Signal Condititioner with Trip Amplifier

DAT 5028

FEATURES
- Universal Analogue Input
- Relay Outputs: 2 SPDT + 2 SPST (version with 4 thresholds)
- Relay Outputs: 2 SPDT (version with 2 thresholds)
- One V/mA Analogue Output for signal transmission
- 1500 Vac galvanic isolation on all ways
- High Accuracy
- CE / UKCA Mark
- DIN rail suitable mounting (EN-50022)

GENERAL DESCRIPTION
The DAT 5028 device is able to acquire RTD or Tc sensors, mV, V or mA input signals connected to the universal analogue input. By means of push-button and 4-digit display on the front panel, four different trip alarms are configurable. Each alarm threshold commands an output relay. Input signal can be retransmitted on the analogue output in a Voltage or Current signal, configurable by means of dip-switch on the side of the device.
By means of an internal 16 bit converter, the device guarantee a high accuracy and a stable measure versus time and temperature.
The 1500 Vac isolation on all ways removes eventual ground-loop effects, allowing the use of the device even in the heavy environmental conditions.
In function of the number of thresholds necessary to the user, the device can be supplied in two different versions:
DAT5028-4 with 4 thresholds (2 SPDT + 2 SPST);
DAT5028-2 with 2 thresholds (2 SPDT).
The device is housed in a rough self-extinguishing plastic container which, thanks to its thin profile of 22.5mm only, allows a high density mounting on EN-50022 standard DIN rail.

USER INSTRUCTIONS
Before to install the device, please read the "Installation Instruction" section.
Connect power supply, analogue input, relay outputs and analogue output as shown in the "Wiring" section.
In normal conditions, the display must always show a value.
To simplify handling or replacing of the device, it is possible to change configuration or remove the wired terminals even with the device powered.

## TECHNICAL SPECIFICATIONS (Typical @ 25 °C and in the nominal conditions)

INPUT			OUTPUT			GENERAL SPECIFICATIONS	
Input Type	**Min**	**Max**	**Output type**	**Min**	**Max**	Supply Voltage	12 .. 30 Vdc
TC (CJC int./ext.)			Current	0 mA	20 mA	Rev. Polarity protection	60 Vdc max
J	-200°C	1200°C	Voltage	0 V	10 V	**Current consumption**	
K	-200°C	1370°C	**Accuracy (2)**		± 0.1 % f.s.	Current consumption @ 24Vdc	120 mA max
R	-50°C	1760°C	**Linearity (2)**		± 0.05 % f.s.	Current consumption	200 mA max
S	-50°C	1760°C	**Thermal Drift (2)**		± 0.01 % / °C	**ISOLATIONS**	
B	400°C	1825°C	**Aux. Voltage**		>12V @ 20 mA	(among all of the ways)	1500 Vac,
E	-200°C	1000°C	**Out of scale values**				50 Hz, 1 min
T	-200°C	400°C	Max Out value		22 mA or 11 V	**ENVIRONMENTAL CONDITIONS**	
N	-200°C	1300°C	Min Out value		0 mA or -0,6 V	Operative temperature	-30°C .. +60°C
Voltage			**Load resistance - Rload**			Storage temperature	-40°C.. +85°C
mV	-100 mV	+100 mV	Current:		≤ 500 Ω	Relative humidity (not cond.)	0 .. 90 %
Volt	-10 V	+10 V	Voltage:		≥ 5 KΩ	Maximum Altitude	2000 m
RTD (2, 3 wires)			Short circuit current		30 mA max	Installation	Indoor
Pt100	-200°C	850°C	**Response time (10÷ 90%)**		400 ms	Category of installation	II
Pt1000	-200°C	200°C				Pollution Degree	2
Ni100	-60°C	180°C	**DIGITAL OUTPUTS**			**MECHANICAL SPECIFICATIONS**	
Ni1000	-60°C	150°C	**N.2 SPST Relays + N.2 SPDT Relays**			Material	Self-extinguish plastic
RES. (2, 3 fili)	0 Ω	500 Ω				IP Code	IP20
	0 Ω	2000 Ω	Max Load (resistive)		2 A @ 250 Vac	Wiring	wires with diameter
Pot.(Rnom < 50KΩ)	0 %	100 %			2 A @ 30 Vdc		0.8÷2.1 mm² /AWG 14-18
Current	-20 mA	+20 mA	Max Voltage		250 Vac (50 / 60 Hz) ,	Tightening Torque	0.8 N m
					110 Vdc	Mounting	in compliance with DIN
Accuracy (1)			Dielectric strength between contacts				rail standard EN-50022
mV, Volt, mA	± 0.05 % f.s.				1000 Vac, 50 Hz, 1 min.	Weight	about 150 g.
Pot, RTD, Res.	± 0.05 % f.s		Dielectric strength between coil and contacts				
TC	> ± 0.05 % f.s. o 5 uV				4000 Vac, 50 Hz, 1 min	**CERTIFICATIONS**	
Linearity (1)			.			**EMC (for industrial environments)**	
mV, Volt, mA	± 0.05 % f.s.					Immunity	EN 61000-6-2
Pot, RTD, Res.	± 0.1 % f.s					Emission	EN 61000-6-4
TC	± 0.2 % f.s.					**UKCA (Rif S.I. 2016 N°1091)**	
Input impedance						Immunity	BS EN 61000-6-2
TC, mV	10 MΩ					Emission	BS EN 61000-6-4
Volt	1 MΩ						
mA	~22 Ω						
Line resistance influence (1)							
TC, mV	<=0.8 uV/Ohm						
RTD 3 wires	0.05%/Ω (50Ω max balanced)						
Sensor excitation current							
RTD,Res	700 uA						
CJC Comp.	± 1°C						
Thermal Drift (1)							
Full Scale	± 0.01% / °C						
CJC	± 0.02% / °C						
Aux. Voltage	>18 V @ 20 mA						

(1) referred to input span (difference between max. and min. values);
(2) referred to output span (difference between max. and min. values)

CONFIGURATION BY DIP-SWITCHES

OFF
ON

Input type | Zero | Span | Output type
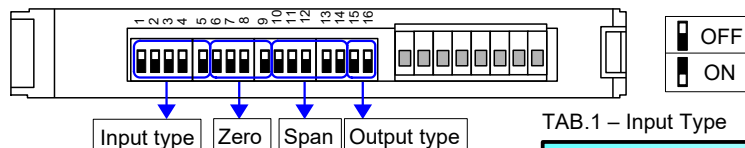
1) Set the input type by the dip-switch [1..5]
(see TAB.1)

2) Set the minimum input scale value (Zero)
by the dip-switch [6..9] (see TAB.2 *)

2) Set the maximum input value (Span)
by the dip-switch [10..14] (see TAB.2 *)

4) Set the output type by the dip-switch [15..16]
(see TAB.3)

* Refer to the proper input type range.
Needed only if Analog Out retransmission is used.

TAB.1 – Input Type

1 2 3 4 5	Type	1 2 3 4 5	Type
	Default		Res. 500Ω
	100 mV		Pt 100
	10 V		Pt 1K
	20 mA		Ni 100
	Tc J		Ni 1K
	Tc K		Pot.
	Tc R		Res. 2kΩ
	Tc S		
	Tc T		
	Tc B		
	Tc E		
	Tc N		

TAB.3 - Out

15 16	
	0-20 mA
	4-20 mA
	0-10 V
	0-5 V

TAB.2a - Range selection for RTD

Zero (°C)	Span (°C)	Span (°C)
Def.	Def.	170
-200	0	180
-150	10	190
-100	20	200
-50	30	250
-40	40	300
-30	50	350
-20	60	400
-10	70	450
0	80	500
5	90	550
10	100	600
20	120	650
30	140	700
50	150	800
100	160	850

TAB.2b - Range selection for Tc

Zero (°C)	Span (°C)	Span (°C)
Def.	Def.	170
-200	0	180
-100	10	190
-80	20	200
-60	30	250
-50	40	300
-40	50	400
-30	60	500
-20	70	700
-10	80	800
0	90	900
10	100	1000
20	120	1300
50	140	1500
100	150	1700
150	160	1850

TAB.2c - Range selection for 100mV

Zero (mV)	Span (mV)	Span (mV)
Def.	Def.	35
-100	0	40
-90	1	45
-80	2	50
-70	3	55
-60	4	60
-50	5	65
-40	6	70
-30	7	75
-20	8	80
-15	9	85
-10	10	90
-5	15	92
0	20	95
10	25	97
20	30	100

TAB.2d - Range selection for mA

Zero (mA)	Span (mA)	Span (mA)
Def.	Def.	13.0
0	5	13.5
1.5	5.5	14.0
2.0	6.0	15.0
2.5	6.5	15.5
3.0	7.0	16.0
3.5	7.5	16.5
4.0	8.0	17.0
4.5	8.5	17.5
5.0	9.0	18.0
5.5	10.0	18.5
6.0	10.5	19.0
6.5	11.0	19.5
7.0	11.5	20.0
7.5	12.0	20.0
8.0	12.5	20.0

TAB.2e - Range selection for Pot.

Zero (%)	Span (%)	Span (%)
Def.	Def.	80
0	5	85
15	10	90
20	15	95
25	20	100
30	25	
35	30	
40	35	
45	40	
50	45	
55	50	
60	55	
65	60	
70	65	
75	70	
80	75	

TAB.2f - Range selection for 10 V

Zero (V)	Span (V)	Span (V)
Def.	Def.	3.5
-10.0	0	4.0
-9.0	0.1	4.5
-8.0	0.2	5.0
-7.0	0.3	5.5
-6.0	0.4	6.0
-5.0	0.5	6.5
-4.0	0.6	7.0
-3.0	0.7	7.5
-2.0	0.8	8.0
-1.5	0.9	8.5
-1.0	1.0	9.0
-0.5	1.5	9.2
0	2.0	9.5
1.0	2.5	9.7
2.0	3.0	10.0

TAB.2g - Range selection for Res 500Ω.

Zero (6 7 8 9) Ω	Span (0 1 2 3 4) Ω	Span (0 1 2 3 4) Ω
Def.	Def.	220
0	10	240
10	20	260
20	30	280
30	40	300
40	50	320
50	60	340
60	70	360
70	80	380
80	90	400
90	100	420
100	120	440
120	140	460
140	160	480
150	180	490
200	200	500

TAB.2h - Range selection for Res 2kΩ

Zero (6 7 8 9) Ω	Span (0 1 2 3 4) Ω	Span (0 1 2 3 4) Ω
Def.	Def.	1250
0	500	1300
50	550	1350
100	600	1400
150	650	1450
200	700	1500
250	750	1550
300	800	1600
350	850	1650
400	900	1700
450	950	1750
500	1000	1800
550	1050	1850
600	1100	1900
650	1150	1950
700	1200	2000

TRIP OPERATION MODE

The relay goes on when the input signal is higher than the set-point level for at least the delay time "t on" (ms). The relay goes off only when the input signal is lower than the hysteresis value for at least delay time.
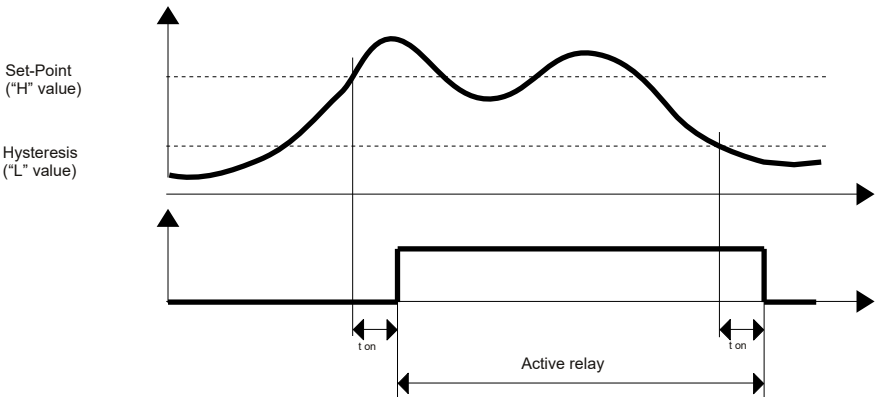
INSTALLATION INSTRUCTIONS

The device is suitable for fitting to DIN rails in the vertical position.
For optimum operation and long life follow these instructions:

When the devices are installed side by side it may be necessary to separate them by at least 5 mm in the following case:
- If panel temperature exceeds 45°C and at least one of the overload conditions exist.

Make sure that sufficient air flow is provided for the device avoiding to place raceways or other objects which could obstruct the ventilation slits. Moreover it is suggested to avoid that devices are mounted above appliances generating heat; their ideal place should be in the lower part of the panel.
Install the device in a place without vibrations.
Moreover it is suggested to avoid routing conductors near power signal cables (motors, induction ovens, inverters etc...) and to use shielded cable for connecting signals.
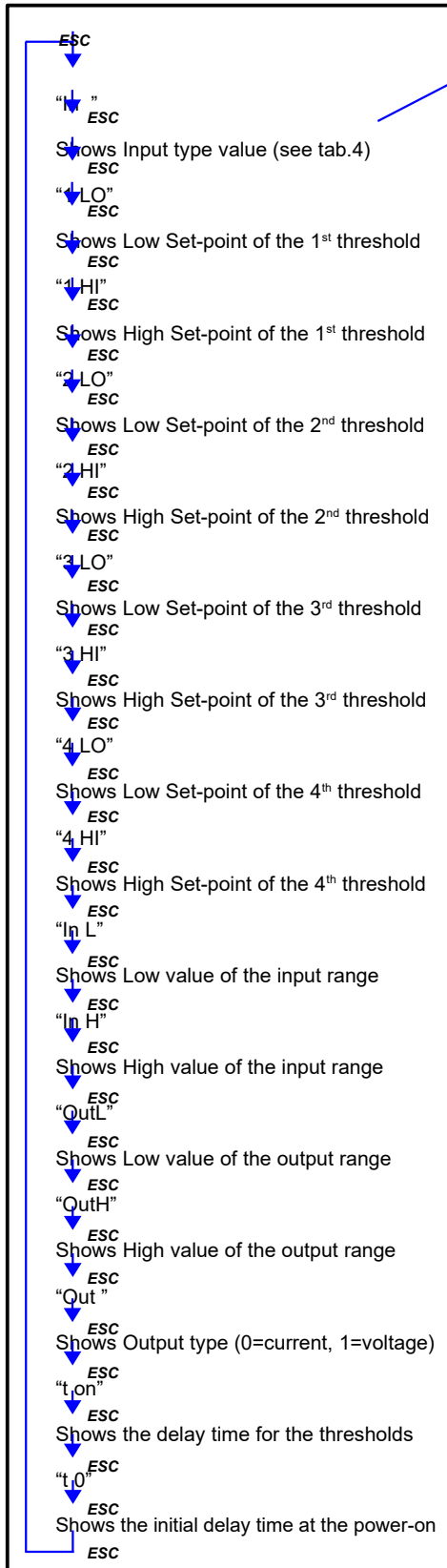
CONFIGURATION CONTROL

The configuration of the device can be checked by means of the push buttons and the 4-digit display on the front side of the device.

In normal operation, the display shows the actual value of the analog input.

To enter in the view mode, follow the next procedure:

1) press the "ESC" button : it will be displayed the label "In"
2) press the "ESC" button again, it will be displayed the input type value (see tab.4).
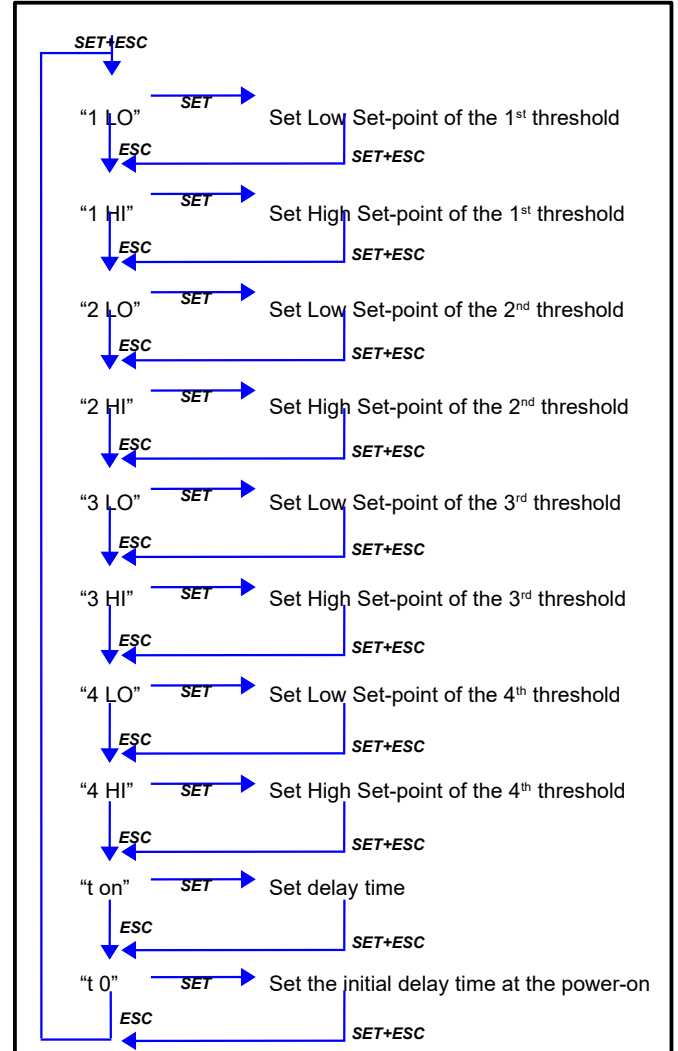3) Keep to press the "ESC" button to visualize all of the setting values of the device (follow the next list:

ESC
↓
"In"
ESC ↓
Shows Input type value (see tab.4)
ESC
"1 LO"
ESC ↓
Shows Low Set-point of the 1st threshold
ESC
"1 HI"
ESC ↓
Shows High Set-point of the 1st threshold
ESC
"2 LO"
ESC ↓
Shows Low Set-point of the 2nd threshold
ESC
"2 HI"
ESC ↓
Shows High Set-point of the 2nd threshold
ESC
"3 LO"
ESC ↓
Shows Low Set-point of the 3rd threshold
ESC
"3 HI"
ESC ↓
Shows High Set-point of the 3rd threshold
ESC
"4 LO"
ESC ↓
Shows Low Set-point of the 4th threshold
ESC
"4 HI"
ESC ↓
Shows High Set-point of the 4th threshold
ESC
"In L"
ESC ↓
Shows Low value of the input range
ESC
"In H"
ESC ↓
Shows High value of the input range
ESC
"OutL"
ESC ↓
Shows Low value of the output range
ESC
"OutH"
ESC ↓
Shows High value of the output range
ESC
"Out "
ESC ↓
Shows Output type (0=current, 1=voltage)
ESC
"t on"
ESC ↓
Shows the delay time for the thresholds
ESC
"t 0"
ESC ↓
Shows the initial delay time at the power-on
ESC

TAB.4 – Input Type

100 mV	1
10 V	2
20 mA	3
Tc J	4
Tc K	5
Tc R	6
Tc S	7
Tc T	8
Tc B	9
Tc E	10
Tc N	11
Res 500Ω	12
Pt 100	13
Pt 1K	14
Ni 100	15
Ni 1K	16
Pot	17
Res 2kΩ	18

4) To exit from the view mode don't press any button for 5 second: the device will automatically visualize the actual input measure.
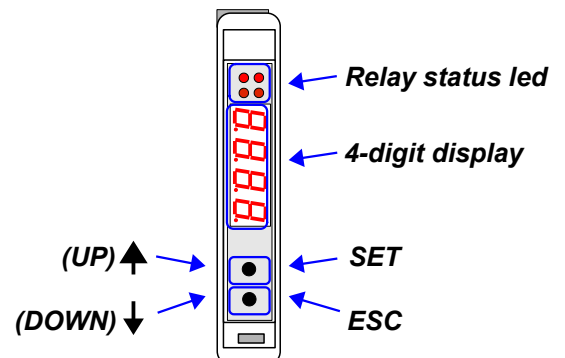
THRESHOLD CONFIGURATION

To configure the threshold values press both the buttons ("SET"+"ESC") for at least 5 seconds.

1) Press the button "ESC" to scroll through to the list until the desired parameter to be configured appears.
2) Press the button "SET" to confirm the selection of the parameter; the display shows the value currently programmed.
3) Press the button "UP" or "DOWN" to modify the value: keeping pressed the button "UP" or "DOWN" to increase the speed of variation of the numbers.
4) When the desired value has been reached press both the buttons for at least 4 seconds. Don't press any button for 5 second to discard the changes.

SET+ESC
"1 LO" — **SET** → Set Low Set-point of the 1st threshold — **SET+ESC**
ESC ↓
"1 HI" — **SET** → Set High Set-point of the 1st threshold — **SET+ESC**
ESC ↓
"2 LO" — **SET** → Set Low Set-point of the 2nd threshold — **SET+ESC**
ESC ↓
"2 HI" — **SET** → Set High Set-point of the 2nd threshold — **SET+ESC**
ESC ↓
"3 LO" — **SET** → Set Low Set-point of the 3rd threshold — **SET+ESC**
ESC ↓
"3 HI" — **SET** → Set High Set-point of the 3rd threshold — **SET+ESC**
ESC ↓
"4 LO" — **SET** → Set Low Set-point of the 4th threshold — **SET+ESC**
ESC ↓
"4 HI" — **SET** → Set High Set-point of the 4th threshold — **SET+ESC**
ESC ↓
"t on" — **SET** → Set delay time — **SET+ESC**
ESC ↓
"t 0" — **SET** → Set the initial delay time at the power-on — **SET+ESC**
ESC

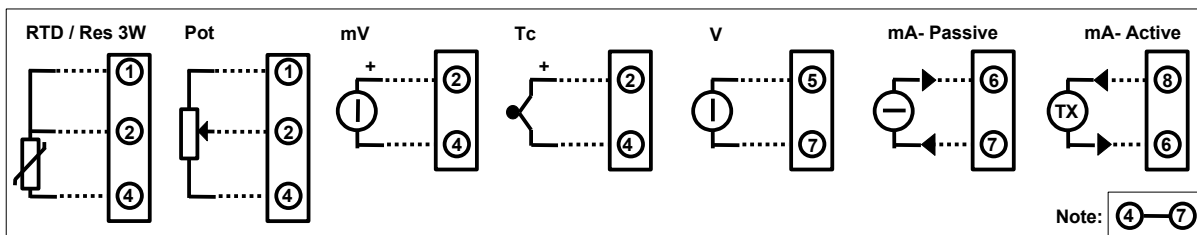5) Repeat the step from 1 up to 4 for each parameter to be configured.

To exit from the threshold configuration don't press any button for 5 seconds: the device will automatically visualize the actual input measure in function of the programming made.
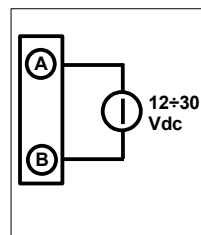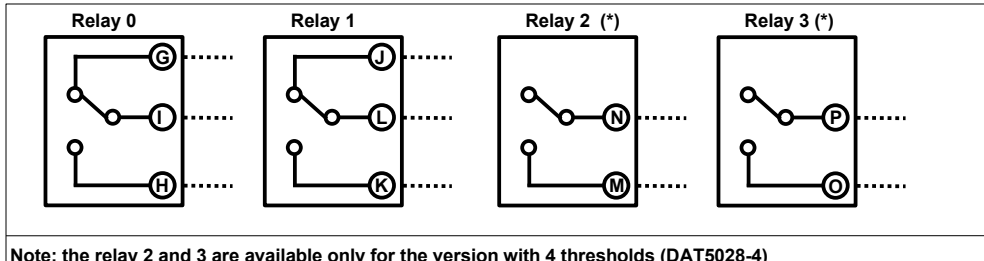
- Relay status led
- 4-digit display
- (UP) ↑
- (DOWN) ↓
- SET
- ESC

WIRING

ANALOGUE INPUT

RTD / Res 3W   **Pot**   **mV**   **Tc**   **V**   **mA- Passive**   **mA- Active**

RTD / Res 3W: terminals 1, 2, 4
Pot: terminals 1, 2, 4
mV: terminals 2, 4 (+)
Tc: terminals 2, 4 (+)
V: terminals 5, 7
mA- Passive: terminals 6, 7
mA- Active: terminals 8, 6 (TX)

Note: 4 — 7

SUPPLY

A
B
12÷30 Vdc

RELAY OUTPUT

Relay 0	Relay 1	Relay 2 (*)	Relay 3 (*)
G, I, H	J, L, K	N, M	P, O

Note: the relay 2 and 3 are available only for the version with 4 thresholds (DAT5028-4)

ANALOGUE OUTPUT

mA Active loop   **mA Passive loop**   **Voltage**

mA Active loop: Vaux — D, C, Load
mA Passive loop: C, E, Load
Voltage: F, E, Load (+)

LIGHT SIGNALLING

LED	COLOUR	STATE	DESCRIPTION
R*n*	RED	ON	Relay [n] excited
		OFF	Relay [n] released

INSULATION STRUCTURE

INPUT
POWER SUPPLY
ANALOG OUTPUT
RELAYS

MECHANICAL DIMENSIONS (mm)
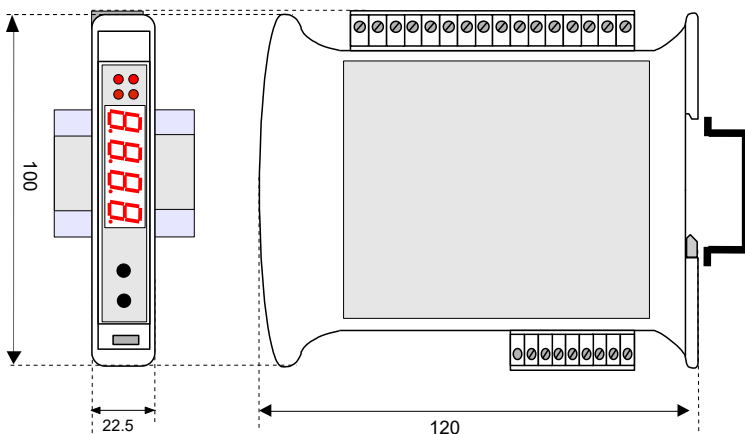
100
22.5
120

HOW TO ORDER

DAT 5028 can be supplied with the configuration specified by the customer.
It is necessary to specify the number of necessary thresholds (2 or 4).
Refer to the "Technical Specification" section for the output type available.

ORDER CODE EXAMPLE:

DAT 5028 - **2**

Number of thresholds : DAT 5028-2 (2 SPDT relay)
DAT 5028-4 (2 SPDT relay + 2 SPST relay)

■ = Requested
☐ = Optional

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