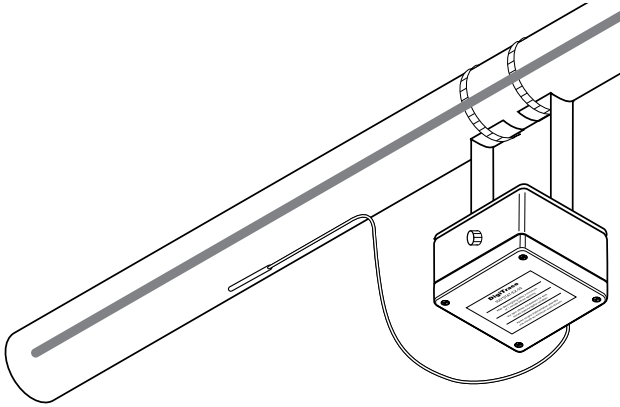


Raychem ETS-05

Ex SURFACE SENSING ELECTRONIC THERMOSTAT



PRODUCT OVERVIEW

The Raychem ETS-05 electronic surface sensing thermostat provides accurate temperature control for heating cables. The ETS-05 is available in two versions. The ETS-05-L2-E is for temperatures up to 199°C, while the ETS-05-H2-E can be used for temperatures up to 499°C. The maximum nominal load is 32 A for both thermostats. Temperature setting is accurate via digital rotary switches inside the enclosure.

The ETS-05 has a LED indicator which indicates the status of the thermostat (powered on/off), the status of the heat-tracing cable (powered on/off) and the status of the sensor. In case of sensor failure the thermostat can switch to an on or off state, depending upon the users requirement.

PRODUCT CHARACTERISTICS

	ETS-05-L2-E	ETS-05-H2-E
Application	Surface sensing	Surface sensing
Area of use	Hazardous area: Zone 1 or Zone 2 (Gas) or Zone 21 or Zone 22 (Dust) Ordinary	

APPROVALS CERTIFICATION

<p>Raychem – ETS-05 Electronic Thermostat Ex II 2(1)G II 2D Ex e ia mb (Ga) IIC T5 Gb Ex tb IIIC T100°C Db Ta-40 to +60°C Supply = 99-121V (ETS-05-x1-x) or 195-230V (ETS-05-x2-x) Maximum switched current 32A Resistive IECEx BAS 13.0071 Baseefa13ATEX0137 Um=253V Max. Current = 0.5A Prospective short circuit current 1500A</p>
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ERL (Russia, Kazakhstan, Belarus)
 For other countries contact your local Pentair representative.

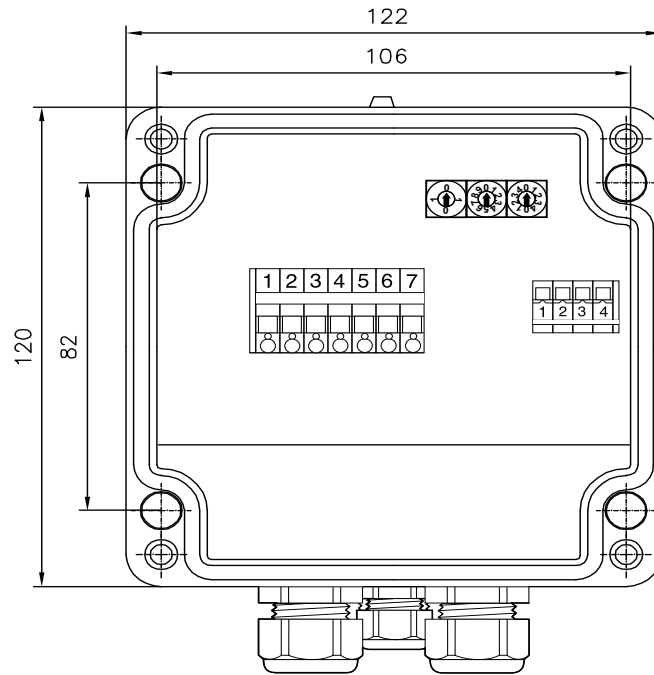
PRODUCT SPECIFICATION

Temperature setpoint range	0°C to 199°C	0°C to 499°C
Temperature measurement range	-55°C to 260°C	-55°C to 585°C
Maximum sensor lead resistance	20 Ohm	20 Ohm
Ingress protection	IP66	IP66
Switching accuracy	±1 K at 5°C	±1 K at 5°C, 2°C at 499°C
Switching differential (Hysteresis)	≈ 3°C	≈ 3°C
Output relay	Single Pole change over type (SPST)	Single Pole change over type (SPST)
Switching capacity	32 A resistive load	32 A resistive load
Ambient temperature range	-40°C to + 60°C	-40°C to + 60°C
Supply voltage	230 V +10% / -15% 50/60 Hz	230 V +10% / -15% 50/60 Hz
Internal power consumption	3 VA	3 VA
Terminal size	max. 6 mm ²	max. 6 mm ²
Cable entries	2 x M25: 1 x M25 gland for power cable in 1 x M25 rain plug for heating cable out	2 x M25: 1 x M25 gland for power cable in 1 x M25 rain plug for heating cable out
Sensor	M16 gland with 3 wire PT100 flexible sensor, 2 m long	M16 gland with 3 wire PT100, stainless steel sensor, 2 m long,

LED STATUS INDICATIONS

Green: ETS-05 powered on, heat-tracing cable off	Green: ETS-05 powered on, heat-tracing cable off
Yellow: ETS-05 powered on, heat-tracing cable on	Yellow: ETS-05 powered on, heat-tracing cable on
Red flashing: Sensor failure - controller in fail safe mode	Red flashing: Sensor failure - controller in fail safe mode

DIMENSIONS (IN MM)

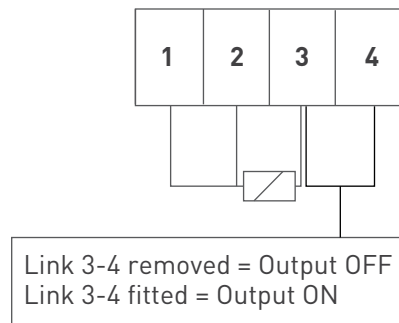


Power Terminals

1	2	3	4	5	6	7
Line Out	Neutral Out	Neutral Supply	230V Supply	Earth	Earth	Earth

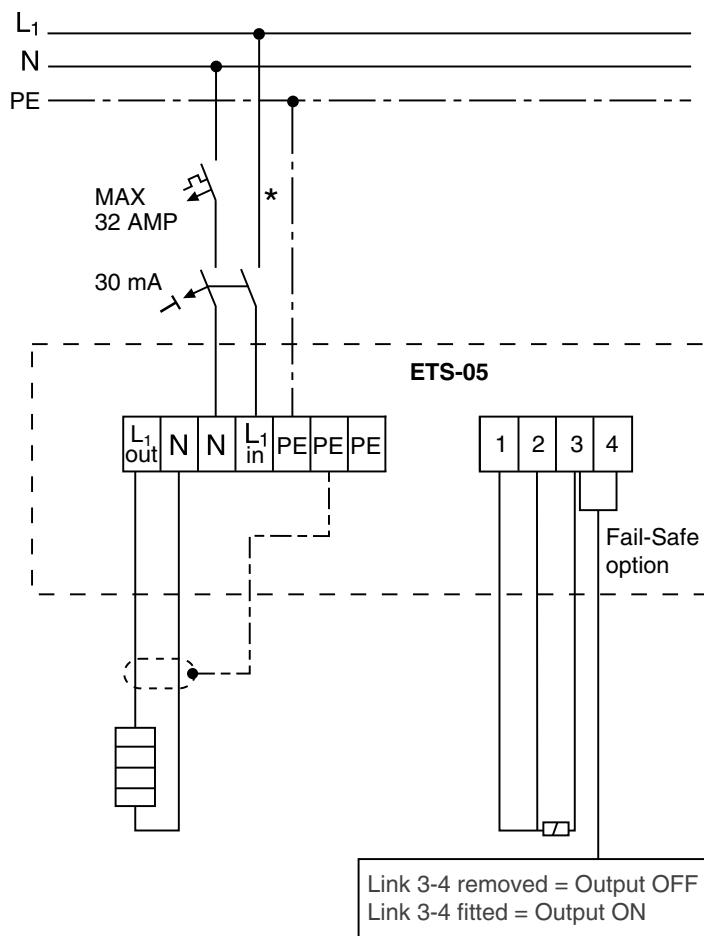
Terminals 2 and 3 are joined electrically
 Terminals 5, 6 and 7 are joined electrically

Sensor/Failure Mode Select Terminals



Terminals 1 to 3 allow for the connection of a three wire PT100 sensor.
 Terminals 3 to 4 allow the user to select the default heating status on sensor error.
 Without a link fitted the heating will turn OFF if a sensor error is detected (default)
 With a link fitted the heating will turn ON if a sensor error is detected

TYPICAL WIRING DIAGRAM FOR DIRECT SWITCHING



* Circuit breaker configurations may vary according to local standards/requirements

MOUNTING METHOD

Support bracket SB-100, SB-101, SB-110, SB-111, SB-130 or surface mounting with 4 fixing holes on 106 x 82 mm centres

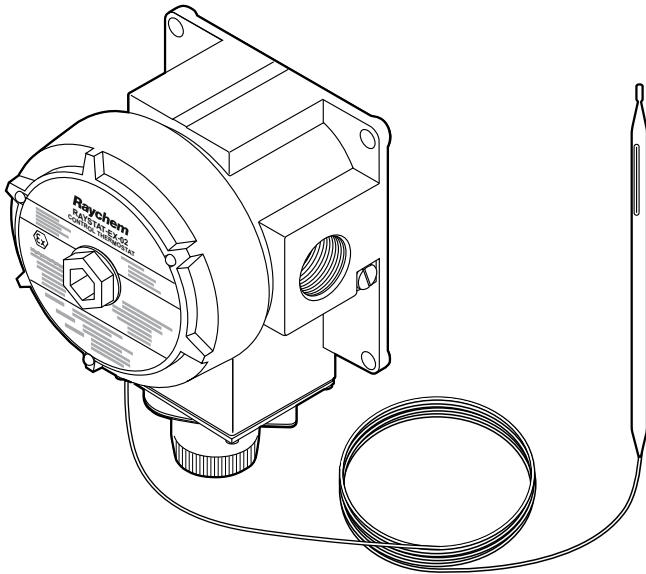
Support bracket SB-100, or SB-101, SB-110, SB-111, SB-130 or surface mounting with 4 fixing holes on 106 x 82 mm centres

ORDERING DETAILS

Product Name	ETS-05-L2-E	ETS-05-H2-E
Part number	1244-014367	1244-014368

Raychem RAYSTAT-EX-02

SURFACE SENSING MECHANICAL THERMOSTAT



This EEx d approved surface sensing thermostat provides temperature control for all Raychem BTV, QTVR, KTV, VPL and XTV heating cables in hazardous areas. The switching temperature range is -4°C to $+163^{\circ}\text{C}$ and is adjustable externally to the Ex enclosure by a dial mounted under a bolted-on cover and seal.

The switching current capacity is 22 A. It has a single pole change-over switch with volt-free contacts.


Cable entry is through a single 3/4" NPT thread entry. Raychem cable glands are available to suit non-armoured and armoured cable.

The 3 m long stainless steel fluid filled bulb and capillary give freedom to locate the enclosure remote from the bulb. The bulb exposure range is -50°C to $+215^{\circ}\text{C}$. The cast aluminium construction with stainless steel fittings gives a lightweight unit which can be pipe mounted using Raychem support brackets or surface mounted.

THERMOSTAT

Area of use	Hazardous area: Zone 1, Zone 2 (Gas), Zone 21, Zone 22 (Dust) Ordinary
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APPROVALS

LCIE 08 ATEX 6095 X
 Ex II 2 G D
 IECEx LCI 08.0036X
 Ex d IIC T6
 Ex tD A21 IP66 T80°C

ERL (Russia, Kazakhstan, Belarus)
 For other countries contact your local Pentair representative.

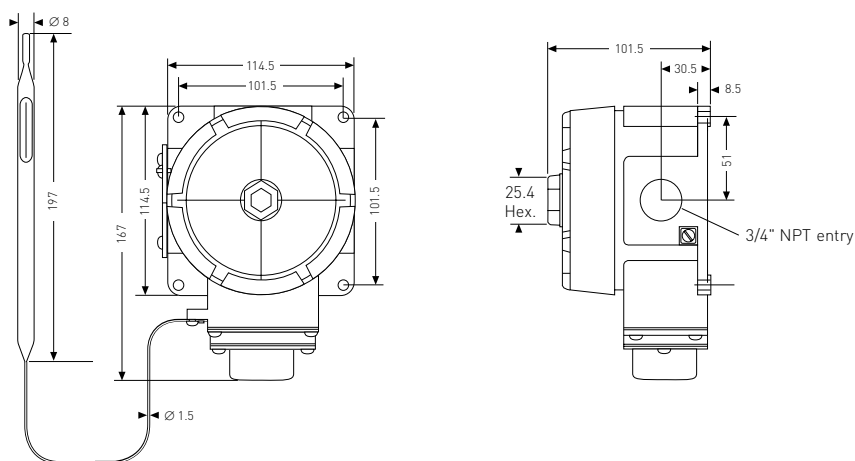
ENCLOSURE

Body and lid	Lacquer coated cast aluminium with stainless steel fittings and nitrile rubber internal lid seal
Protection	IP 65 if installed with Raychem cable glands GL-33 or GL-34
Lid fixing	Screw thread lid locked in place by a 2 mm hexagonal key grub screw
Entry	1 x 3/4" NPT
Ambient operating temperature	-40°C to $+60^{\circ}\text{C}$

TEMPERATURE SENSING

Type	Fluid filled bulb and capillary
Dimensions	Capillary 3 m long, bulb 197 mm x 8 mm
Material	Stainless steel (Type 55316)
Exposure temperature	-50°C to $+215^{\circ}\text{C}$
Minimum bend radius	Do not bend bulb, 15 mm for capillary

DIMENSIONS (IN MM)



SWITCHING

Type	Single pole change over volt free contacts (SPDT)
Rating	22 A at 250 Vac, switching (100.000 cycles)

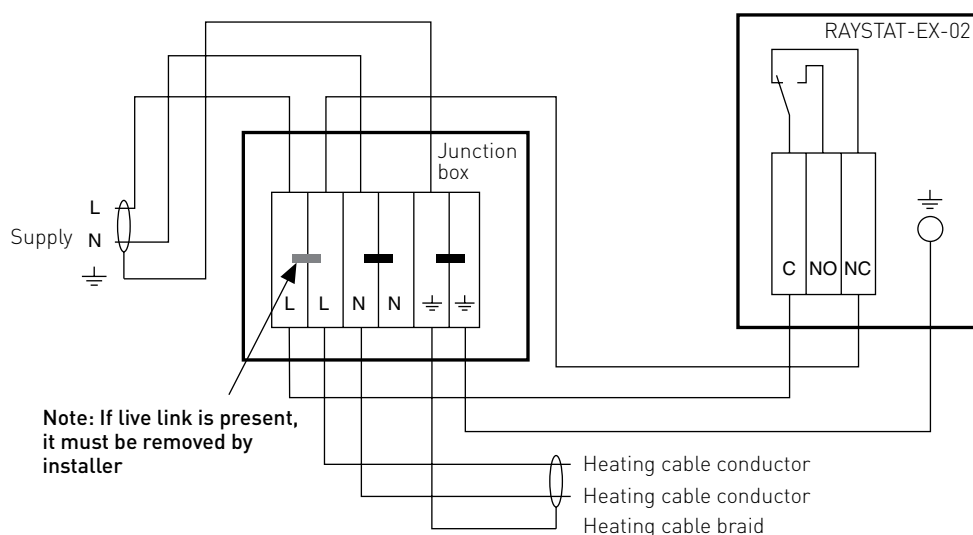
SETTING

Range	-4°C to +163°C
Repeatability	±1.7 K
Differential	5 K
Accuracy (switch on)	±4.5°C at 21°C ambient and 50°C sensor temperature
Method	External knob and dial

CONNECTION TERMINALS

Supply	3 terminals for 1 to 4 mm ² conductors
Internal earth	Single bolt for 1 to 4 mm ² conductors
External earth	Single bolt and clamp for 1 to 4 mm ² conductors

CONNECTION DETAILS AND THERMOSTAT CONTROL SYSTEM



Maximum recommended heating cable lengths (230 V supply)

The maximum recommended heating cable length is restricted by the electrical protection sizing or the switching capacity of the RAYSTAT-EX-02.

For circuits and electrical protection rated up to and including 20 A

Use the maximum recommended heating cable lengths, mentioned in the cable datasheet.

For circuits and electrical protection rated above 20 A but less than or equal to 22 A

Use the shorter length of the values given in the cable datasheet and those given for your switching temperature in the table below.

For circuits and electrical protection rated above 22 A, RAYSTAT-EX-02 must NOT be connected for direct switching.

HEATING- CABLE REFERENCE

	3BTV2-CT/-CR	5BTV2-CT/-CR	8BTV2-CT/-CR	10BTV2-CT/-CR	10QTVR2-CT	15QTVR2-CT	20QTVR2-CT	4XTV2-CT-T3	8XTV2-CT-T3	12XTV2-CT-T3	15XTV2-CT-T3	20XTV2-CT-T2	5KTV2-CT	8KTV2-CT	15KTV2-CT	20KTV2-CT	5VPL2	10VPL2	15 VPL2	20VPL2
Switching temp. (°C)	L max. (m) - Maximum recommended heating cable length																			
5	200	165	120	105	110	85	65	230	145	105	85	65	200	145	90	65	220	145	95	70
10	200	165	120	105	110	90	65	235	150	110	85	65	205	145	90	65	220	150	95	70
15	200	165	120	105	115	90	70	245	155	110	85	65	210	150	95	65	220	150	95	70
20	200	165	120	105	115	95	75	250	160	115	90	65	215	155	95	70	220	150	100	70
25	200	165	120	105	115	95	75	250	165	120	90	70	220	160	100	70	220	155	100	75
30	200	165	120	105	115	95	80	250	170	125	95	70	225	160	100	70	220	155	100	75
35	200	165	120	105	115	95	85	250	180	130	95	75	225	165	105	75	220	155	100	75
40	200	165	120	105	115	95	90	250	180	135	100	75	225	170	105	75	220	155	105	75
45	200	165	120	105	115	95	95	250	180	140	100	75	225	175	110	80	220	155	105	75
50	200	165	120	105	115	95	105	250	180	145	105	80	225	180	115	80	220	155	105	75
55	200	165	120	105	115	95	110	250	180	145	110	80	225	180	115	85	220	155	105	80
60	200	165	120	105	115	95	110	250	180	145	110	85	225	180	120	85	220	155	110	80
65	200	165	120	105	115	95	110	250	180	145	115	85	225	180	125	90	220	155	110	80
70	--	--	--	--	115	95	110	250	180	145	120	90	225	180	130	95	220	155	110	80
75	--	--	--	--	115	95	110	250	180	145	120	90	225	180	130	95	220	155	115	80
80	--	--	--	--	115	95	110	250	180	145	125	95	225	180	130	100	220	155	115	85
85	--	--	--	--	115	95	110	250	180	145	130	100	225	180	130	105	220	155	115	85
90	--	--	--	--	115	95	110	250	180	145	130	100	225	180	130	110	220	155	120	85
95	--	--	--	--	115	95	110	250	180	145	130	105	225	180	130	110	220	155	120	85
100 to 110	--	--	--	--	115	95	110	250	180	145	130	110	225	180	130	110	220	155	120	85
115 to 120	--	--	--	--	--	--	--	250	180	145	130	110	225	180	130	110	220	155	125	90
125 to 150	--	--	--	--	--	--	--	--	--	--	--	--	225	180	130	110	220	155	125	95

MOUNTING METHOD

Raychem support bracket SB-100, SB-101, SB-110, SB-111, SB-125 or surface mounting with 4 fixing holes (M6) on 101.5 x 101.5 mm centres

SETTING

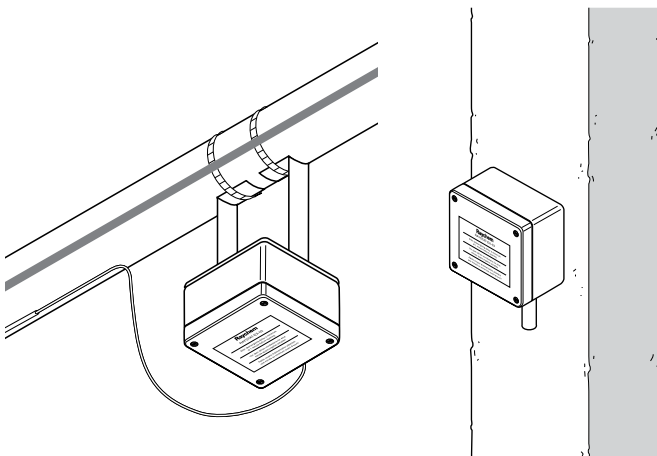
Power cable gland for armoured cable	GL-33	493217-000
Power cable gland for non-armoured cable (to be ordered separately)	GL-34	931945-000

ORDERING DETAILS

Part description	RAYSTAT-EX-02
PN (Weight)	404385-000 (1.77 kg)

Raychem RAYSTAT-EX-03 AND RAYSTAT-EX-04

SURFACE AND AMBIENT SENSING, ELECTRONIC




These electronic surface sensing and ambient thermostats provide accurate temperature control for heating cables.

The units can be supplied at nominal voltages of either 110 V 50/60 Hz or 230 V 50/60 Hz and have a double pole switch rated at 16 A. The switch contacts can be arranged to be volt free. Temperature setting is accurate via digital thumb wheel switches inside the enclosure.

The surface sensing version is supplied with a Pt 100 sensor and a 2 m long stainless steel sheathed extension cable giving freedom to locate the electronics remote from the sensor. The ambient version is supplied with a local Pt 100 sensor and a wind shield.

The enclosure is manufactured from high impact resistant glass filled polyester offering IP66 protection.

For pipe temperatures up to 215°C, the units can be mounted on the pipe using a support bracket.

APPLICATION	RAYSTAT-EX-03	RAYSTAT-EX-04
	Surface sensing	Ambient sensing
THERMOSTAT		
Area of use	Hazardous area: Zone 1 or Zone 2 (Gas) or Zone 21 or Zone 22 (Dust) Ordinary	
APPROVALS CERTIFICATION		
	Baseefa11ATEX0071X  II 2 GD When the unit is powered with a supply voltage ≥ 99 and ≤ 230 Va.c. Ex e mb ia IIC T6 Ta -50°C to +60°C Gb Ex tb IIIC T85°C Ta -50°C to +60°C Db IP66 When the unit is powered with a supply voltage $> 230 \leq 253$ Va.c. Ex e mb ia IIC T5 Ta -50°C to +60°C Gb Ex tb IIIC T100°C Ta -50°C to +60°C Db IP66 ERC (Russia, Kazakhstan, Belarus) For other countries contact your local Pentair representative.	IECEX BAS 11.0036X
PRODUCT SPECIFICATION		
Temperature range	0°C to 499°C	0°C to 49°C
Ingress protection	IP66	IP66
Switching accuracy	± 1 K at 5°C $\pm 1\%$ of setpoint above 100°C	± 1 K at 5°C
Switching differential (Hysteresis)	≈ 1 °C at 100°C ≈ 2 °C at 200°C ≈ 5 °C at 499°C	≈ 1 °C
Output relay	Dual pole change overtype (DPDT) (optional volt free)	Dual pole change over type (DPDT) (optional volt free)

RAYSTAT-EX-03 AND RAYSTAT-EX-04

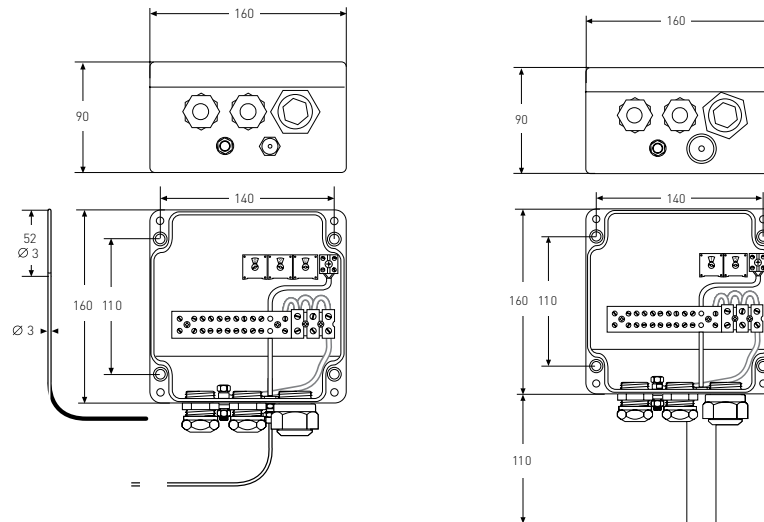
PRODUCT SPECIFICATION (continued)

Switching capacity	16 A 110 Vac $\pm 10\%$ 50/60 Hz 16 A 230/253 Vac $\pm 10\%$ 50/60 Hz resistive load	16 A 110 Vac $\pm 10\%$ 50/60 Hz 16 A 230/253 Vac $\pm 10\%$ 50/60 Hz resistive load
Ambient temperature range	-50°C to +60°C	-50°C to +60°C
Supply voltage	110 Vac $\pm 10\%$ 50/60 Hz 230/253 Vac $\pm 10\%$ 50/60 Hz	110 Vac $\pm 10\%$ 50/60 Hz 230/253 Vac $\pm 10\%$ 50/60 Hz
Internal power consumption	110 Vac ~ 4 VA, 230/253 Vac ~ 3 VA	
Terminal size	max. 4 mm ²	max. 4 mm ²

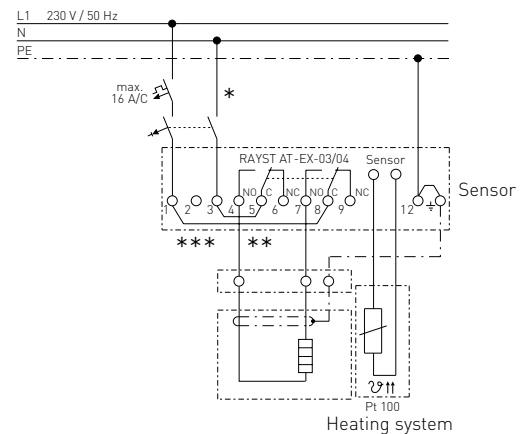
DIMENSIONS (IN MM)

RAYSTAT-EX-03

RAYSTAT-EX-04



TYPICAL WIRING DIAGRAM FOR DIRECT SWITCHING



- * Circuit breaker configurations may vary according to local standards/requirements
- ** Link 1-8 and/or 3-5 can be removed to provide potential-free contacts
- *** Terminal 2: 110 Vac input terminal

Cable entries	2 x M20 glands (cable \varnothing 7.5 – 13 mm) 1 x M25 with M25(M)/M20(F) adaptor and (M20) plug	2 x M20 glands (cable \varnothing 7.5 – 13 mm) 1 x M25 with M25(M)/M20(F) adaptor and (M20) plug
Sensor	2 wire Pt 100, stainless steel sensor, 2 m long	2 wire Pt 100, stainless steel sensor, complete with wind shield

MOUNTING METHOD

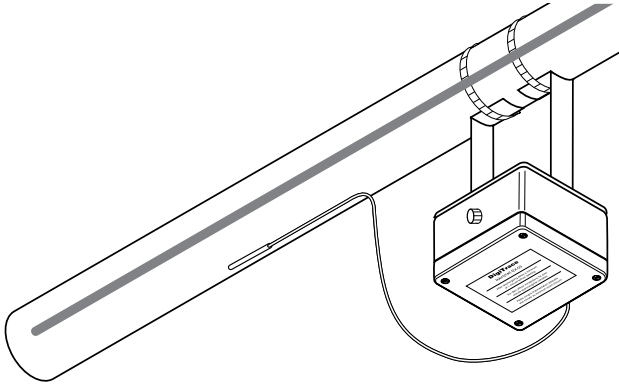
	Raychem support bracket SB-100 or SB-101, SB125 or surface mounting with 4 fixing holes on 110x140 mm centres	Raychem support bracket SB-100 or SB-101, SB125 or surface mounting with 4 fixing holes on 110x140 mm centres
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ORDERING DETAILS

Part Description	RAYSTAT-EX-03	RAYSTAT-EX-04
PN (Weight)	333472-000 (3.0 kg)	462834-000 (3.1 kg)

Raychem ETS-05

SURFACE SENSING ELECTRONIC THERMOSTAT



PRODUCT OVERVIEW


The Raychem ETS-05 electronic surface sensing thermostat provides accurate temperature control for heating cables. The ETS-05 is available in two versions. The ETS-05-L2-E is for temperatures up to 199°C, while the ETS-05-H2-E can be used for temperatures up to 499°C. The maximum nominal load is 32 A for both thermostats. Temperature setting is accurate via digital rotary switches inside the enclosure.


The ETS-05 has a LED indicator which indicates the status of the thermostat (powered on/off), the status of the heat-tracing cable (powered on/off) and the status of the sensor. In case of sensor failure the thermostat can switch to an on or off state, depending upon the users requirement.

PRODUCT CHARACTERISTICS

	ETS-05-L2-E	ETS-05-H2-E
Application	Surface sensing	Surface sensing
Area of use	Hazardous area: Zone 1 or Zone 2 (Gas) or Zone 21 or Zone 22 (Dust) Ordinary	

APPROVALS CERTIFICATION

Raychem – ETS-05 Electronic Thermostat  II 2(1)G II 2D
 Ex e ia mb (Ga) IIC T5 Gb
 Ex tb IIIC T100°C Db
 Ta-40 to +60°C Supply = 99-121V (ETS-05-x1-x) or 195-230V (ETS-05-x2-x)
 Maximum switched current 32A Resistive
 IECEx BAS 13.0071
 Baseefa13ATEX0137
 Um=253V
 Max. Current = 0.5A
 Prospective short circuit current 1500A

 (Russia, Kazakhstan, Belarus)
 For other countries contact your local Pentair representative.

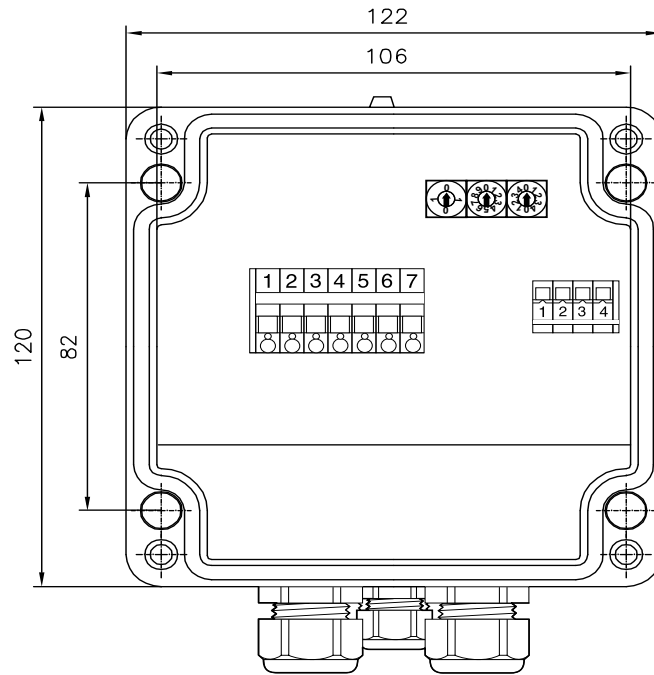
PRODUCT SPECIFICATION

Temperature setpoint range	0°C to 199°C	0°C to 499°C
Temperature measurement range	-55°C to 260°C	-55°C to 585°C
Maximum sensor lead resistance	20 Ohm	20 Ohm
Ingress protection	IP66	IP66
Switching accuracy	±1 K at 5°C	±1 K at 5°C, 2°C at 499°C
Switching differential (Hysteresis)	≈ 3°C	≈ 3°C
Output relay	Single Pole change over type (SPST)	Single Pole change over type (SPST)
Switching capacity	32 A resistive load	32 A resistive load
Ambient temperature range	-40°C to + 60°C	-40°C to + 60°C
Supply voltage	230 V +10% / -15% 50/60 Hz	230 V +10% / -15% 50/60 Hz
Internal power consumption	3 VA	3 VA
Terminal size	max. 6 mm ²	max. 6 mm ²
Cable entries	2 x M25: 1 x M25 gland for power cable in 1 x M25 rain plug for heating cable out	2 x M25: 1 x M25 gland for power cable in 1 x M25 rain plug for heating cable out
Sensor	M16 gland with 3 wire PT100 flexible sensor, 2 m long	M16 gland with 3 wire PT100, stainless steel sensor, 2 m long,

LED STATUS INDICATIONS

Green: ETS-05 powered on, heat-tracing cable off	Green: ETS-05 powered on, heat-tracing cable off
Yellow: ETS-05 powered on, heat-tracing cable on	Yellow: ETS-05 powered on, heat-tracing cable on
Red flashing: Sensor failure - controller in fail safe mode	Red flashing: Sensor failure - controller in fail safe mode

DIMENSIONS (IN MM)

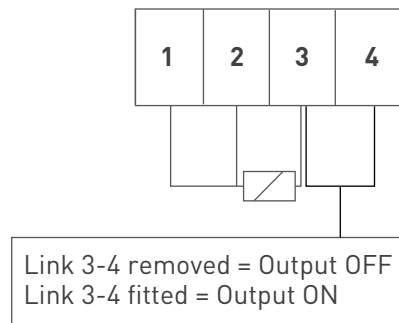


Power Terminals

1	2	3	4	5	6	7
Line Out	Neutral Out	Neutral Supply	230V Supply	Earth	Earth	Earth

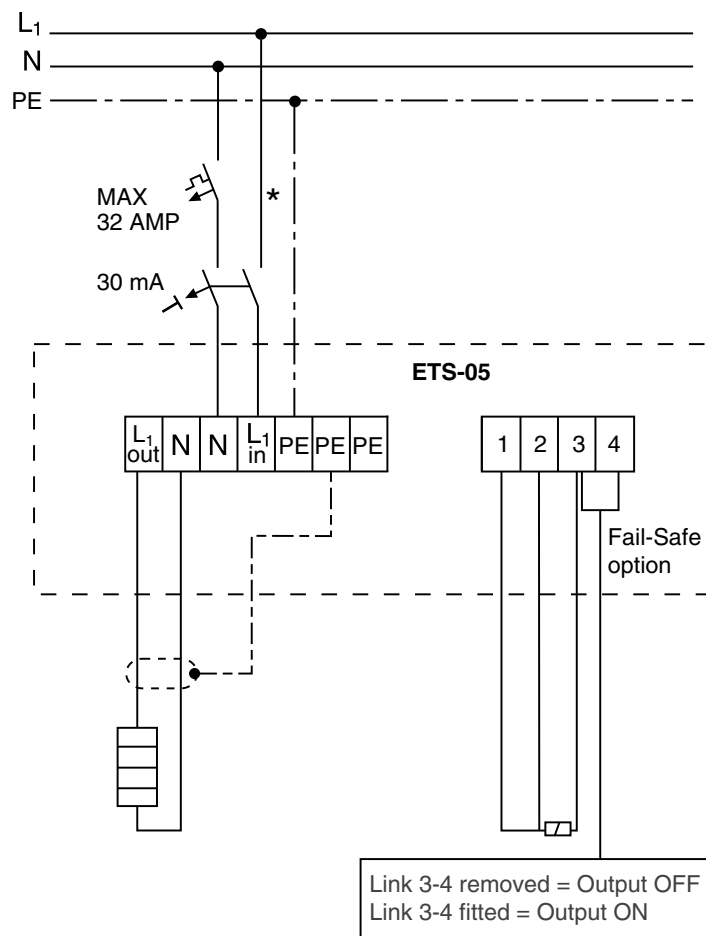
Terminals 2 and 3 are joined electrically
 Terminals 5, 6 and 7 are joined electrically

Sensor/Failure Mode Select Terminals



Terminals 1 to 3 allow for the connection of a three wire PT100 sensor.
 Terminals 3 to 4 allow the user to select the default heating status on sensor error.
 Without a link fitted the heating will turn OFF if a sensor error is detected (default)
 With a link fitted the heating will turn ON if a sensor error is detected

TYPICAL WIRING DIAGRAM FOR DIRECT SWITCHING



MOUNTING METHOD

Support bracket SB-100, SB-101, SB-110, SB-111, SB-130 or surface mounting with 4 fixing holes on 106 x 82 mm centres

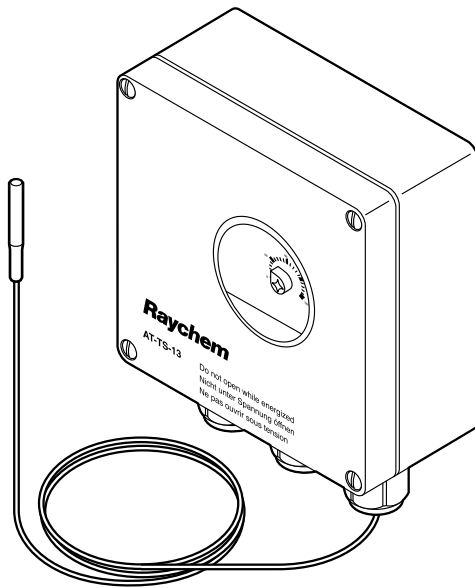
Support bracket SB-100, or SB-101, SB-110, SB-111, SB-130 or surface mounting with 4 fixing holes on 106 x 82 mm centres

ORDERING DETAILS

Product Name	ETS-05-L2-E	ETS-05-H2-E
Part number	1244-014367	1244-014368

Raychem AT-TS-13 AND AT-TS-14

SURFACE SENSING THERMOSTAT, ELECTRONIC



AT-TS thermostats provide temperature control in safe area. The temperature set point can be checked through a window in the lid. LED´s are providing an indication when cables are energized (Heating ON) or when the temperature sensor is defect (sensor break or sensor short-circuit).

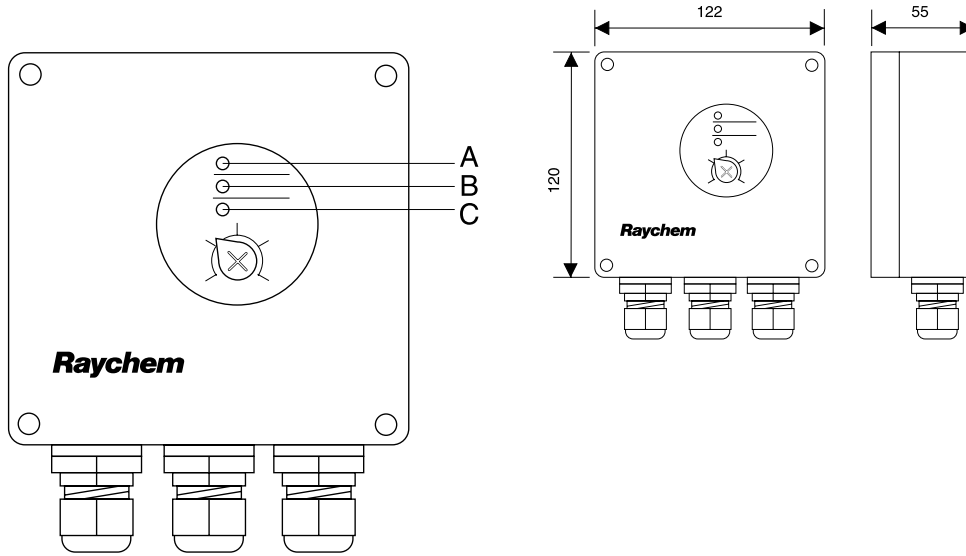
The temperature sensor has a length of 3 meter and can be shortened for ambient sensing operating. Direct connection of the heating cable is possible. Connection kits need to be ordered separately. The thermostat is available in 2 temperature ranges.

GENERAL	AT-TS-13	AT-TS-14
Area of use	Ordinary area, outdoors	Ordinary area, outdoors
Supply voltage	230 Vac +10% -15% 50/60 Hz	230 Vac +10% -15% 50/60 Hz
Max. switching current	16 A, 250 Vac	16 A, 250 Vac
Max. conductor size	2.5 mm ²	2.5 mm ²
Switching differential	0.6 K to 1 K	0.6 K to 1 K
Switching accuracy	± 1 K at 5°C (calibration point)	2 K at 60°C (calibration point)
Switch type	SPST (normally open)	SPST (normally open)
Adjustable temperature range	-5°C to +15°C	0°C to +120°C
HOUSING		
Temperature setting	inside	inside
Exposure temperature	-20°C to +50°C	-20°C to +50°C
Ingress protection	IP65 according to EN 60529	IP65 according to EN 60529
Entries	1 x M20 for supply cable (Ø 8-13 mm) 1 x M25 for heating element (Ø 11-17 mm) 1 x M16 for the sensor	1 x M20 for supply cable (Ø 8-13 mm) 1 x M25 for heating element (Ø 11-17 mm) 1 x M16 for the sensor
Material	ABS	ABS
Lid fixing	nickel-plated quick release screws	nickel-plated quick release screws
Mounting	SB-110 and SB-111 or surface mount	SB-110 and SB-111 or surface mount

APPROVALS

EAC (Russia, Kazakhstan, Belarus)
For other countries contact your local Pentair representative.

DIMENSIONS (IN MM)



- A Green LED Heating cable on
- B Red LED Sensor break
- C Red LED Sensor short-circuit

TEMPERATURE SENSOR	AT-TS-13	AT-TS-14
Type	PTC KTY 83-110	PTC KTY 83-110
Length sensor cable	3 m	3 m
Diameter sensor cable	5.5 mm	5.5 mm
Diameter sensor head	6.5 mm	6.5 mm
Sensor material	PVC	Silicone
Max. exposure temperature sensor cable	80°C	160°C

The sensor cable may be extended to a maximum of 100 m using a 2-conductor wire with a cross-section of 1.5 mm². The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage carrying cables. The shield of the extension cable should be grounded at the controller end only.

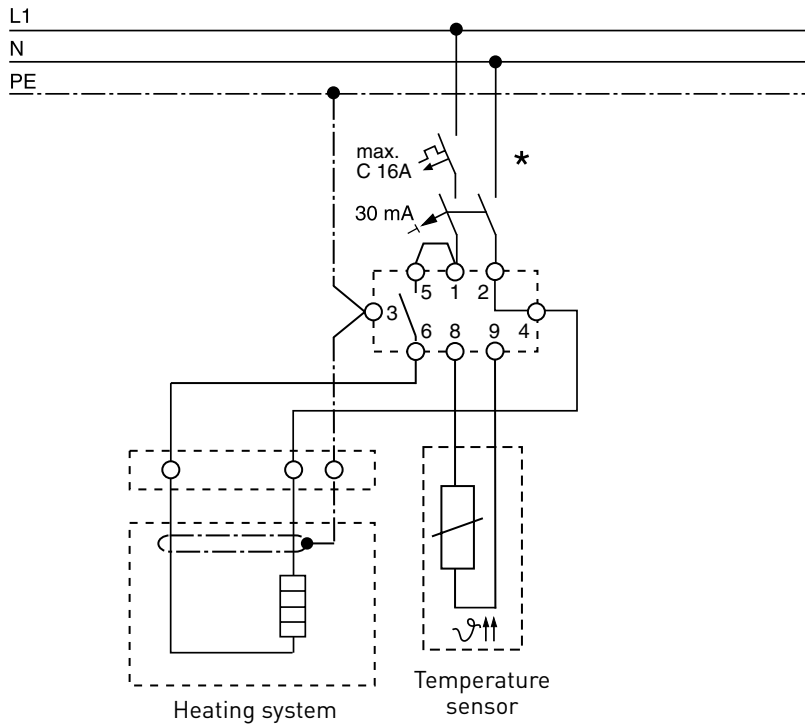
OUTPUT PARAMETERS		
Alarm on LED	Green LED: Heating Cable ON Red LED: Sensor break Red Led: Sensor short-circuit	Green LED: Heating Cable ON Red LED: Sensor break Red Led: Sensor short-circuit

ORDERING DETAILS		
Part description	AT-TS-13	AT-TS-14
PN (Weight)	728129-000 (0.44 kg)	648945-000 (0.44 kg)

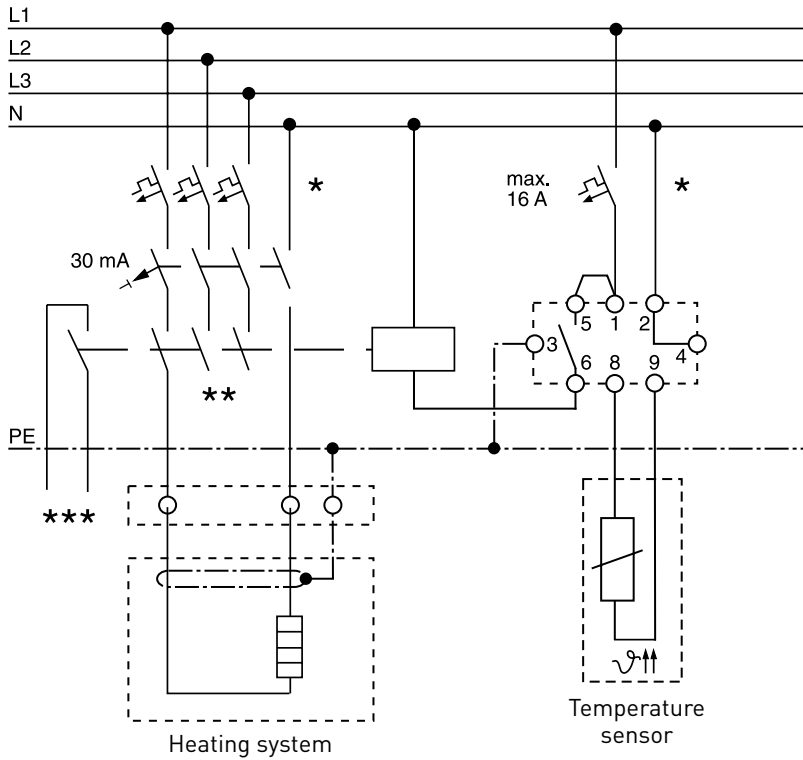
ACCESSORIES		
PA Reducer	Reducer M25 (M)/M20 (F)	Reducer M25 (M)/M20 (F)
PN	184856-000	184856-000
Spare temperature sensor (AT-TS-13 and AT-TS-14)	HARD-69 (Max. exposure temperature 160°C)	HARD-69
PN (Weight)	133571-000 (180 g)	133571-000 (180 g)

WIRING DIAGRAM FOR THERMOSTAT

AT-TS-13 or AT-TS-14



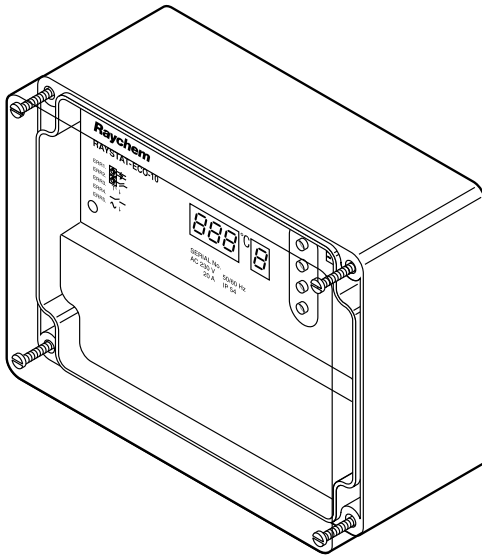
AT-TS-13/14 with contactor



- * Two- or four-pole electrical protection by circuit-breaker may be needed for local circumstances, standards and regulations
- ** Depending on the application, one- or three-pole circuit-breakers or contactors may be used
- *** Optional: Potential-free circuit-breaker for connection to the BMS

Raychem RAYSTAT-ECO-10

AMBIENT SENSING ENERGY SAVING FROST PROTECTION CONTROLLER



The RAYSTAT-ECO-10 temperature controller is designed to control heating cables used for frost protection applications. It continuously adjusts the heat-tracing output based on the ambient temperature. Using a proprietary algorithm, the RAYSTAT-ECO-10 controller measures ambient temperature and determines the appropriate cycle time during which the heating cables will be energised.

Since ambient temperatures in winter are often below freezing point, but well above the minimum designed ambient temperature, significant energy savings are realised. Parameters are displayed and can be set easily. The controller includes a 25 A relay which allows direct switching of the heating circuit. The enclosure can easily be installed outdoors. The unit includes a Pt 100 sensor for determining ambient temperature in ordinary area.

The RAYSTAT-ECO-10 controller is designed to provide trouble-free, long term operation. In addition to the display, the controller includes an alarm relay that switches either upon low supply voltage, upon output fault or upon RTD failure thus allowing remote indication of system status.

GENERAL

Area of use	Ordinary area, outdoors
Ambient operating temperature range	-20°C to +40°C
Supply voltage (nominal)	230 V +10% -10%, 50/60 Hz
Internal power consumption	≤ 14 VA

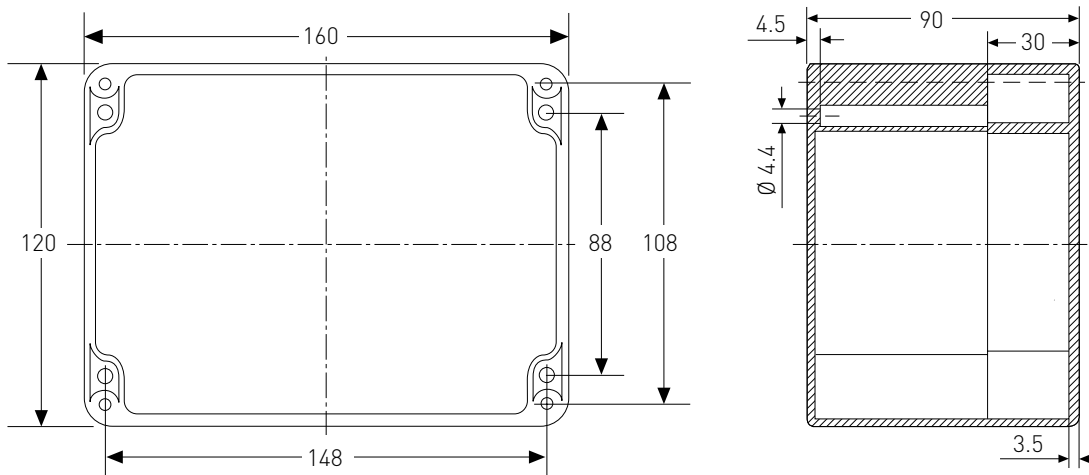
ENCLOSURE

Protection	IP65
Base and lid	Grey polycarbonate base Transparent lid
Lid fixing	4 captive screws
Entries	2 x M25, 1 x M20, 1 x M16 Direct entry of heating cable into unit with M25 connection kit
Gland plug	1 x M20

APPROVALS

ERC (Russia, Kazakhstan, Belarus)
For other countries contact your local Pentair representative.

DIMENSIONS (IN MM)



TEMPERATURE SENSOR

Type	3-wire Pt 100 according to IEC Class B
Area of use	Ordinary area
Sensor can be extended with a 3-wire shielded cable of max. 20 Ω per conductor (max. 150 m with a 3 x 1.5 mm ² cable). The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage carrying cables. The shield of the extension cable should be grounded at the controller end only.	

OUTPUT RELAYS

Control relay	Single pole single throw relay, rating: 25 A at 250 Vac
Alarm relay	Single pole double throw relay, rating: 2 A at 250 Vac, voltage free

PARAMETER SETTINGS

Maintain temperature set point	0°C to + 30°C (heating 0% powered)
Minimum ambient temperature	-30°C to 0°C (heating 100% powered)
Heater Operation if Sensor Error	ON (100%) or OFF, user defined ON or OFF
Voltage Free Operation	YES or NO
Parameters can be programmed without power supply (internal battery) and parameters are stored in non-volatile memory.	

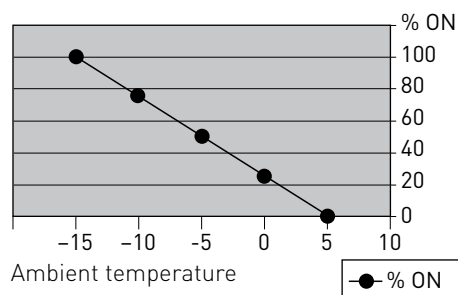
ENERGY SAVING WITH PROPORTIONAL AMBIENT SENSING CONTROL (PASC)

Duty cycle (power to heater ON) depends on the ambient temperature.

For example:

If minimum temperature = -15°C and if maintain temperature (set point) = +5°C

AMBIENT T°	% ON	
-15	100	Min. Ambient
-10	75	
-5	50	
0	25	
5	0	Set point

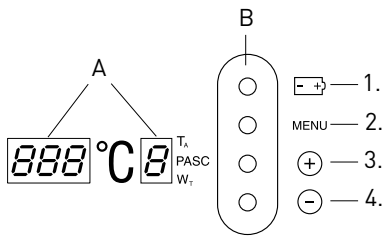


Result: At ambient temperature of -5°C, 50% energy is saved

DIAGNOSED ALARMS

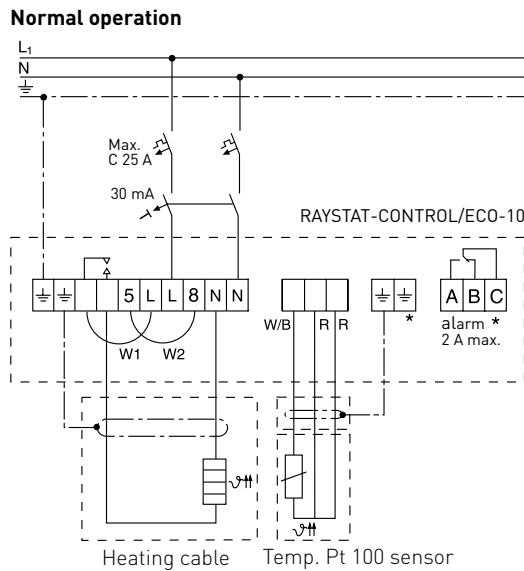
Sensor errors	Sensor short/Sensor open circuit
Low temperature	Min. expected ambient temperature reached
Voltage errors	Low supply voltage/Output voltage fault

DISPLAY LAYOUT

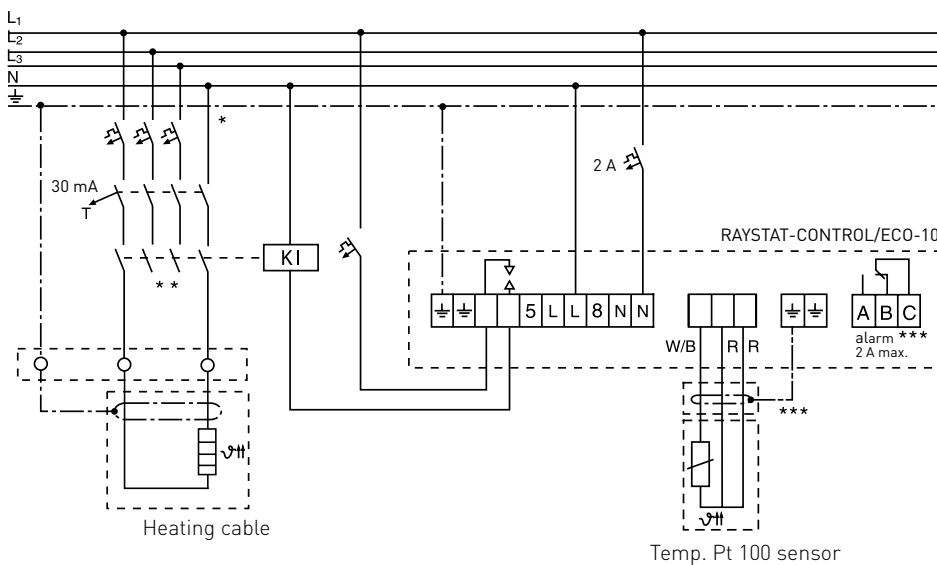


- A. LED Display (parameter and error indications)
- B. Push buttons
 - 1. Battery activation
 - 2. Parameter selection
 - 3. Increase value
 - 4. Decrease value

CONNECTION DETAILS



VOLTAGE FREE OPERATION: REMOVE LINKS W1 AND W2



- * Electrical protection by circuit-breaker may be needed for local circumstances, standards and regulations.
- ** Depending on the application, one- or three-pole circuit-breakers or contactors may be used.
- *** Optional

RAYSTAT-ECO-10

CONNECTION TERMINALS

Supply	3 terminals for 0.75 mm ² to 4 mm ²
Pt 100 connection	4 terminals for 0.75 mm ² to 2.5 mm ²
Control relay connection	3 terminals for 0.75 mm ² to 4 mm ²
Alarm relay connection	3 terminals for 0.75 mm ² to 2.5 mm ²

MOUNTING METHOD

	Surface mounting with 4 fixing holes on 148 x 108 mm centres, M4 clearance
Support bracket	SB-100, SB-101 (SB-110 or SB-111)

ORDERING DETAILS

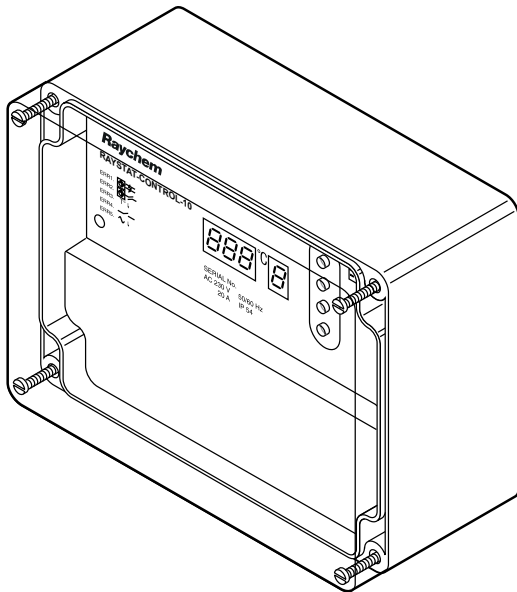
Part description	RAYSTAT-ECO-10
PN (Weight)	145232-000 (0.8 kg)

ACCESSORIES

PA Reducer	Reducer M25 (M)/M20 (F)
PN	184856-000

Raychem RAYSTAT-CONTROL-10

SURFACE SENSING PROGRAMMABLE THERMOSTAT WITH ALARM RELAY



The RAYSTAT-CONTROL-10 surface sensing thermostat is designed to provide user friendly measurement and control for heating cables. The thermostat has a 25 A control relay (that can be arranged to be volt free) and a 2 A volt free SPDT alarm relay.

Parameter and eventual alarm conditions are shown on the digital display and settings can be programmed easily, even without power supply.

The RAYSTAT-CONTROL-10 thermostat is supplied with a Pt100 sensor. This sensor has a 3 m long silicone extension cable giving freedom to locate the electronics remote from the sensor.

Two M25 entries allow for the power cable and heating cable to be connected directly into the unit. The units can be mounted on the pipe using the SB-100 or SB-101 support bracket.

GENERAL

Application	Surface sensing
Area of use	Ordinary area (indoors, outdoors) Sensing in zone 1 or zone 2 possible with MONI-PT100-EXE (separately available)
Ambient operating temperature range	-20°C to +40°C
Supply voltage (nominal)	230 V +10% -10%, 50/60 Hz
Internal power consumption	< 14 VA

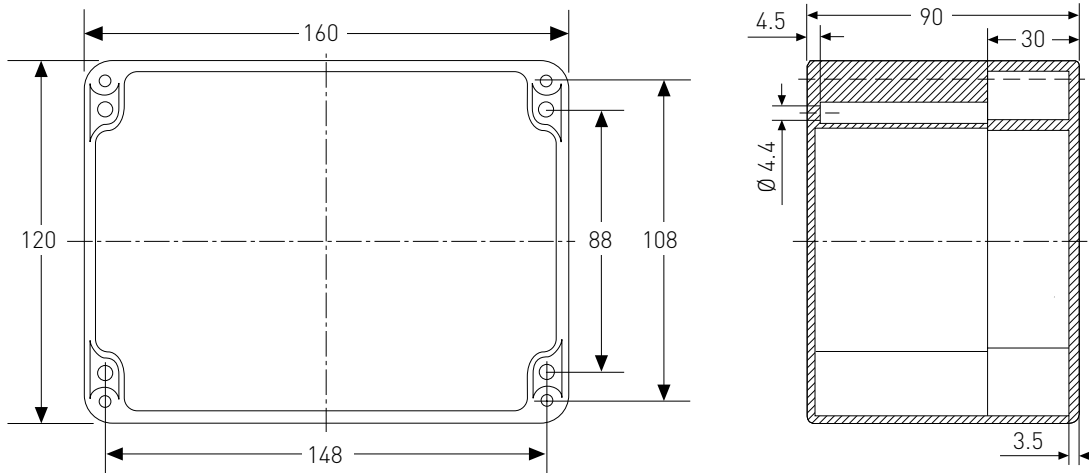
ENCLOSURE

	IP65
Base and lid	Grey polycarbonate base Transparent lid
Lid fixing	4 captive screws
Entries	2 x M25, 1 x M20, 1 x M16 Direct entry of heating cable into unit with M25 connection kit
Gland plug	1 x M20

APPROVALS

EAC (Russia, Kazakhstan, Belarus)
For other countries contact your local Pentair representative.

DIMENSIONS (IN MM)



TEMPERATURE SENSOR

Type	3-wire Pt 100 according to IEC Class B
Maximum exposure temperature	200°C
Area of use	Ordinary area

Sensor can be extended with a 3-wire shielded cable of max. 20 Ω per conductor (max. 150 m with a 3 x 1.5 mm² cable). Sensing in hazardous area zone 1 or zone 2 can be done with MONI-PT100-EXE. The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage carrying cables. The shield of the extension cable should be grounded at the controller end only.

OUTPUT RELAYS

Control relay	Single pole single throw relay, rating: 25 A at 250 Vac
Alarm relay	Single pole double throw relay, rating: 2 A at 250 Vac, voltfree

PROGRAMMABLE PARAMETER SETTINGS

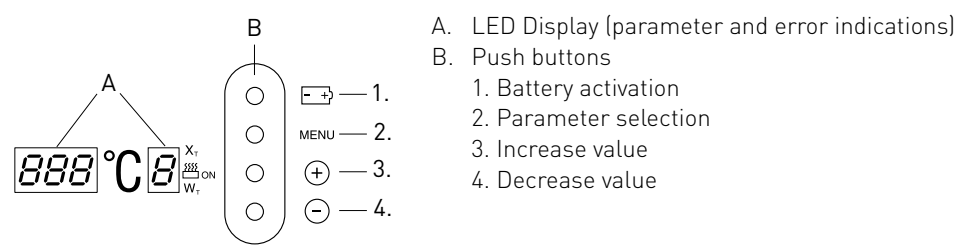
Temperature setting	0°C to +150°C
Hysteresis	1 K to 5 K
Low Temperature Alarm	-40°C to +148°C
High Temperature Alarm	+2°C to +150°C or switched OFF
Heater Operation if Sensor Error	ON or OFF
Volt Free Operation	YES or NO

Parameters can be programmed without power supply (internal battery) and parameters are stored in non-volatile memory.

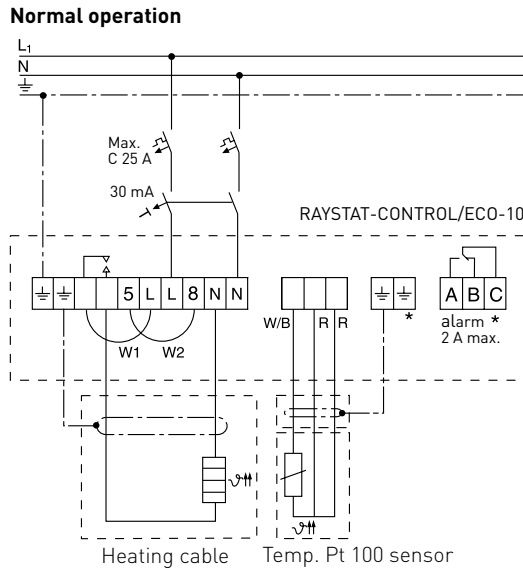
DIAGNOSED ALARMS

Sensor errors	Sensor short/Sensor open circuit
Low temperature	High temperature/Low temperature
Voltage errors	Low supply voltage/Output voltage fault

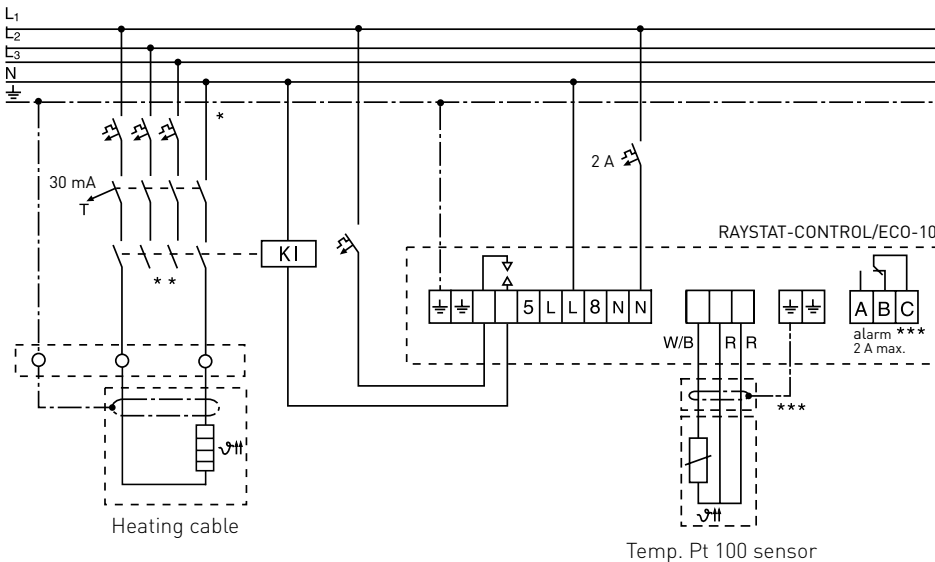
DISPLAY LAYOUT



CONNECTION DETAILS



VOLTAGE FREE OPERATION: REMOVE LINKS W1 AND W2



- * Electrical protection by circuit-breaker may be needed for local circumstances, standards and regulations.
- ** Depending on the application, one- or three-pole circuit-breakers or contactors may be used.
- *** Optional

CONNECTION TERMINALS

Supply	3 terminals for 0.75 mm ² to 4 mm ²
Pt 100 connection	4 terminals for 0.75 mm ² to 2.5 mm ²
Control relay connection	3 terminals for 0.75 mm ² to 4 mm ²
Alarm relay connection	3 terminals for 0.75 mm ² to 2.5 mm ²

MOUNTING METHOD

Support bracket	Surface mounting with 4 fixing holes on 148 x 108 mm centres, M4 clearance SB-100, SB-101
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ORDERING DETAILS

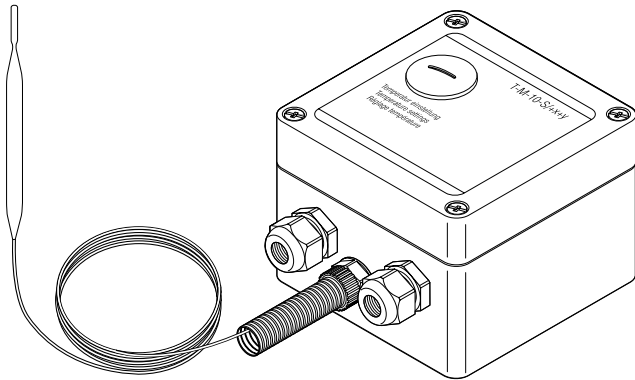
Part description	RAYSTAT-CONTROL-10
PN (Weight)	828810-000 0.8 kg)

ACCESSORIES

PA Reducer	Reducer M25 (M)/M20 (F)
PN	184856-000

Raychem T-M-10-S/+X+Y

SURFACE SENSING THERMOSTAT



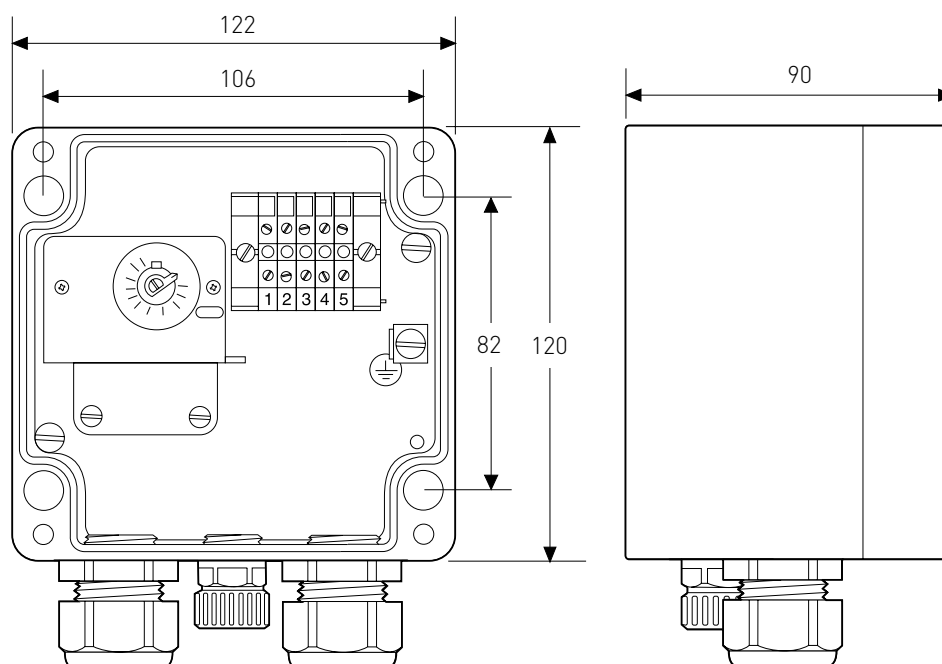
A surface sensing thermostat providing temperature control in safe areas.

Temperature set point adjustment can be completed, without opening the enclosure, via a removable plug in the lid. The 2 meter long stainless steel capillary is protected at the enclosure by a flexible conduit.

Direct connection of the heating cable is possible.

The thermostat is available in 3 temperature ranges: 0–50°C; 0–200°C; 50–300°C.

GENERAL	T-M-10-S/+0+50C	T-M-10-S/0+200C	T-M-10-S/+50+300C
Area of use	Ordinary area	Ordinary area	Ordinary area
PRODUCT SPECIFICATION			
Max rated voltage (nom)	230 Vac	230 Vac	230 Vac
Temperature setting	0°C to +50°C	0°C to +200°C	+50°C to +300°C
Switching type	Single pole change over (SPDT) 100,000 cycles at 16 A	Single pole change over (SPDT) 100,000 cycles at 16 A	Single pole change over (SPDT) 100,000 cycles at 16 A
Switching capacity	Max 16 A	Max 16 A	Max 16 A
Hysteresis/Differential	2.5% of temperature range	2.5% of temperature range	2.5% of temperature range
Accuracy	±1.5% of setpoint for temperature setting in upper third of range (measured at 22°C)		
Setting	Internal dial, through lid	Internal dial, through lid	Internal dial, through lid
Terminal size	4 mm ²	4 mm ²	4 mm ²
Ambient operating temp. range	-20°C to +80°C	-20°C to +80°C	-20°C to +80°C
OUTPUT PARAMETERS			
Control relay	Change-over switch	Change-over switch	Change-over switch

DIMENSIONS (IN MM)

ENCLOSURE	T-M-10-S/0+50C	T-M-10-S/0+200C	T-M-10-S/+50+300C
Protection	IP65	IP65	IP65
Dimension	122 x 120 x 90 mm	122 x 120 x 90 mm	122 x 120 x 90 mm
Materials body and lid	Grey, polyester enclosure		
Lid fixing	4 captive screws, stainless steel		
Entries	2 entries: 1 x M25 Reducer M25 (M)/M20 (F) incl. M20 gland (Ø 8-13 mm) 1 x M20 gland (Ø 8-13 mm)		

TEMPERATURE SENSOR

		Fluid filled capillary, 2 m long		
Dimensions	Ø	8 mm	8 mm	8 mm
	Length sensing element	166 mm	78 mm	56 mm
Material	V4A Stainless Steel			
Exposure temperature	-40°C to +60°C		-20°C to +230°C	
Minimum bending radius	10 mm for capillary, the sensor cannot be bent			

MOUNTING METHOD

Support bracket	SB-110 or SB-111 or surface mount	SB-110 or SB-111 or surface mount	SB-110 or SB-111 or surface mount
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ORDERING DETAILS

Ordering references	PN Number	Weight
T-M-10-S/0+50C	105336-000	1 kg
T-M-10-S/0+200C	337388-000	1 kg
T-M-10-S/+50+300C	607672-000	1 kg

MEANING OF REFERENCE: T-M-10-S/+X+Y

T = thermostat

M = mechanical thermostat

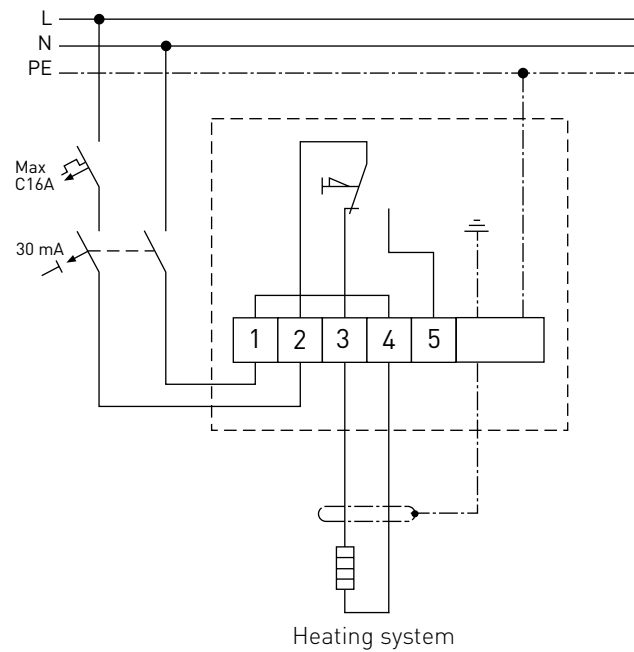
10 = control thermostat

S = surface sensing

x = min temperature of control range

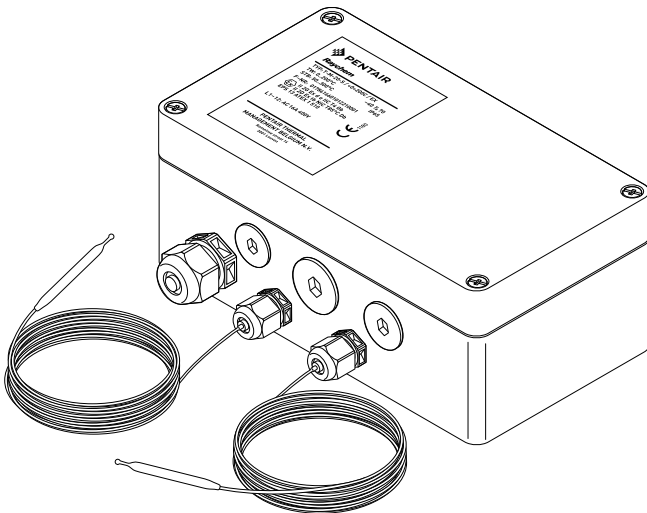
y = max temperature of control range

CONNECTION DETAILS



Raychem T-M-20-S/+X+Y/EX

SURFACE SENSING THERMOSTAT WITH SAFETY LIMITER FOR HAZARDOUS AREA



A surface sensing thermostat providing temperature control and temperature limit in hazardous areas.

The safety limiter prevents the heating system exceeding a preset maximum temperature should the control function fail to operate or an unsafe process temperature occur. The maximum rated voltage is 400 VAC. The switching current capacity is 16 A maximum via independent Ex d single pole change over micro switches with volt-free contacts.

The switches are mounted within an Ex e enclosure together with a spring-type terminal block for fast easy connection. The sensors are 3 meter long stainless steel fluid filled bulb and capillary.







The thermostat is delivered with Ex approved power cable glands and plugs and the entries offer the possibility for a variety of connections such as connecting M25 and M20 glands for direct heating cable entry or alarm output.

The thermostat with limiter is available in 3 temperature ranges: +0°C +120°C, +0°C +200°C and +50°C +300°C

GENERAL

	T-M-20-s/+0+120C/EX	T-M-20-S/+0+200C/EX	T-M-20-S/+50+300C/EX
Area of use	Hazardous area: Zone 1 or Zone 2 (Gas) or Zone 21 or Zone 22 (Dust) Ordinary		

APPROVAL CERTIFICATION

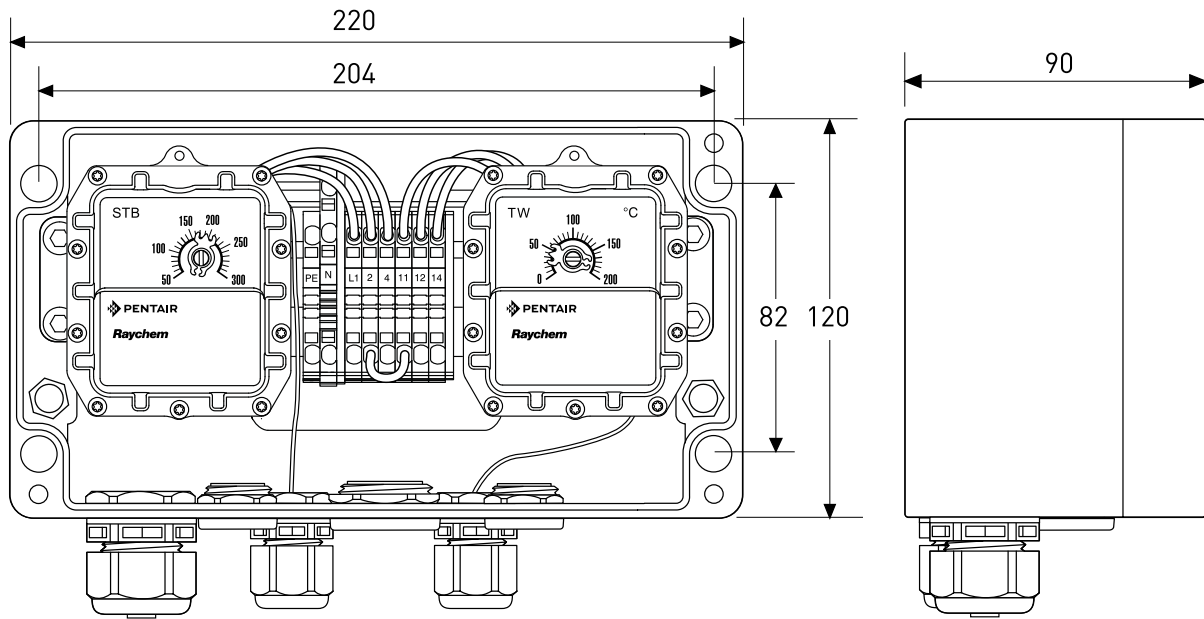
	T-M-20-s/+0+120C/EX	T-M-20-S/+0+200C/EX	T-M-20-S/+50+300C/EX
	EPS 13 ATEX 1 510  II 2G Ex d e IIC T4/T5/T6 Gb  II 2D Ex tb IIIC T85°C /T100°C/T130°C Db	EPS 13 ATEX 1 510  II 2G Ex d e IIC T4/T5/T6 Gb  II 2D Ex tb IIIC T85°C /T100°C/T130°C Db	EPS 13 ATEX 1 510  II 2G Ex d e IIC T4/T5/T6 Gb  II 2D Ex tb IIIC T85°C /T100°C/T130°C Db

EAC (Russia, Kazakhstan, Belarus)
For other countries contact your local Pentair representative.

PRODUCT SPECIFICATION

		T-M-20-s/+0+120C/EX	T-M-20-S/+0+200C/EX	T-M-20-S/+50+300C/EX
Temperature setting	Controller	+0°C to +120°C	+0°C to +200°C	+50°C to +300°C
	Limiter	+0°C to +120°C	+50°C to +300°C	+50°C to +300°C
Switching type		Single pole change over (SPDT) >100.000 cycles at I nom	Single pole change over (SPDT) >100.000 cycles at I nom	Single pole change over (SPDT) >100.000 cycles at I nom
Switching capacity		Maximum 16A at 400 Vac, resistive load	Maximum 16A at 400 Vac, resistive load	Maximum 16A at 400 Vac, resistive load
Hysteresis/Differential	Controller	max. 2.5% range, calibrated downwards	max. 2.5% range, calibrated downwards	max. 2.5% range, calibrated downwards
	Limiter	max 7% calibrated upwards	max. 7.5%, calibrated upwards	max. 7.5%, calibrated upwards
Setting		Inside enclosure	Inside enclosure	Inside enclosure
Reset limiter		Inside enclosure by means of a screwdriver		
Terminal size		4 mm ²	4 mm ²	4 mm ²
Terminal type		spring-type terminals	spring-type terminals	spring-type terminals
Ambient operating temp. range		-40°C to +70°C	-40°C to +70°C	-40°C to +70°C

DIMENSIONS (IN MM)



OUTPUT

PARAMETERS	T-M-20-s/+0+120C/EX	T-M-20-S/+0+200C/EX	T-M-20-S/+50+300C/EX
Control relay	Change-over switch	Change-over switch	Change-over switch
Limiter relay	Change-over switch with possibility for external alarm Capillary leakage detection system		

ENCLOSURE

Protection	IP65	IP65	IP65
Dimension	220 x 120 x 90 mm	220 x 120 x 90 mm	220 x 120 x 90 mm
Materials body and lid	Black, glass filled polyester enclosure	Black, glass filled polyester enclosure	Black, glass filled polyester enclosure
Lid fixing	4 captive screws, stainless steel	4 captive screws, stainless steel	4 captive screws, stainless steel
Entries	6 entries: 1 x M25 gland (Ø 8-17 mm): power supply 1 x M25 stopping plug: output to heating cables 2 x M20 stopping plug: output to heating cables (possibility to connect single conductor heating element) 2 x M20: capillary sensors		

TEMPERATURE SENSOR

Type		Fluid filled capillary, 3 m long	Fluid filled capillary, 2 m long	Fluid filled capillary, 2 m long
Dimensions	Controller	Ø 6 mm; length sensing element = 90 mm	Ø 6 mm; length sensing element = 72 mm	Ø 4 mm; length sensing element = 135 mm
	Limiter	Ø 6 mm; length sensing element = 58 mm	Ø 4 mm; length sensing element = 78 mm	Ø 4 mm; length sensing element = 78 mm
Material			stainless steel	stainless steel
Temperature exposure	Controller	-40°C +138°C	-40°C +230°C	-40°C +345°C
	Limiter	-40°C +138°C	-40°C +345°C	-40°C +345°C
Minimum bending radius		5 mm for capillary (not for sensor)	5 mm for capillary (not for sensor)	5 mm for capillary (not for sensor)

MOUNTING METHOD

Support bracket	SB-120, SB-125 or surface mounting via 4 fixing holes at 204 x 82 centres		
PN		SB-120	165886-000
		SB-125	1244-00603

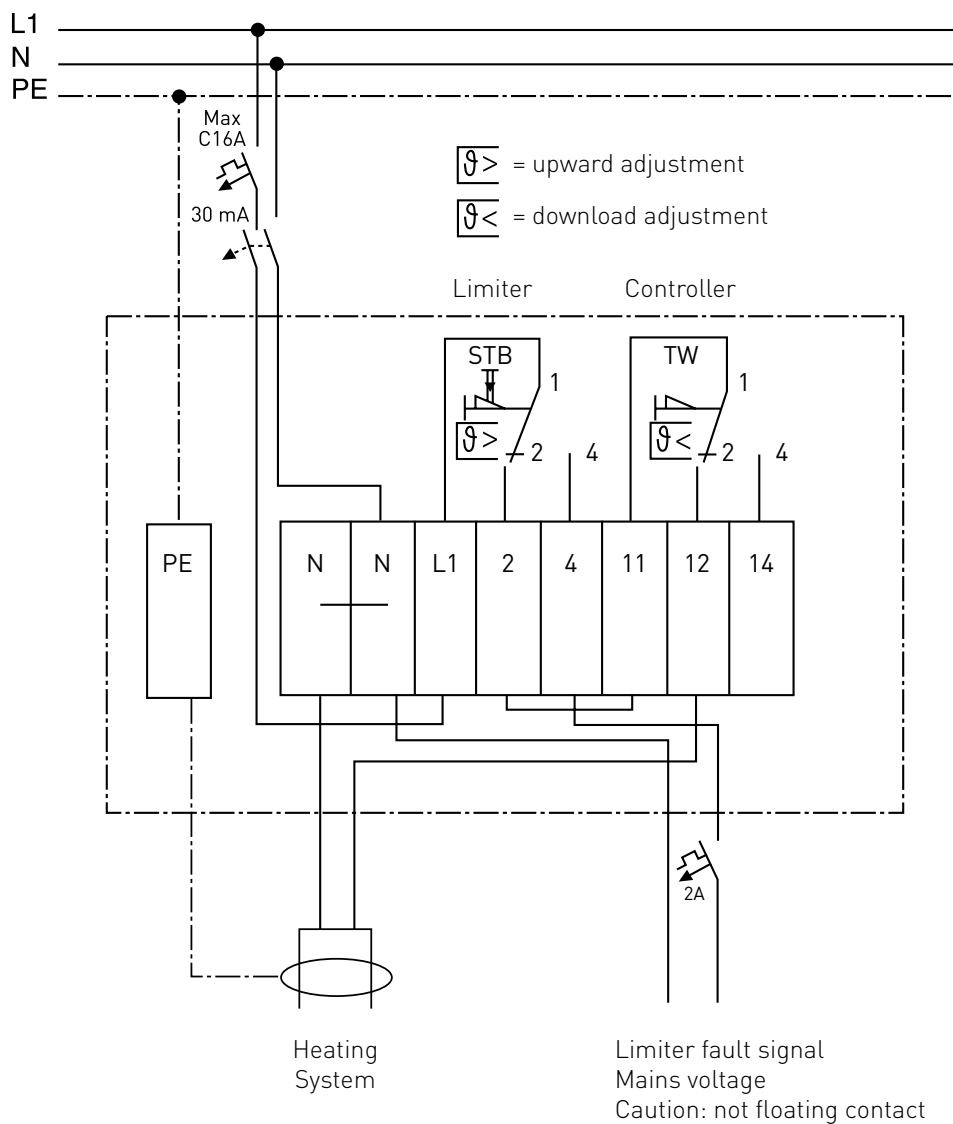
ORDERING DETAILS

Ordering references:	PN Number	Weight
T-M-20-S/+0+200C/EX	1244-013410	2 kg
T-M-20-S/+50+300C/EX	1244-013411	2 kg
T-M-20-S/+0+120C/EX	1244-016536	2 kg

MEANING OF REFERENCE: T-M-20-S/+X+Y/EX

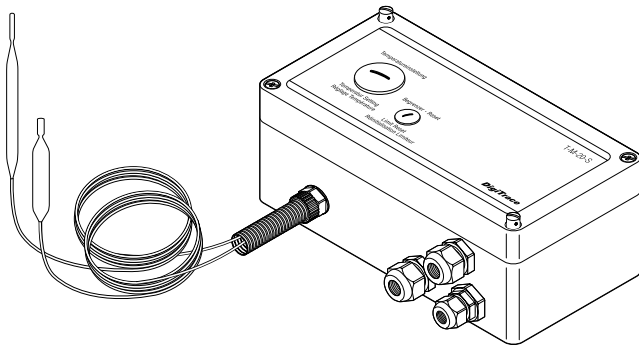
- T = thermostat
- M = mechanical thermostat
- 20 = control thermostat + limiter
- S = surface sensing
- x = min temperature of control range
- y = max temperature of control range
- Ex = hazardous area

CONNECTION DETAILS



Raychem T-M-20-S/+X+Y

SURFACE SENSING THERMOSTAT WITH LIMITER



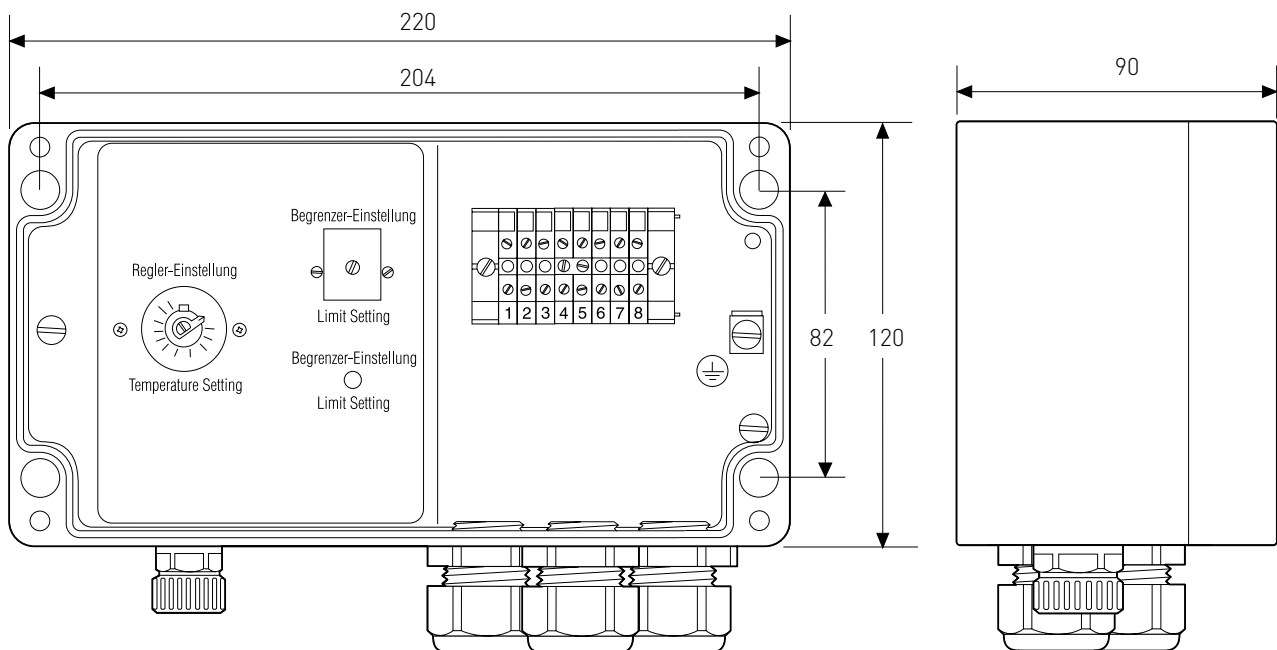
A surface sensing thermostat providing temperature control and temperature limiter in safe areas. The high limit cut-out prevents the heating system exceeding a preset maximum temperature should the control function fail to operate or an unsafe process temperature occur.

Temperature set point adjustment and limiter reset can be completed, without opening the enclosure, via removable plugs in the lid.

Both 2 meter long stainless steel fluid filled bulb and capillary are protected at the enclosure by a flexible conduit.

Direct connection of the heating cable is possible. The thermostat is available in 3 temperature ranges. 0–50°C; 0–200°C; 50–300°C.

GENERAL		T-M-20-S/0+50C	T-M-20-S/0+200C	T-M-20-S/+50+300C
Area of use		Ordinary area	Ordinary area	Ordinary area
PRODUCT SPECIFICATION				
Max rated voltage (nom)		230 Vac	230 Vac	230 Vac
Temperature setting	Controller	0°C to +50°C	0°C to +200°C	+50°C to +300°C
	Limiter	+20°C to +150°C	+130°C to +200°C	+20°C to +400°C
Switching type		Single pole change over (SPDT) 100,000 cycles at 16 A (controller) 500 cycles at 10 A (limiter)		
Switching capacity	Controller	Max 16 A at 230 Vac	Max 16 A at 230 Vac	Max 16 A at 230 Vac
	Limiter	Max 10 A at 230 Vac	Max 10 A at 230 Vac	Max 10 A at 230 Vac
Breaking capacity	Controller	3700 VA	3700 VA	3700 VA
	Limiter	2300 VA	2300 VA	2300 VA
Hysteresis/Differential		2.5% of temperature range	2.5% of temperature range	2.5% of temperature range
Accuracy		±0.5% of setpoint in upper third of temperature range (at 22°C ambient)		
Setting		Internal dial, through lid	Internal dial, through lid	Internal dial, through lid
Terminal size		4 mm ²	4 mm ²	4 mm ²
Ambient operating temp. range		-20°C to +80°C	-20°C to +80°C	-20°C to +80°C

DIMENSIONS (IN MM)**OUTPUT PARAMETERS**

	T-M-20-S/0+50C	T-M-20-S/0+200C	T-M-20-S/+50+300C
Control relay	Change-over switch (SPDT)		
Limiter relay	Change-over switch with possibility for external alarm (SPDT)		

ENCLOSURE

	T-M-20-S/0+50C	T-M-20-S/0+200C	T-M-20-S/+50+300C
Protection	IP65	IP65	IP65
Dimension	222 x 120 x 90 mm	222 x 120 x 90 mm	222 x 120 x 90 mm
Materials body and lid	Grey, polyester enclosure	Grey, polyester enclosure	Grey, polyester enclosure
Lid fixing	4 captive screws, stainless steel		
Entries	3 entries: 1 x M25 Reducer M25 (M)/M20 (F) incl. M20 gland (Ø 8-13 mm) 1 x M20 gland (Ø 8-13 mm) 1 x M20 gland (Ø 8-13 mm)		

TEMPERATURE SENSOR

Type	Fluid filled capillary, 2 meter long
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Dimensions

	T-M-20-S/0+50C	T-M-20-S/0+200C	T-M-20-S/+50+300C
Controller Ø	8 mm	8 mm	8 mm
Length sensing element	166 mm	78 mm	56 mm
Limiter Ø	6 mm	6 mm	6 mm
Length sensing element	80 mm	78 mm	176 mm
Material	V4A Stainless Steel		
Exposure temperature	Controller	-40°C to +60°C	-20°C to +230°C
	Limiter	-40°C to +170°C	-20°C to +345°C
Minimum bending radius	10 mm for capillary, the sensor cannot be bent		

MOUNTING METHOD

Support bracket	SB-120 or surface mount
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ORDERING DETAILS

Ordering references	PN Number	Weight
T-M-20-S/0+50C	260448-000	1.9 kg
T-M-20-S/0+200C	750502-000	1.9 kg
T-M-20-S/+50+300C	608706-000	1.9 kg

MEANING OF REFERENCE: T-M-20-S/+X+Y

T= thermostat

M= mechanical thermostat

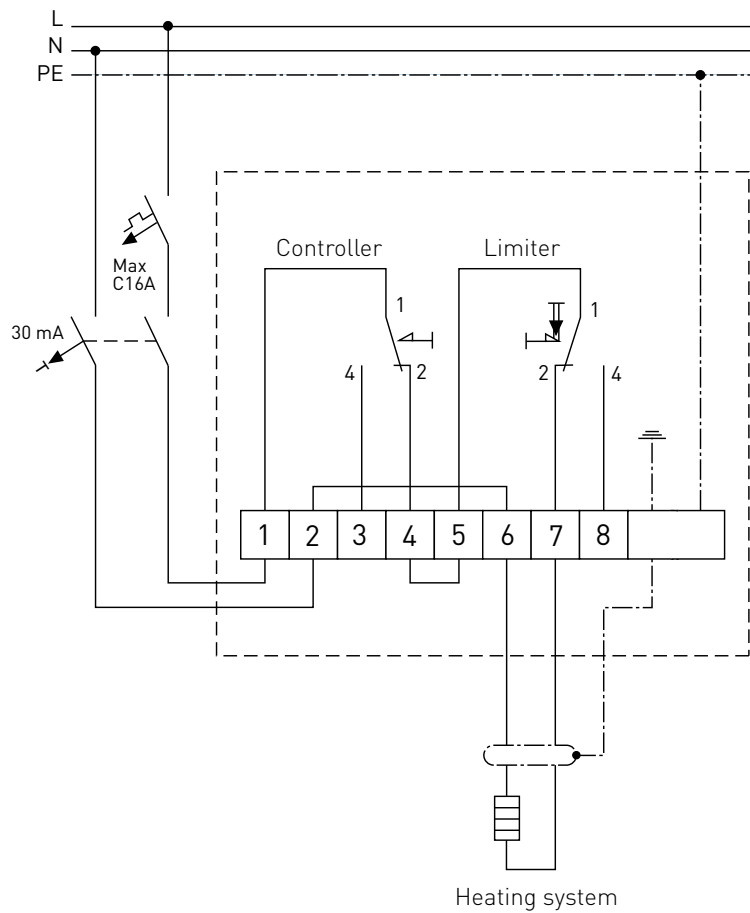
20= control thermostat + limiter

S= surface sensing

x= min temperature of control range

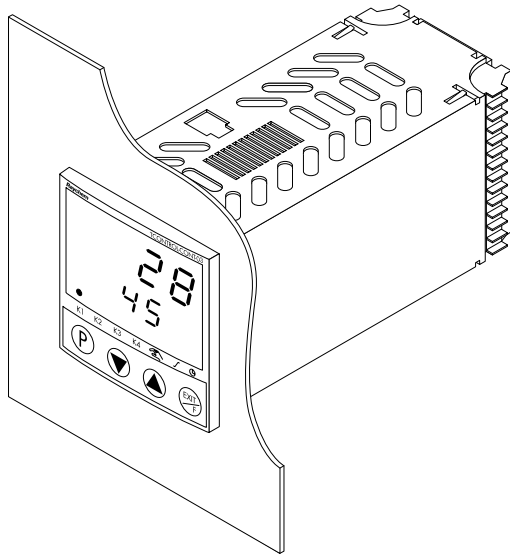
y= max temperature of control range

CONNECTION DETAILS



Raychem TCONTROL-CONT-03

SINGLE-CIRCUIT ELECTRONIC CONTROLLER WITH DUAL DISPLAY



The Raychem TCONTROL-CONT-03 family of electronic controllers provide accurate temperature control and centralized monitoring for individual heat-tracing circuits.

The compact panel mount TCONTROL-CONT-03 has two displays for indicating the process value and the set point. During programming these displays provide user guidance and visual aid to simplify commissioning.

Alternatively, the optional and easy to use Raychem TCONTROL-CONT-03/CONFIG software can be used for computer aided configuration.


Raychem TCONTROL-CONT-03 units are factory configured for ON/OFF control and are suitable for most heat-tracing applications. Other types of control algorithms can be configured by the user.

Different hardware configurations are available: Units with a relay output for controlling electro-mechanical relays or solid state relays and TCONTROL-CONT-03/MA units with an analog output for driving other types of actuators like thyristors. The health of the temperature input sensor is permanently monitored for failures. An alarm will appear in the event of sensor break or short circuit. In the event of a sensor failure the control output switches to a user defined state (ON or OFF)

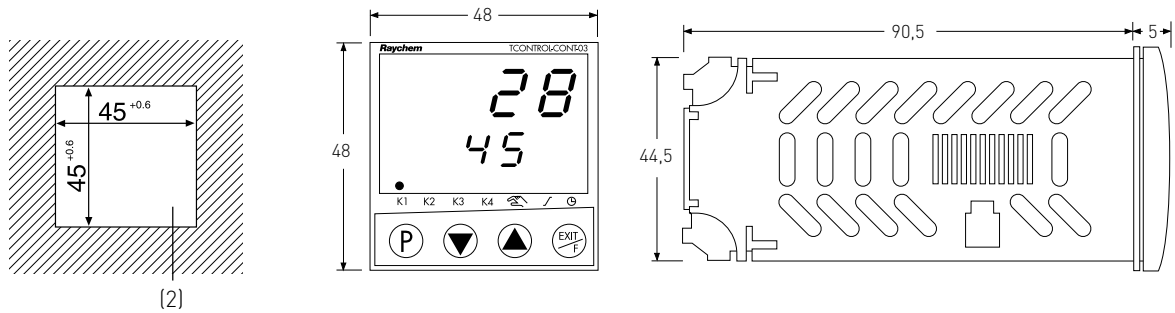
SPECIFIC FEATURES:

- Time delayed controller activation after initial power up (this can be used to avoid peak demands during start-up)
- Service counter included in order to count and eventually alarm on the number of relay operations.

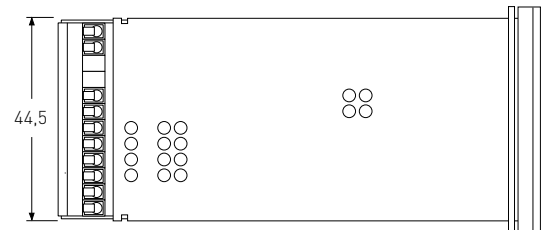
GENERAL

Application	Raychem TCONTROL-CONT-03 units are panel mount controllers and are typically used for providing tight temperature control of individual heat-tracing circuits.	
Area of use	Non hazardous area indoors (panel mount – through the panel)	
Approvals/Certification	Electrical Safety to DIN EN 61010-1 over voltage category III, pollution degree 2 EMC DIN EN 61326, Class B to industrial requirements.	
	 (Russia, Kazakhstan, Belarus) For other countries contact your local Pentair representative.	
Memory data backup	EEPROM based non-volatile memory. No loss of configuration data after power outage or long term shut down.	
Display	2 piece of 7-segment LED display with status indication LED 's (yellow/green)	
Supported control modes	ON/OFF, P, PI, PD or PID with auto-tuning are user selectable	
Measuring accuracy	Pt100 3-wire	error ≤ 0.1%,
	Pt100 2-wire	error ≤ 0.4%
	Thermocouples (incl. cold junction)	error ≤ 0.25%
	Voltage and current inputs	error ≤ 0.1%

DIMENSIONS (IN MM)



	Minimum spacing in between panel cut-outs	Horizontal spacing	Vertical spacing
TCONTROL-CONT-03 (all types)	Without Space for configuration connector	> 8 mm	> 8 mm
	With Space for configuration connector	> 8 mm	> 65 mm



(1) Connector for optional programming interface
(2) Panel cut-out

ELECTRICAL PROPERTIES

Supply Voltage & own power consumption	110 Vac to 240 Vac -15/+10%, 48 to 63 Hz & ~15 VA
Electrical connections	Via screw terminals on the back of the unit. Terminals are suitable for wires ranging from 1 to maximum 1.3 mm ² solid core or 1 mm ² stranded with cable shoe. Terminal strips are pluggable.
Supported output types (depending on model)	TCONTROL-CONT-03: 3 relay outputs (SPST) + 1 logic output TCONTROL-CONT-03/MA: 2 relay outputs (SPST) + analog output TCONTROL-CONT-03/COM: 3 relay outputs (SPST) + 1 logic output + RS485 TCONTROL-CONT-03/COMA: 2 relay outputs (SPST) + analog output + RS485

INPUT OPTIONS (ALL TYPES)

Temperature sensor inputs	Pt 100, Pt 1000 RTD 's in 2- and 3 wire connection, KTY11-6 sensors Thermocouple types: L, J, U, T, K, E, N, S
Electrical input signals	0/4 .. 20 mA or 0/2 .. 10 V (R _i = 100 Kohm)
Temperature control range	From -200 to + 2400°C depending on the type of temperature sensor used

OUTPUT OPTIONS AND OUTPUT RATINGS (DEPENDING ON TYPE)

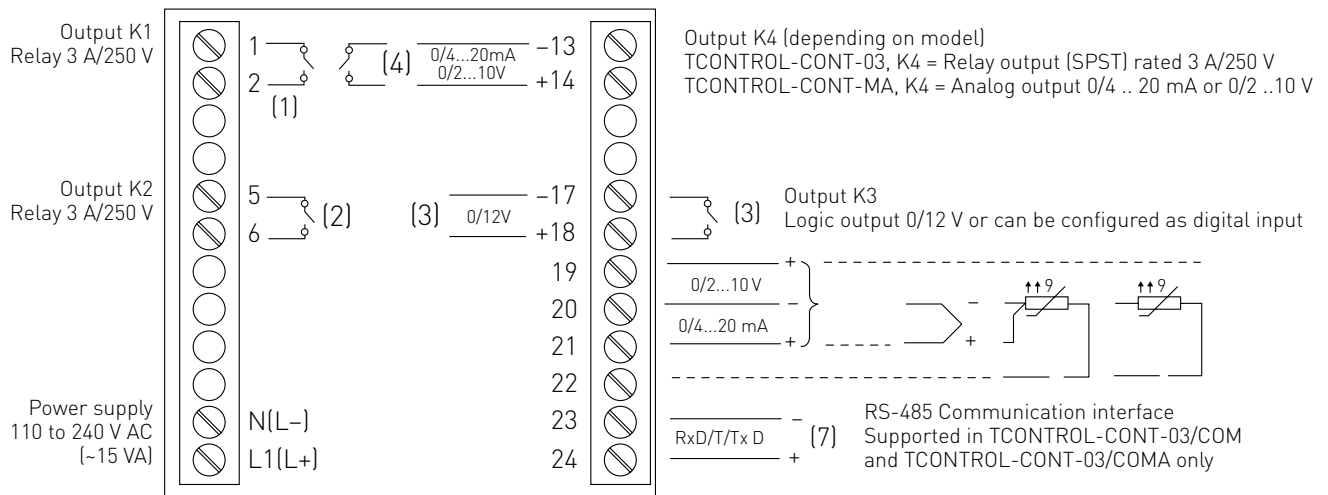
TCONTROL-CONT-03 TCONTROL-CONT-03/COM	Control and alarm relay contacts (SPST) are rated 3 A at 230 VAC. Expected lifetime: 350k operations at rated current or ~900K operations at 1 A Logic output 0 .. 12 V. Maximum current 20 mA
TCONTROL-CONT-03/MA TCONTROL-CONT-03/COMA	Control output, analog: 0/4 .. 20 mA Rload ≥ 500 Ohm Logic output 0 .. 12 V, maximum current 20 mA Alarm relay contacts (SPST) are rated 3 A at 230 VAC. Expected lifetime: 350k operations at rated current. 900k operations at 1 A
Communication options (*)	RS-485, Modbus at 9600, 19200 or 38400 BPS. Maximum up to 32 devices per network. (*)
Alarm options	2 independently configurable alarm relay outputs are provided. TCONTROL-CONT-03 units automatically alarm in case of sensor break or sensor short. On top of the input sensor driven alarms up to 8 different temperature triggered alarm functions can be defined. (see installation instructions for details)

ENCLOSURE

Housing type	Plastic enclosure approved to IEC 61554 (ABS) Suitable for installation in electrical distribution panels
Environmental protection	Front IP65, rear IP20 to DIN EN60529
Max. operating temperature	-5 to +55°C
Max. storage temperature	-40 to +70°C
Relative humidity	90% maximum, no condensation
Installation position	All positions allowed.

(*) supported on TCONTROL-CONT-03/COMx units onl

CONNECTION DIAGRAM



WIRING EXAMPLE

Ordering details	Part description	Product Number	Weight
Control units	TCONTROL-TCONT-03	1244-006829	~ 0.125 kg
	TCONTROL-CONT-03/MA	1244-006830	
	TCONTROL-CONT-03/COM	1244-006982	
	TCONTROL-CONT-03/COMA	1244-006981	

ACCESSORY SELECTION TABLE

Configuration and setup interface + software	TCONTROL-CONT-03/CONFIG	1244-006983	~ 0.120 kg
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ACCESSORY SELECTION TABLE

Sensors for hazardous area	MONI-PT100-EXE (1), (2)	967094-000
	MONI-PT100-4/20MA	704058-000
Sensor for non-hazardous area	MONI-PT100-NH	140910-000
Support bracket for temperature sensors	JB-SB-26	338265-000

Note 1: Sensor can be extended with a 3-wire shielded cable of max 30 Ohms per conductor (max. 150 m with a 1.5 mm² cable).

The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage carrying cables.

The shield of the extension cable should be grounded at the controller end only.

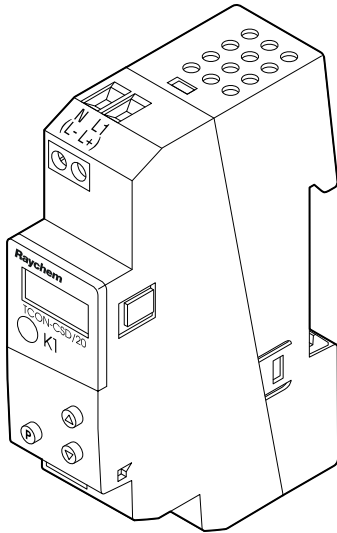
Note 2: MONI-PT100-EXE temperature sensors can be directly connected to the TCONTROL-CONT-03 input terminals.

There is no need to use current limiting devices such as zener barriers or isolators.

Note 3: Installed in ordinary area.

Raychem TCON-CSD/20

DIN RAIL MOUNTABLE ELECTRONIC THERMOSTAT WITH DISPLAY



The TCON-CSD/20 is a compact digital thermostat for simple ON/OFF temperature control. The temperature is measured through a temperature sensor and shown on a LCD display. The actual status of the output relay is signaled via a LED.

The instrument is commissioned and operated via three soft key push buttons on the unit's front panel.

Through its compact design and robust construction the TCON-CSD/20 allows for simple and space-saving installation.

Specific features:

- Time-delayed controller activation after initial power up (can be used to avoid peak demands on power during start-up)
- Parameter level can be protected by means of a secret code
- Adjustable switching differential.
- Input sensors are permanently monitored for cable short or breakage.

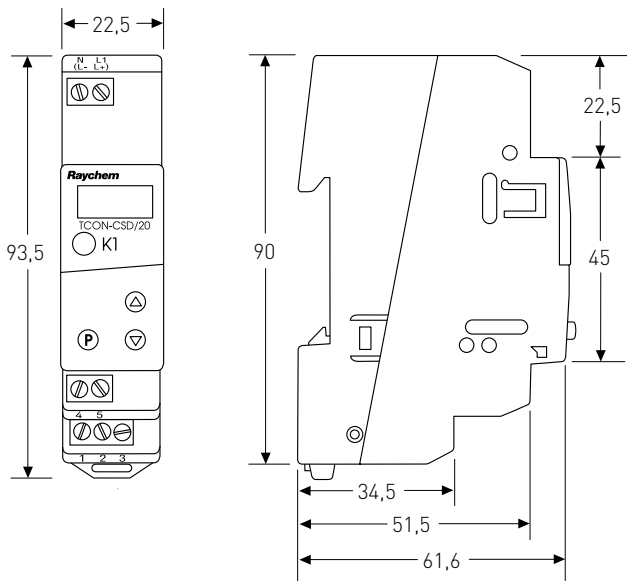
GENERAL

Application	Usable for all applications requiring tight temperature control for either line sensing or ambient sensing control
Area of use	DIN rail mounting in panels or enclosures installed in non-hazardous area. Sensing temperature in hazardous area Zone 1 is possible when used in conjunction with MONI-PT100-EXE or MONI-PT100-EXE-SENSOR (separately available)
Temperature control range	-200°C to +500°C (accuracy 0.1%)
Ambient operating temperature	0°C to +55°C
Storage temperature	-40°C to +70°C
Climatic conditions	≤75% relative humidity, no condensation
LED indicator	The LED at the front of the unit lights up when the output relay is energized.

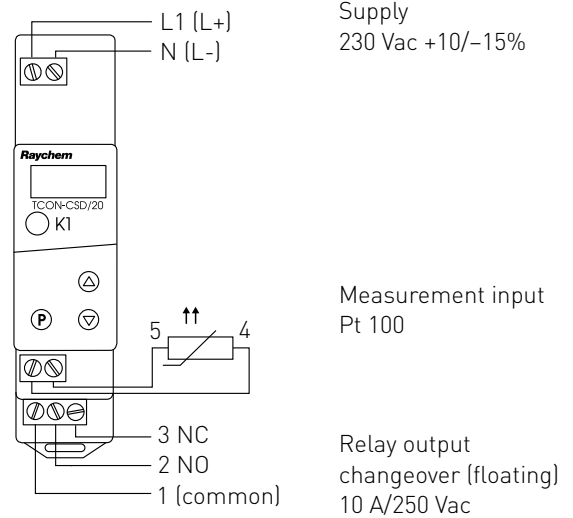
ENCLOSURE

Protection	IP 20 to EN 60529
Material	Polycarbonate
Installation	On 35 x 7.5 mm DIN rail
Installation position	Any position allowed
Flammability class	UL 94 V0

DIMENSIONS (IN MM)



WIRING DIAGRAM



ELECTRICAL DATA

Power supply & own power consumption	230 Vac +10/-15%, 48 – 63 Hz < 1 VA
Connection terminals	Screw terminals for wires with a maximum cross-section of 2.5 mm ²
Relay output	10 A rated changeover contact (SPDT)
Contact lifetime	A minimum lifetime of 150 K operations at 10 A/250 Vac 50 Hz resistive load.

TEMPERATURE SENSOR

Pt100, Pt1000 or KTY2X-6 all connected in 2-wire circuit
 Sensor "open" and sensor "short" will be automatically detected and will cause the output to switch to the customer programmed default either permanently ON or OFF
 When using 2-wire temperature sensors there will be an error on the temperature readout of approximately 1°C per 0.39 Ohm lead resistance added.
 TCON-CSD/20 units are equipped with an option to compensate for the cable resistance added in order to improve the accuracy. Refer to the installation instructions for more details.
 When the sensor cable is laid in cable ducts or in the vicinity of high voltage carrying cables the sensor extension cable should be shielded. The shield of the extension cable should be grounded at the controller end only.

Switching point accuracy	±2% of range span
Switching differential	Adjustable from 0.25% to 5% (factory set at minimum value)
Zero point correction	Enables matching of the switching point and probe accuracy (offset)

ELECTROMAGNETIC COMPATIBILITY

To EN 61 326. Emission approved to Class B, immunity to industrial requirements

ELECTRICAL SAFETY

To EN 61 010, Part 1, over voltage category III, pollution degree 2

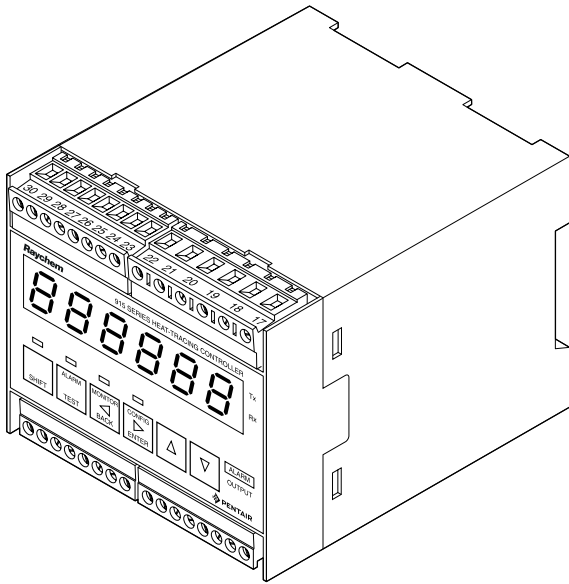
DATA BACKUP

EEPROM (unit does not loose configuration settings after power outage)

ORDERING DETAILS

Order reference & weight	1244-001133 (0.11 kg)
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Raychem HTC-915-CONT HEAT-TRACE CONTROL SYSTEM



PRODUCT OVERVIEW

The Raychem HTC-915 system is a compact, full-featured microprocessor-based single-point heat-trace controller. The HTC-915-CONT provides control and monitoring of electrical heat-tracing circuits for both freeze protection and temperature maintenance and can be set to monitor and alarm for high and low temperature, high and low current, ground fault level, and voltage. The Raychem HTC-915-CONT is provided with two outputs: one to drive an external contactor coil, and the other to drive an external solid-state relay (SSR). Communications capability is included for remote control and configuration, complete with Supervisor software capability.

CONTROL

The Raychem HTC-915-CONT measures temperature via 3-wire platinum PT100 connected directly to the unit. When used with an Ex approved PT100 sensor (as is the MONI-PT100-EXE) the controller can measure temperatures in a hazardous area. Open, shorted, or out of range PT100 resistance is automatically detected. If a PT100 failure occurs, the control output trips open and an alarm is generated. The controller can be used in line sensing, ambient sensing, proportional ambient sensing, and power limiting mode.

MONITORING

A broad variety of parameters are measured including: temperature, voltage, power, contactor cycles, hours in use, load resistance, load current, and ground-fault current. To ensure system integrity, the system can be programmed to periodically check the heating cable for faults, alerting maintenance personnel of a heat-tracing problem. A potential free relay is provided for alarm annunciation back to a Distributed Control System (DCS) or alarm indicator.

GROUND-FAULT ALARMING

Optionally, the HTC-915-CONT can be programmed to measure ground-fault current. This option allows for the generation of early warnings before the ELCB trips. The trip level of the early alarm is user definable and can be set at any value between 10 and 250 mA. The ground fault alarms allow for preventive maintenance to be scheduled before the safety device trips and causes down time of important pipelines. Note that this alarm may only be used to generate a warning, it is not intended to replace the RCD (ELCB), which is mandatory for most applications.

OVERTEMPERATURE PREVENTION

In order to assure that T class temperatures inside hazardous areas are not being exceeded the HTC-915-CONT can be equipped with the temperature limiter HTC-915-LIM. The HTC-915-LIM is a compact microprocessor based temperature limiter that provides protection against overtemperature of heating cables. (Refer to the installation instructions of the HTC-915-LIM for the full list of details.)

INSTALLATION

The Raychem HTC-915-CONT comes ready to install, and the DIN rail mount plastic enclosure is approved for use in indoor locations. The HTC-915-CONT operator interface includes LED displays and function keys that make it easy to set-up and maintain - no additional devices are needed. Alarm conditions and program settings are easy to interpret on the full-text front panel. Settings are stored in nonvolatile memory in the event of power failure.

COMMUNICATIONS

Multiple Raychem HTC-915-CONT units may be networked to a host PC running Windows-based Supervisor software for central programming, status review, and alarm annunciation. The HTC-915-CONT supports the Modbus protocol and includes an RS-485 communications interface.

APPLICATION

Type	Surface sensing/ambient sensing
Area of use	Non-hazardous area indoors, typically panel mounted
Approval certification	CE marked  (Russia, Kazakhstan, Belarus) For other countries contact your local Pentair representative.

PRODUCT SPECIFICATION

Temperature range controller	-60°C to 570°C in steps of 1 K
Control algorithms	EMR: Line sensing on/off, proportional ambient SSR: Line sensing on/off, proportional, proportional ambient, power limiting, soft start
Switching accuracy	1 K

ELECTRICAL PROPERTIES

Connection terminals	Screw type terminals. All terminals suitable for stranded and solid core connection cables having a cross section between 0.5 and 2.5 mm ² (24 to 12 AWG)				
Supply voltage	100 Vac to 250 Vac, +10% -10%, 50/60 Hz, 0.15 A to 0.06 A				
Power consumption	Max 20 VA with limiter connected				
Control output	<table border="0"> <tr> <td>Contactor control output</td> <td>(EMR) Electromechanical relay rated 3 A/250 Vac, 50/60 Hz</td> </tr> <tr> <td>Solid-state relay control output</td> <td>(SSR) 12 VDC, 75 mA. max. to drive normally open Solid state relays. Depending on the application, one, two or three phase switching elements have to be used. (Solid state relays are not included)</td> </tr> </table>	Contactor control output	(EMR) Electromechanical relay rated 3 A/250 Vac, 50/60 Hz	Solid-state relay control output	(SSR) 12 VDC, 75 mA. max. to drive normally open Solid state relays. Depending on the application, one, two or three phase switching elements have to be used. (Solid state relays are not included)
Contactor control output	(EMR) Electromechanical relay rated 3 A/250 Vac, 50/60 Hz				
Solid-state relay control output	(SSR) 12 VDC, 75 mA. max. to drive normally open Solid state relays. Depending on the application, one, two or three phase switching elements have to be used. (Solid state relays are not included)				
Switching capacity	Depends on the type of switch element used (The switch element is external)				
Alarm output relay	Relay contact rated 3 A/250 Vac, 50/60 Hz Output is user programmable to open or to close on alarm.				
Power output	12 Vdc, 200 mA max.				

TEMPERATURE SENSOR

Type	100 Ω platinum Pt 100, 3-wire, $\alpha = 0.00385 \Omega/^\circ\text{C}$. Can be extended with a three core shielded cable of maximum 20 Ω lead resistance per conductor.
Quantity	2 RTD inputs available

COMMUNICATIONS

Protocol	Modbus RTU or ASCII
Topology	Multidrop/daisychain
Cable	Single shielded twisted pair, 0.5 mm ² (24 AWG) or larger
Length	Typical 2.7 km max @ 9600 Baud
Quantity	Up to 32 devices
Address	Programmable

PROGRAMMING AND SETTING

Method	Via programmable keypad or via RS485 interface
Units of measure	°C or °F
Digital display	Actual temperature, control temperature, heater current, load power, voltage, resistance, ground fault level, alarm status, programming parameter values.
LED indicators	LEDs available for: display mode, heater ON, alarm condition, receive/transmit data.
Memory	Nonvolatile, restore after power loss.
Stored parameters (measured)	Minimum and maximum process temperature. Maximum ground fault current, maximum heater current. Power accumulator. Contactor cycle counter. Time in use clock.
Alarm conditions	Low/high temperature, Low/high current, Low/high voltage. Low/high resistance. Groundfault alarm/trip. RTD failure, loss of programmed values, switch failure.
Other	Multi language support, password protection.

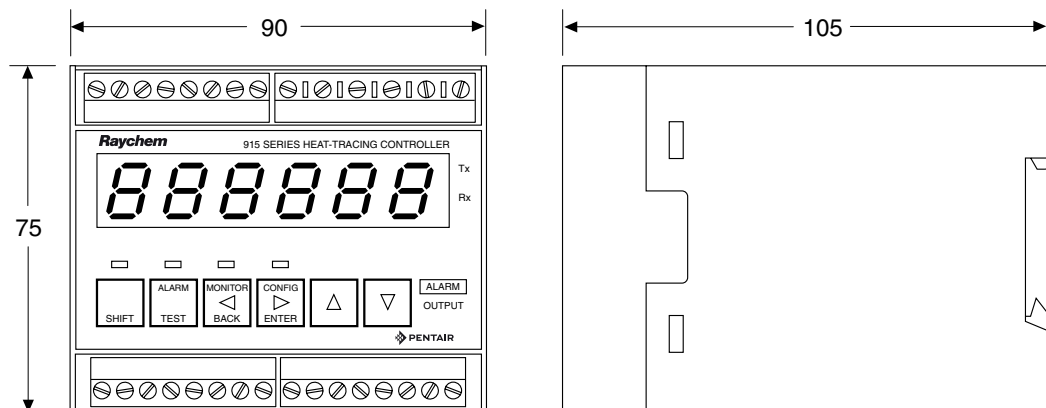
MONITORING

Temperature	Low/High alarm range -60°C to 570°C or OFF
Ground fault (via external CT, optional)	Alarm/Trip range 10 mA to 250 mA or OFF
Load current (via external CT, optional)	Low/High alarm range 0.3 A to 100 A or OFF (can be adjusted to match heater current)
Voltage	Low/High alarm range 10 Vac to 330 Vac or OFF
Resistance	Low resistance range 1 to 100% deviation (can be adjusted to match heater current) High resistance range 1 to 250% deviation
Power	Power limit 3 W to 33 KW
Auto cycle	Diagnostic test interval adjustable from 1 to 240 minutes or 1 to 240 hours

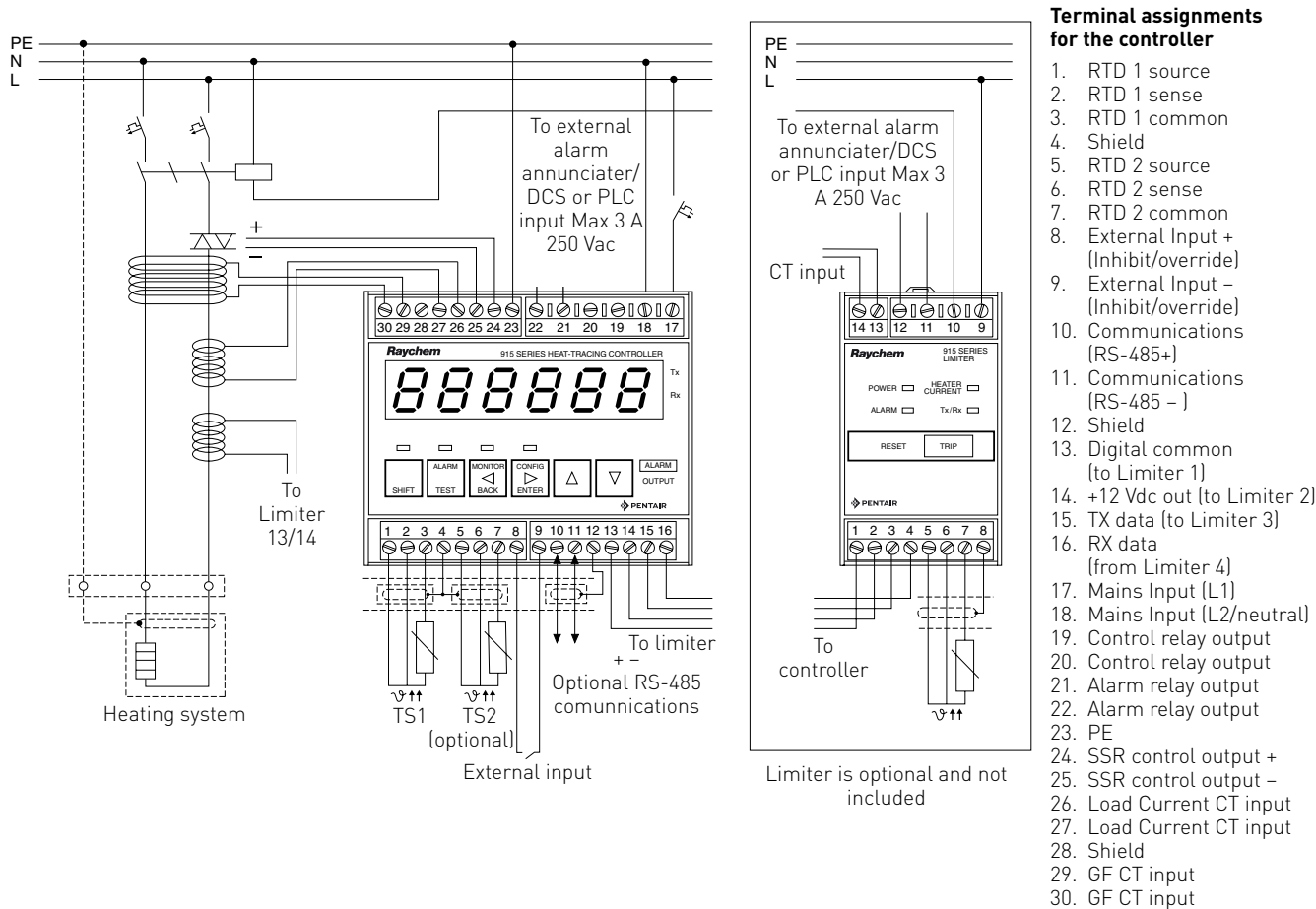
ENCLOSURE

Ambient operating temperature range	-40°C to +50°C
Ambient storage temperature range	-40°C to +85°C
Relative humidity	0% to 90% Non condensing
Ingress protection	Housing: IP40, Terminals: IP20
Material	ASA-PC, color: green
Flammability class	V0 (UL94)
Mounting method	Panel mounting on 35 mm DIN rail

ENCLOSURE DIMENSIONS



WIRING DIAGRAM

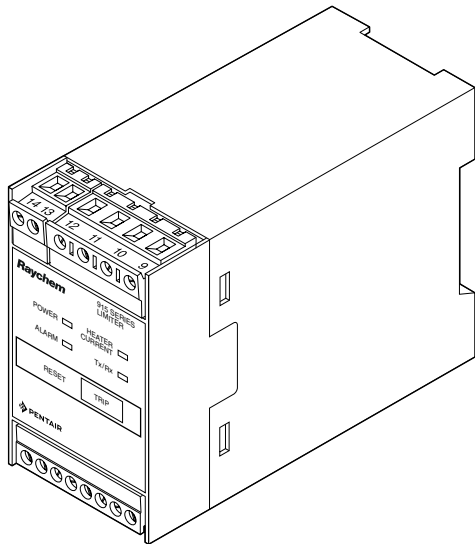


ORDERING DETAILS

Controller	Part description	HTC-915-CONT	
	PN (Weight)	10275-001 (0.4 kg)	
Limiter	Part description	HTC-915-LIM	
	PN (Weight)	10275-003 (0.2 kg)	
Current sensor (load current transformer)		HTC-915/CT	1244-000276 (0.15 kg)
Current sensor (earth leakage current transformer)		HTC-915/ELCT	1244-000277 (0.15 kg)
RTD for Hazardous area zone 1		MONI-PT100-EXE	967094-000 (0.44 kg)
RTD for non hazardous area		MONI-PT100-NH	140910-000 (0.22 kg)
RS485 Communication cable		See datasheet RS485-WIRE	
Solid state relays	20 A 230 Vac single phase	DT-SSR-1-23-20	1244-001468 (0.16 kg)
	50 A 480 Vac single phase	DT-SSR-1-48-50	1244-001467 (0.75 kg)

Raychem HTC-915-LIM

TEMPERATURE LIMITER



PRODUCT OVERVIEW

The Raychem HTC-915-LIM is a compact, microprocessor-based temperature limiter that provides protection against over-temperature. The HTC-915-LIM has two output relays, one normally closed limiter relay (opening in occurrence of over temperature) and one alarm relay. The HTC-915-LIM is available in two versions: the first one is the base unit for use in conjunction with the HTC-915-CONT (Heat-Trace control system). The lock out temperature of this device can be programmed and altered via the front panel of the HTC-915 control unit. The limiter can be set at any value between 20 and 450°C in steps of 1K.

A second version of the HTC-915-LIM has a preprogrammed lock out temperature. HTC-915-LIM limiters are available for T1, T2, T3, T4 and T5 classified areas as indicated in table at the bottom of next page (*).

OPERATION

The Raychem HTC-915-LIM measures temperature via a 3-wire PT100 connected directly to the input terminals of the unit. In order to assure the hottest temperature is being measured the measuring tip of the PT100 needs to be installed at a representative location. When used with an Ex approved sensor (as is the MONI-PT100-EXE), the HTC-915-LIM can measure temperatures in hazardous area. Open, shorted or out-of-range PT100 resistance is automatically detected. As a result of that the control output will trip open and an alarm will be generated. When in normal operation the set point temperature of the limiter is exceeded the control output will trip open. Once tripped, the control output will remain open even if the measured temperature drops below the set point. The unit will not restart until manually reset. The HTC-915-LIM can be reset via the front panel of the unit by pressing and holding the reset button for 2 seconds or via the alarm menu of the HTC-915-CONT when the limiter is used in conjunction with a HTC-915-CONT Heat-Trace control system. Another possibility to reset the limiter is via the remote input of the HTC-915-CONT controller or via the optional Raychem Supervisor software.

MONITORING

When the limiter is used in conjunction with the Raychem HTC-915-CONT, the combination can be used as a fully featured control and monitoring system that measures a broad variety of parameters such as: temperature, voltage, power, contactor cycles, hours in use, load resistance, load current, and ground-fault current. To ensure system integrity, the controller can be programmed to periodically check the heating cable for faults, alerting maintenance personnel of a heat-tracing problem. Additional alarm outputs are available on the controller (refer to the controller datasheet for the full list of features).

OVERTEMPERATURE ALLOWANCE

The Raychem HTC-915-LIM can be configured such that it will allow its setpoint temperature to be exceeded without tripping. In this instance, the unit is programmed to measure load current, and will allow a temporary over-temperature condition only when no current flows to the load. This feature shall only be used under certain, well-defined circumstances, such as when the process is heated by external heat sources, or when the installation is being steam cleaned.

INSTALLATION

The Raychem HTC-915-LIM can be used as a stand alone unit with a fixed preprogrammed lock-out temperature as well as in combination with a Raychem HTC-915-CONT control unit.

The DIN rail mount plastic enclosure is for use in safe area only.

The HTC-915-CONT operator interface includes all functions required to simplify set-up and integration of the limiter.

APPLICATION

Type	Surface sensing electronic
Area of use	Ordinary area locations, indoors
Approval certification	CE marked EAC (Russia, Kazakhstan, Belarus) For other countries contact your local Pentair representative.

PRODUCT SPECIFICATION

Temperature range limiter	20°C to 450°C in steps of 1 K
Switching accuracy	1 K

ELECTRICAL PROPERTIES

Connection terminals	Screw type terminals. All terminals suitable for stranded and solid core connection cables having a cross section between 0.5 and 2.5 mm ² (24 to 12 AWG)
Power supply	12 Vdc to 24 Vdc, 100 to 50 mA. Max. (can be directly obtained from a Raychem HTC-915-CONT)
Control output	NC relay contact rated 3 A 250 Vac, 50/60 Hz
Alarm output relay	Relay contact rated 3 A 250 Vac, 56/60 Hz (N.C. in operation opening on alarm or power outage)

TEMPERATURE SENSOR

Type	100 Ω platinum RTD, 3-wire, α = 0.00385 Ω/°C.
Quantity	1 RTD input available
Cable extension	Can be extended with a three core shielded cable of maximum 20 Ω lead resistance per conductor. Open, shorted or out-of-range RTD resistance is detected. If an RTD failure is detected, the control output trips open.

COMMUNICATIONS (TO RAYCHEM 915 CONTROLLER)

Topology	Point-point (limiter >> controller)
Cable	Four conductor cable, 0.5 mm ² (24 AWG) or larger
Length	3 m max.

PROGRAMMING AND SETTING

Method	Via the keypad of the Raychem HTC-915-CONT or Supervisory software
Units of measure	°C or °F, depending on the units setting of the programming device
Alarm conditions	Over-temperature, RTD failure, CT failure, loss of programmed values, limiter reset.

MONITORING

LED indicators	LEDs available for: power, presence of heater current, limiter trip, Tx/Rx, alarm
Current (via external CT, optional)	Presence of Heater current, 0.2 A min.

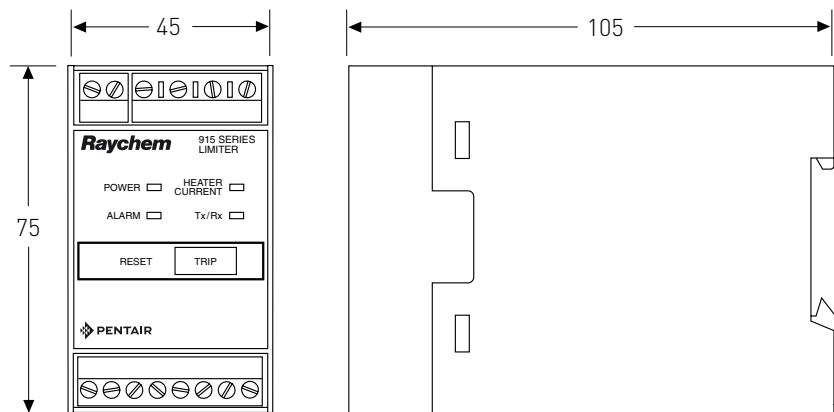
ENCLOSURE

Ambient operating temperature range	-40°C to +50°C
Ambient storage temperature range	-40°C to +85°C
Relative humidity	0% to 90% Non condensing
Protection	Housing: IP40, Terminals: IP20
Materials	ASA-PC, color: green
Mounting	Panel mounting on 35 mm DIN rail

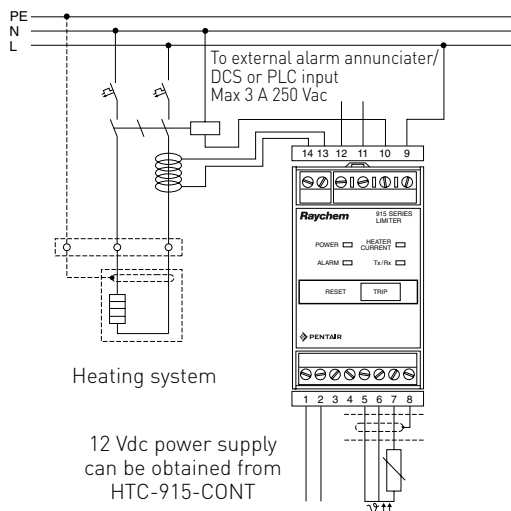
(*)	T1	T2	T3	T4	T5
Model	HTC-915-LIM-T1	HTC-915-LIM-T2	HTC-915-LIM-T3	HTC-915-LIM-T4	HTC-915-LIM-T5
Lock out temperature	450°C	300°C	200°C	135°C	100°C

When used in conjunction with the HTC-915-CONT (Heat-Trace control system) the pre programmed set point can be altered

DIMENSIONS (IN MM)



WIRING DIAGRAM



Terminal assignments of the limiter

1. Digital common (from HTC 13)
2. +12 Vdc in (from HTC 14)
3. RX data (from HTC 15)
4. TX data (to HTC 16)
5. RTD 1 source
6. RTD 1 sense
7. RTD 1 common
8. Shield
9. Control relay output
10. Control relay output
11. Alarm relay output
12. Alarm relay output
13. Load Current CT input
14. Load Current CT input

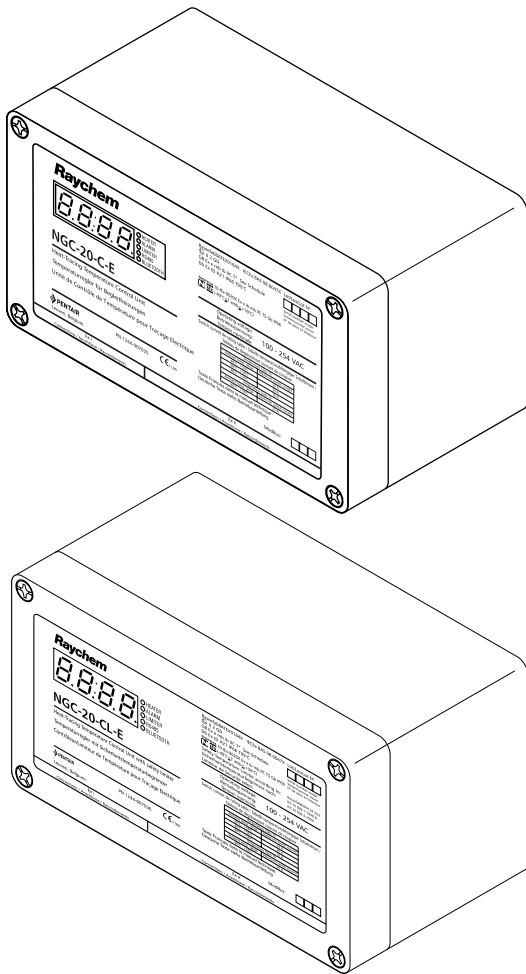
- * Wiring for Communications with HTC-915-CONT Controller omitted for clarity. Refer to installation instructions for details.
- ** Current sensor optional and not included

ORDERING DETAILS

Controller	Part description	HTC-915-CONT		
	PN (Weight)	10275-001 (0.4 kg)		
Limiter	Part description	HTC-915-LIM		
	PN (Weight)	10275-003 (0.2 kg)		
Limiter	HTC-915-LIM	base unit for use with HTC-915-CONT	10275-003	
	HTC-915-LIM/T1	Preprogrammed to trip at 450°C (+0/-10°K)	10275-004	
	HTC-915-LIM/T2	Preprogrammed to trip at 300°C (+0/-10°K)	10275-005	
	HTC-915-LIM/T3	Preprogrammed to trip at 200°C (+0/-5°K)	10275-006	
	HTC-915-LIM/T4	Preprogrammed to trip at 135°C (+0/-5°K)	10275-007	
	HTC-915-LIM/T5	Preprogrammed to trip at 100°C (+0/-5°K)	10275-008	
Current sensor (load current transformer)	HTC-915/CT		1244-000276 (0.15 kg)	
RTD for Hazardous area zone 1	MONI-PT100-EXE		967094-000 (0.44 kg)	

Raychem NGC-20-C-E AND NGC-20-CL-E

FIELD-MOUNTED ELECTRONIC HEAT-TRACING CONTROL UNIT



PRODUCT OVERVIEW

The Raychem NGC-20 is an electronic heat-tracing control unit featuring the benefits of local control and the capability for central monitoring. Raychem NGC-20 control unit can be used for single phase circuits up to 25 A and is approved for use in hazardous areas. The Raychem NGC-20 can provide tight temperature control and is available with an IEC 61508-SIL 2 classified safety temperature limiter on board (NGC-20-CL-E). It measures the temperature with up to two RTD(s) connected to the unit. The Safety temperature limiter has a dedicated temperature input.

CONTROL, MONITORING AND ALARM CAPABILITIES

The Raychem NGC-20 offers several different control algorithms including PASC for an optimised electrical heat-tracing control. The Raychem NGC-20 offers alarms for high and low temperature, high and low current, ground-fault current and voltage. The trip and warning level of the ground-fault current is user configurable and can be used as a warning and to isolate circuits. The Raychem NGC-20 control unit provides a dry contact relay for alarm annunciation.

AUTOMATED HEAT-TRACING SYSTEM CHECK

To ensure system integrity the Raychem NGC-20 control unit can be configured to periodically check dormant heating cables for faults. As a consequence maintenance is systematically informed about the status of the heat-tracing system and unexpected and usually expensive downtime of important pipelines can be reduced.

COMMUNICATIONS AND NETWORKING

The Raychem NGC-20 control unit is equipped with a RS-485 interface. Through this interface up to 247 Raychem NGC-20 units can be networked to a single Raychem NGC-UIT or to one serial port of standard PC running Pentair' Raychem Supervisor software.

The Raychem NGC-20 control unit can as well be monitored and/or configured via the Raychem NGC-CMA wireless handheld device. This device is available for hazardous and non-hazardous areas.

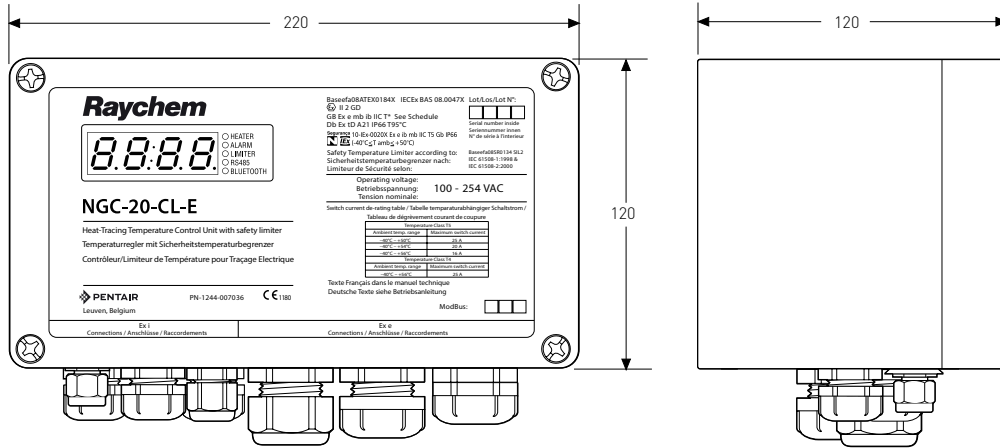
INSTALLATION

The Raychem NGC-20 control unit can be installed in the field near the heating application. The Raychem NGC-20 enclosures are manufactured from high impact-resistant, UV stabilized glass-filled polyester suitable for installation indoors or outdoors. One heating cable can be directly connected to the unit. The units can be mounted on the heated surface via an appropriate support bracket.

CONFIGURATION AND COMMISSIONING

The Raychem NGC-20 control unit can be commissioned locally by means of a handheld programming device (Raychem NGC-CMA) or from a central location using the Raychem NGC-UIT or Raychem Supervisor Software. After programming, all settings are permanently stored in the non-volatile memory of the Raychem NGC-20 control unit, avoiding loss of data in the event of power failure or after a long term power shutdown. The Raychem NGC-20 control unit allows the heating and power cable to be connected directly to the unit.

DIMENSIONS (IN MM)



Sample shown is Raychem NGC-20-CL-E Gland included in scoop of delivery - 1 x M25 x 1,5

GENERAL

Application type **CE** Raychem NGC-20-C(L)-E units are approved for use in Hazardous area Zone 1 or Zone 2 (Gas) or Zone 21 or Zone 22 (Dust) and non hazardous areas

APPROVALS

Baseefa08ATEX0184X
 Ex II 2 GD
 Gb Ex e mb ib IIC T* Db Ex tD A21 IP66 T95°C
 IECEX BAS 08.0047X
 Gb Ex e mb ib IIC T*
 Db Ex tD A21 IP66 T95°C

ERC (Russia, Kazakhstan, Belarus)
 For other countries contact your local Pentair representative.

T*: The switching capacity depends on the hazardous area temperature classification (T-Class) and the maximum expected use temperature. Ratings as shown in table below

Temperature Class T5		Temperature Class T4	
Maximum Ambient Temperature	Maximum Switching Current	Maximum Ambient Temperature	Maximum Switching Current
+50°C	25 A	Up to 56°C	25 A
+54°C	20 A		
+56°C	16 A		

All values as per hazardous area certification.
 Current ratings are given for a supply voltage of 254 V +/- 10%, 50/60 Hz and resistive loads only.

FUNCTIONAL SAFETY APPROVAL

Baseefa Baseefa08SR0134 SIL2
 IEC 61508-1:1998 & IEC 61508-2:2000

Conditions of Safe Use Refer to Hazardous Area Certificate or installation instructions

ENVIRONMENTAL

Temperature range control unit	From -80°C to +700°C in steps of 1K
Temperature range limiter	From -60°C to +599°C in steps of 1K (NGC-20-CL-E only)
Ambient operating temperature	From -40°C to +56°C
Storage temperature	From -55°C to +80°C

ENCLOSURE

	Raychem NGC-20-C(L)-E units can be installed directly on the pipe via an appropriate support bracket as long as the maximum permitted ambient temperature is not exceeded. Alternatively, units can be mounted on any stable structure via the moulded holes in the enclosure.
Protection	IP 66 per IEC-60529
Material	Glass fibre reinforced enclosure with internal earth plate on the bottom
Entries	<p>1 x M25 gland Ø 8 – 17 mm: power IN/heating cable out</p> <p>3 x M25 1 x M25 stopping plug: daisy chaining of power 1 x M25 rain plug: daisy chaining of power</p> <p>3 x M20 Digital communication IN/OUT and alarm (all with stopping plugs)</p> <p>2 X M16 Temperature sensor(s) 1 with stopping plug one with rain plug</p>
Mounting & installation	Installation on an appropriate support bracket directly on the heated surface up to temperatures of 230°C. When the temperature of the heated surface is above 230°C, install the control unit to a stable structure nearby the application.
Installation position	Any position allowed, typical use with glands facing down

1 EC-61508 Safety related information is published in the NGC-20 installation instructions INSTALL-130. A copy of the INSTALL-130 can be downloaded from the literature section on salesthermaluk@pentair.com or can be obtained via your local Pentair representative.

ELECTRICAL DATA

Power supply & own power consumption	100 Vac to 254 Vac +/-10 % 50/60 Hz 20 VA max.
Connection terminals	Spring-type
L, N and PE terminals	9 pc (cables with diameter ranging from 0.2 to 6 mm ²)
Alarm output terminals	3 pc (cables with diameter ranging from 0.2 to 2.5 mm ²)
Pt 100 (RTD) terminals	12 pc (cables with diameter ranging from 0.2 to 1.5 mm ²)
RS-485 communication	7 pc (0.2 to 1.5 mm ²)
Internal Earth stud for RTD shield	1 pc (Cable diameter max 6 mm ²)
Contact lifetime main switch	500k operations at 25 A/250 Vac (resistive load)
Alarm output relay	Contact rated 250 Vac/3 A Relay output is software programmable to open, close or to toggle in case of alarm
Electromagnetic compatibility	EN 61000-6-2:2005 (Gen. Immunity standard for industrial environments) EN 61000-6-3:2007 (Gen. Emission standard for residential, commercial and light industrial) EN 61000-3-2-2006 (Limits for harmonic current emissions) EN 61000-3-3:1995+A1:2001+A2:2005 (limitation of voltage fluctuations and flicker)
Electrical safety	EN 61010-1, Category III, Pollution degree 2
Vibration & Shock	Shock to EN 60068-2-27: 1/2 sine wave of 11 ms duration, 15 g Vibration to EN 60068-2-6/sine wave 10 to 150 Hz (p-p), 2 g

TEMPERATURE SENSORS

Compatible types	100 Ω platinum, 3-wire, α = 0.00385 Ω/°C. Can be extended with a three core shielded or braided cable of maximum 20 Ω lead resistance per conductor.
Quantity	Two RTD inputs for the control unit plus one independent temperature input for the safety limiter. All temperature sensors are permanently monitored for “sensor short”, “sensor break”.

COMMUNICATIONS

Physical network	RS-485 and Bluetooth Class 1
Protocol/topology	Modbus RTU or ASCII. Multi drop/Daisy chain
Cable and maximum length	Shielded twisted pair cable, 0.5 mm ² (AWG 24) or larger maximum cable length between should be no more than 1200 m
Maximum quantity of control units in one network	Max. of 247 units per Raychem NGC-UIT or per serial communication port
(Modbus) Network address	Software programmable via Raychem NGC-CMA-NH, Raychem NGC-CMA-EX or Raychem Supervisor

PROGRAMMING AND SETTING

Method	Through handheld programming device Raychem NGC-CMA-NH, NGC-CMA-EX (hazardous area) and a wireless Bluetooth connection or via RS485 interface and Raychem Supervisor software or Raychem User Interface Terminal (NGC-UIT2-ORD) and Raychem software.
Units of measure	°C or °F, software selectable
Memory	Non-volatile, no loss of parameters after the event of power outage or long term shut down, data holding time ~10 years.
LED indicators	Status LEDS are available for:
NGC-20-C-E	Heater, Alarm, RS-485 communication, Bluetooth communication
NGC-20-CL-E	Heater, Alarm, Limiter Tripped, RS-485 communication and Bluetooth

MEASURING RANGES

Temperature range control unit	From -80°C to +700°C in steps of 1K
Temperature range limiter	From -60°C to +599°C in steps of 1K (NGC-20-CL-E only)
Voltage	From 50 Vac to 305 Vac
Load Current	From 0.3 A to 30 A
Ground-fault current	From 10 mA to 250 mA (RCD/ELCB required due to IEC and/or local regulations)
Heater time alarm	From 1 to 1 x 10 ⁶ hours
Relay cycle alarm	From 0 to 2 x 10 ⁶ cycl

Ordering information

RAYCHEM NGC-20 CONTROL UNITS

Product name	NGC-20-C-E (Hazardous area approved control unit without safety temperature limiter)
Part number & (weight)	1244-007035 (2.2 kg)
Product name	NGC-20-CL-E (Hazardous area approved control unit with integrated safety temperature limiter)
Part number & (weight)	1244-007036 (2.3 kg)

Raychem NGC-20 accessories

TEMPERATURE SENSORS

Product name	MONI-PT100-260/2 or MONI-PT100-EXE-SENSOR
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SUPPORT BRACKET FOR INSTALLATION ON PIPE

Product name	SB-125
Part number & (weight)	1244-06603 (0.5 kg)

BLUETOOTH ENABLED HANDHELD PROGRAMMING DEVICE WITH CUSTOMIZED RAYCHEM SOFTWARE

Product name	NGC-CMA-EX ⓘ (Hazardous area approved device for use in Zone 1, 2, 21, 22)
Part number & (weight)	1244-006605 (1.2 kg)
Product name	NGC-CMA-NH (Industrial grade, not approved for use in hazardous area)
Part number & (weight)	1244-006606 (0.8 kg)

CONNECTION DIAGRAM (TYPICAL)

