Universal isolated converter configurable by Dip-Switch or PC double output & trip amplifier
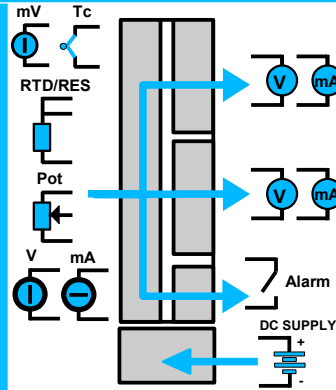
DAT 4530

FEATURES

- Universal configurable input for:
  mV, Tc, RTD, Res, Potentiometer, V and mA
- Two outputs configurable in current or voltage
- Trip alarm
- Configurable by dip-switch or PC
- High accuracy
- On-field reconfigurable
- Galvanic isolation among all the ways
- UL / CE mark
- Suitable for DIN rail mounting in compliance
  with EN-50022 and EN-50035

GENERAL DESCRIPTION

The universal isolated converter DAT 4530 is able to measure and linearise voltage, current and resistance signals, potentiometers and the standard thermocouples and RTDs with, if required, the cold junction compensation, the wires compensation. For mV, V and mA input it is possible to set an option for the fast sampling (option HS) or to extract the square root of the measured signal (option SQRT). In function of programming, the measured values are converted in a current or voltage signal on the two outputs. Moreover an output contact is available as trip alarm.
By dip-switches accessible opening the window on the side of the enclosure, it is possible to select the input type and range and the output type without recalibrate the device.
By Personal Computer the user can set the two outputs with independent settings, the parameters of the Trip Alarm and the optional parameters for his own necessity;
The galvanic isolation between input, outputs and power supply eliminates the effects of all ground loops eventually existing and allows the use of the converter in heavy environmental conditions found in industrial applications. The device guarantees high accuracy and performances stability both versus time and temperature.
The DAT 4530 is in compliance with the Directive UL 61010-1 for US market and with the Directive CSA C22.2 No 61010-1 for the Canadian market.
It is housed in a plastic enclosure of 12.5 mm thickness suitable for DIN rail mounting in compliance with EN-50022 and EN-50035 standards.
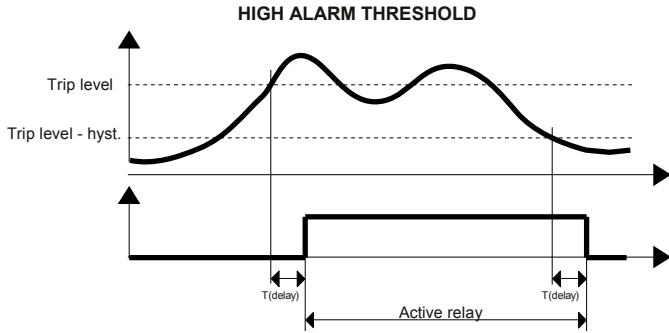
USER INSTRUCTIONS

The connections must be made as shown in the section "Connections".It is possible to configure the converter on field by dip-switch or Personal Computer as shown in the section " Programming ". The configuration by dip-switches can be made also if the device is powered (note: after the configuration the device takes some seconds to provide the right output measure).

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

INPUT

Input type	Min	Max	Span min
TC (CJC int./ext.)			
J	-200°C	1200°C	100°C
K	-200°C	1300°C	100°C
S	0°C	1750°C	400°C
R	0°C	1750°C	400°C
B	0°C	1850°C	400°C
E	-200°C	1000°C	100°C
T	-200°C	400°C	100°C
N	-200°C	1300°C	100°C
Voltage			
mV	-100 mV	+90 mV	5 mV
mV	-100 mV	+200 mV	10 mV
mV	-100 mV	+800 mV	20 mV
RTD (2, 3, 4 wires)			
Pt100	-200°C	850°C	50°C
Pt1000	-85°C	185°C	30°C
Ni100	-60°C	180°C	50°C
Ni1000	-60°C	150°C	30°C
RES. (2, 3, 4 wires)	0 Ω	500 Ω	50 Ω
	0 Ω	2000 Ω	50 Ω
Pot. (Rnom.< 50KΩ)	0 %	100 %	10 %
Voltage	-10 V	10 V	1 V
Current	0 mA	20 mA	1 mA

Accuracy (1)
mV, TC	the higher of ±0.1% and ±12 uV
RTD	the higher of ±0.1% and ±0.2°C
Res.	the higher of ±0.1% and ±0.15
Potentiometer	± 0.05 % f.s.
Voltage	the higher of ±0.1% and ± 2 mV
mA	the higher of ±0.1% and ± 6 uA
mV, V, mA	± 0.5 % f.s (opt. HS)

Linearity (1)
TC, RTD	± 0.1 % f.s.
mV, V, mA	± 0.05 % f.s.

(1) referred to the input Span (difference between max. and min.)

Input impedance
TC, mV	>= 10 MΩ
mA	~22 Ω

RTD excitation current
RTD, Res	400 uA
Aux. Voltage	>18V @ 20mA

Line resistance influence (1)
TC, mV	<=0.8 uV/Ohm
RTD 3w (50Ω max balanced)	0.05%/Ω
RTD 4w (100Ω max balanced)	0.005%/Ω

Thermal drift (1)
Full scale	± 0.01% / °C
CJC	± 0.01% / °C
CJC Comp.	± 0.5°C

OUTPUT (2 CHANNELS)

Output type	Min	Max	Min Span
Current	0 mA	20 mA	4 mA
Voltage	0 V	10 V	1 V

Output resolution
Current	7 uA
Voltage	4 mV
Aux. Voltage	>12V @ 20mA

Burn-out values
Max. output value	22 mA or 11 V
Min. output value	0 mA or -0.6 V

Output load Resistance - Rload
Current output	< 500 Ω
Voltage output	> 10 KΩ
Short circuit current	30 mA max.
Response time (10÷ 90%)	about 400 ms
	100 ms (option HS)

ALARM TRIP (SSR)

Contact	SPST
Max Load (resistive) :	
Voltage	48 Vdc / 30 Vac
Current	0.4 A

POWER SUPPLY
Power supply voltage	20 .. 30 Vdc
Reverse polarity protection	60 Vdc max
Current consumption	
Current output	90 mA max.
Voltage output	30 mA max.

ISOLATION
Among all the ways	1500 Vac, 50 Hz, 1 min

ENVIRONMENTAL CONDITIONS
Operative Temperature	-20°C .. +60°C
UL Operative Temperature	-10°C .. +60°C
Storage Temperature	-40°C.. +85°C
Humidity (not condensed)	0 .. 90 %
Maximum Altitude	2000 m
Installation	Indoor
Category of installation	II
Pollution Degree	2

MECHANICAL SPECIFICATIONS
Material	Self-extinguish plastic
IP Code	IP20
Wiring	wires with diameter 0.8÷2.1 mm² /AWG 14-18
Tightening Torque	0.8 N m
Mounting	in compliance with DIN rail standard EN-50022 and EN-50035
Weight	about 90 g.

CERTIFICATIONS
EMC (for industrial environments)
Immunity	EN 61000-6-2
Emission	EN 61000-6-4
UL	
US Standard	UL 61010-1
Canadian Standard	CSA C22.2 No 61010-1
CCN	NRAQ/NRAQ7
Typology	Open Type device
Classification	Industrial Control Equipment
File Number	E352854

THRESHOLD OPERATION

HIGH ALARM THRESHOLD

For the high alarm the relay goes on when the input signal is higher than the trip level and after the delay time. The relay goes off only when the input signal is lower than the trip level minus the hysteresis value or when reaches the minimum value of the input scale and after the delay time.

LOW ALARM THRESHOLD
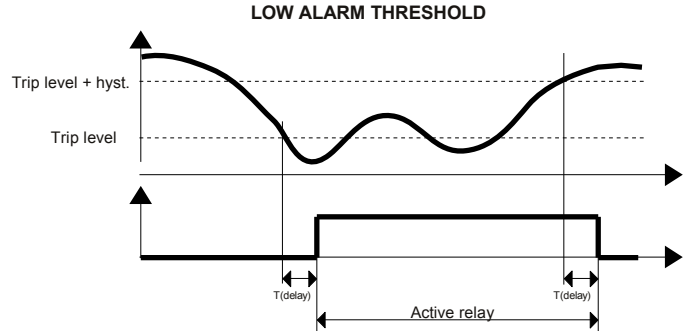
For the low alarm the relay goes on when the input signal is lower than the trip level and after the delay time. The relay goes off only when the input signal is higher than the trip level plus the hysteresis value or when reaches the maximum value of the input scale and after the delay time.

PROGRAMMING

CONFIGURATION BY PC
Notice: before to execute the next operations, check that the drivers of the cable CVPROG in use have been previously installed in the Personal Computer.

By software DATESOFT from version 2.7 it is possible to:
- set the default programming of the device;
- program the options not available with the dip-switch;
  (burn-out level, CJC offset, trip alarm settings, delay on output, etc...);
- read, in real time, the input and output measures;
- follow the dip-switches configuration wizard.

To configure the device follow the next steps:
1) Open the protection plastic label on the front of the device.
2) Connect the two plugs of cable CVPROG to the Personal Computer (USB plug) and to the device (uUSB plug).
3) Run the software DATESOFT
4) Select the COM port in use and click on "Open COM".
5) Click on the icon "Program".
6) Set the programming data.
7) Click on the icon "Write" to send the programming data to the device.
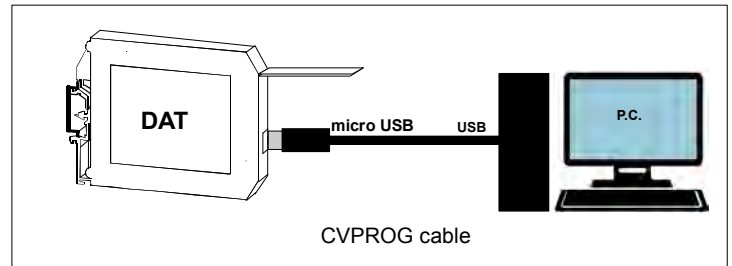
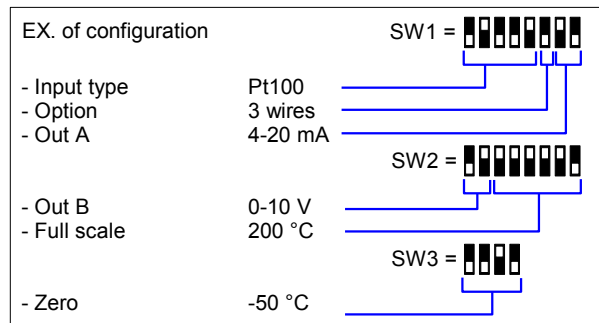*__For information about DATESOFT refer to the software's user guide.__*

CVPROG cable

CONFIGURATION BY DIP-SWITCHES

1) Open the suitable door on the side of the device.

2) Set the input type by the dip-switch SW1 [1..5] (see TAB.1)

3) Set the output A type by the dip-switch SW1 [7..8] and SW2 [1..2] (see TAB.2)

4) Set, if available, the input option by the dip-switch SW1 [6] (see TAB.3)

5) Set the minimum input scale value (Zero) by the dip-switch SW3 [1..4] (see TAB.4)*

6) Set the maximum input value (Full scale) by the dip-switch SW2 [3..8] (see TAB.4)*
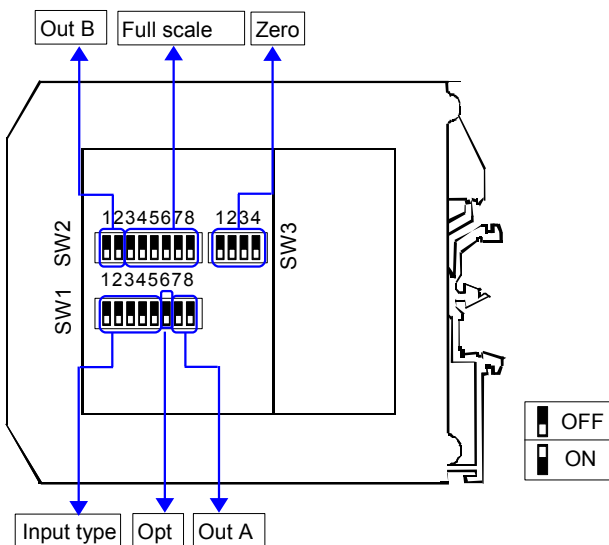
NOTE:
- It is also possible to set the dip-switches using the wizard of the configuration software following the procedure described in the section "Configuration by PC" until the step 6 and clicking on icon "Switch".

EX. of configuration		SW1 =
- Input type	Pt100	
- Option	3 wires	
- Out A	4-20 mA	
		SW2 =
- Out B	0-10 V	
- Full scale	200 °C	
		SW3 =
- Zero	-50 °C	

DIP-SWITCH CONFIGURATION TABLES

TAB.1 – Input type settings

SW1 (1 2 3 4 5)	SW1 (1 2 3 4 5)	SW1 (1 2 3 4 5)
EPROM *	Tc J	Res. 2KΩ
90 mV	Tc K	Res. 500Ω
200 mV	Tc R	Pt100
800 mV	Tc S	Ni100
10 V	Tc T	Pt 1K
20 mA	Tc B	Ni 1K
	Tc E	Pot. <500Ω
	Tc N	Pot. <50KΩ

NOTES:

* To set the input range refer to the TAB.4 (next pages) referred to the input type selected by the TAB.1.

* If the dip-switches SW1 [1..5] are all set in the position 0 ("EPROM"), the device will follow the configuration programmed by PC (input type and range, output type and range, trip alarm 's settings and options).

* If the dip-switches SW2 [3..8] and SW3 [1..4] are all set in the position 0 ("Default"), the device will follow the input scale programmed by PC for the input type selected by the dip-switches SW1 [1..5]

* Eventual wrong dip-switches settings will be signalled by the blinking of the led "PWR".

* **If the dip-switch SW1 [6] is set in the ON position and is in progress a measure by Resistance or RTD 2 wires sensor, it is necessary to connect the terminal I to the terminal L and the terminal G to to the terminal H.**

TAB.2

Out A — SW1 (7 8)

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

Out B — SW2 (1 2)

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

TAB.3 Options

SW1 (6)	CJC	RTD/RES
	External	3 wires
	Internal	2/4 wires

TAB.4a – mV, Tc input scale settings

Zero SW3 (1 2 3 4) mV-°C	Full scale SW2 (3 4 5 6 7 8) mV-°C	SW2 mV-°C	SW2 mV-°C	SW2 mV-°C
Default	Default	75	225	700
-200	0	80	250	750
-100	5	85	255	800
-80	10	90	275	850
-60	15	95	300	900
-50	20	100	325	950
-40	25	110	350	1000
-30	30	120	375	1100
-20	35	130	400	1200
-10	40	140	425	1300
0	45	150	450	1400
10	50	160	475	1500
20	55	170	500	1600
50	60	180	550	1750
100	65	190	600	1800
150	70	200	650	1850

TAB.4b – Pt100, Pt1K, Ni100, Ni1K input scale settings

Zero SW3 (1 2 3 4) °C	Full scale SW2 (3 4 5 6 7 8) °C	SW2 °C	SW2 °C	SW2 °C
Default	Default	75	210	370
-200	0	80	220	380
-150	5	85	230	390
-100	10	90	240	400
-50	15	95	250	425
-40	20	100	260	450
-30	25	110	270	475
-20	30	120	280	500
-10	35	130	290	525
0	40	140	300	550
5	45	150	310	600
10	50	160	320	650
20	55	170	330	700
30	60	180	340	750
50	65	190	350	800
100	70	200	360	850

TAB.4c – Resistance < 2 Kohm input scale settings.

Zero SW3 (1 2 3 4)	Ω	Full Scale SW2 (3 4 5 6 7 8)	Ω	SW2 (3 4 5 6 7 8)	Ω	SW2 (3 4 5 6 7 8)	Ω	SW2 (3 4 5 6 7 8)	Ω
	Default		Default		800		1150		1600
	0		500		820		1175		1650
	150		520		840		1200		1700
	200		540		860		1225		1750
	250		560		880		1250		1800
	300		580		900		1275		1850
	350		600		920		1300		1900
	400		620		940		1325		1950
	450		640		960		1350		2000
	500		660		980		1375		2000
	550		680		1000		1400		2000
	600		700		1025		1425		2000
	650		720		1050		1450		2000
	700		740		1075		1475		2000
	750		760		1100		1500		2000
	800		780		1125		1550		2000

TAB.4d – Resistance < 500 ohm input scale settings

Zero SW3 (1 2 3 4)	Ω	Full Scale SW2 (3 4 5 6 7 8)	Ω	SW2 (3 4 5 6 7 8)	Ω	SW2 (3 4 5 6 7 8)	Ω	SW2 (3 4 5 6 7 8)	Ω
	Default		Default		125		210		370
	0		50		130		220		380
	10		55		135		230		390
	20		60		140		240		400
	30		65		145		250		410
	40		70		150		260		420
	50		75		155		270		430
	75		80		160		280		440
	100		85		165		290		450
	125		90		170		300		460
	150		95		175		310		470
	175		100		180		320		480
	200		105		185		330		490
	225		110		190		340		500
	250		115		195		350		500
	300		120		200		360		500

TAB.4e – Potentiometer input scale settings

Zero SW3 (1 2 3 4)	%	Full Scale SW2 (3 4 5 6 7 8)	%	SW2 (3 4 5 6 7 8)	%	SW2 (3 4 5 6 7 8)	%	SW2 (3 4 5 6 7 8)	%
	Default		Default		34		66		98
	0		5		36		68		100
	15		6		38		70		100
	20		8		40		72		100
	25		10		42		74		100
	30		12		44		76		100
	35		14		46		78		100
	40		16		48		80		100
	45		18		50		82		100
	50		20		52		84		100
	55		22		54		86		100
	60		24		56		88		100
	65		26		58		90		100
	70		28		60		92		100
	75		30		62		94		100
	80		32		64		96		100

TAB.4f – Current input scale settings

Zero		Full Scale							
SW3 1 2 3 4	mA	SW2 3 4 5 6 7 8	mA	SW2 3 4 5 6 7 8	mA	SW2 3 4 5 6 7 8	mA	SW2 3 4 5 6 7 8	mA
	Default		Default		8		11.5		16
	0		5		8.2		11.75		16.5
	1.5		5.2		8.4		12		17
	2		5.4		8.6		12.25		17.5
	2.5		5.6		8.8		12.5		18
	3		5.8		9		12.75		18.5
	3.5		6		9.2		13		19
	4		6.2		9.4		13.25		19.5
	4.5		6.4		9.6		13.5		20
	5		6.6		9.8		13.75		20
	5.5		6.8		10		14		20
	6		7		10.25		14.25		20
	6.5		7.2		10.5		14.5		20
	7		7.4		10.75		14.75		20
	7.5		7.6		11		15		20
	8		7.8		11.25		15.5		20

TAB.4g – Voltage input scale settings

Zero		Full Scale							
SW3 1 2 3 4	Volt	SW2 3 4 5 6 7 8	Volt	SW2 3 4 5 6 7 8	Volt	SW2 3 4 5 6 7 8	Volt	SW2 3 4 5 6 7 8	Volt
	Default		Default		3.4		6.6		9.8
	0		0.5		3.6		6.8		10
	1.5		0.6		3.8		7		10
	2		0.8		4		7.2		10
	2.5		1		4.2		7.4		10
	3		1.2		4.4		7.6		10
	3.5		1.4		4.6		7.8		10
	4		1.6		4.8		8		10
	4.5		1.8		5		8.2		10
	5		2		5.2		8.4		10
	5.5		2.2		5.4		8.6		10
	6		2.4		5.6		8.8		10
	6.5		2.6		5.8		9		10
	7		2.8		6		9.2		10
	7.5		3		6.2		9.4		10
	8		3.2		6.4		9.6		10

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 cases:
- If panel temperature exceeds 45°C.
- Use of high power supply value (> 27 Vdc).
- Use of one or both current outputs.
- Use of active current input.

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.
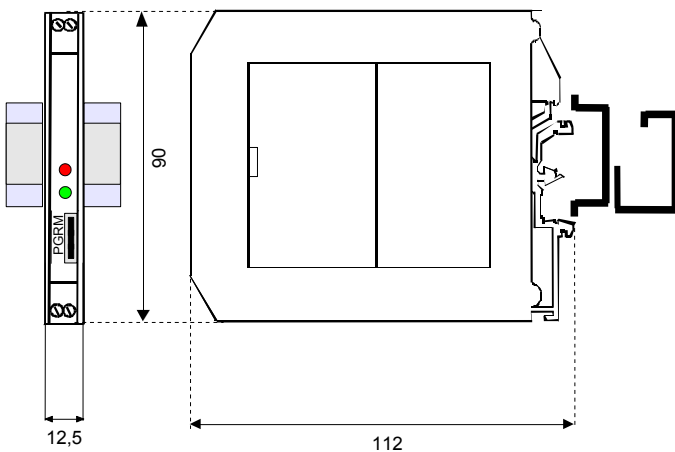Install the device in a place without vibrations.
Moreover it is suggested to avoid routing conductors near power signal cables (motors, induction ovens, inverters etc...) and to use shielded cable for connecting signals.
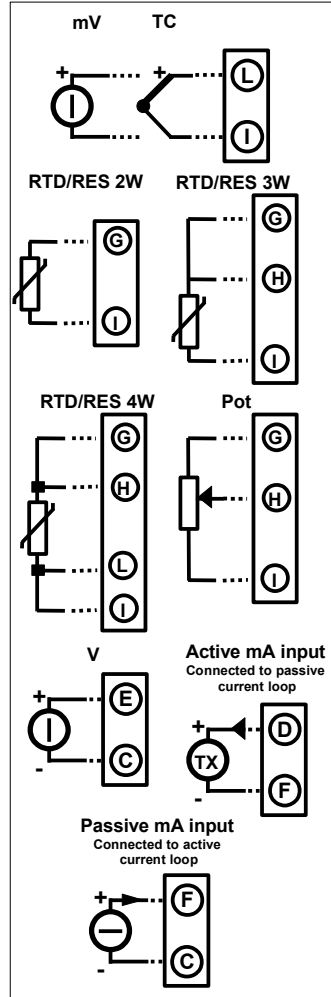
ISOLATION STRUCTURE

INPUT
TRIP ALARM
OUTPUT A
OUTPUT B
POWER SUPPLY

DIMENSIONS (mm)

90

12,5

112

LIGHT SIGNALLING

LED	COLOUR	STATE	DESCRIPTION
PWR	GREEN	ON	Device powered
		OFF	Device not powered
		BLINKING	Wrong dip-switches settings
ALARM	RED	ON	Trip alarm active
		OFF	Trip alarm not active

The symbol reported on the product indicates that the product itself must not be considered as a domestic waste.
It must be brought to the authorized recycle plant for the recycling of electrical and electronic waste.
For more information contact the proper office in the user's city , the service for the waste treatment or the supplier from which the product has been purchased.
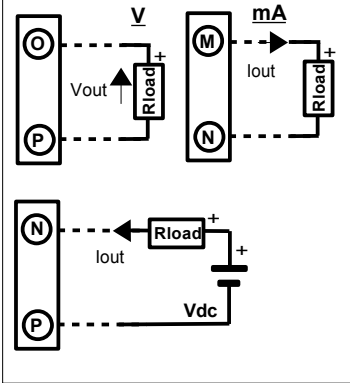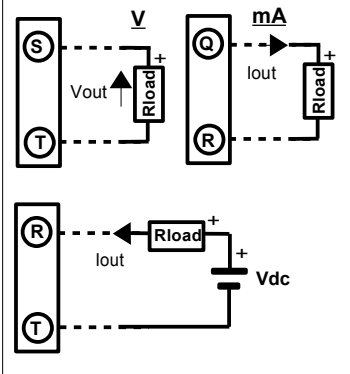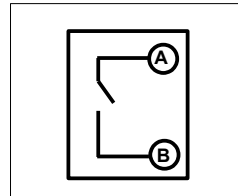
CONNECTIONS

INPUT SIDE

mV   TC

L
I

RTD/RES 2W   RTD/RES 3W

G
I

G
H
I

RTD/RES 4W   Pot

G
H
L
I

G
H
I

V

E
C

Active mA input
Connected to passive current loop

+ TX − D F

Passive mA input
Connected to active current loop

+ − F C

OUTPUT SIDE

CHANNEL A

V
O
P
Vout
Rload

mA
M
N
Iout
Rload

N
P
Iout
Rload
Vdc

CHANNEL B

V
S
T
Vout
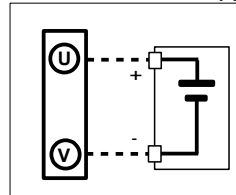Rload

mA
Q
R
Iout
Rload

R
T
Iout
Rload
Vdc

TRIP ALARM

A
B

POWER SUPPLY(*)

U
V

(*) Note: for UL installation the device must be powered using a power supply unit classified NEC class 2 or SELV

HOW TO ORDER

The device is provided as requested on the Customer's order.
Refer to the section "Programming" to determine the input and output ranges.
In case of the configuration is not specified, the parameters must be set by the user.

ORDER CODE EXAMPLE:

DAT 4530 / Pt100 / 0 ÷ 200 °C / 4 ÷ 20 mA / 4 ÷ 20 mA / 3wires

Input type
Input scale
Out A scale
Out B scale
Options

ED.02.15-R.02