Temperature Switches and Probes 1050

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Temperature Switches and Probes 1050
Table of contents

Index

Instructions for instrument selection in the catalogue

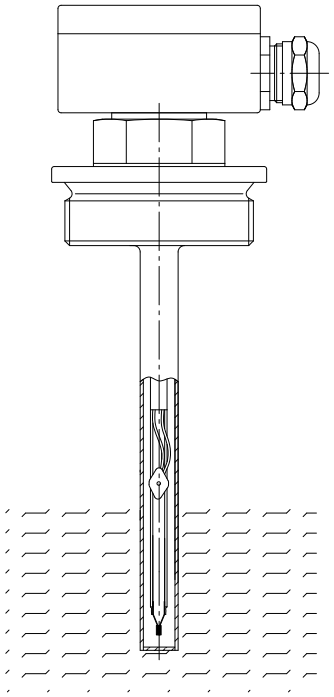
So that the customer gets the best equipment solution according to his requirements, we recommend this simple procedure using the following pages:

- Define the dimension of the fitting or interface (e.g. thread G2“, DIN-flange DN25/PN16, etc.)
- Determine the electrical connection (e.g. terminal box, cable entry, plug, etc.)
- Find out the operating conditions, min. and max. operating pressure, temperature and specific gravity of the media at the max. operating temperature.
- With the size of the fitting and material of the instrument, a guide specification can be selected on pages 338 to 340.
- The full and final specification can now be generated by reference to the „type key“ on pages 341 to 343.
- With the type description and the technical operating conditions a price quotation can be made or the instrument can be ordered.
- Specification of the requested approval.

Temperature Switches and Probes 1050
Description and function

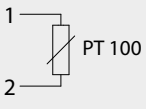
The control of temperature is the function of the Inotemp instruments. The temperature probes are used as continuous monitoring devices and the temperature contacts as switching functions at set values. The instruments may be installed in containers and tanks that comply with the technical requirements of the plant, i.e. that are designed for the appropriate operating parameters. The medium can be liquid, gaseous or solid, but must not have a tendency to become resinous, glutinous or to crystallize, as the results can be distorted.
According to the directive ATEX 94/9/EG, for use in zones 1 or 2, Inotemp Ex-instruments have to connected to safety barriers or to a certified intrinsically safe circuit with a protection rating that meets EExia IIC.
The Inotemp can be installed independent of position. The instruments are supplied completely assembled. Fitting being either a screw fitting or flange fitting as options.
The Inotemp is tipped with resistive elements that sense temperature. The elements are inserted into a tube system and sealed. An Inotemp can be constructed in three different designs:
- Instrument with one or more temperature contacts
- Instrument with one or more temperature probes
- Instrument with temperature contacts and probes

Temperature switches are available in switching functions either normally closed (TO) or normally open (TS). They can also be specified with or without hysteresis. Temperature probes can be supplied with or without control units.

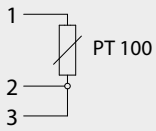


Temperature probe

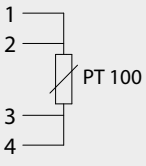
The standard sensor in a temperature probe is a PT100, but can be selected according to the customers request, e.g. PT500, PT1000 or other values. The value of resistance rises with temperature and can be used directly by control systems or converted to an analogue signal of 4-20mA with a control unit.



2-wire



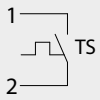
3-wire



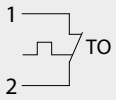
4-wire

Temperature contact

By rising temperature the contacts are switched at customer spedified temperatures and can be normally open or normally closed for rising temperatures. Contacts can be provided to operate either with or without hysteresis.



Normally open



Normally closed

Temperature Switches and Probes 1050
Certificates / Approvals

Certificates

SCHWEIZERISCHER VEREIN FÜR QUALITÄTS- UND MANAGEMENTSYSTEME
Certified according to ISO 9000 rev. 2000

SWISS TECHNICAL SERVICES AG
Approval as production factory, welding examination and procedure qualification incl. restamping certificate for the production of pressure tanks according to SVTI-regulation 501, 201

Approvals

The company Heinrich Kübler AG can manufacture temperature switches and probes to most national and industrial approvals. Therefore a wide range of instruments with approvals requirements can be produced according to customer's requests.

TECHNISCHER ÜBERWACHUNGSVEREIN DEUTSCHLAND (PED)
Approval as production factory for manufacture of pressure tanks according to AD HP 0, PED Pressure Equipment Directive 97/23/EG

SOCIETE NATIONALE DE CERTIFICATION ET D'HOMOLOGATION (ATEX)
Approval for the production of temperature switches and probes according to EU-Directive 94/9/EG

Temperature Switches and Probes 1050
Approvals

As an innovative manufacturer of instruments for level control, we can offer to our customers systems according to different directives. The types of approval, applications and limits of use can be taken from the following specifications.

Approvals

Ex

A large number of temperature switches and probes from our standard range, or to customer requests, can be built according to the EU-Directive 94/9/EG with the protection types EEx ia IIC T3 to T6, EExd T4 to T6 or dust Ex/D. By the combination of the instruments with the type key, the catalogue shows with the Ex hexagonal logo which components can be used for Ex-instruments.

Temperature of media:

EEx ia-instruments	
T3	180 °C
T4	130 °C
T5	95 °C
T6	80 °C

EEx d-instruments	
T4	120 °C
T5	95 °C
T6	80 °C

Electrical limit values:
Depending on applications
Type apparent on type plate, installation and operating manual

PED

Under the Pressure Equipment Directive 97/23/EG, any pressure vessel or instrument used within a pressurised system at 0,5 bar or above, has to conform to various categories. Depending on the design data or customer needs, manufacture of instruments is to either of the categories below.

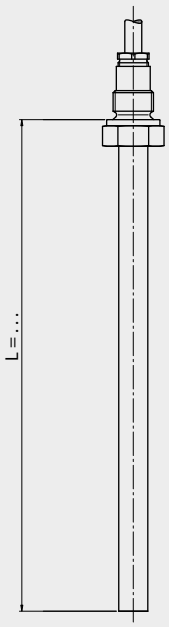
Category II	
Module	A1

Category IV	
Module	B+D

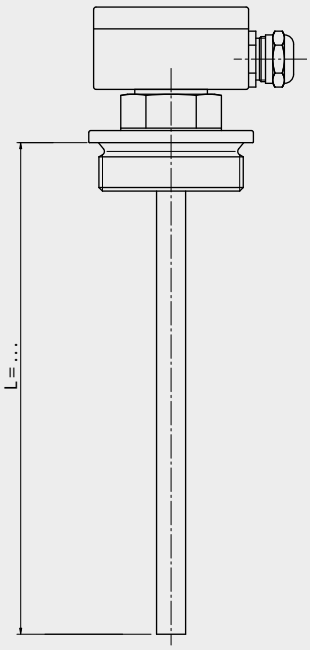
Temperature Switches and Probes 1050
Stainless steel and Brass design

Technical data	Stainless steel	Brass
Guide tube diameter:	8 mm length to 1000 mm 10 mm length to 1000 mm 12 mm length to 3000 mm	8 mm length to 1000 mm 12 mm length to 3000 mm
Connection sizes:	Thread BSP 1/8" ... Thread NPT 1/8" ... Flange DIN DN15 .. Flange Ansi ½" ...	Thread BSP 1/8" ... Thread NPT 1/8" ...
Temperature contacts:	TO ... °C Normally closed TS ... °C Normally open	TO ... °C Normally closed TS ... °C Normally open
Temperature probes:	PT - 100 (optional with control unit) PT - 1000 (optional with control unit)	PT - 100 (optional with control unit) PT - 1000 (optional with control unit)
Control unit:	TP5333A TP5350A TP5333B TP5350B TP5335A TP5335B	TP5333A TP5350A TP5333B TP5350B TP5335A TP5335B
Approvals:	See approvals pages 336-337	-
Electrical connections:	See pages 344-345	See pages 344-345
Operating parameters:	Temperature: -160 °C ... +250 °C Pressure: -1 ... 100 bar	Temperature: -30 °C ... +150 °C Pressure: -1 ... 100 bar

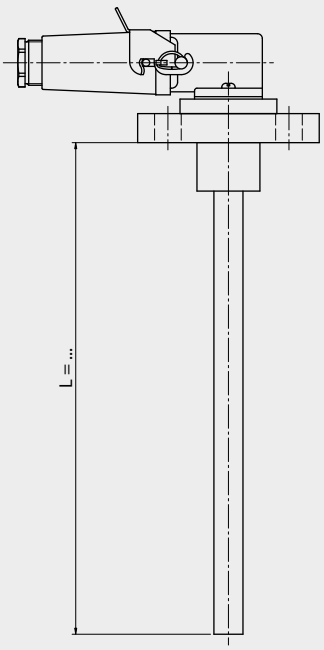
Thread with cable
Type E ..



Thread with terminal box
Type A ..



Flange with plug
Type AS .. F

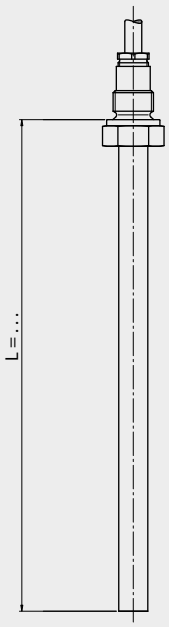


Type combination see type key Temperature Switches and Probes

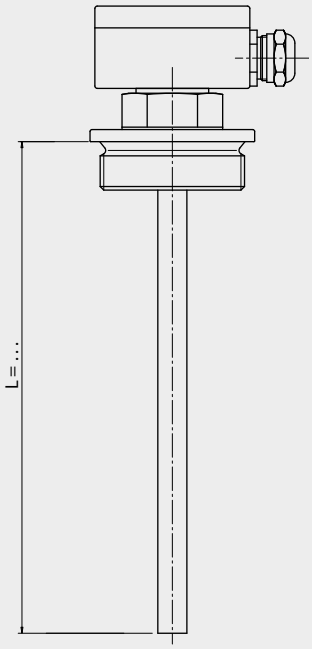
Temperature Switches and Probes 1050
Alloy and Titanium design

Technical data	Alloy	Titanium
Guide tube diameter:	10 mm length to 1000 mm 12 mm length to 3000 mm	10 mm length to 1000 mm 12 mm length to 3000 mm
Connection sizes:	Thread BSP ⅛" ... Thread NPT ⅛" ... Flange DIN DN15 .. Flange Ansi ½" ...	Thread BPS ⅛" ... Thread NPT ⅛" ...
Temperature contacts:	TO ... °C Normally closed TS ... °C Normally open	TO ... °C Normally closed TS ... °C Normally open
Temperature probes:	PT - 100 (optional with control unit) PT - 1000 (optional with control unit)	PT - 100 (optional with control unit) PT - 1000 (optional with control unit)
Control unit:	TP5333A TP5350A TP5333B TP5350B TP5335A TP5335B	TP5333A TP5350A TP5333B TP5350B TP5335A TP5335B
Approvals:	See approvals pages 336-337	See approvals pages 336-337
Electrical connections:	See pages 344-345	See pages 344-345
Operating parameters:	Temperature: -160 °C ... +250 °C Pressure: -1 ... 100 bar	Temperature: -30 °C ... +150 °C Pressure: -1 ... 100 bar

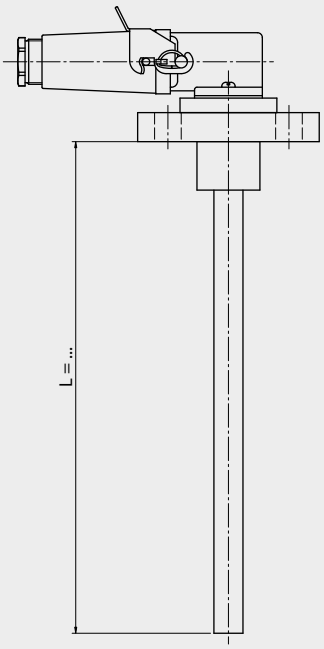
Thread with cable
Type E ..



Thread with terminal box
Type A ..



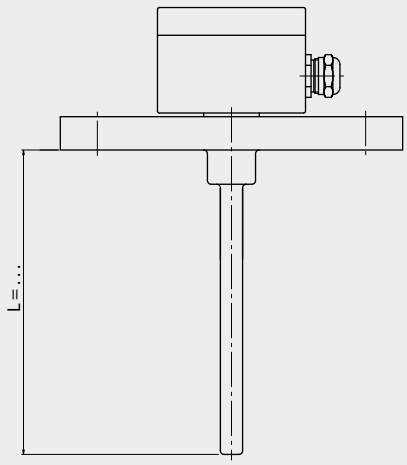
Flange with plug
Type AS .. F



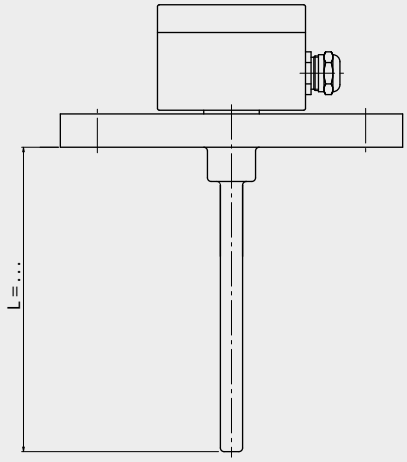
Type combination see type key Temperature Switches and Probes

Temperature Switches and Probes 1050
E-CTFE and PFA coated design

Technical data	E-CTFE coated
Guide tube diameter: (without coating)	10 mm length to 1000 mm 12 mm length to 1000 mm 14 mm length to 2000 mm 18 mm length to 3000 mm
Connection sizes:	Flange DIN DN50 ... Flange Ansi ½" ...
Temperature contacts:	TO ... °C Normally closed TS ... °C Normally open
Temperature probes:	PT - 100 (optional with control unit) PT - 1000 (optional with control unit)
Control unit:	TP5333A TP5350A TP5333B TP5350B TP5335A TP5335B
Approval	See approvals pages 336-337
Electrical connections:	See connections pages 344-345
Operating parameters:	Temperature: -10 °C ... +150 °C Pressure: -1 ... 40 bar



Technical data	PFA coated
Guide tube diameter: (without coating)	10 mm length to 1000 mm 12 mm length to 1000 mm 14 mm length to 2000 mm 18 mm length to 3000 mm
Connection sizes:	Flange DIN DN50 ... Flange Ansi ½" ...
Temperature contacts:	TO ... °C Normally closed TS ... °C Normally open
Temperature probes:	PT - 100 (optional with control unit) PT - 1000 (optional with control unit)
Control unit:	TP5333A TP5350A TP5333B TP5350B TP5335A TP5335B
Approval	See approvals pages 336-337
Electrical connections:	See connections pages 344-345
Operating parameters:	Temperature: -10 °C ... +200 °C Pressure: -1 ... 40 bar



Type combination see type key Temperature Switches and Probes

Temperature Switches and Probes 1050
Type key

Code 1	Key 1	Electrical connection	ATEX
	AL	Aluminium terminal box	
	AV	Stainless steel terminal box	
	ALDC	Aluminium terminal box EExd explosion proof	
	ALD	Aluminium terminal box EExd explosion proof	
	AVD	Stainless steel terminal box EExd explosion proof	
	AP	Terminal box Polyester	
	AB	Terminal box ABS	
	AS	Connection plug	
	AF	Connection plug with PA-flange	
	E	Connection cable	
	..	Various	

Key 2	Materials of process connection	ATEX
V	Stainless steel	
Ti	Titanium	
H	Alloy	
EEC	Stainless steel E-CTFE coated	
PFA	Stainless steel PFA coated	
P	Polyvinylchloride PVC	
PP	Polypropylene PP	
PF	Polyvinylidenfluoride PVDF	
..	Various	

Key 3	Design process connection	ATEX
E .. -	Thread to the top DIN G ⅛" ...	
ENPT .. -	Thread to the top NPT G ⅛"...	
R .. -	Thread to the bottom DIN G ⅛" ...	
RNPT .. -	Thread to the bottom NPT G ⅛"...	
BKNW .. -	Screwed connection acc. to DIN 11851, NW15 ...	
TC .. -	Tri-Clamp flange DN15 ...	
F .. -	Flange acc. to different standards	
VE .. -	Various	

Type combination

Code	1	2	3	4	5	6	7
Key	1/2/3	1	1/2	1	1	1	1
Example	EVF -	15/16/C -	VTS -	1TF -	L200 -	1PVC -	EX

Temperature Switches and Probes 1050
Type key

Code 2	Key	Flange dimensions and designs			ATEX
	- .. / .. / ..	Standard	1. Nom.width	2. Nom.pressure	3. Form	
		DIN	DN 15 ... 500	PN 6 ... 400	C, F, N,B ...	Ex
		ANSI	1/2" ... 20"	150 ... 2500 lbs	SF, RTJ, FF...	Ex
		JIS B 2010	1/2" ... 20"	5K ... 63K	SF, RTJ, FF ...	Ex
		BSI BS 4504	DN 15 ... 500	PN 6 ... 400	2.5/x ... 400/x	Ex
		BSI BS 10	1/2" ... 20"	150 ... 2500 lbs	A ... T	Ex
		S	Special flange acc. to drawing			

Code 3	Key 1	Guide tube material	ATEX
	- V ..	Stainless steel (also flexible)	Ex
	- Ti ..	Titanium	Ex
	- H ..	Alloy	Ex
	- EEC ..	Stainless steel E-CTFE coated	Ex
	- PFA ..	Stainless steel PFA coated	Ex
	- P ..	Polyvinylchloride PVC	
	- PP ..	Polypropylene PP	
	- PF ..	Polyvinylidenfluoride PVDF	
	- PA ..	Polyamide PA (flexible design)	
	.. ..	Various	

	Key 2	Temperature contacts	ATEX
	.. TO -	With temperature contact normally closed - opening on rising level	Ex
	.. TS -	With temperature contact normally open - closing on rising level	Ex

Code 4	Key	Temperature probes / Temperature control units	ATEX
	..TF -	Quantity temperature probe without control unit	Ex
	..TF / TP -	Quantity temperature probe with control unit TP5333 A/B	Ex (B)
	..TF / TD -	Quantity temperature probe with control unit TP5335 A/B	Ex (B)
	.. TF / TP50 -	Quantity temperature probe with control unit TP5350 A/B	Ex (B)
		(Control units only possible with terminal boxes)	

Type combination

Code	1	2	3	4	5	6	7
Key	1/2/3	1	1/2	1	1	1	1
Example	EVF -	15/16/C -	VTS -	1TF -	L200 -	1PVC -	EX

Temperature Switches and Probes 1050
Type key

Code 5	Key	Guide tube length	ATEX
	L .. -	Guide tube length in mm	

Code 6	Key	Cable / Length of cable in m	ATEX
	.. PVC -	.. Polyvinylchloride PVC (PVC-grey)	
	.. PVC-blue -	.. Polyvinylchloride PVC (PVC-blue)	
	.. Sil -	.. Silicone	
	.. PUR -	.. Pur (partly oil resisting)	
	.. FEP -	.. Teflon	
	.. Lit -	.. Insulated stranded wire	
	.. NiLit -	.. Insulated nickel stranded wire	
	.. Radox -	.. Radox	
	..	.. Various	
	options		
	.. / CY	Shielded cable	
	.. / ÖL	Oil resisting cable	

Code 7	Key	Approvals and options	ATEX
	Ex	Intrinsically safe design acc. to EExia	
	EExd	Explosion proof design acc. to EExd	
	Ex/D	Intrinsically safe design acc. to EExia	
	EExd/D	Explosion proof design acc. to EExd	
	Adjustable	Adjustable design	

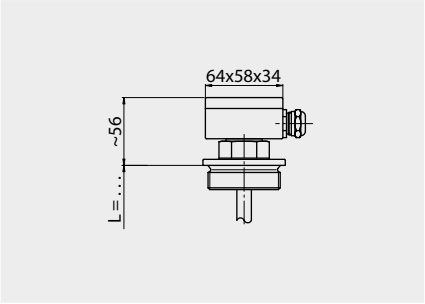
Type combination

Code	1	2	3	4	5	6	7
Key	1/2/3	1	1/2	1	1	1	1
Example	EVF -	15/16/C -	VTS -	1TF -	L200 -	1PVC -	EX

Temperature Switches and Probes 1050
Electrical connections

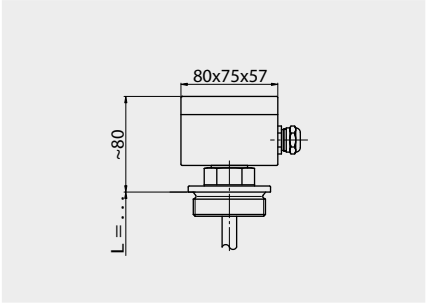
Terminal box

Type AL **(101)**



Ambient temperature: max. +150 °C
Material: Aluminium
Cable gland: Brass nickel-plated
Cable entry: M20x1.5 mm
Protection rating: IP 65

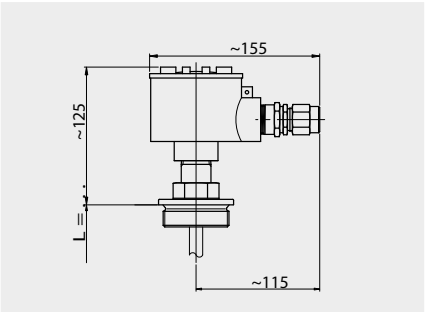
Type AL **(105)**



Ambient temperature: max. +150 °C
Material: Aluminium
Cable gland: Brass nickel-plated
Cable entry: M20x1.5 mm
Protection rating: IP 65

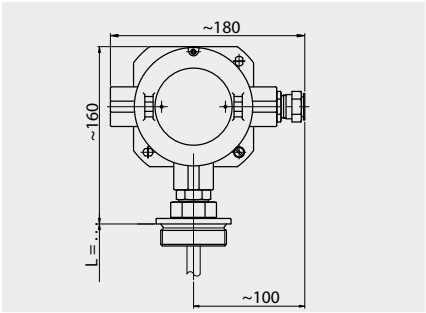
Terminal box

Type ALDC **(EExd)**



Ambient temperature: max. +85 °C
Material: Aluminium
Cable gland: Brass nickel-plated
Cable entry: M20x1.5 mm
Protection rating: IP 65

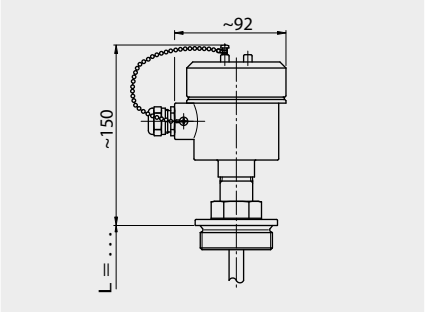
Type ALD **(EExd)**



Ambient temperature: max. +55 °C
Material: Aluminium
Cable gland: Brass nickel-plated
Cable entry: M20x1.5 mm
Protection rating: IP 66

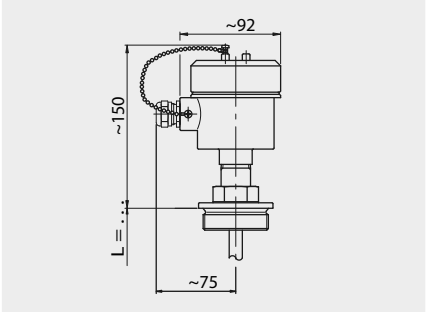
Terminal box

Type AV



Ambient temperature: max. +180 °C
Material: Stainless steel
Cable gland: Brass nickel-plated
Cable entry: M20x1.5 mm
Protection rating: IP 65
Option: Cable gland
M20x 1.5 mm in Stainless steel

Type AVD **(EExd)**

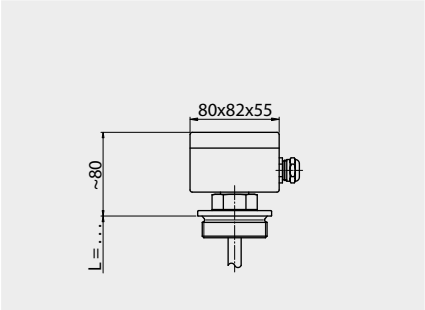


Ambient temperature: max. +40 °C
Material: Stainless steel
Cable gland: Brass nickel-plated
Cable entry: M20x1.5 mm
Protection rating: IP 65
Option: Cable gland
M20x 1.5 mm in Stainless steel

Temperature Switches and Probes 1050
Electrical connections

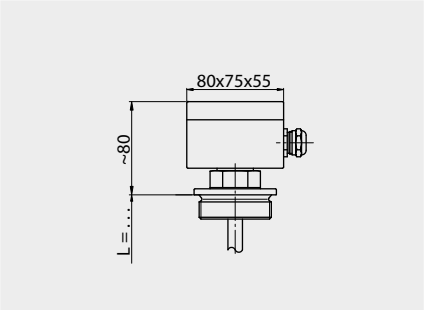
Terminal box

Type AB



Ambient temperature: max. +80 °C
Material: ABS
Cable gland: PVC
Cable entry: M20x1.5 mm
Protection rating: IP 65

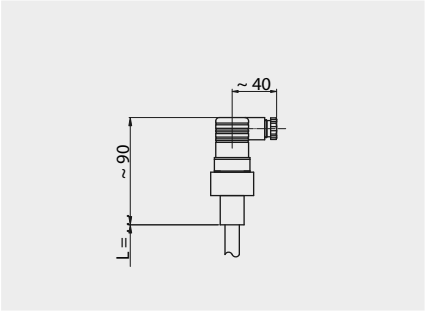
Type AP



Ambient temperature: max. +100 °C
Material: Polyester
Cable gland: Polyamide
Cable entry: M20x1.5 mm
Protection rating: IP 65

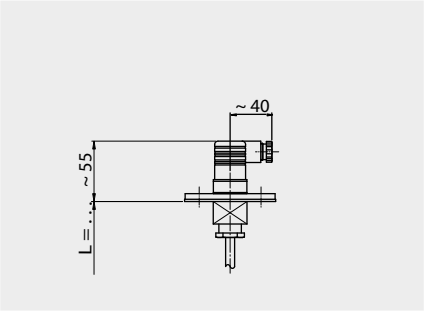
Connection plug

Type AS



Ambient temperature: max. +80 °C
Material: PVC
Cable gland: PA
Cable entry: -
Protection rating: IP65

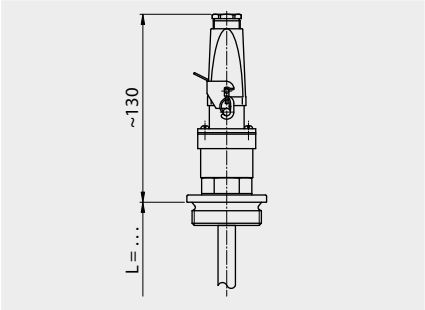
Type AF



Ambient temperature: max. +80 °C
Material: PA / PVC
Cable gland: PA
Cable entry: -
Protection rating: IP 65

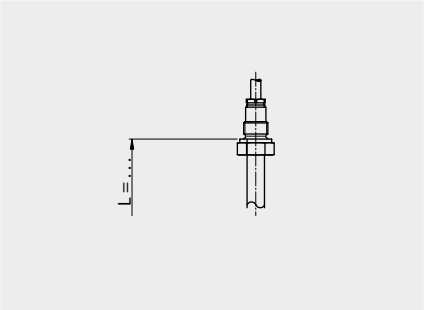
Connection plug / cable

Type AS (HTS)



Ambient temperature: max. +80 °C
Material: Thermoplast / Aluminium
Cable gland: PA / Alu
Cable entry: -
Protection rating: IP 65
2. variant
Connection plug 90° offset
(Type AS W/HTS)

Type E



Ambient temperature: max. +180 °C
Material: Various
Cable gland: Brass nickel-plated
Cable entry: Various
Protection rating: IP 55 - 68

Temperature Switches and Probes 1050
Temperature contacts / Temperature probes

Temperature contacts	acc.to guide tube ø	max. voltage	max. current	switching capacity
Normally open	ø 8 mm	-	-	-
Normally closed	ø 8 mm	-	-	-
Normally open	ø 10 ... 40 mm	230 DC / AC	0.5 A	40 VA
Normally closed	ø 10 ... 40 mm	230 DC / AC	0.5 A	40 VA

Max. quantity	acc. to guide tube ø		normally open	normally closed
	ø 8 mm		-	-
	ø 10 mm		1	1
	ø 12 mm		2	2
	ø 14 mm		3	3
	ø 16 mm		3	3
	ø 18 ... 40 mm		6	6

Measuring accuracy	normally open	normally closed	normally open PEPI	normally closed PEPI
Hysteresis	7.5 °C	7.5 °C	1 °C	1 °C
Accuracy	+ / - 5 °C	+ / - 5 °C	+ / - 3 °C	+ / - 3 °C
Graduation / Resolution	5 °C	5 °C	5 °C	5 °C
Temperature range	40 °C ... 120 °C	40 °C ... 120 °C	40 °C ... 120 °C	40 °C ... 120 °C

Temperature probes	acc. to guide tube ø	max. quantity	2/3/4 wire	temp. range
PT - 100	ø 8 mm	1	2/3 wire	- 30 °C ... 150 °C
PT - 100	ø 10 ... 40 mm	5	2/3/4 wire	- 196 °C ... 250 °C
PT - 1000	ø 8 mm	1	2/3 wire	- 30 °C ... 150 °C
PT - 1000	ø 10 ... 40 mm	5	2/3/4 wire	- 196 °C ... 250 °C

Temperature Switches and Probes 1050
Cable / Materials

Cable	Min. / Max. temperature [°C]	Material	Max. leads	Thickness of lead
... PVC -	-20 °C / +80 °C	Polyvinylchlo-ride	12	0.25 - 0.75
... PVC-blau -	-20 °C / +80 °C	Polyvinylchlo-ride	7	0.75
... Sil -	-60 °C / +180 °C	Silicone	12	0.25 - 0.75
... PUR -	-40 °C / +80 °C	Polyurethane	10	0.25 - 0.75
... FEP -	-100 °C / +200 °C	Fluorethylen-propylene	4	0.25 - 0.5
... Radox -	-35 °C / +120 °C	Radox	10	0.5 - 0.75
... Lit -	-5 °C / +70 °C -65 °C / +200 °C	Insulated stran-ded wires PVC Insulated stran-ded wires FEP	1 1	0.5 0.5
... NiLit -	-60 °C / +450 °C	Insulated nickel stranded wires with glass insulation	1	0.5

Options	
... / CY	Shielded cable
... / ÖL	Oil resisting cable

Material design temperatures	Material	Temperature min.	Temperature max.
V	Stainless steel	- 196 °C	+ 400 °C
Ti	Titanium	- 10 °C	+ 300 °C
H	Alloy / Ni Mo	- 196 °C	+ 400 °C
EEC	Stainless steel E-CTFE coated	- 78 °C	+ 150 °C
PFA	Stainless steel PFA coated	- 100 °C	+ 250 °C
P	Polyvinylchloride PVC	- 15 °C	+ 60 °C
PP	Polypropylene PP	- 5 °C	+ 100 °C
PF	Polyvinylidenfluoride PVDF	- 5 °C	+ 150 °C
PA	Polyamide PA	- 40 °C	+ 110 °C
M	Brass	- 196 °C	+ 250 °C
AL	Aluminium	- 196 °C	+ 150 °C

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