30 mA	24 ... 230 VAC/VDC ±15 %	77 x 35 x 60	28.5 x 70.5

# Hygrostat HMH



## Features

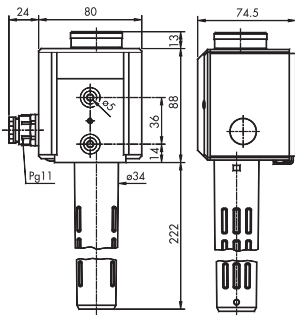
- With adjustable switch point
- rH 10 ... 100 %

## Technical Data

Protection	IP54
Operating temperature	-20°C... +60°C
Output signal	1 Microswitch 250 V / 10 A
Electrical connection	Screw terminal

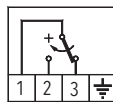
## Standard products (extra short lead time)

Product No.	Humidity [%rH]	Hysteresis [d%rH]	Sensor T max. [°C]
HMH	10 ... 100	approx. 1.5	+70



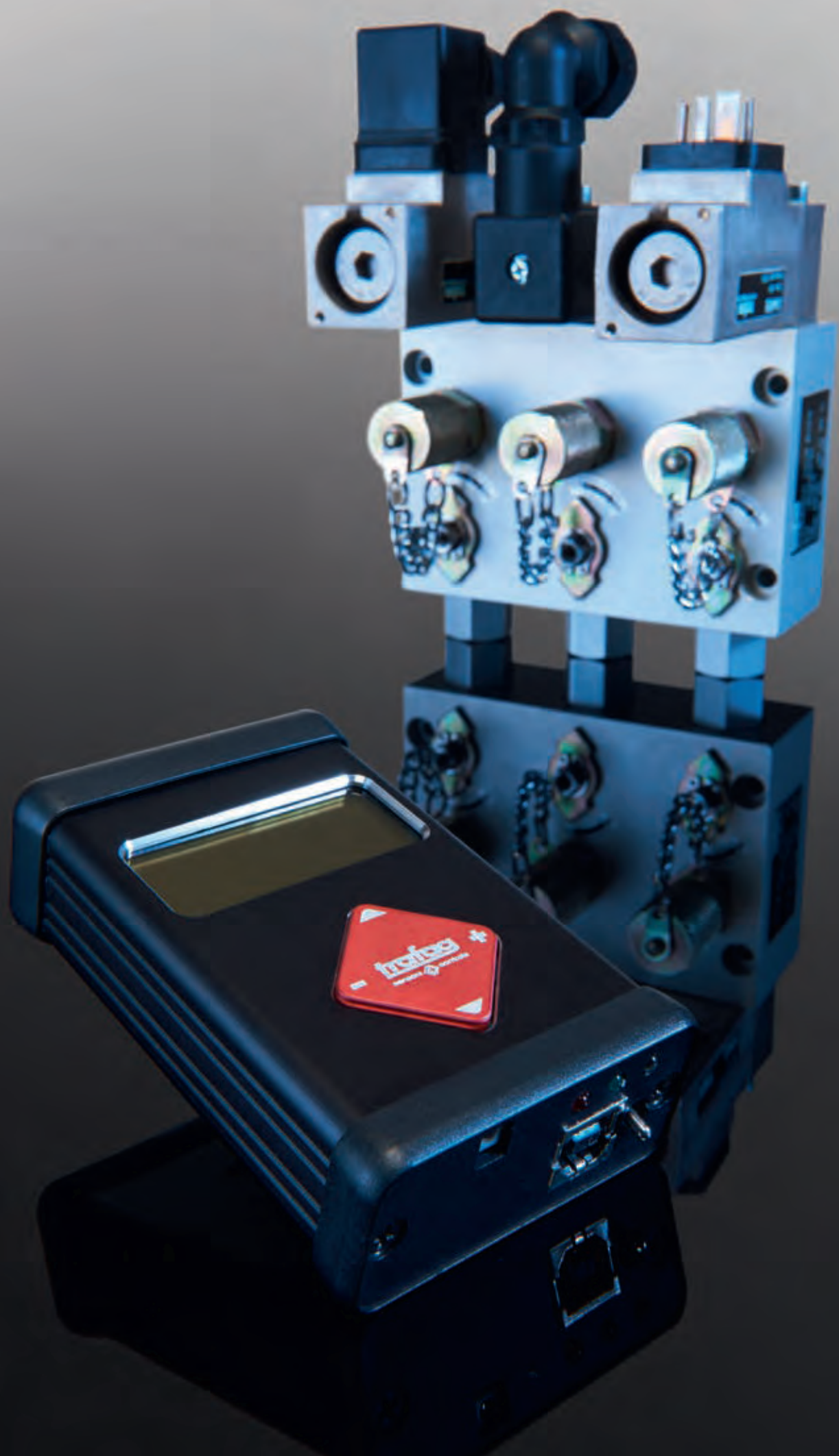
AC 250 V, 10 A (25 °C)  
8 A (60 °C)

2 = dehumidifying  
3 = humidifying



Data sheet

[www.trafag.com/H72402](http://www.trafag.com/H72402)



# Accessories

Trafag offers a wide range of original accessories which are ideally matched to our products. These include devices for monitoring or configuring transmitters such as hand pumps with precision pressure gauge or the Sensor Communicator, a handheld device which provides direct access to the calibration values of the transmitter in the Trafag ASIC. Trafag also offers a wide range of accessories meet specific application requirements and also make installation easier. They include diagnostic valve manifolds, snubbers and pressure peak damping elements for measuring pressure, or protective pipes for thermostats.

## Accessories for thermostats

- Protection tubes for direct mounting and remote sensors
- Duct mounting bracket
- Capillary tube holder
- Mounting brackets
- Screwed cable glands, ship approved, for retrofit



# MB31

## Mounting Plate

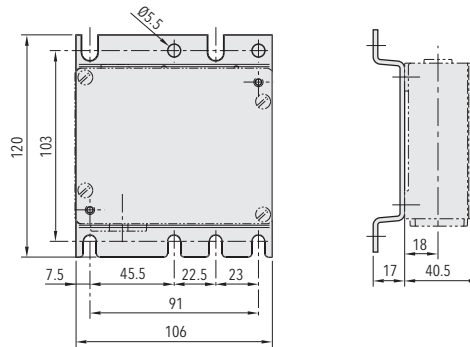


### Features

- For pressure transmitters and pressure switches

### Technical Data

Material	Steel galvanised
----------	------------------



### Standard products (extra short lead time)

Product No	Suitable for type	Material
MB31	N, ND, P, PS, PV, PD, PK, PVF, EXP, EXPK, EXPD	Steel galvanised

# CG

## Screwed cable gland



### Features

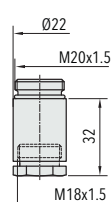
- DIN 8280 for shipbuilding
- Retrofit for pressure transmitters, pressure switches and thermostats

### Technical Data

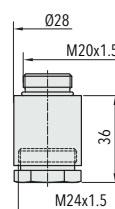
Material	Brass
Connection	M18x1.5, M24x1.5
Cable	Ø 10.5 mm, 16.5 mm

### Standard products (extra short lead time)

Product No		Material
CG18	M18x1.5 for 8 ... 10.5 mm cable diameter	Brass
CG24	M24x1.5 for 14 ... 16.5 mm cable diameter	Brass



CG18



CG24

# 83../84..

## Protection tubes for remote sensors



### Features

- For liquid media
- Pressure proof up to 25 bar (types 83xx)
- Pressure proof up to 40 bar (types 84xx)

### Technical Data

Material	Stainless steel 1.44435/316L, brass nickel plated
Media temperature	See table

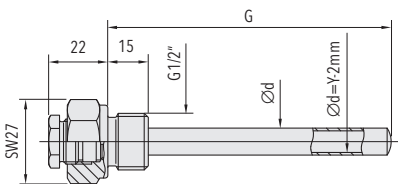


Data sheet

[www.trafag.com/H72163](http://www.trafag.com/H72163)

### Standard products (extra short lead time)

Product No	Suitable for type	Material	Protection tube diameter [mm]	Protection tube length [mm]
83160110K	M, MS, M2S, L, I, IS, ISP	Brass nickel plated	10	110
83160150K	M, MS, M2S, L, I, IS, ISP, ISN	Brass nickel plated	10	150
83160200K	I, IS	Brass nickel plated	10	200
83160300K	M, MS, M2S, L, I, IS	Brass nickel plated	10	300
83160400K	M, MS, M2S, L, I, IS	Brass nickel plated	10	400
83170110	ISP, ISN	Brass nickel plated	12	110
83180150K	D ... R	Brass nickel plated	14	150
83190065	ISP, ISN	Brass nickel plated	15	65
84110110K	M, MS, M2S, L, I, IS, ISP	1.4435 (AISI316L)	10	110
84110150K	M, MS, M2S, L, I, IS, ISP, ISN	1.4435 (AISI316L)	10	150
84110200K	I, IS	1.4435 (AISI316L)	10	200
84110400K	M, MS, M2S, L, I, IS	1.4435 (AISI316L)	10	400
84120110	ISP, ISN	1.4435 (AISI316L)	12	110
84140065	ISP, ISN	1.4435 (AISI316L)	15	65



### Operating temperature

Length G [mm]	Range T [°C]	Sensor-Ø [mm]
200	-30 ... +40, 0 ... +35, +10 ... +80	7
150	+5 ... +95, +20 ... +150, +20 ... +110	7
110	+20 ... +230, +70 ... +350	7
180	-30 ... +40, 0 ... +35	5.5/11
150	+5 ... +95, +20 ... +150	5.5/11
110	+20 ... +230, +70 ... +350	9
65	+5 ... +95, +20 ... +150, +20 ... +110	12

# 121.../141...

## Protection tubes for direct mounting

### Features

- For thermostats type MST and ISPT/ISNT
- Lateral clamp mounting (type MST)
- Pressure proof up to 40 bar (types 141x)
- With captive nut (types 141x)



### Technical Data

Material	Stainless steel 1.44435/316L, brass nickel plated
Media temperature	See table

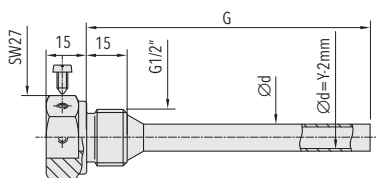


Data sheet

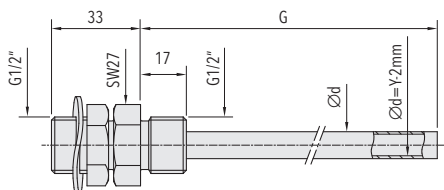
[www.trafag.com/H72163](http://www.trafag.com/H72163)

### Standard products (extra short lead time)

Product No	Suitable for type	Material	Protection tube diameter [mm]	Protection tube length [mm]
12110150K	MST ... 15	1.4435 (AISI316L)	10	150
12110400K	MST ... 40	1.4435 (AISI316L)	10	400
12160150K	MST ... 15	Brass nickel plated	10	150
12160400K	MST ... 40	Brass nickel plated	10	400
14110150K	ISNT ... 150	1.4435 (AISI316L)	10	150
14120110K	ISNT ... 110	1.4435 (AISI316L)	12	110
14140065K	ISP/ISNT ... 65	1.4435 (AISI316L)	15	65



121X..



141X..

### Operating temperature

Length G [mm]	Range T [°C]	Sensor-Ø [mm]
200	-30 ... +40, 0 ... +35, +10 ... +80	7
150	+5 ... +95, +20 ... +150, +20 ... +110	7
110	+20 ... +230, +70 ... +350	7
180	-30 ... +40, 0 ... +35	5.5/11
150	+5 ... +95, +20 ... +150	5.5/11
110	+20 ... +230, +70 ... +350	9
65	+5 ... +95, +20 ... +150, +20 ... +110	12



# W.../K...

## Thermostat sensor duct holder



### Features

- For HVAC
- For retrofitting of thermostats

### Technical Data

Material Steel galvanised

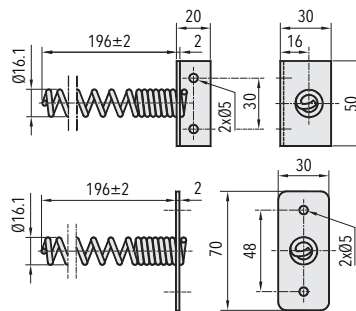


Data sheet

[www.trafag.com/H72106](http://www.trafag.com/H72106)

### Standard products (extra short lead time)

Product No	Suitable for type	Material
K200	L, LF, M, MS	Steel galvanised
W200	I, IS, M2, M2S	Steel galvanised



# K80140

## Capillary tube holder

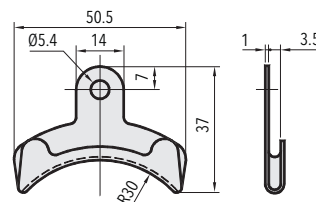


### Features

- For Froststats F/F...R

### Technical Data

Material Steel galvanised



### Standard products (extra short lead time)

Product No	Material	Package size
K80140	Steel galvanised	6 pcs.

# Terminology for pressure measurement instruments

## Relevant standards

DIN 16086, IEC 61298-2

### Instrument types

#### Pressure sensors

Membranes with elements applied whose physical properties change when the membranes deform (strain gauges with changing resistance, for example).

#### Pressure transmitters

Transmitters for converting the pressure to be measured into a defined or standardised analogue and/or digital output signal.

#### Pressure transducers

Pressure sensors that have a process connection and electrical connection (e.g. connector) but do not convert pressure into a standardised electrical signal like a pressure transmitter.

### Types of pressure measurement

#### Differential pressure measurement

The measurement of differential pressure of two different pressures. The measuring instrument has two pressure connections.

#### Absolute pressure measurement

The measuring result is always the deviation to the absolute zero (vacuum).

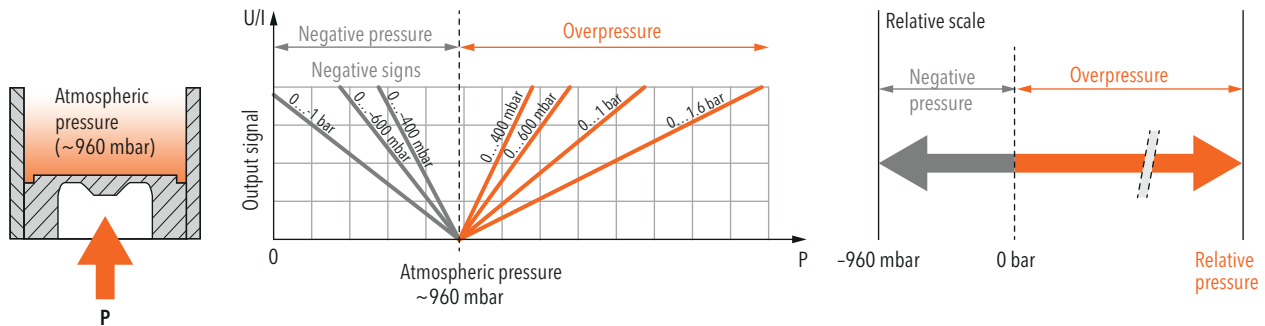
e.g. 4 mA = 0 bar (= vacuum); zero point (ZP): 0 bar

#### Relative pressure measurement DIN 16086: overpressure

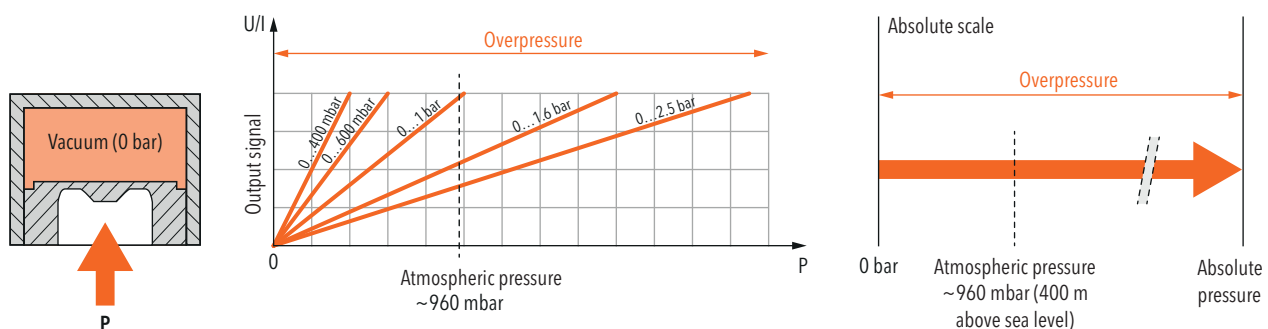
The measuring result is always the deviation to the current, absolute atmospheric pressure.

e.g. 4 mA = 960 mbar (= atmospheric pressure); zero point (ZP): 0 bar

### Relative pressure measurement



### Absolute pressure measurement



# Terminology for pressure measurement instruments

## Main features

### Nominal pressure measuring range

Range between the upper and lower limits of the size measured (operating pressure). The specified accuracy remains within this range.

### Measuring span

Algebraic difference between the upper and lower limit values of a certain measuring range.

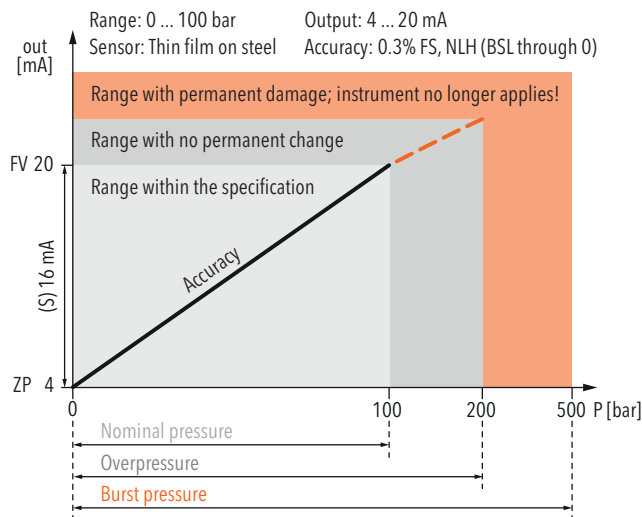
### Overpressure Max. working pressure

Highest pressure specified by manufacturer for which the pressure transformer is designed at maximum temperature. The pressure transformer can be loaded up to this pressure without the guaranteed metrological properties having changed after going back into the measuring range. However, there is no longer a clear link between pressure and output signal in the range between nominal pressure and overpressure.

### Burst pressure

Pressure value (static) at which the measuring instrument suffers permanent damage. The instrument can withstand pressures up to this value without bursting and will not leak any measuring medium.

## Example



## Accuracy

### Typ. accuracy

(Typical) Mostly corresponds to the 1-sigma value of the normal distribution, i.e. approx. 68.3%. Generally, well over 75% of all Trafag instruments meet this typical measured value.

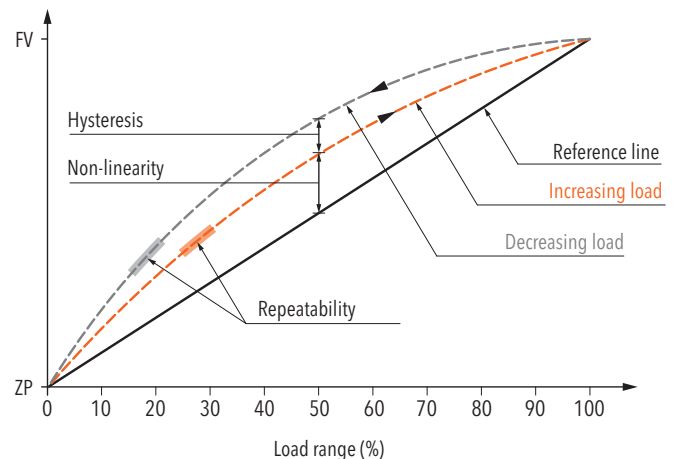
### Max. accuracy

(maximum) 100% of all instruments meet this maximum measured value.

### Non-linearity

The largest deviation from the effective characteristic line of an ideal reference line. The reference line can be defined as a limit point adjustment, a BSL or a BSL through 0.

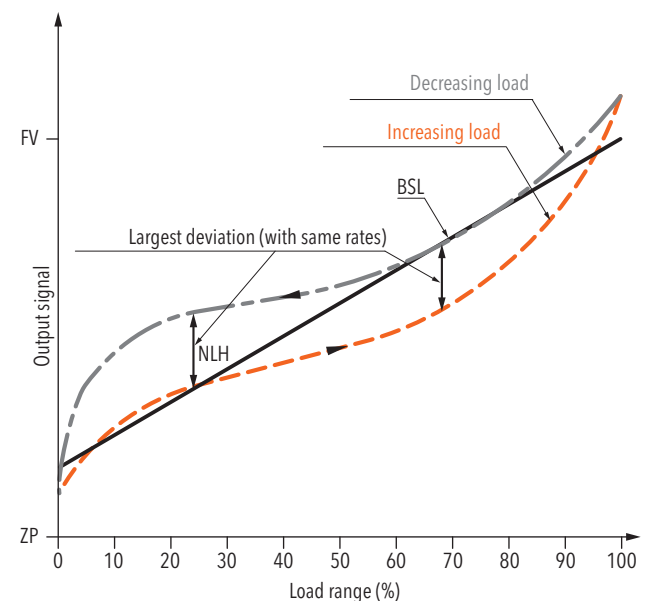
## Specifications: Non-linearity, Hysteresis



### BSL Best Straight Line

The reference line according to the BSL or the minimum value adjustment is placed in such a way that the maximum positive and negative deviations are as small as possible.

## Specifications: Accuracy NLH (BSL)

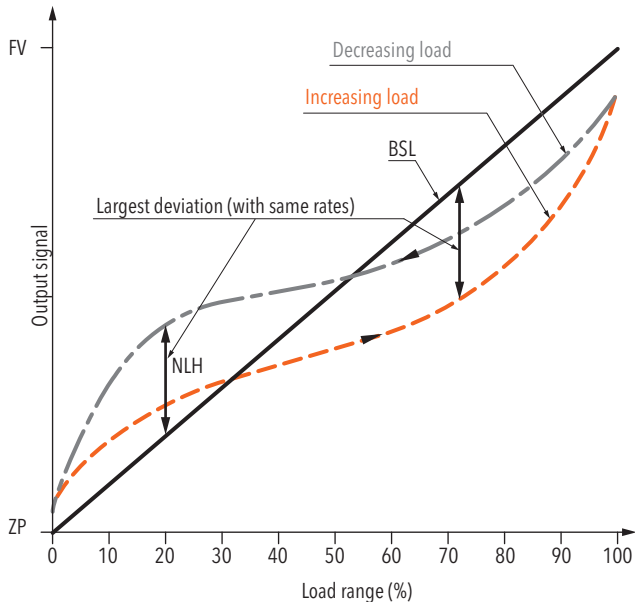


# Terminology for pressure measurement instruments

## BSL through zero

As an additional requirement for the minimum value adjustment, the BSL through zero (also BSL/0) must go straight through zero or the origin.

## Specifications: Accuracy NLH (BSL through zero)



## Non-linearity according to limit point adjustment

The reference line runs through the origin and end point of the characteristic line. Non-linearity indicates the greatest deviations from this line.

## Hysteresis

Property of an instrument for yielding different output values in relation to its input values, which are dependent on the effective direction in which the input values are created (acc. to IEC 61298-2).

## Pressure hysteresis

The difference that occurs at the same pressure between measurements in the direction of increasing and then decreasing pressure.

## Temperature hysteresis

Maximum change of the zero point and output span for the pressure signal after specified temperature cycle over the operating temperature range.

## NLH non-linearity and hysteresis

Largest deviation from the ideal characteristic line (BSL, BSL/0 or limit point). In pressure measuring instruments, the non-linearity and pressure hysteresis are given together at a constant temperature.

## Accuracy DIN 16086: Measurement deviation

The accuracy denoted in the standard DIN 16086 with measurement deviation (at 25°C reference temperature) includes all deviations as a result of non-linearity, hysteresis, non-repeatability, zero point (start of measuring range) errors and span (end of measuring range) errors. Zero point errors and span errors also include the measuring uncertainty of the configuration ensemble.

## Repeatability DIN 16086: Non-repeatability

Deviation of the output signals with same input signals under identical (established) application conditions.

## Temperature coefficient TC

Change of measured value for zero point and span as a result of changes in temperature.

## Long-term stability Long-term drift

The change of accuracy due to aging under certain reference conditions during a certain period of time, typically 1 year.

## TEB Total error band

Total error (root from sum of the square of the deviations) due to measurement deviations (accuracy) and temperature influence (temperature coefficient TC). The temperature influence is usually given in the information from Trafag across a range larger than that given in the standard (-10 ... +60 °C). Whilst DIN 16086 also continues to add to the long-term stability over a year, the information from Trafag is subject to ex-works conditions for obvious reasons.

## Scale accuracy

For pressostats: Deviation arising from the manual switch point adjustment with the help of the display (scale).

## Electrical Data

### Output signal

Electrical signal that emits the value of the measurement size for further processing

### Rise time Step response

The time it takes for an output signal after a severe pressure change to increase from 10% to 90% of its final value that results from the change in pressure.

### Zero point ZP

Output signal in the pressureless state ( $P_{min}$ ), e.g. 4 mA at 0 bar ( $P_{min}$ ).

# Terminology for pressure measurement instruments

## Final value FV

Output value of the largest pressure value in the nominal pressure range ( $P_{\max}$ ), e.g. 20 mA at 100 bar ( $P_{\max}$ ).

## Span S

Final value (FV) - zero point (ZP) = span (S)  
e.g. span (S) = (FV) 20 mA - (ZP) 4 mA = 16 mA

## Switching differential Pressostats

Range within which the micro-switch in pressostats switches on and off

Example:

X...X = adjustable value

X - X = non-adjustable value; runs proportional to the nominal pressure

X = fixed value

## Limiter Pressostats

Pressostat with manual micro-switch reset.

## Environmental conditions

### Media temperature

Permissible temperature range of the measuring media.

### Operating temperature Ambient temperature

Temperature range in which the measuring instrument adheres to its specifications. As the electronics in certain instruments are more sensitive to temperature than the sensor element, the maximum ambient temperature for the instrument is lower than the permissible media temperature.

### Storage temperature

Temperature range in which the measuring instrument can be stored or transported without permanently changing the measuring characteristics.

### Protection

Humidity and dust shield according to IP classes in accordance with EN 60529.

## EMC Protection

### EMC Electromagnetic compatibility

Instrument property for functioning in an environment with electromagnetic interference and for not unduly influencing this environment (to which other equipment also belongs).

### Immision

Immunity to external electromagnetic disturbances.

### Emission

Interference emission from electromagnetic disturbances.

### Surge

Immunity to unipolar surge voltages that can occur due to surges as a result of switching operation and lighting.

### Burst

Immunity to recurring, rapid, transient electrical disturbances.

# Information on Ex products

Trafag offers a wide range of EX-, ATEX- and IECEx approved products for pressure and temperature monitoring. These products provide reliable functionality in various hazardous zones, with a guaranteed safety operation. In addition to both CE and ATEX-conformance, Trafag products are also extremely fail-safe.

## CE - Designation and labelling

CE 1258  $\text{Ex}$  II 2 GD

Control No. of notified body for the supervision of the quality assurance system

I: Mining  
II: All other applications

Category (see below)

G = Gas  
D = Dust

- Category 1: Can be used in zone 0 (gas) and 20 (dust)
  - Potentially explosive atmosphere: Permanent
  - Two independent failures – safety
- Category 2: Can be used in zone 1 (gas) and 21 (dust)
  - Potentially explosive atmosphere: Regularly
  - One failure – safety
- Category 3: Can be used in zone 2 (gas) and 22 (dust)
  - Potentially explosive atmosphere: Unlikely or for very short time

## IEC/EN 60079-8 – Gases

Ex ia IIC T6 Ga

Type of protection

Equipment groups (for gases)

Temperature class

Equipment protection level

- Type of protection: Intrinsically safe
- Equipment group (gases): IIC = Hydrogen, Acetylene
- Temperature level: Defines ignition temperature and permissible temperature of equipment surface
- Protection level: Referring to installation zone (Ga = Zone 0 = Category 1 in ATEX)

## IEC/EN 60079-0 – Dust

Ex ia IIIC IP6X T130 °C Da

Type of protection

Equipment groups (for dust)

IP protection

Surface temperature

Equipment protection level

- Type of protection: Intrinsically safe, powder filling, encapsulation, ...
- Equipment group (dust): IIIC = Conductive dust
- Temperature level: Defines maximum surface temperature
- Protection level: Referring to installation zone (Da = Zone 20 = Category 1 in ATEX)

## EN 50303 – Mining

Ex ia I Ma

Type of protection

Equipment for mining

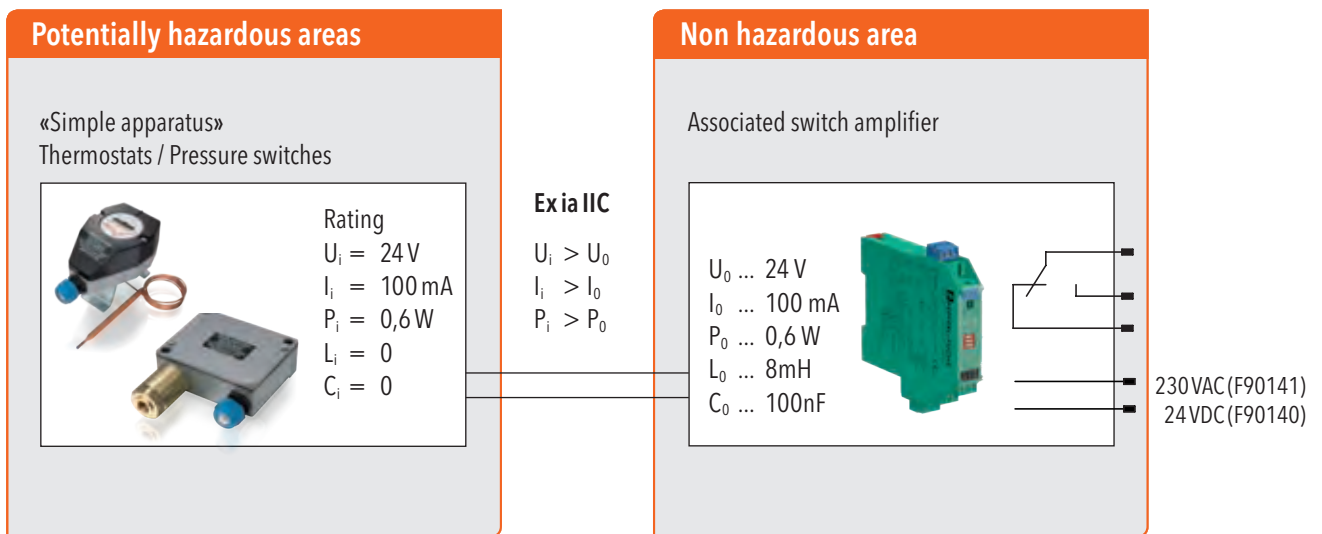
Equipment protection level

- Category and Protection level:
  - Category M1 / Protection level Ma: Fully functional and safe when explosive atmosphere is present. Requires means to cope with two independent failures
  - Category M2 / Protection level Mb: These products are intended to be deenergised in the presence of an explosive atmosphere

# Simple Apparatus

Pressostats and Thermostats, when combined with a certified switch amplifier (Zener barrier/Zener relay), can be used as «simple electrical apparatus» in Zone 1 and 2, as well as in Zone 21 and 22, according to EN 60079-11. These pressostats and thermostats are not suitable for Zone 0 and Zone 20. The use in safety relevant applications (approved electrical apparatus) is not permitted.

Switch amplifiers are suitable for intrinsically safe applications. The device transmits signals from the hazardous area into the safe area.



Recommended switch amplifier (see chapter "Accessories"):

Trafag parts no.: ZEN230VAC (230 VAC)

ZEN24VDC (24 VDC)

If another type of switch amplifier is used, make sure its electrical rating limits are within the specification of the simple apparatus thermostat or pressostat.

# Fluid resistance guide

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION		RESILIENT MATERIALS	PLASTICS	METALS	
S	S	S	S	S	Acetaldehyde
S	S	S	S	S	Acetamide
S	S	S	S	S	Acetate, Amyl
S	S	S	S	S	Acetic acid, 10%
S	S	S	S	S	Acetic acid, Glacial
S	S	S	S	S	Acetic anhydride
S	S	S	S	S	Acetone
S	S	S	S	S	Acetylene gas
S	S	S	S	S	Acetylene tetra-chloride
S	S	S	S	S	Acrylic acid
S	S	S	S	S	Alcohol, amyl
S	S	S	S	S	Alcohol ethyl (Ethanol)
S	S	S	S	S	Alcohol methyl (Methanol)
S	S	S	S	S	Alkazine
S	S	S	S	S	Alumina
S	S	S	S	S	Aluminum chloride
S	S	S	S	S	Aluminum oxide
S	S	S	S	S	Aluminum hydroxide
S	S	S	S	S	Aluminum potassium sulfate
S	S	S	S	S	Aluminum potassium 10%
S	S	S	S	S	Aluminum sodium sulfate
S	S	S	S	S	Aluminum sulfate (Alum)
S	S	S	S	S	Ammonia
S	S	S	S	S	Ammonium bicarbonate
S	S	S	S	S	Ammonium bromide
S	S	S	S	S	Ammonium carbonate
S	S	S	S	S	Ammonium chloride
S	S	S	S	S	Ammonium hydroxide
S	S	S	S	S	Ammonium monophosphate
S	S	S	S	S	Ammonium nitrate
S	S	S	S	S	Ammonium nitrate hydroxide 25%
S	S	S	S	S	Ammonium persulfate 5%
S	S	S	S	S	Ammonium phosphate
S	S	S	S	S	Ammonium sulfate
S	S	S	S	S	Ammonium sulfite
S	S	S	S	S	Ammonium triphosphate
S	S	S	S	S	Amyl acetate
S	S	S	S	S	Aniline dyes
S	S	S	S	S	Aniline hydrochloride
S	S	S	S	S	Animal fat
S	S	S	S	S	Antimony trichloride
S	S	S	S	S	Antioxidants
S	S	S	S	S	Argon gas
S	S	S	S	S	Aromatic hydrocarbons
S	S	S	S	S	Arsenic acid
S	S	S	S	S	Arsenic trichloride
S	S	S	S	S	Asphalt
S	S	S	S	S	Barium chloride 5%
S	S	S	S	S	Barium hydroxide
S	S	S	S	S	Barium nitrate
S	S	S	S	S	Barium sulphide
S	S	S	S	S	Beer
S	S	S	S	S	Beet sugar liquid
S	S	S	S	S	Benzene benzol (Benzene)
S	S	S	S	S	Benzaldehyde
S	S	S	S	S	Benzic acid
S	S	S	S	S	Black sulfate liquor
S	S	S	S	S	Blast furnace gas
S	S	S	S	S	Bleaching powder, wet
S	S	S	S	S	Blood
S	S	S	S	S	Borax
S	S	S	S	S	Boric acid
S	S	S	S	S	Brake fluid (non-petroleum)
S	S	S	S	S	Brine
S	S	S	S	S	Bromine, dry
S	S	S	S	S	Bromine, wet
S	S	S	S	S	Butadiene (gas)
S	S	S	S	S	Butane
S	S	S	S	S	Butanol
S	S	S	S	S	Buttermilk
S	S	S	S	S	Butyl acetate
S	S	S	S	S	Butyl alcohol
S	S	S	S	S	Butyl stearate
S	S	S	S	S	Butyric acid
S	S	S	S	S	Calcium acetate
S	S	S	S	S	Calcium bisulfite
S	S	S	S	S	Calcium carbide
S	S	S	S	S	Calcium carbonate
S	S	S	S	S	Calcium chlorate
S	S	S	S	S	Calcium chloride
S	S	S	S	S	Calcium nitrate
S	S	S	S	S	Calcium sulfite
S	S	S	S	S	Calcium sulfide
S	S	S	S	S	Calgon
S	S	S	S	S	Cane sugar syrup
S	S	S	S	S	Carbolic acid (Phenol)
S	S	S	S	S	Carbon bisulfide
S	S	S	S	S	Carbon dioxide dry
S	S	S	S	S	Carbon disulfide
S	S	S	S	S	Carbon monoxide
S	S	S	S	S	Carbon tetrachloride
S	S	S	S	S	Carbonated water

CODES: S - SATISFACTORY F - FAIR U - UNSATISFACTORY T - TEST FOR SPECIFIC APPLICATION		RESILIENT MATERIALS	PLASTICS	METALS	
S	S	S	S	S	Carbolic acid
S	S	S	S	S	Castor oil
S	S	S	S	S	Cellulose (see Ethyl acetate)
S	S	S	S	S	China wood oil (Tung)
S	S	S	S	S	Chloroform
S	S	S	S	S	Chlorides, organic
S	S	S	S	S	Chloric acid
S	S	S	S	S	Chlorinated water
S	S	S	S	S	Chlorinated solvents
S	S	S	S	S	Chlorine anhydrous liquid
S	S	S	S	S	Chlorine, gas
S	S	S	S	S	Chlorine, dioxide
S	S	S	S	S	Chlorine trifluoride
S	S	S	S	S	Chloroacetic acid
S	S	S	S	S	Chlorobenzene
S	S	S	S	S	Chloroform
S	S	S	S	S	Chloroformic acid, diluted
S	S	S	S	S	Chloroform (trichloroethane)
S	S	S	S	S	Chlorox
S	S	S	S	S	Choline chloride
S	S	S	S	S	Chromic plating solution
S	S	S	S	S	Chromic acid
S	S	S	S	S	Chromic-potassium sulfate
S	S	S	S	S	Chromium sulfate (basic)
S	S	S	S	S	Cider
S	S	S	S	S	Cineacetic acid
S	S	S	S	S	Coal tar
S	S	S	S	S	Cocconut oil
S	S	S	S	S	Cold water
S	S	S	S	S	Coffee
S	S	S	S	S	Coke oven gas
S	S	S	S	S	Cooking oil
S	S	S	S	S	Copper acetate
S	S	S	S	S	Copper ammonium acetate
S	S	S	S	S	Copper chloride
S	S	S	S	S	Copper cyanide (elect. pl. sol.)
S	S	S	S	S	Copper nitrate
S	S	S	S	S	Copper sulfate
S	S	S	S	S	Copper sulfate (elect. pl. sol.)
S	S	S	S	S	Corn oil
S	S	S	S	S	Corn starch slurries
S	S	S	S	S	Cottonseed oil
S	S	S	S	S	Cressote
S	S	S	S	S	Cresylic acids (alyl phenols)
S	S	S	S	S	Cupric chlorides 5%
S	S	S	S	S	Dibutyl phthalate
S	S	S	S	S	Diesel fuel
S	S	S	S	S	Diesel oil light
S	S	S	S	S	Diethyl ether
S	S	S	S	S	Dichloroethane
S	S	S	S	S	Dichloroethane (low chem. #200)
S	S	S	S	S	Disinfectant water
S	S	S	S	S	D.T.E. Lubricating oil
S	S	S	S	S	Dowtherm A or E
S	S	S	S	S	Enamel
S	S	S	S	S	Esso #90 line
S	S	S	S	S	Ethane
S	S	S	S	S	Ether
S	S	S	S	S	Ethyl acetate
S	S	S	S	S	Ethyl benzene
S	S	S	S	S	Ethyl cellulose
S	S	S	S	S	Ethyl chloride
S	S	S	S	S	Ethyl metacapan
S	S	S	S	S	Ethyl sulfate
S	S	S	S	S	Ethylene
S	S	S	S	S	Ethylene bromide
S	S	S	S	S	Ethylene chloride
S	S	S	S	S	Ethylene dibromide
S	S	S	S	S	Ethylene dichloride
S	S	S	S	S	Ethylene glycol
S	S	S	S	S	Ethylene oxide
S	S	S	S	S	Emulsifying fluid
S	S	S	S	S	Fatoh (see alcohol-ethyl)
S	S	S	S	S	Ferric acids
S	S	S	S	S	Ferric chloride
S	S	S	S	S	Ferric nitrate
S	S	S	S	S	Ferric sulfate
S	S	S	S	S	Ferrous ammonium sulfate
S	S	S	S	S	Ferrous chloride
S	S	S	S	S	Ferrous sulfate
S	S	S	S	S	Fish oil
S	S	S	S	S	Fluoboric acid
S	S	S	S	S	Fluorine
S	S	S	S	S	Fluoric acid
S	S	S	S	S	Formaldehyde
S	S	S	S	S	Formic acid
S	S	S	S	S	Freon 11
S	S	S	S	S	Freon 12
S	S	S	S	S	Freon 13
S	S	S	S	S	Freon 21

Due to the numerous different application possibilities Trafag cannot accept any guarantee for the correctness of these recommendations. We therefore suggest that for a particular application you carry out tests to verify the fluid resistance.







# Conversion of pressure units

	bar	mbar	Pa N/m <sup>2</sup>	kPa kN/m <sup>2</sup>	MPa MN/m <sup>2</sup>	at kp/cm <sup>2</sup>	atm	mmWS mmCE	mWS mCE	Torr mm Hg	psi lbf/in <sup>2</sup>
<b>1 bar</b>	1	1000	10 <sup>5</sup>	100	0.1	1.02	0.987	1.02·10 <sup>4</sup>	10.2	750	14.5
<b>1 mbar</b>	0.001	1	100	0.1	10 <sup>-4</sup>	1.02·10 <sup>-3</sup>	0.987·10 <sup>-3</sup>	10.2	0.0102	0.75	0.0145
<b>1 Pa 1 N/m<sup>2</sup></b>	10 <sup>-5</sup>	0.01	1	0.001	10 <sup>-6</sup>	1.02·10 <sup>-5</sup>	0.987·10 <sup>-5</sup>	0.102	1.02·10 <sup>-4</sup>	0.0075	1.45·10 <sup>-4</sup>
<b>1 kPa 1 kN/m<sup>2</sup></b>	0.01	10	1000	1	0.001	0.0102	9.87·10 <sup>-3</sup>	102	0.102	7.5	0.145
<b>1 MPa 1 MN/m<sup>2</sup></b>	10	10 <sup>4</sup>	10 <sup>6</sup>	1000	1	10.2	9.87	1.02·10 <sup>5</sup>	102	7500	145
<b>1 at 1 kp/cm<sup>2</sup></b>	0.981	981	0.981·10 <sup>5</sup>	98.1	0.0981	1	0.968	10 <sup>4</sup>	10	736	14.22
<b>1 atm</b>	1.013	1013	1.013·10 <sup>5</sup>	101.3	0.1013	1.033	1	1.033·10 <sup>4</sup>	10.332	760	14.696
<b>1 mmWS 1mmCE</b>	0.981·10 <sup>-4</sup>	0.098	9.807	9.81·10 <sup>-3</sup>	9.81·10 <sup>-6</sup>	10 <sup>-4</sup>	0.968·10 <sup>-4</sup>	1	0.001	0.0736	1.422·10 <sup>-3</sup>
<b>1 mWS 1mCE</b>	0.0981	98.07	9807	9.81	9.81·10 <sup>-3</sup>	0.1	0.0968	1000	1	73.6	1.422
<b>1 Torr 1 mmHg</b>	1.133·10 <sup>-3</sup>	1.333	133.323	0.133	1.333·10 <sup>-4</sup>	1.36·10 <sup>-3</sup>	1.316·10 <sup>-3</sup>	13.595	1.359·10 <sup>-2</sup>	1	1.934·10 <sup>-2</sup>
<b>1 psi 1 lbf/in<sup>2</sup></b>	6.895·10 <sup>-2</sup>	68.95	6895	6.895	6.895·10 <sup>-3</sup>	7.031·10 <sup>-2</sup>	0.06805	703.1	0.7031	51.7	1

# Conversion of temperature units

[°F] to [°C]					
Formula: °C = 5/9·(°F - 32)					
°F	°C	°F	°C	°F	°C
-100	-73.3	105	40.6	315	157.2
-95	-70.6	110	43.3	320	160.0
-90	-67.8	115	46.1	325	162.8
-85	-65.0	120	48.9	330	165.6
-80	-62.2	125	51.7	335	168.3
-75	-59.4	130	54.4	340	171.1
-70	-56.7	135	57.2	345	173.9
-65	-53.9	140	60.0	350	176.7
-60	-51.1	145	62.8	355	179.4
-55	-48.3	150	65.6	360	182.2
-50	-45.6	155	68.3	365	185.0
-45	-42.8	160	71.1	370	187.8
-40	-40.0	165	73.9	375	190.6
-35	-37.2	170	76.7	380	193.3
-30	-34.4	175	79.4	385	196.1
-25	-31.7	180	82.2	390	198.9
-20	-28.9	185	85.0	395	201.7
-15	-26.1	190	87.8	400	204.4
-10	-23.3	195	90.6	405	207.2
-5	-20.6	200	93.3	410	210.0
0	-17.8	205	96.1	415	212.8
5	-15.0	210	98.9	420	215.6
10	-12.2	215	101.7	425	218.3
15	-9.4	220	104.4	430	221.1
20	-6.7	225	107.2	435	223.9
25	-3.9	230	110.0	440	226.7
30	-1.1	235	112.8	445	229.4
32	0	240	115.6	450	232.2
35	1.7	245	118.3	455	235.0
40	4.4	250	121.1	460	237.8
45	7.2	255	123.9	465	240.6
50	10.0	260	126.7	470	243.3
55	12.8	265	129.4	475	246.1
60	15.6	270	132.2	480	248.9
65	18.3	275	135.0	485	251.7
70	21.1	280	137.8	490	254.4
75	23.9	285	140.6	495	257.2
80	26.7	290	143.3	500	260.0
85	29.4	295	146.1	505	262.8
90	32.2	300	148.9	510	265.6
95	35.0	305	151.7	515	268.3
100	37.8	310	154.4	520	271.1

[°C] to [°F]					
Formula: °F = 9/5·(°C + 32)					
°C	°F	°C	°F	°C	°F
-100	-148	105	221	315	599
-95	-139	110	230	320	608
-90	-130	115	239	325	617
-85	-121	120	248	330	626
-80	-112	125	257	335	635
-75	-103	130	266	340	644
-70	-94	135	275	345	653
-65	-85	140	284	350	662
-60	-76	145	293	355	671
-55	-67	150	302	360	680
-50	-58	155	311	365	689
-45	-49	160	320	370	698
-40	-40	165	329	375	707
-35	-31	170	338	380	716
-30	-22	175	347	385	725
-25	-13	180	356	390	734
-20	-4	185	365	395	743
-15	5	190	374	400	752
-10	14	195	383	405	761
-5	23	200	392	410	770
0	32	205	401	415	779
5	41	210	410	420	788
10	50	215	419	425	797
15	59	220	428	430	806
20	68	225	437	435	815
25	77	230	446	440	824
30	86	235	455	445	833
32	89.6	240	464	450	842
35	95	245	473	455	851
40	104	250	482	460	860
45	113	255	491	465	869
50	122	260	500	470	878
55	131	265	509	475	887
60	140	270	518	480	896
65	149	275	527	485	905
70	158	280	536	490	914
75	167	285	545	495	923
80	176	290	554	500	932
85	185	295	563	505	941
90	194	300	572	510	950
95	203	305	581	515	959
100	212	310	590	520	968

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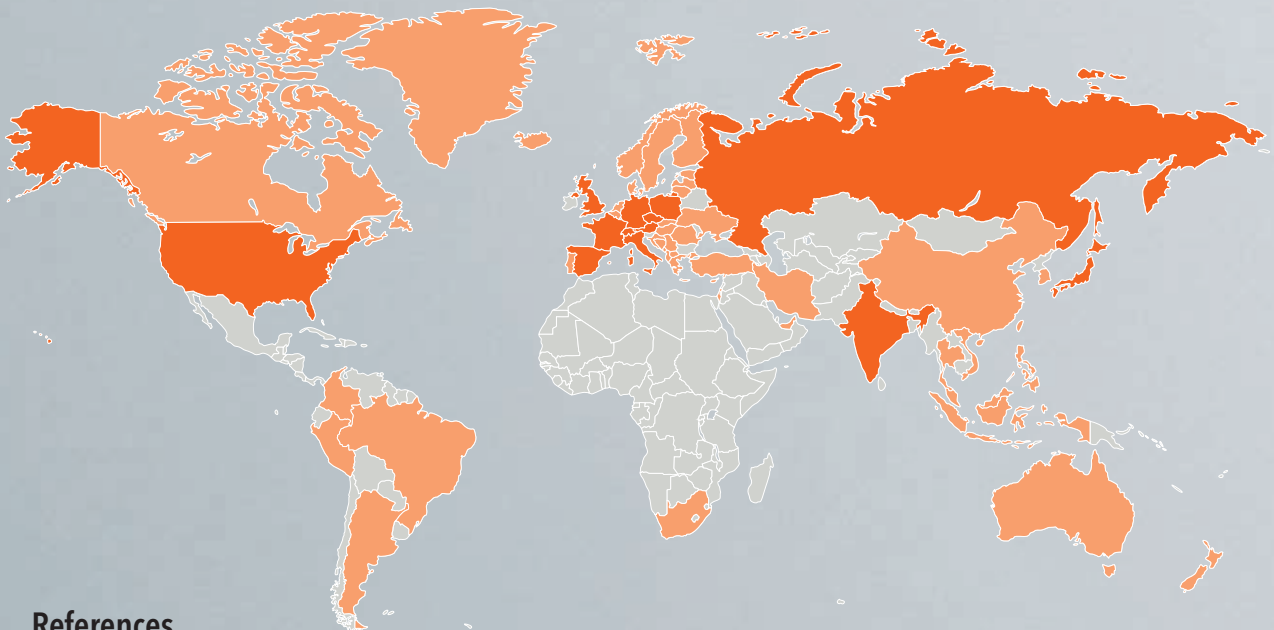
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