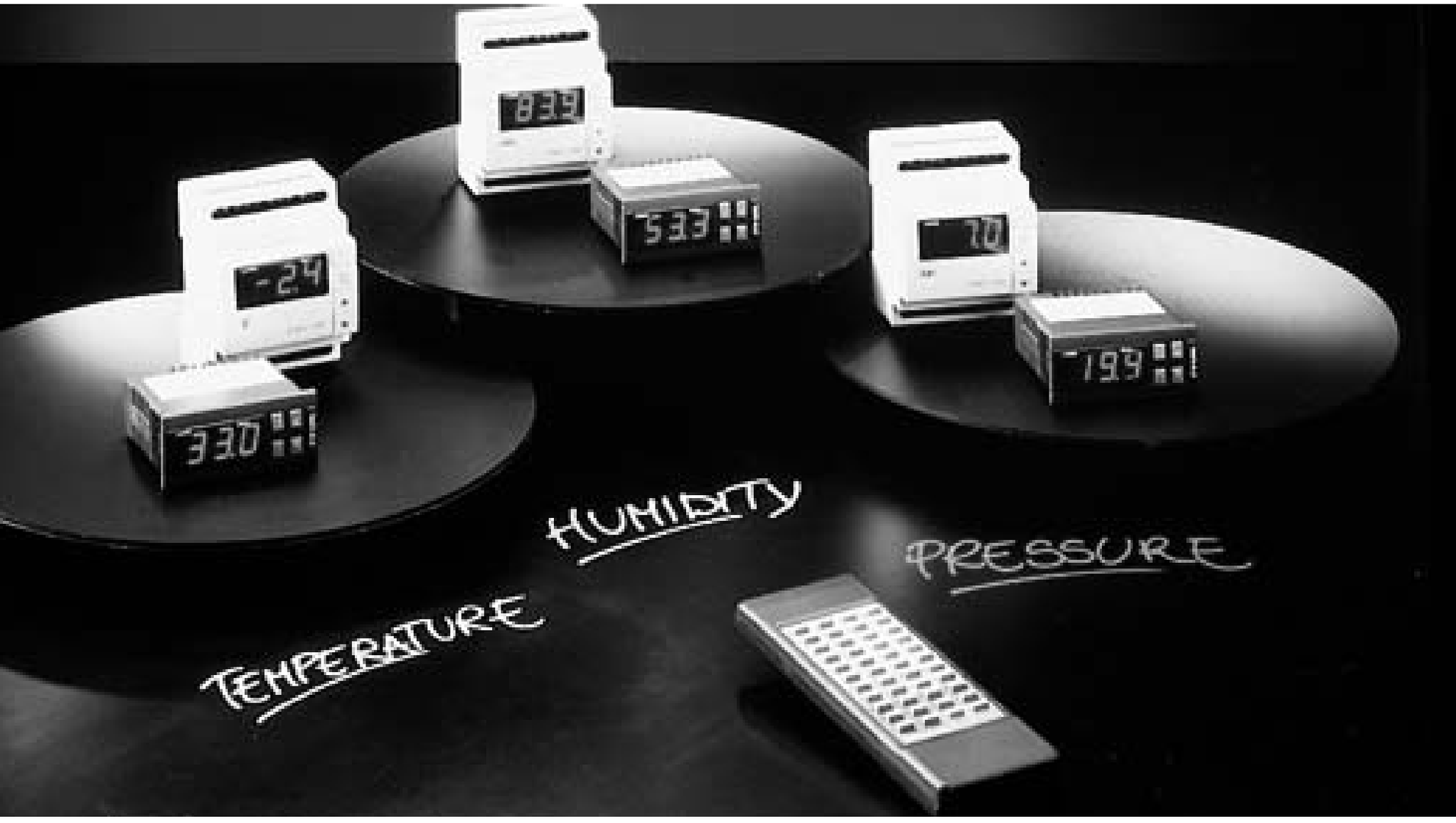
universal infrared series



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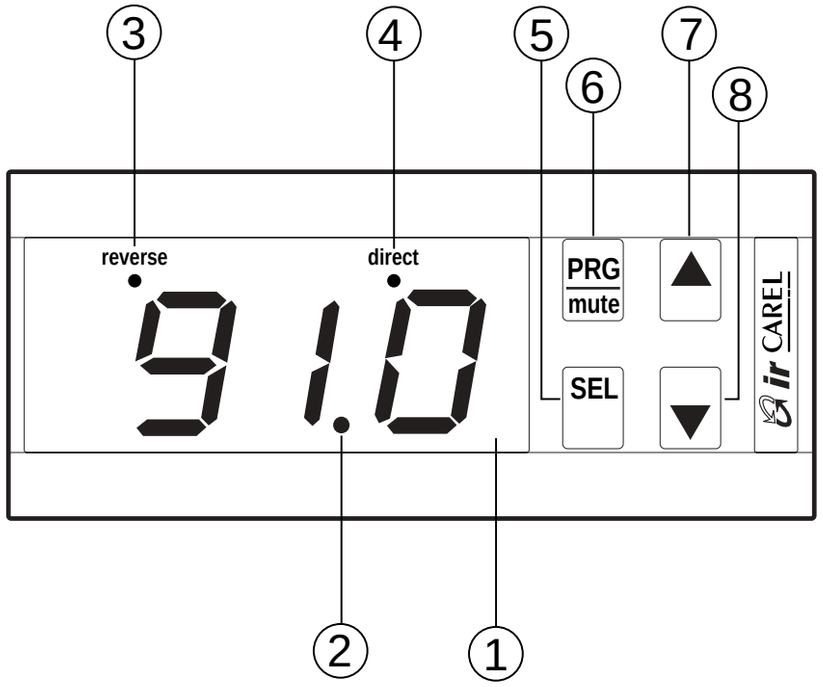
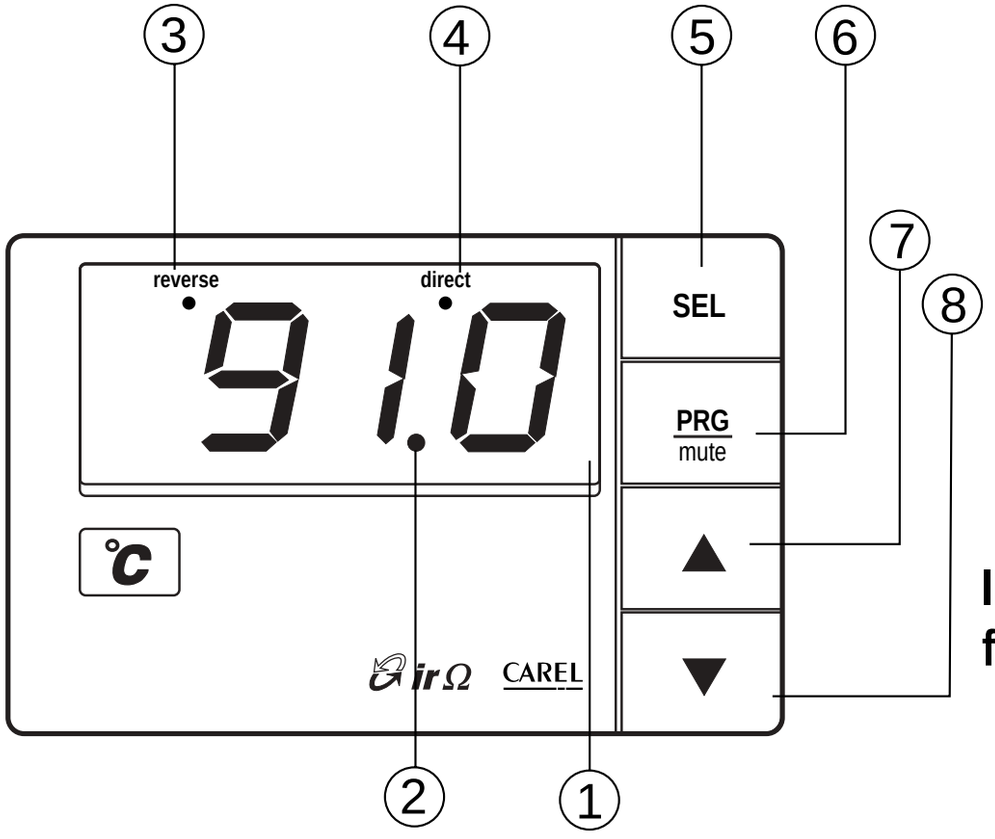


IR32
fig. 1



IRDR
fig. 2

1 - Display
2 - Led decimale
3 - Led reverse
4 - Led direct
5 - Tasto SEL: visualizza il Set Point. Se premuto insieme al tasto PRG-Mute per 5 s. permette di accedere ai parametri di configurazione (con codice tipo 'Cxx').
6 - Tasto PRG/Mute: premuto per 5 secondi da' accesso al menu' dei parametri di utilizzo più frequente (codice tipo 'Pxx'). In caso di allarme tacita il buzzer. Resetta le altre segnalazioni d'allarme se premuto al cessare della causa.
7 - Tasto "Freccia Sù": incrementa il valore del parametro selezionato.
8 - Tasto "Freccia Giù": decrementa il valore del parametro selezionato. Nelle versioni NTC, se premuto quando sul display e' visualizzato il valore della sonda principale permette la visualizzazione della seconda sonda.

1 - Display
2 - Decimal Point
3 - Led reverse
4 - Led direct
5 - Key SEL: *displays the Set-point. Hold it down for more than 5 seconds together with the PRG-MUTE key to access the Configuration menu (code type 'Cxx').*
6 - Key PRG/MUTE: *Hold it down for 5 seconds to access the menu of the more frequently used parameters (code type 'Pxx'). In the event of alarm condition, press it to silence the buzzer.*
7 - Key UP: *increases the value of the selected parameter.*
8 - Key DOWN: *decreases the value of the selected parameter. For NTC input versions, if pressed when the main probe value is displayed, it displays the second probe value.*

Your regulator belongs to the UNIVERSAL INFRARED SERIES comprising over 40 models designed to control Pressure, Humidity and Temperature and developed according to the experience Carel has acquired for more than 20 years in the regulation of Conditioning, Refrigeration and Heating units. For your convenience we are illustrating below the code structure of the ***Infrared Series****. Remember that all models, except those indicated below, are equipped with alarm buzzer, serial output and I.R. receiver for parameters programming through remote keypad (supplied as an accessory).*

IR aa b c d

- *only for IR32V versions* ***d*** *can be different from 0:*
  - ***E****, 12÷24 Vac-dc, no I.R. receiver and no buzzer*
  - ***L****, 12÷24 Vac-dc*
  - ***U****, 24÷240Vac-dc, no supplied with serial card*
  - ***H****, 110÷240Vac-dc, no supplied with serial card*
- ***0*** *for NTC probe*
- ***1*** *for Pt100 probe*
- ***2*** *for thermocouple probes, type J or K*
- ***3*** *for current 0/20 mA or 4/20 mA*
- ***4*** *for voltage input -0,4 / +1 Vdc*
- ***D*** *in the versions with 1 output for SSR*
- ***A*** *in the versions with 4 outputs for SSR*
- ***V*** *for 1 relay output versions*
- ***W*** *for 2-relay output versions*
- ***Z*** *for 4-relay output versions*
- ***32*** *for panel mounting version*
- ***DR*** *for DIN rail mounting version*

In addition, the model ***IRDRTE0000*** *is available for DIN rail mounting, with 230 Vac power supply, 1 relay, NTC probe, no buzzer and no serial output.*

Refer to picture 1 for IR32 models and to picture 2 for IRDR:

1 - Display: *shows the value measured by the connected probe. In the event of alarm condition the probe value will be shown alternately with the codes of activated alarms. During programming it shows the parameter codes and their values.*

2 - Decimal Point: *shows the number of decimal points in the controlled parameter.*

3 - Led reverse: *flashes when at least one device with "Reverse" function is activated. The number of flashes indicates the Reverse activated relays. A 2-second-pause occurs, between flashes.*

4 - Led direct: *flashes when at least one device with "Direct" function is activated. The other indications are the same as in " Led reverse" . Note: for the meaning of* ***Reverse*** *and* ***Direct*** *see next paragraph.*

5 - Key SEL: *displays and/or selects the Set-point. If pressed for more than 5 seconds together with PRG-MUTE, it allows you to enter the password and the configuration parameters (code type 'Cxx').*

6 - Key PRG/Mute: *If pressed for 5 seconds it allows you to access the menu of the more frequently used parameters (code type 'Pxx'). In the event of alarm condition, it silences the buzzer and it also resets any other alarm signal, if pressed after the event that caused the alarm has disappeared.*

7 - Key Up: *increases the value of the Set-point or of any other selected parameter.*

8 - Key Down: *decreases the value of the Set-point or of any other selected parameter. For NTC input versions, if pressed when the main probe value is shown, it displays the value of the second probe as long as the key is being pressed (see NTC1, NTC2, paragraph "Connections").*

To install the regulator follow these instructions:

1) ***connect probes and power supply*** *following the instructions in the paragraphs below "Hints for Installation" and "Connections". It is advisable to connect actuators only after having programmed the controller.*

2) ***setting the instrument.*** *The Infrared Series regulators are supplied preprogrammed so as to be used in the more frequent applications (see page 38). However, it is always possible to modify in part or completely the factory-set function so as to customize the instrument to your requirements. There are two programming procedures:*
   2a) simplified programming. *In all factory-set applications, you only have to check and if necessary to modify a few parameters (Set-point and differential for example). It is also possible to modify other parameters to obtain better performance (see "Description of useful Parameters").*
   2b) advanced programming. *It allows the instrument to be tailored to uses different from the factory-set ones. As you will see, programming is extremely simple thanks to a series of prearranged functions (Modes), which are ready to be activated.*

3) *for models with* ***current, voltage or J thermocouple*** *inputs, some special parameters should be selected. See paragraph "Special parameters for thermocouples and voltage/current probes".*

4) ***connecting the actuators.*** *It is recommended to carefully evaluate the maximum switching power of relays (see "Technical specifications").*

For optimun performance please follow the notes below.

- ***Remember that it is necessary to install all the electromechanical devices required to ensure a safety operation of the plant.***
- ***Avoid installation in places with the following features:***
  - *Relative humidity higher than 90% or condensing*
  - *Heavy vibrations or shocks*
  - *Exposures to continuous jets of water*
  - *Exposure to aggressive and polluting environment (eg: sulphurous and ammoniacal gases, saline mist, smoke) to avoid corrosion and/or oxidation*
  - *High magnetic and/or radio interferences (avoid therefore machine installation near transmitter aerials)*
  - *Exposure of controllers to direct solar radiation and to atmospheric agents in general.*

- ***It should be remembered that incorrect connection of power supply voltage can seriously damage the system. When connecting the regulators it is necessary to follow these instructions:***
  - *Use wire suitable for the used terminals*
  - *Slacken each termination screw and insert the wire terminals, then tighten the screws*
  - *When the procedure has ended, pull the cables slightly to check the correct tightening*
  - *Separate as much as possible the probes and digital input cables from those of inductive and power loads, to avoid any electromagnetic interferences.*

- ***Never insert in the same channels power cables and probe cables.***

- Avoid installating probe cables near power devices (Magnetothermic contactors or others).

*- Probes can be positioned up to a **maximum distance** of 100 meters from the controller, provided that their cables have a minimum section of 1mm^2 and are shielded.*

*- To improve immunity against noise and to get a better precision, we advise using shielded cables; in this case, connect **just one end of the shielding to the electrical panel ground**; do not connect the other end of the cable.*
When usign thermocouples, it is necessary to use shielded cables to ensure protection against noise; moreover, the probes can be lengthened only by using the suitable compensated cables and connectors. (As for codes see Carel price-list).

- If a supervisory network connection is provided through suitable serial boards (IR32SER for IR32 models and IRDRSER for IRDR models), it is necessary to pay attention to the earthing of the system. In particular: the secondary of the transformers which feed the instruments should not be earthed. If it is necessary to connect to a transformer with a earthed secondary, an isolating transformer should be used. Even if it is possible to connect more instruments to the same insulation transformer, we suggest you to use a different insulation transformer for each instrument (see Carel price list for the codes and specifications of the insulation transformers).

Before describing how to program the instrument, it is necessary to review some basic concepts:

- ***Direct Mode and Reverse Mode:*** *a regulator works in Direct mode, when it tends to operate against the rise of the controlled variable. Direct function is typical, for example, of refrigeration: the more the measured temperature increases the more the capacity of the refrigeration circuit increases, so as to make temperature itself fall. We use the term Reverse if the regulation tends to operate against the decreasing of the controlled variable. This is used, for example, in heating systems where you have to oppose the decreasing temperature by increasing the heat production.*

- ***Set-point (or Set):*** *this is the value that the controlled parameter has to maintain, for example the value of the temperature at which an oven is to work. When the controlled parameter is at the Set-point value, all outputs are de-activated.*

- ***Differential or hysteresis:*** *regulates the outputs when the controlled parameter deviates from the Set. Without Differential the instrument could pass suddenly from all outputs OFF (parameter equal to SET) to all outputs ON (parameter different from SET). Instead, when differential > 0, the outputs insertion is gradual and the regulator will activate all outputs only when the difference between the controlled parameter and the Set Point exceeds the value of the Differential. A 'narrow' differential usually maintains the controlled parameter very near to the Set, but it can provoke frequent turning ON and OFF of the controlled devices i.e. hunting problems. If a very precise regulation is required, instead of selecting a narrow differential, the P+I regulation (described in the "Technial Manual") can be activated.*

The instrument is supplied ready for the following applications:

Models with temperature probes (NTC, Pt100, Thermocouples): *control of ovens, burners, heating systems and in general low temperature alarms.*

Models for humidity probes: *control of humidifiers and in general low humidity alarms.*

Models for pressure probes: *control of evaporators and in general low pressure alarms.*

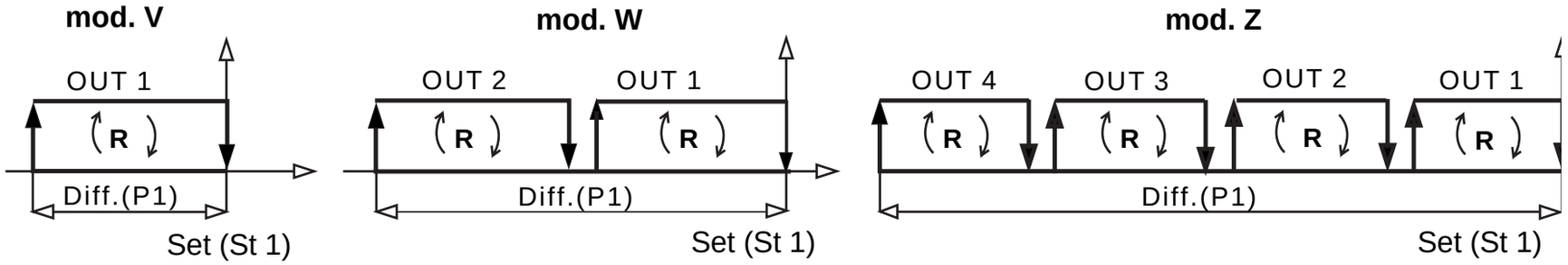


Fig. 4

As shown in the picture, the main parameters in this function mode are Set Point (St1) and differential (P1). For the standard function, which corresponds to Reverse action, the regulator energizes the outputs only if the controlled parameter decreases from the Set-point value. Once fixed at the desired Set Point (St1), the outputs will be energized one by one as the parameter deviates from St1. As shown in the picture, in models with more outputs, the activation of relays is equally distributed within the differential. When the controlled parameter is equal to/lower than St1-P1, all outputs will energize. Viceversa, starting from values lower than St1, if the parameter starts to increase any active relay will be de-activated as approaching St1. When the St1 value is reached, all outputs will be disenergized.
The REVERSE led will flash with a number of pulses equal to the activated outputs.

To customize the regulator's function to your requirements it will be necessary to modify the Set (factory-set value= 20) and the differential (factory-set value= 2). However, there are other parameters, not previously programmed, which can be usefully selected:

Useful Parameters

Higher/Lower limit alarm set: *allows you to select a maximum and a minimum value for the controlled param. When the instrument detects a value which is beyond the set thresholds, it displays an alarm code and gives off an acoustic signal (in models with buzzer). High and low thresholds are absolute values and so, to avoid alarm intervention during normal function, they have to be beyond the "Set Point-differential" plus "Set Point". If the Set Point has been modified, it is necessary to check that the new combined values do not exceed alarm limits.*

Alarm differential: *the hysteresis of the alarms. A minimum differential is necessary to avoid consecutive activating/deactivating of alarms due to small variations in the controlled parameter. Infrared Series regulators have a factory-set alarm differential value of "2". Higher/lower limit alarms have an automatic reset, in fact when the controlled parameter returns within the maximum allowed limits, the alarm is automatically deactivated.*
It is possible to set the alarm set, even if a relative alarm, assigning the values with a negative sign to the parameter P27). In this case, pay attention to the signs of P25 and P26: as a matter of fact the negative sign shows the event of its respective alarm before the Point, whereas the positive sign shows the event after the Set Point.

Alarm delay: *allows you to set a time-delay in the alarm signal. The regulator activates the alarm only after the selected time delay has elapsed. If during a delay the controlled parameter returns within the allowed limits, the timer will be zeroed.*

Calibration offset: *allows you to modify the value displayed by the instrument. This compensates for any errors or differences with other instruments.*

For your convenience we have listed the factory-set values of the Set Point and of the other useful parameters as follows.

Parameter	Code	Factory-set value	Range
Set Point	St1	20	probe limits
Differential	P1	2,0	0.1 / 99.9
Calibration offset	P14	0,0	-99 / 99
Lower limit alarm	P25	depending on the probe	-99 / P26
Higher limit alarm	P26	depending on the probe	P25 / 999
Alarm Differential	P27	2,0	0.1 / 99.9
Alarm Delay	P28	60 minutes	0 / 120 min.

The Set-point can be modified as follows (pictures 1 and 2):

a) press the "5" key for some seconds: the display shows St1;
b) release the "5" key: the actual value of the Set-point will flash;
c) press either "7" or "8" keys until you reach the desired value;
d) press "5" to confirm the new St1 value;

The Differential and the Useful Parameters can be modified as follows:

a) press the "6" key for 5 seconds: "P1" is displayed;
b) press either "7" or "8" keys until the parameter to be modified is shown;
c) press the "5" key: the present value of the parameter to be modified is displayed;
d) press either "7" or "8" keys until you reach the desired value;
e) press "5" to confirm;
f) the code identifying the modified parameter is displayed;
g) repeat instructions from point b) to point f) if you want to modify other parameters, otherwise go to point h);
h) press the "6" key to store the modified data and go back to normal operation.

Current input models have a special parameter, C13, which allows you to choose the type of current input: C13=0 for 4/20 mA probes, factory-set value, and C13=1 for 0/20 mA probes. The value is therefore to be modified only if a 0/20 mA probe is being used.
The same C13 parameter is used by thermocouple input instruments: The value C13=0, factory-set, corresponds to thermocouples type K, C13=1 to thermocouples type J. The value of C13 is therefore to be modified only if you require thermocouples type J.
Current/voltage inputs instruments have two special parameters, C15 and C16, which allow the user to define the working range of the actual probe, and which are the values corresponding to minimum (C15 parameter) and maximum (C16 parameter) input. C15 and/or C16 parameters must be modified only if the probe limits are different from the factory-set ones: C15=0 and C16=100.

C13, C15 and C16 parameters can be modified as follows:

a) *press the "5" and "6" keys simultaneously for 5 seconds;*
b) *the display shows 0;*
c) *select the password, by pressing the "7" key until 22 is displayed;*
d) *press the "5" key to confirm the password;*
e) *if the selected password is correct, code "C0" will be displayed, otherwise you will have to repeat procedures from point a);*
f) *press the "7" and/or "8" keys until the desired parameter is displayed (C13, C15 or C16): then press the "5" key;*
g) *the value associated to the parameter is displayed: press either "7" or "8" keys until the desired value is displayed; press "5" to confirm;*
h) *repeat procedures from point f) to modify other parameters or press the "6" key to exit the procedure.*

Advanced programming *allows you to modify the functions of the instrument to adapt it to uses different from the factory-set ones (pag. 38).*
This is an extremely simple procedure thanks to the ***Function Modes****. In each regulator, in fact, have been memorized as many as* ***9 different programs*** *designed to optimally provide the best solution to any control problems. The procedure is as follows:*

1) having chosen the Function Mode suitable to your application, you will have to activate it by modifying a parameter (C0)

2) then you will be able to modify Set-point, differential and any other parameter you consider useful by following the same procedures described above.

Before describing in detail the features of the 9 "Function Modes" it is necessary to introduce two other basic concepts:

Multiple Set-Points. *We have previously described the function with only one Set. There are, however, applications with 2 Sets: this is the case, for example, of a heating system working with two different Sets, one for functioning by day and the other by night, or of a conditioning system with a winter Set and a summer Set. As you will see in the description of Modes, the Infrared series regulators can also manage two set-points.*

Neutral Zone or Dead Band: *indicates an interval in the values around the Set Point where the controlled parameter can fluctuate without having to activate any outputs. The concept will be resumed in the description of Modes 3, 4 and 5.*

Note: *to follow the description of Modes more easily it is advisable to refer to the pictures at the end of the manual. In the description below, associated to parameters, you will always find the corresponding programming code (eg.* ***Set*** *will be associated with code* ***St1****) so as to simplify any modification of these parameters.*

Mode 1: DIRECT function (pict. 5).

The main parameters in this kind of function are Set Point (St1) and differential (P1). In the Direct function mode the regulator opposes the controlled parameter only if it exceeds the Set Point value. Having once fixed the desired Set Point (St1), the outputs will be energized one by one as the parameter deviates from St1. As shown in the picture, the relays in the models with more outputs are equally distributed within each single set differential. When the controlled parameter is equal to/higher than St1+P1, all outputs energize. Viceversa, if the parameter, starting from values higher than St1, starts to decrease, any active relay will be deactivated as approaching St1. When the St1 value is reached, all outputs will be disenergized. The DIRECT led will flash periodically, once for each activated output.

Mode 2: REVERSE function mode (pict. 6).

This is the previously described factory-set mode.

Mode 3: Dead-Band function mode (pict. 7).

The main parameters in this kind of function mode are Set Point (St1), Reverse mode differential (P1), Direct mode differential (P2) and Dead-Band (P3). The aim of the regulator is to bring the controlled parameter within a limited range, called dead zone, set around the Set Point (St1). As shown in the picture, the dead zone value depends on the P3 parameter value. Within the dead zone the instrument does not require the intervention of any device. Outside the dead zone the instrument will work in DIRECT mode, when the controlled parameter increases and, in REVERSE mode, when it decreases. According to the used model, there can be one or more relays in Direct and Reverse function. Said outputs are activated/deactivated according to the procedures already shown in modes 1 and 2, according to the values of the controlled parameter, of St1 value, of P1 and of P2. The DIRECT led and REVERSE led indicators will flash as already described. ***Warning:*** *when the instrument has only one relay output, it will work in REVERSE mode with Dead-Band.*

Mode 4: PWM function mode (pict. 8).

The main parameters in this kind of function mode are Set Point (St1), Reverse mode differential (P1), Direct mode differential (P2) and dead zone (P3). The logic of regulation in this kind of function is the same as in Mode 3. It is, in fact, a function with Dead-Band with the extra feature that relays are activated in an impulsive way according to the PWM procedure (Pulse Width Modulation). In practice, each single relay, instead of being activated when exceeding the differential (or part of it), is periodically activated (with a period of 20 seconds, modifiable if needed) for a time from 0,2 to 20 seconds, according to the amount of power. The relay ON period is ***proportional*** *to the position of the controlled parameter within the differential, as shown in the picture. The PWM functioning therefore provides a proportional control which can improve the regulation of the controlled parameter. However, the limits of this kind of functioning should be considered. For example, it is not advisable to use it with compressors or other actuators whose reliability can suffer the effects of rapid switching. It should be remembered, then, that too rapid on/off routines of the relays can compromise their life (calculated in about 1 million activations). In* ***PWM*** *function DIRECT/ REVERSE leds will flash with a number of flashes equal to the number of active outputs. When the instrument is equipped with only one relay, it will function in REVERSE mode with Dead-Band.*

Mode 5: alarm function mode (pict. 9).

The main parameters in this kind of function mode are Set Point (St1), Reverse mode differential (P1), Direct mode differential (P2), Dead-Band (P3), lower limit alarm Set (P25), higher limit alarm Set (P26), alarm differential (P27) and alarm time delays (P28). With this ***kind of function*** *1 relay (V and W versions) or 2 relays (Z version) have been set to signal the presence of a general alarm (disconnected or short circuit probe, anomalous function in electronics) or a higher/lower limit alarm. In V and W versions the activated relay is always*

the same. In Z version relay 3 is activated for general alarms and for lower limit alarm, whereas relay 4 is activated for general alarms and for higher limit alarm. The alarm relay activation is added to the other alarm signals, active with other function modes that are ***alarm code*** *on display and* ***acoustic warning*** *(in buzzer equipped versions). In W and Z versions, the relays which are not used for the alarm signal can be used as in Mode 3. Once activated, the alarm output will go back to the OFF position when the cause of the alarm ends ("automatic resetting", is obtained with a "low" value selected for the alarm differential P27) or when the PRG-MUTE key is being pressed (with manual resetting, is obtained by selecting "high" values for P27). It is important to point out that if the MUTE key is pressed when the cause of the alarm is still present, the buzzer will be silenced but the alarm code and the alarm relay will remain active.*

Mode 6: Direct / Reverse selection from digital input (pict. 10).

The main parameters in this kind of function are Set Point (St1), Direct mode differential (P1), Set Point (St2) and Reverse mode differential (P2). The instrument selects Direct or Reverse function (see Mode 1 and Mode 2) according to the condition of the digital input 1. More precisely you will have: Direct function when digital input 1 is open and Reverse function when digital input 1 is closed.

Mode 7: Direct function mode with selection of Set and differential from digital input (pict. 11).

With this kind of function the condition of the digital input (open/closed) does not change the kind of action (always Direct), but changes Set Point and differential. The main parameters in this kind of function are active Set (St1) and differential (P1) with open digital input and active Set (St2) and differential (P2) with closed digital input.

Mode 8: Reverse function mode with selection of Set and differential from digital input (pict. 12).

*With this **kind of function** the variation of digital input (open/closed) does not change the kind of action (always Reverse), but changes Set Point and differential. The main parameters in this kind of function are active Set (St1) and differential (P1) with open digital input and active Set (St2) and differential (P2) with closed digital input.*

Mode 9: function with 2 Set Points, one in Direct and one in Reverse (pict. 13).

The main parameters in this kind of function are Set-point (St1), Direct mode differential (P1), Set Point (St2) and Reverse mode differential (P2). This function is present in W and Z versions, and is similar to mode 3 (function with Dead-Band) since half of the outputs are active in Direct and half in Reverse. The difference is that there is no single fixed Set Point, so you can work as if you had two independent instruments working with the same probe.

Special function.

*This **special mode** gives no limits to the outputs management. This procedure allows you, starting from one of the other 9 modes, to modify a great number of parameters. For each output it is possible to select: reference Set, hysteresis, kind of action (Direct or Reverse, with On/Off or PWM action), hysteresis between two adjacent outputs, etc. Moreover, it is possible to select the digital input function, to define timings on outputs, activating times and to select many other functions. For NTC input models, a second probe can be used to make the instrument work in differential mode or to modify the Set Point according to the temperature read by the second probe (compensation). The use of this mode requires a certain experience as well as detailed information which cannot be found in this guide. To get further information please ask for the Universal Infrared Series **technical manual** (code +030220160).*

Value of the main parameters with the different Function Modes.

Each Function Mode has a defined set of values for Set-points and main parameters. This means that, when the Function Mode is modified, the instrument will automatically store the set of values associated to the selected Mode.

The table below shows the values associated with the first 9 Modes. Mode 2 has been highlighted because it is the factory-set one (Default value). In any moment it is possible to reset the Default value using the 'Reset procedure' (see pag. 57).

Par.	Descript.	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
St1	Set-point 1	20	20	20	20	20	20	20	20	20
St2	Set-point 2	absent	absent	absent	absent	absent	40	40	40	40
P1	Hysteresis	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
P2	Hysteresis	absent	absent	2.0	2.0	2.0	2.0	2.0	2.0	2.0
P3	Dead-Band	absent	absent	2.0	2.0	2.0	absent	absent	absent	absent
P14	Probe Calibr.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
P25	Lower al. (1)	-100	-100	-100	-100	-100	-100	-100	-100	-100
P26	Higher al. (2)	999	999	999	999	999	999	999	999	999
P27	Alarm Hyster.	2	2	2	2	2	2	2	2	2
P28	Alarm del. (3)	60	60	60	60	60	60	60	60	60

(1): -50 NTC input
(2): 90 for NTC input, +600 for Pt100 input.
(3): minutes

Advanced set-up: Function mode modification

As previously explained, the Infrared series instruments are supplied ready to use, with pre-selected Mode 2 (Reverse function).

If this kind of function is not compatible with the required use, it can be easily modified by following these instructions (see pict.1 and 2):

*a) press the "5" and "6" keys **simultaneously** for 5 seconds;*
b) the display shows 0;
c) select the password by pressing the "7" key up to 22;
d) press the "5" key to confirm the password;
e) if the selected password is correct, the display will show the code "C0", otherwise you will have to repeat the instructions from point a).

C0 is the parameter corresponding to the "Function Mode". To load one of the 9 described Modes it is sufficient to give C0 the chosen Mode number, according to the following instructions:

f) when C0 is displayed, press the "5" key;
g) the display shows the present Function Mode;
h) press either "7" or "8" keys until you reach the desired Function Mode; press "5" to confirm;
i) press the "6" key to end procedure and memorise the new function mode.

In Function Modes 1, 2, 3, 4 and 5 there is only one Set Point, the procedure to modify it has already been described on page 40.

*In Function Modes 6, 7, 8 and 9 the instrument works with 2 Set Points. To modify both Set Points follow these instructions (**see pictures 1 and 2**):*

a) *press the "5" key for some seconds: the display will show St1;*
b) *release "5": the present value of St1 begins to flash;*
c) *press either "7" or "8" keys until you reach the desired value;*
d) *press "5" to confirm the newly set value of St1;*
e) *after having confirmed St1, the display shows the St2 code for some seconds, and then the present value of Set point 2 begins to flash;*
f) *press either "7" or "8" until you reach the desired value;*
g) *press "5" to confirm St2;*
h) *the display shows again the value read by the main probe.*

The Universal Infrared instruments are capable of performing a lot of extra functions besides those described in the Advanced Programming Procedure section, thanks to some ***special parameters*** *(Cxx type).*
For your convenience the table below lists all the standard parameters of the Infrared regulators (Pxx and Cxx types) ***except those regarding the Special Mode****. Each parameter will be accompanied by just a* ***brief*** *description because we assume you already know the meaning and function mode of each single parameter. We strongly recommend reading carefully the Technical Manual of the Universal Infrared Range before using the* ***special parameters****.*
To access the full parameter list, follow the procedure indicated on page 49 but replace the password "22" with "77". If you enter the right password, the display will show the first parameter of the list, that is C0. To display and modify the value of the parameter follow the procedure described above. Similarly, in order to confirm any modification, press "6".

Par.	Description	Min.	Max	Default
St1	Set Point 1	min. probe	max. probe	20
St2	Set Point 2 (Function Modes 6, 7, 8, 9)	min. probe	max. probe	40
C0	Function Mode (see page 42)	1	9	2
Setting the Hysteresis (see pages 37 and 42)				
P1	Hysteresis of Set Point 1	0.1	99.9	2.0
P2	Hysteresis of SP 2 (F. Modes 3,4,5,7,8,9)	0.1	99.9	2.0
P3	Dead-Band (Function Modes 3,4,5)	0	99.9	2.0

Par.	Description	Min.	Max	Default
C4	Compensation Coefficient. NTC only and with Mode 1 or 2 & C19 = 2, 3 or 4. Consider D=NTC2 - SET2 : **if C19 = 2** when D<=0 SET1=SET1 when D > 0 SET1=SET1+D*C4 **if C19 = 3** when D>=0 SET1=SET1 when D < 0 SET1=SET1+D*C4 **if C19 = 4** when NTC2 > SET2+P2, SET1=SET1+(D-P2)*C4 when NTC2 < SET2- P2, SET1=SET1+(D+P2)*C4	-2.0	2.0	0.5
C5	Control action: 0=Prop(P), 1=Prop+Integ(P+I)	0	1	0
	Parameters of the outputs			
C6	Delay between on routines of 2 different outs	0	999”	5”
C7	Minimum time between on routines of the same output	0	5’	0
C8	Minimum off time of the same output	0	5’	0
C9	Minimum on time of the same output	0	15’	0
C10	Status of the outputs with probe alarm: 0 = All relay de-energized 1 = All relays energized 2 = Direct action relays energised, all others de-energised 3 = Reverse action relays energised, all others de-energ.	0	3	0

Par.	Description	Min.	Max	Default
C11	Output rotation: Modes 1, 2, 6,7,8 & models W&Z 0: no rotation 1: standard rotation 2: 2+2 rotation (compressor on outs 1 & 3) 3: 2+2 rotation (valve normal open) 4÷7: see technical manual	0	7	0
C12	time of PWM cycle	0,2”	999”	20”
Probe parameters (see page 41)				
C13	Probe type: 0=4-20, 1=0-20; 0=K T/c, 1= J T/c NTC input: if C13=1 the instruments displays NTC2 and controls on NTC1	0	1	0
P14	Probe calibration or offset	-99	+99.9	0.0
C15	Min.value for scaling of analogue inputs	-99	C16	0.0
C16	Max.value for scaling of analogue inputs	C15	999	100
C17	Probe response time (noise filter)	1	14	5
C18	Temperature units: 0=°C, 1=°F	0	1	0
C19	2nd probe: NTC only, Mode 1 or 2 0 = no modification of the Standard Mode 1 = differential mode NTC1 - NTC2 2 = summer compensation 3 = winter compensation 4 = active compensation with Dead-Band	0	4	0

Par.	Description	Min.	Max	Default
Set-Point				
C21	Minimum Set-point 1 limit	-99	C22	min. probe
C22	Maximum Set-point 1 limit	C21	999	max.probe
C23	Minimum Set-point 2 limit	-99	C24	min. probe
C24	Maximum Set-point 2 limit	C23	999	max.probe
Alarm Parameters (see pages 37 and 38)				
P25	Low absolute alarm Set-Point	-99	P26	min.probe
P26	High absolute alarm Set-Point	P25	999	max.probe
P27	Alarm hysteresis	0.1	99.0	2.0
P28	Alarm Delay	0	120'	0'
C29	Config. of dig. input 1 (C0 must be different from 6,7,8) In case of alarm the status of relays depends on C31) 0 = non active input 1 = immediate alarm with automatic reset 2 = immediate alarm with manual reset 3 = delayed alarm (P28) with manual reset 4 = on/off of the control	0	4	0
C30	Digital Input 2 (IRDR only)	0	4	0
	Options as for C29			
C31	Status of the outputs in case of alarm condition detected via digital input. Options as for C10			

Par.	Description	Min.	Max	Default
Other:				
C32	Address of unit for serial connection	1	16	
C33	Do NOT modify this parameter	0	1	0
C50	Activation of Keypad (KP) and Remote Control(RC) 0 = KP off, RC ON (only type P parameters) 1 = KP on, RC ON (only type P parameters) 2 = KP off, RC OFF 3 = KP on, RC OFF 4 = KP on, RC ON (all parameters)	0	4	4 (Def.=1 for instr.with serial num. < 10.000)
C51	Code to activate the IR remote control	0	120	0

- Problem: ***keypad/remote control unit does not work***
Check: see parameter C50.

- Problem: ***value changes repeatedly***
Check: - possible noise. See 'Hints for Installation' above.
- modify parameter C17 (decrease its value).

- Problem: ***high/low alarms are not detected***
Check: decrease alarm time delays. See parameters P25, P26 and P27

- Problem: ***outputs not activated***
Check: check time delays of the outputs; par. C6, C7, C8.

- Problem: ***outputs are activated too often***
Check: increase the value of the differential.See par. C6, C7 and C8.

- Problem: ***the variable never reaches the set-point***
Check: if the size of the entire system has been correctly calculated, the differential P1 or P2 should be decreased as well as the Dead-Band P3

- Problem: ***the value displayed does not correspond to the actual value***
Check: the position of the sensor (see page 35&36). For models with current, voltage or J/K Tc input see the section "Special Parameters for Thermocouples" (see page 43).

Reset of the control

Important*: sometimes you may need to restore the factory-set configuration. To do so, follow these guidelines (Reset procedure):*

1 - cut off power

2 - supply the instrument while holding down '6'

Messages	Description	Cause	Solution
Er0	probe error	probe cable interrupted or short-circuited	check connections between instrum.&probe
		connection error	check probe signal (eg. NTC=10KΩ @25°C)
		faulty probe	
Er1 (NTC only)	probe error NTC2	see above but for probe NTC2	see above but for NTC2 probe
Er2	memory error	supply cut off during programming step	turn off then turn on he instrument again holding down key “6”
		electrical noise	if persists, replace the unit
Er3	external alarm	digital input contact open	special function: see parameter C29
			check external contact
Er4	HIGH alarm	input has exceeded P26 for more than P28	check parameters P26 and P28
Er5	LOW alarm	input is below P25 for more than P28	check parameters P25 & P28

Warning: *In case of alarm condition, the buzzer and the alarm code must be manually reset pressing the key ‘6’ (note: the alarm code will disappear only if the alarm is not still pending). The alarm relay (Mode 5 only) is automatically reset when the alarm disappears; it can need a manual reset only for special value of P27 (Er4 & Er5) and of C29 (Er3) (see the technical manual for details). In case of alarm type Er0, Er1, Er2 the normal function of the unit restarts automatically when the alarm disappears; after a Er3 alarm the unit restarts automatically or manually according to C29; Er4 & Er5 alarms do not affect the normal function of the unit.*

Inputs

according to model (see pag 32):	Temperature: NTC, Pt100, K/J Thermoc.
	Current 4/20 mA or 0/20 mA
	Voltage -0,4/+1 Vdc
Operating range:	NTC: -50/90 °C, Pt100: -100/600 °C,
	ThcK: -100/999 °C, ThcJ: -100/800 °C
	Current/Voltage: see parameters C15 and C16
Resolution:	0.1or 1, according to decimal point selection
Controler accuracy:	± 0.5 % of maximum range

Power supply

Voltage	IR32D, W and Z: from 12 to 24 Vac-dc ±10%
	IR32V: see pag.1 field 'd', tolerance±10%
	IRDRV and W: 24 Vac± 10% and 230 Vac ± 15%
	IRDRTE: 230 Vac ± 15%
	IRDRA and Z: from 12 to 24 Vac-dc, ± 10%
Power consumption:	IR32A, D and V: 2VA; IR32W and IR32Z: 3VA
	IRDRTE, IRDRV, IRDRW and IRDRA: 3VA
	IRDRZ: 4VA
Probe power supply output:	10 Vdc, @ max 30mA (8Vdc for IRDRW)

Conditions of use

Working temperature:	0 ÷ 50 °C
Storage temperature:	-10 ÷ 70 °C
Relative ambient humidity:	lower than 90%rH, not condensing
Ambient pollution:	normal

Insulation

There is a basic insulation between the low voltage section and the very low voltage section and a double insulation between the low voltage section and the front panel.

Outputs

Number of relays:	*IR32 for NTC: 1, 2 or 4 SPDT relays*
(according to the mod.)	*others IR32V: 1 SPST relay;*
	IR32W: 1 SPST relay + 1 SPDT;
	IR32Z: 1 SPST relay+ 3 SPDT
	IRDRTE, IRDRV & W: 1 or 2 SPDT relays
	IRDRZ: 1st and 2nd relays SPDT, 3rd & 4th SPST
	IR32D: 1 output for SSR (solid status relay)
	IR32A and IRDRA: 4 outputs for SSR
	(solid status relay)
Relay features (all models):	*max.sw.voltage 250 Vac, max. sw.power 2000VA,*
	max.inrush curr. 10A. Disconnection of
	type 1C according to ECC EN 60730-1
Signal caratcteristics for SSR	*output voltage: 10 Vdc; output resistance: 660 Ω*
(solid status relay)	*max. outputs voltage: 15 mA*

Mechanical features

Connections:	*IR32: panel mounting with hanger*
	IRDR: DIN rail mounting
Cases:	*plastic; IR32 autoextinguishing according to UL94-40*
Protection index:	*IR32: IP 65 with panel mounted instrument*
	IRDR: IP 40
Connections:	*through screw terminals max. sect.1.5 mm²*

Serial connection *(models indicated on pag.1)*	*IR32: through accessory IR32SER* *IRDR: through accessory IRDRSER*
Parameters modification	*from keyboard, from serial and from remote control (for remote control accessory see price-list)*

Important: cables should resist to maximum temperature, that is the maximum ambient temper. allowed for the unit + controller (self heating is 20 °C max., with all outputs ON).

*The range of the **Carel Universal Infrared Instruments** features absolutely innovative specifications and is certainly extremely competitive with any other regulator on the market in this price bracket. And what's more, the Infrared Series can be further enhanced with a complete range of accessories capable of making your instrument perform superbly.*
Here are some examples:

- ***Remote Control, for an easy programming procedure***

The remote control unit for the Carel Universal Infrared regulators is available in the main languages. Modifying the working parameters is now as easy as to turn up or down the volume of your TV set. For more information,contact your nearest dealer.

- ***Modi Kit for parameters modification via PC***

The Modi Kit for Personal Computer is the best solution to the problem of centralized programming procedure. The Modi Kit allows you to store your standard configuration so as to tranfer it easily and quickly to all the Infrared instruments via serial connection.
The Modi Kit makes your job easier since it prevents any error that may occur during the manual programming procedure by non-qualified personnel.

- ***Serial connection***

All IR instruments can be network connected to supervisory and telemaintenance systems.

- ***Package for Supervisory and Telemaintenance Systems***

Carel has a wide range of software programmes available for any type of supervisory and telemaintenance requirement.
Functions performed:

- *variables monitoring and data storage on hard-disk (the trend of the variables can be displayed in a graph on a hourly, daily or monthly basis and printed whenever necessary);*
- *detection and storage of any off-normal condition (together with date and time of the alarm);*
- *modification of the main parameters directly via PC.*

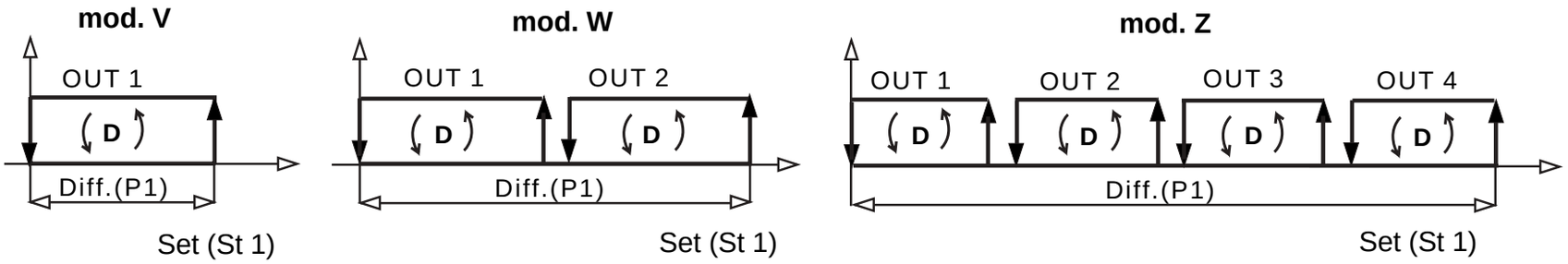


fig. 5: Mode 1

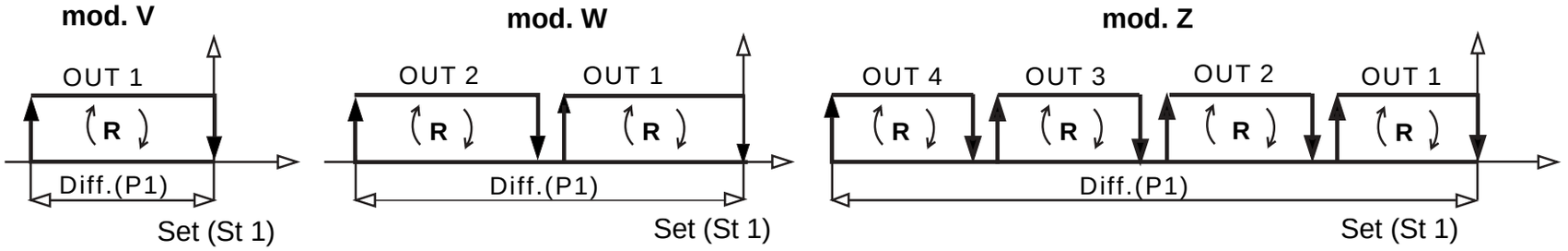


fig. 6: Mode 2

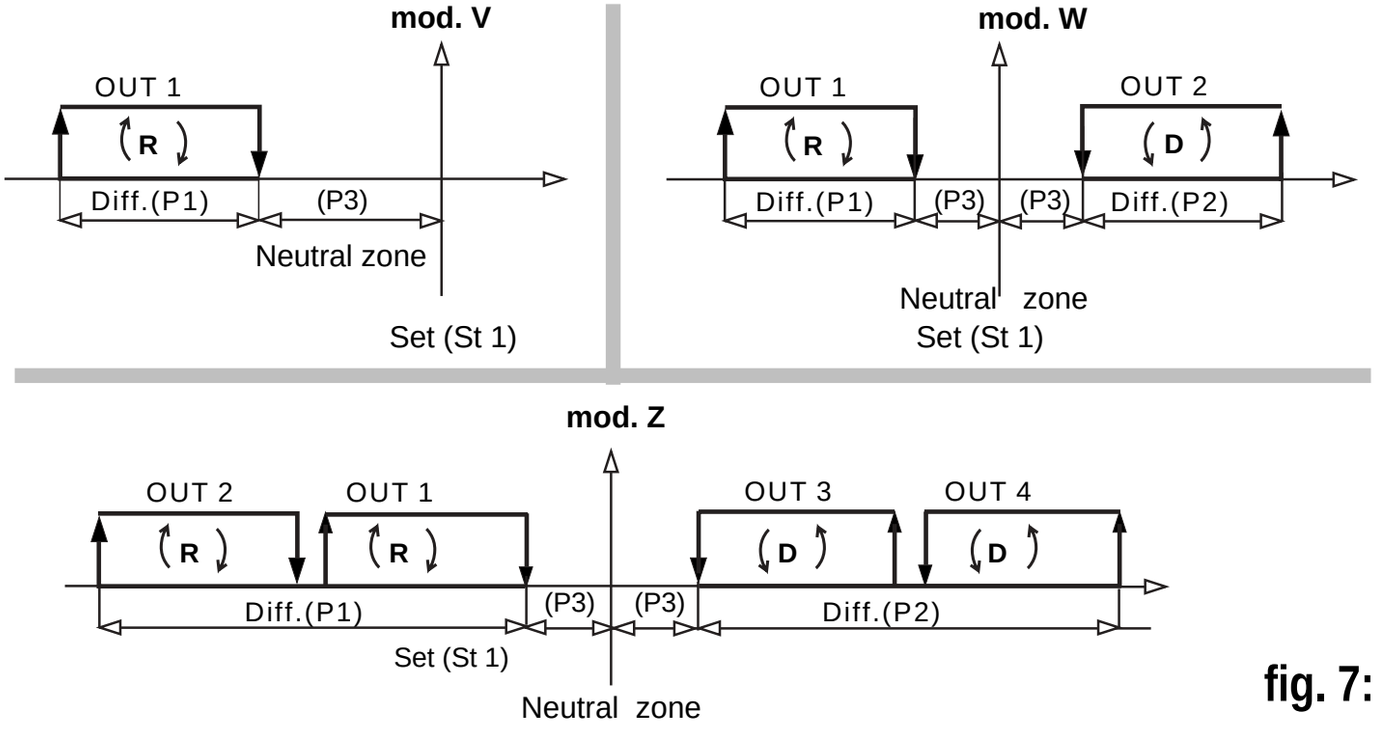


fig. 7: Mode 3

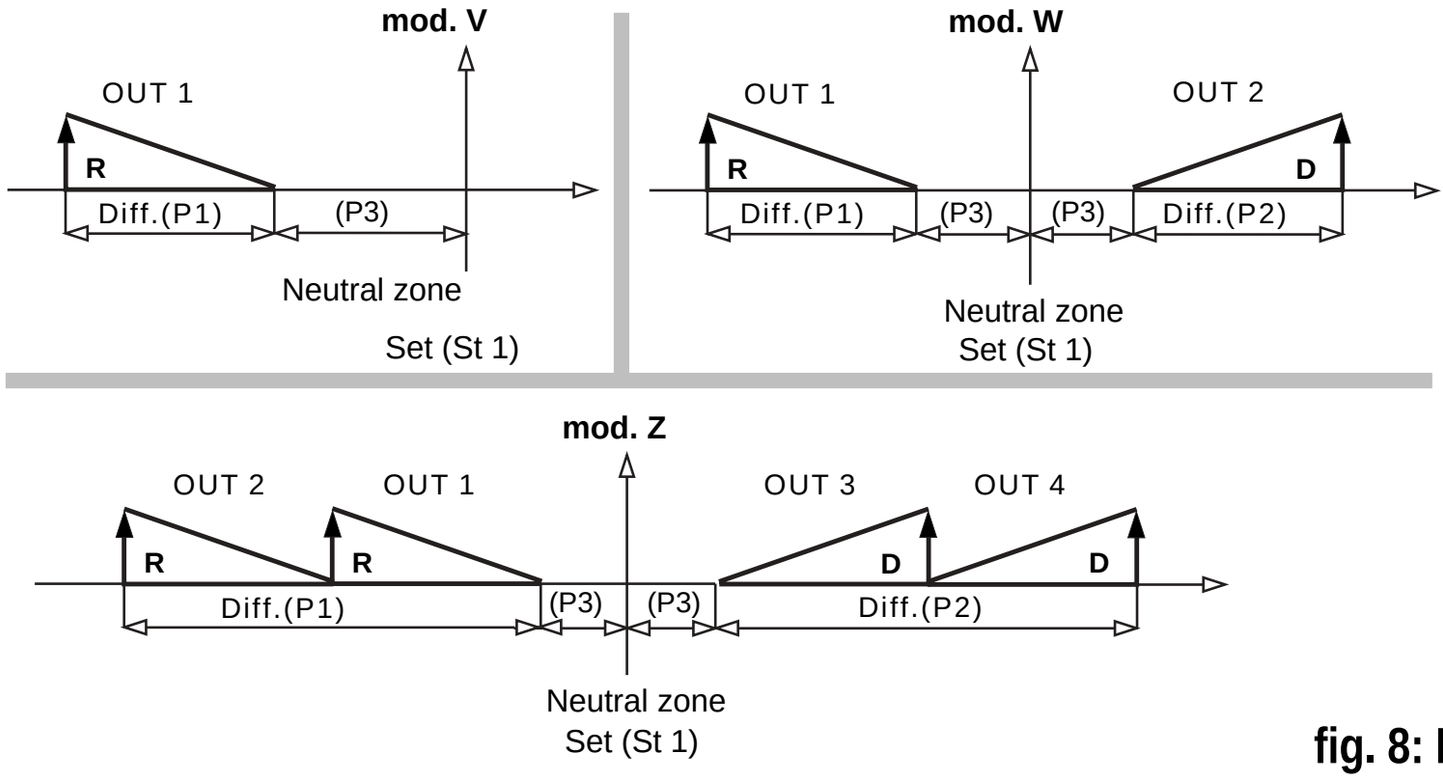


fig. 8: Mode 4

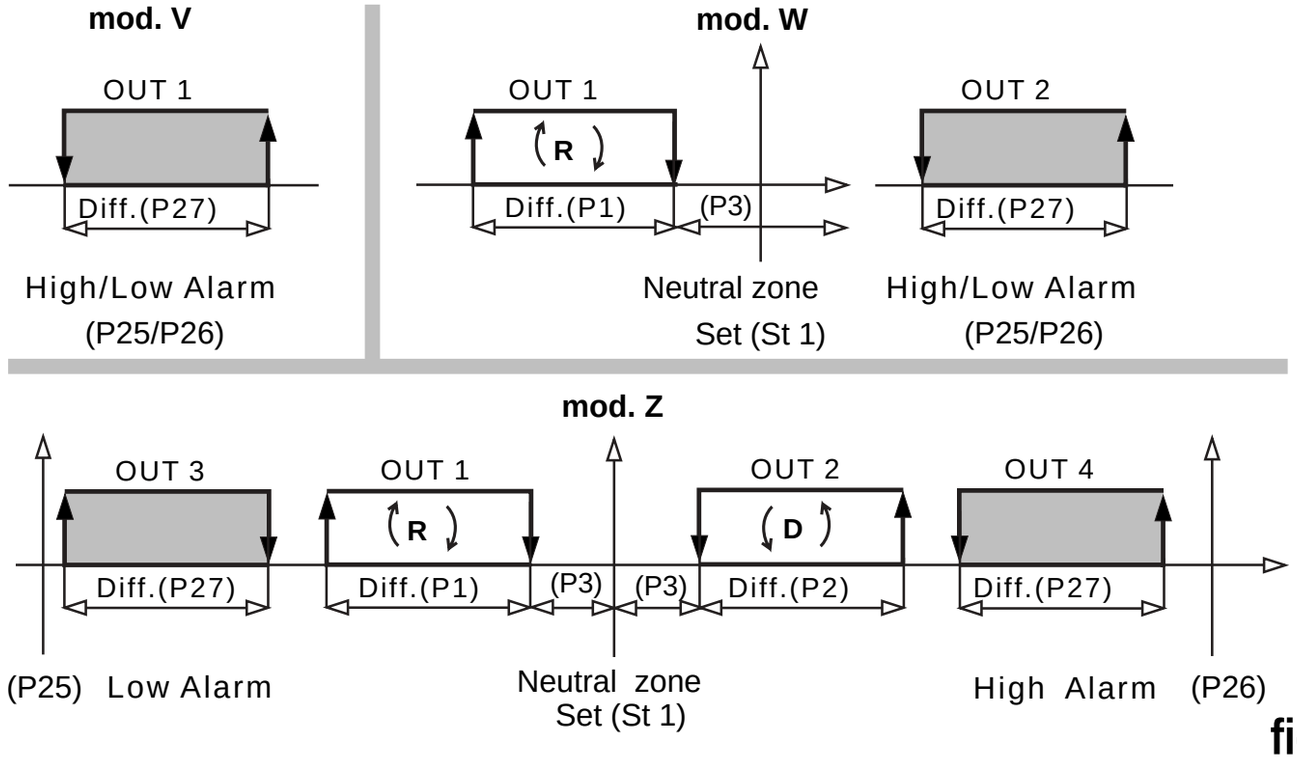
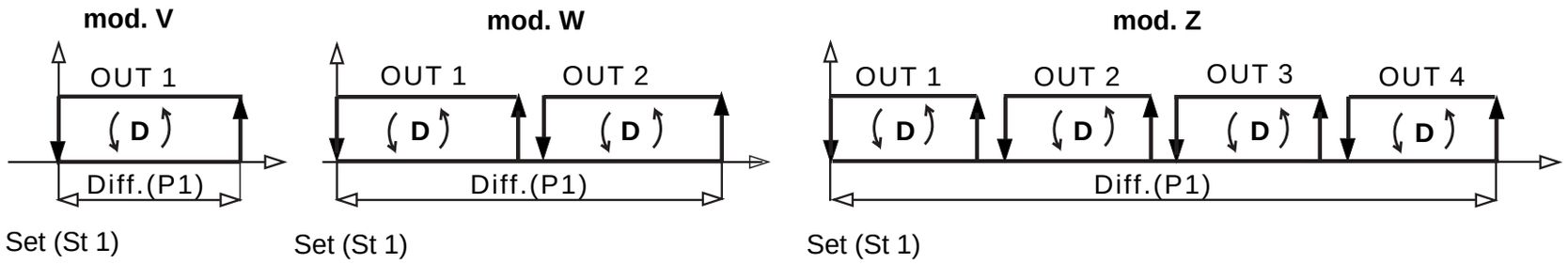
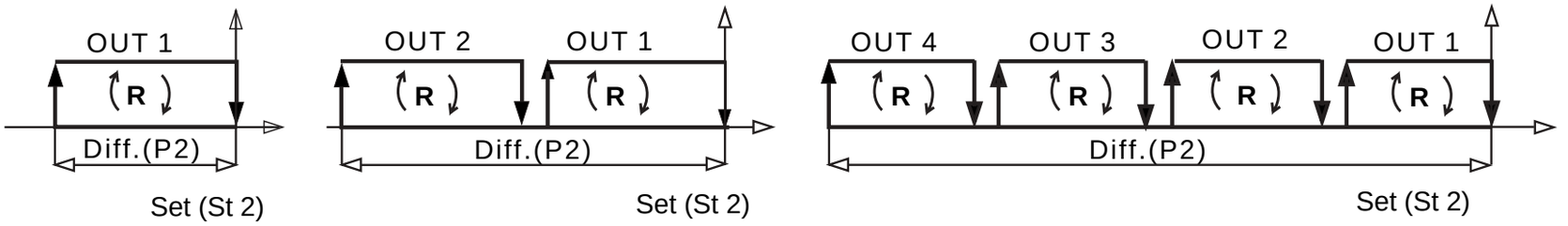


fig. 9: Mode 5

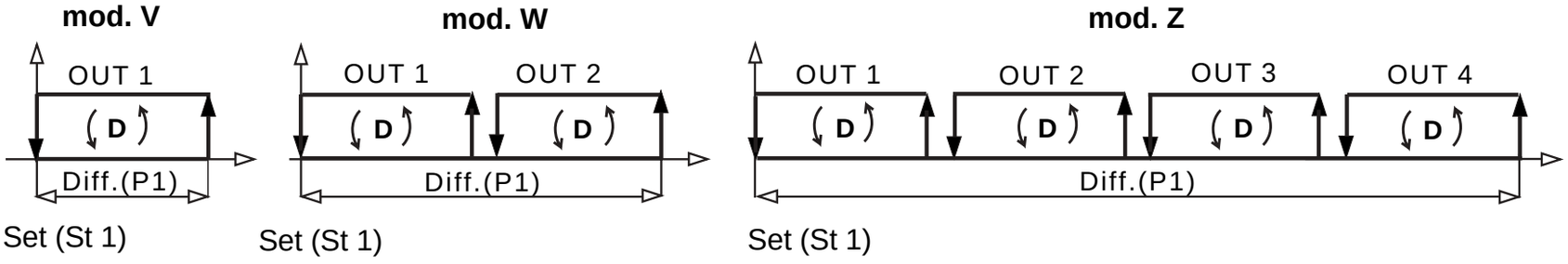


INGRESSO DIGITALE APERTO/ *DIGITAL INPUT OPEN*

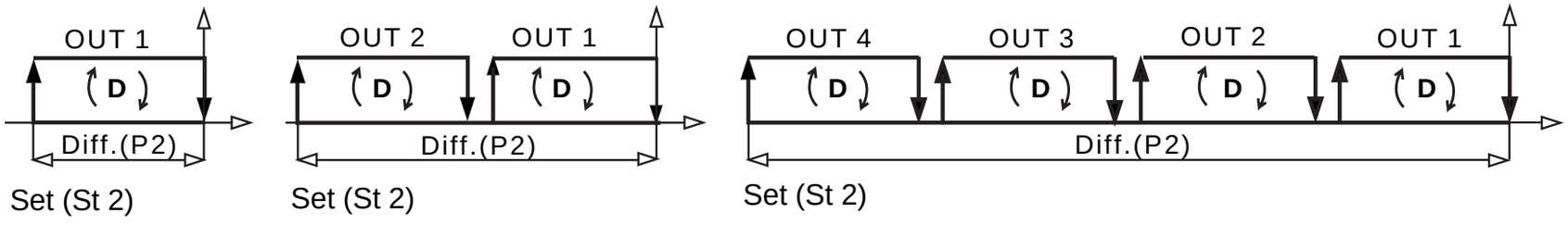


INGRESSO DIGITALE CHIUSO/ *DIGITAL INPUT CLOSED*

fig. 10: Mode 6



INGRESSO DIGITALE APERTO/ *DIGITAL INPUT OPEN*



INGRESSO DIGITALE CHIUSO/ *DIGITAL INPUT CLOSED*

fig. 11: Mode 7

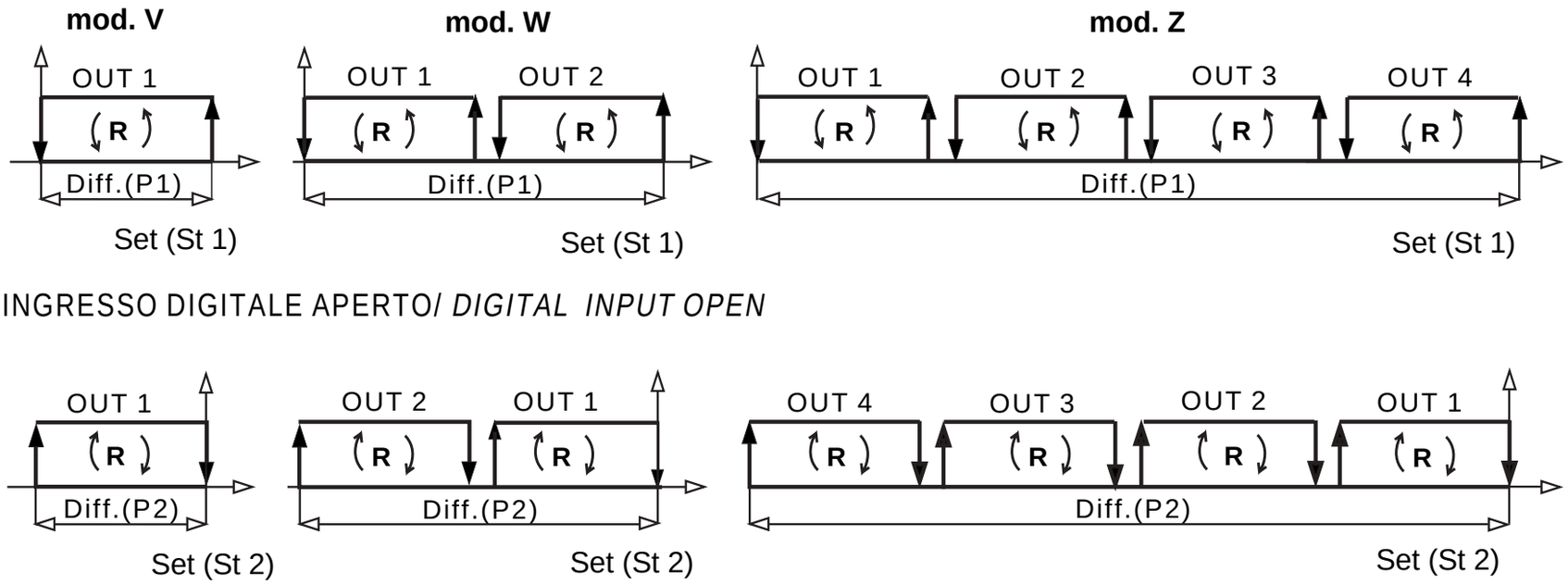


fig. 12: Mode 8

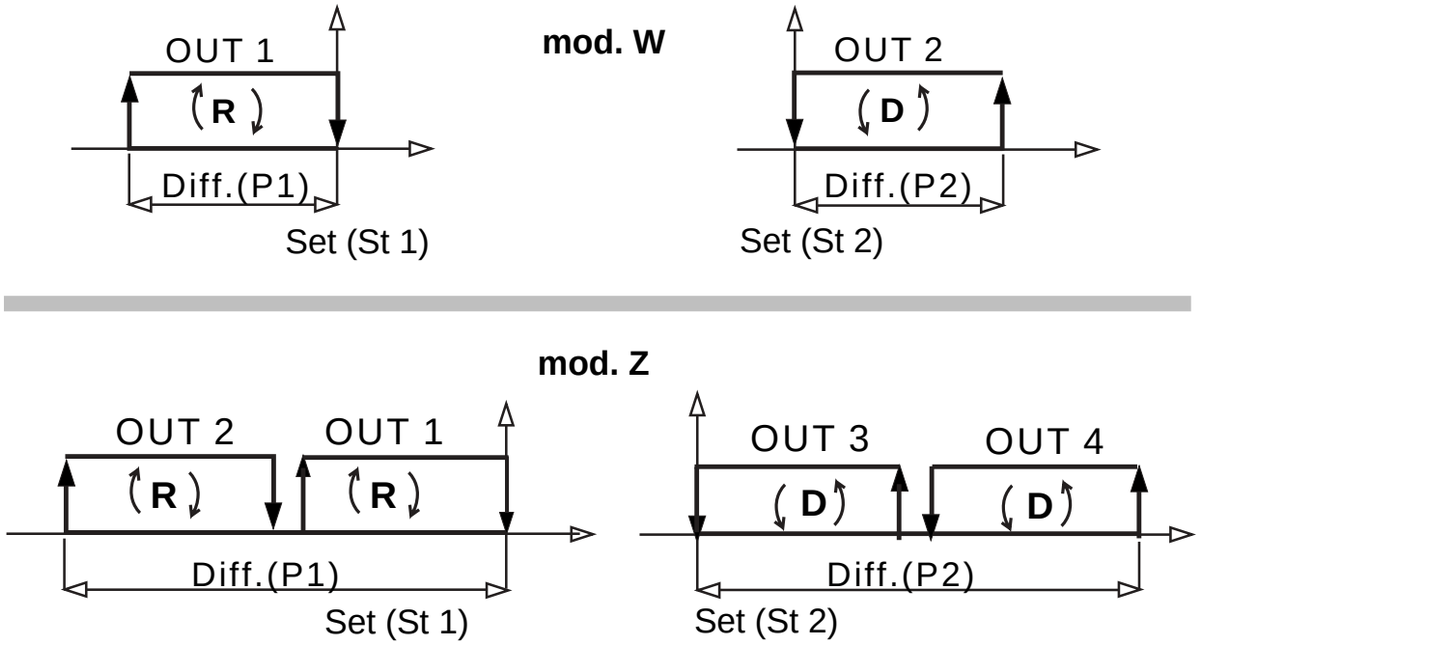
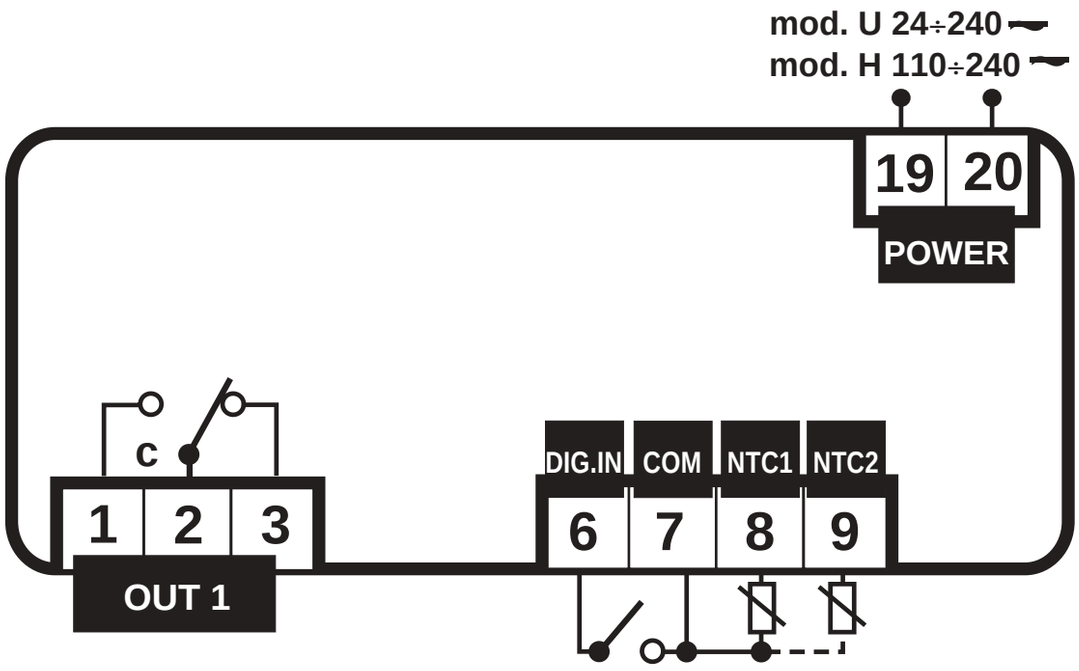


fig. 13: Mode 9

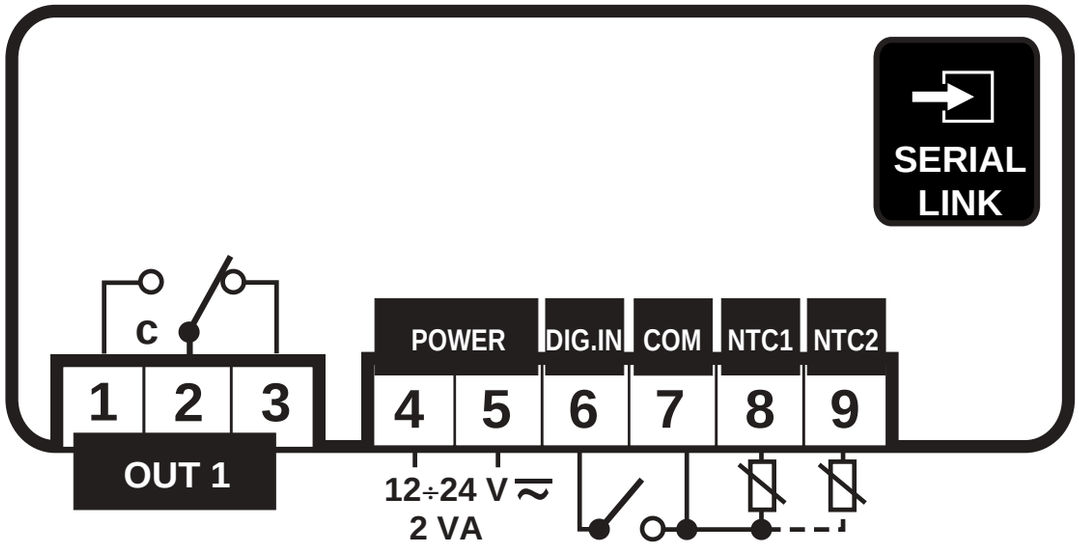
Versione V, alimentazione 24÷240 o 110÷240 Vac/Vdc, ingresso NTC

Version V, *power supply 24÷240 o 110÷240Vac/Vdc, NTC input*



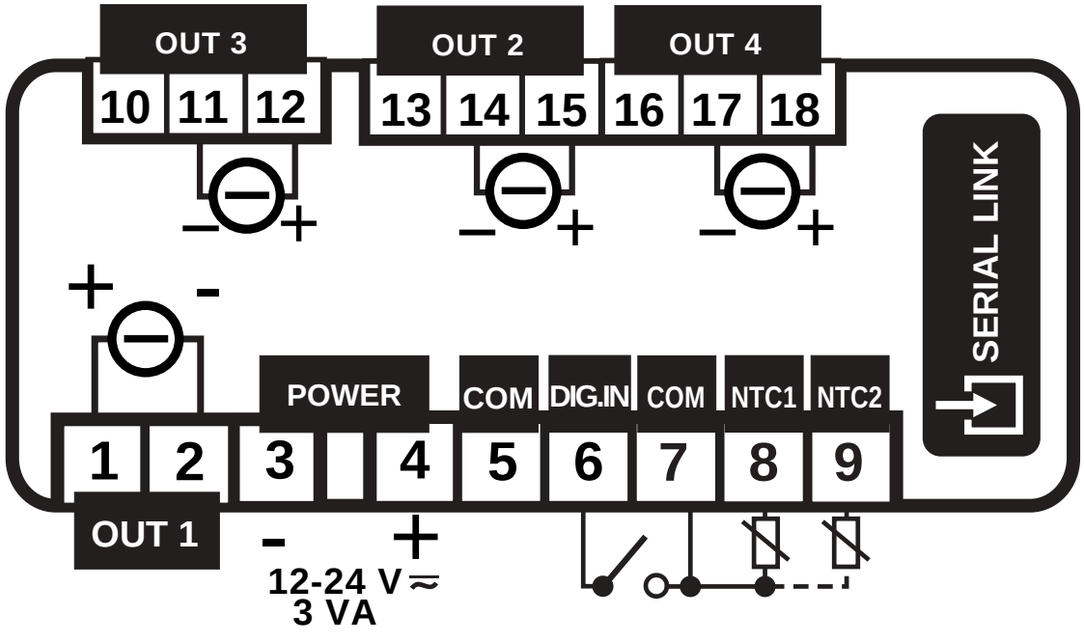
Versione V, alimentazione 12÷24Va/Vdc e ingresso NTC

Version V, *power supply 12÷24 Vac/Vdc, NTC input*



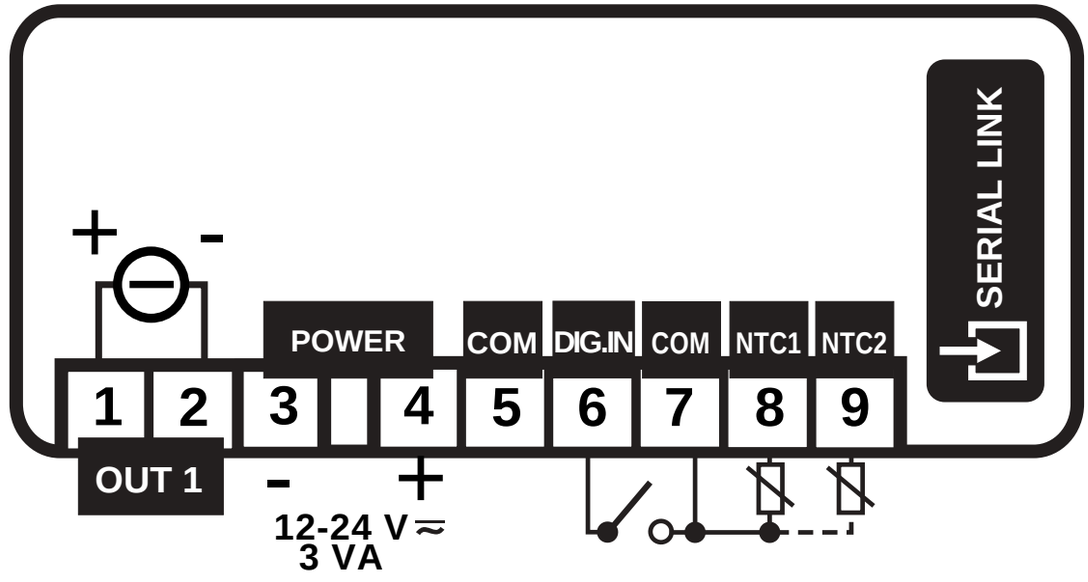
Versione A, alimentazione 12÷24 Vac/Vdc, ingresso NTC

Version A, *power supply 12÷24Vac/Vdc, NTC input*



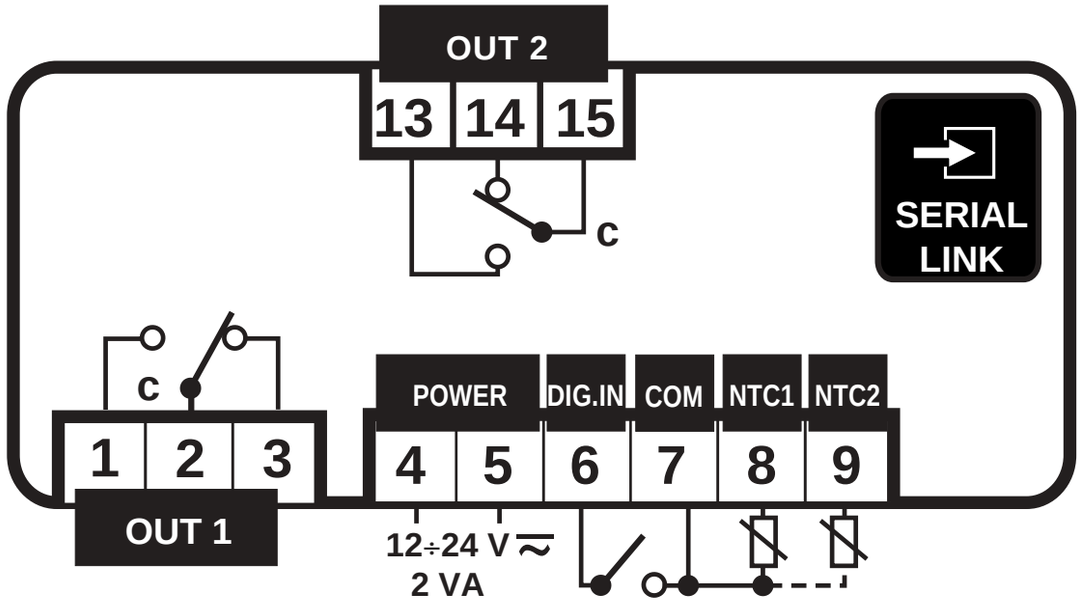
Versione D, alimentazione 12÷24 Vac/Vdc, ingresso NTC

Version D, *power supply 12÷24Vac/Vdc, NTC input*



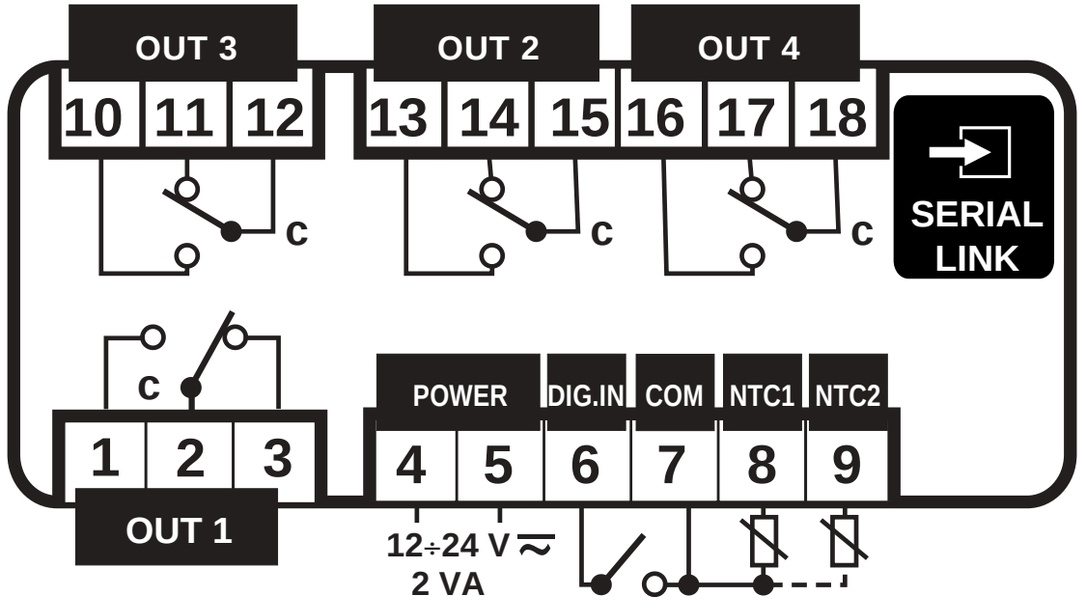
Versione W, alimentazione 12÷24 Vac/Vdc, ingresso NTC

Version W, *power supply 12÷24Vac/Vdc, NTC input*



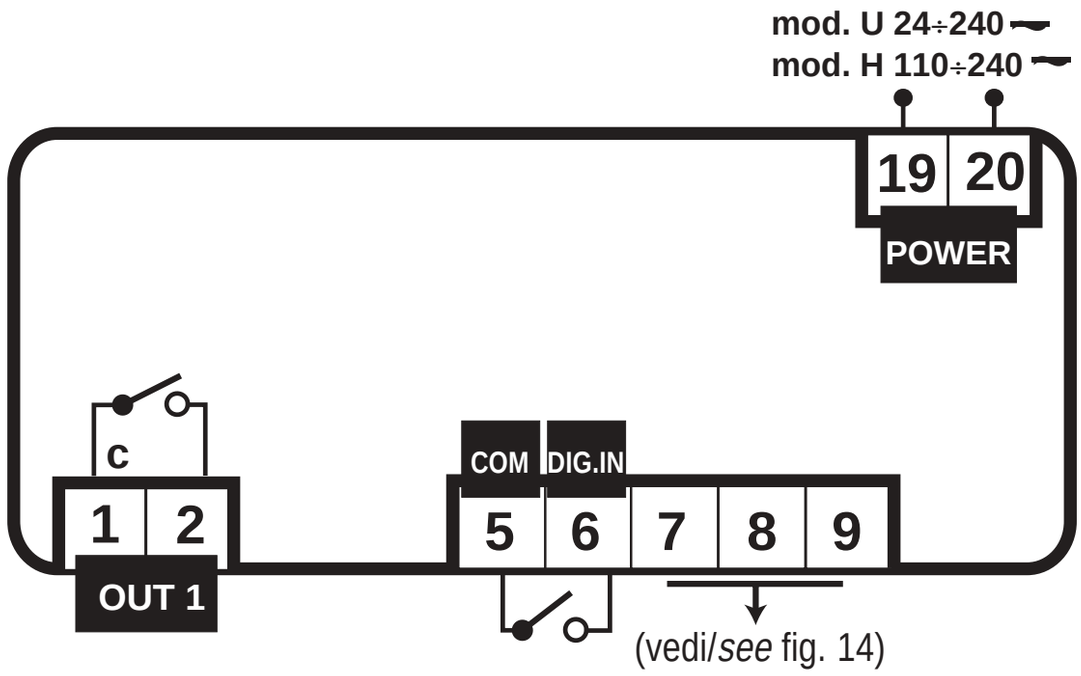
Versione Z, alimentazione 12÷24Va/Vdc e ingresso NTC

Version Z, *power supply 12÷24 Vac/Vdc, NTC input*



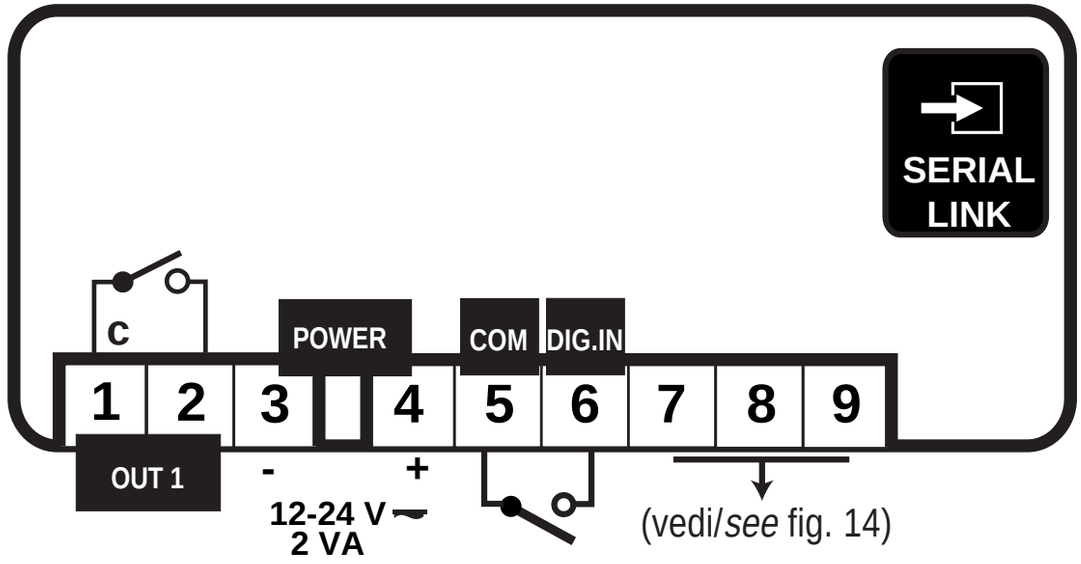
Versione V, alimentazione 24÷240 o 110÷240 Vac/Vdc e ingresso Pt100 o Tc J/K o V/I

Version V, *power supply 24÷240 o 110÷240Vac/Vdc and Pt100 or J/K Tc or V/I input*



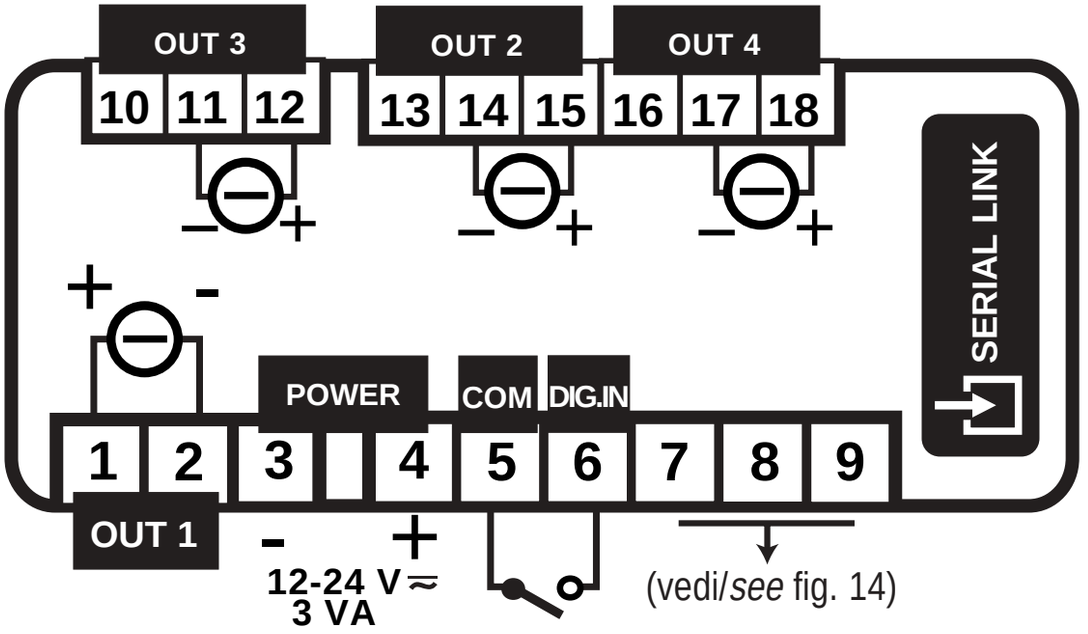
Versione V, alimentazione 12÷24 Vac/Vdc e ingresso Pt100 o Tc J/K o V/I

Version V, *power supply 12÷24Vac/Vdc and Pt100 or J/K Tc or V/I input*



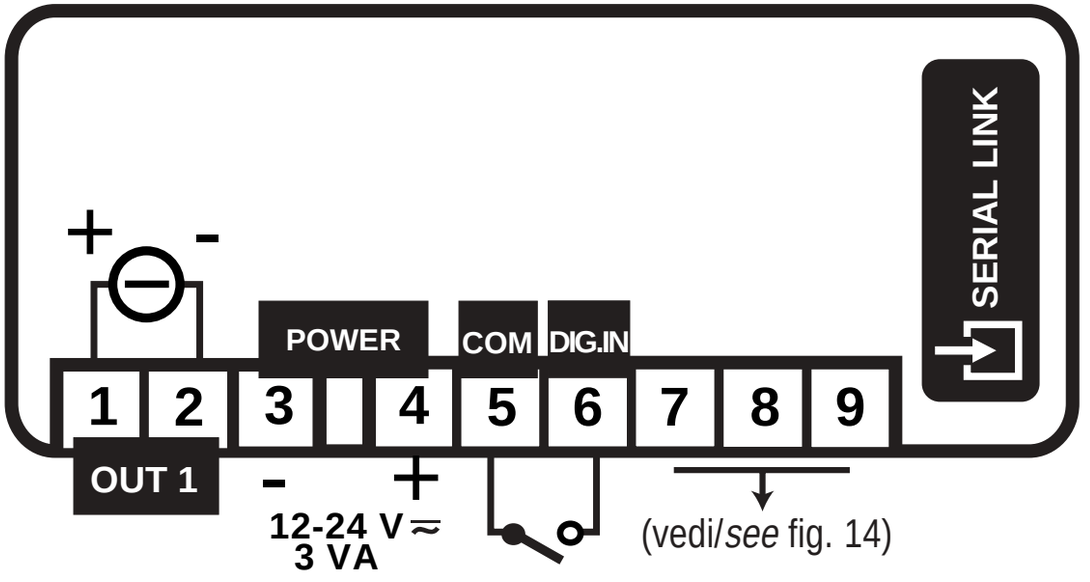
Versione A, alimentazione
12÷24 Vac/Vdc

Version A, *power supply*
12÷24Vac/Vdc



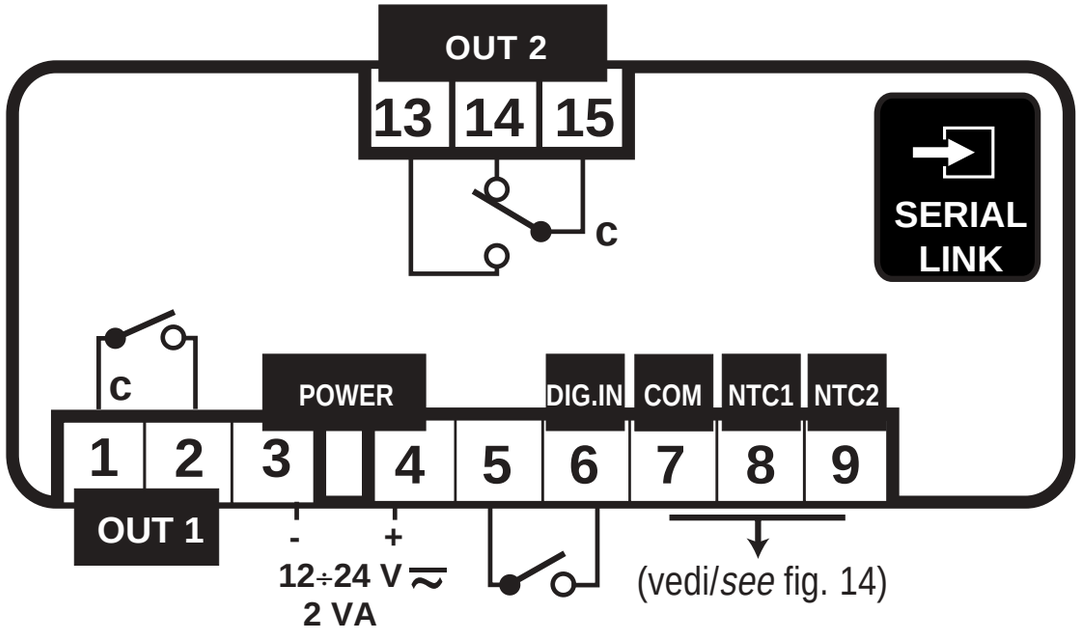
Versione D, alimentazione
12÷24 Vac/Vdc

Version D, *power supply*
12÷24Vac/Vdc



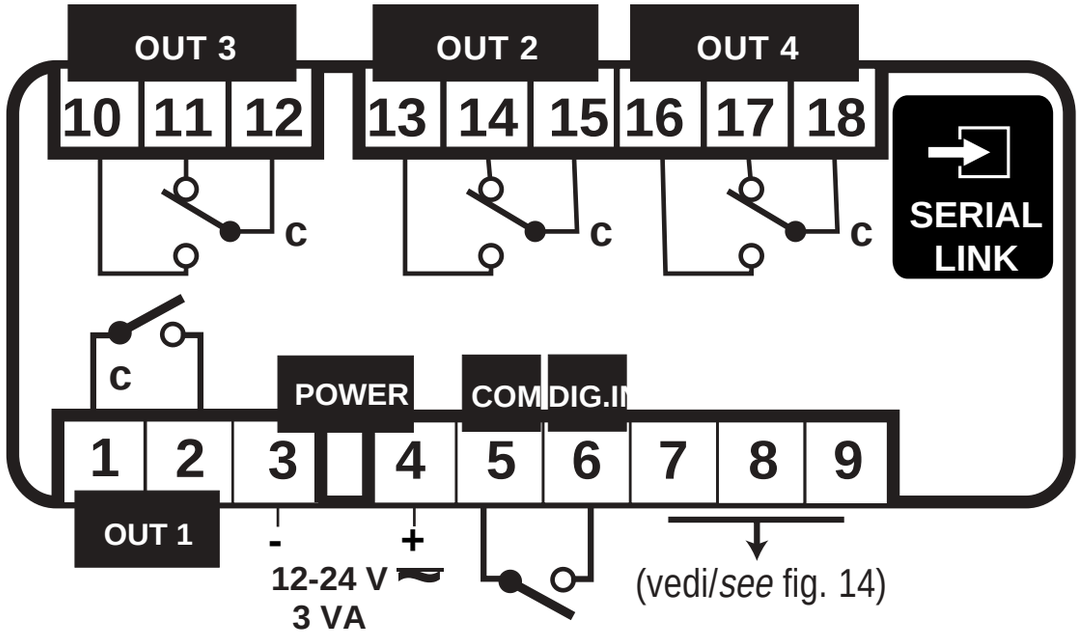
Versione W, alimentazione 12÷24 Vac/Vdc e ingresso Pt100 o Tc J/K o V/I

Version W, *power supply 12÷24Vac/Vdc and Pt100 or J/K Tc or V/I input*



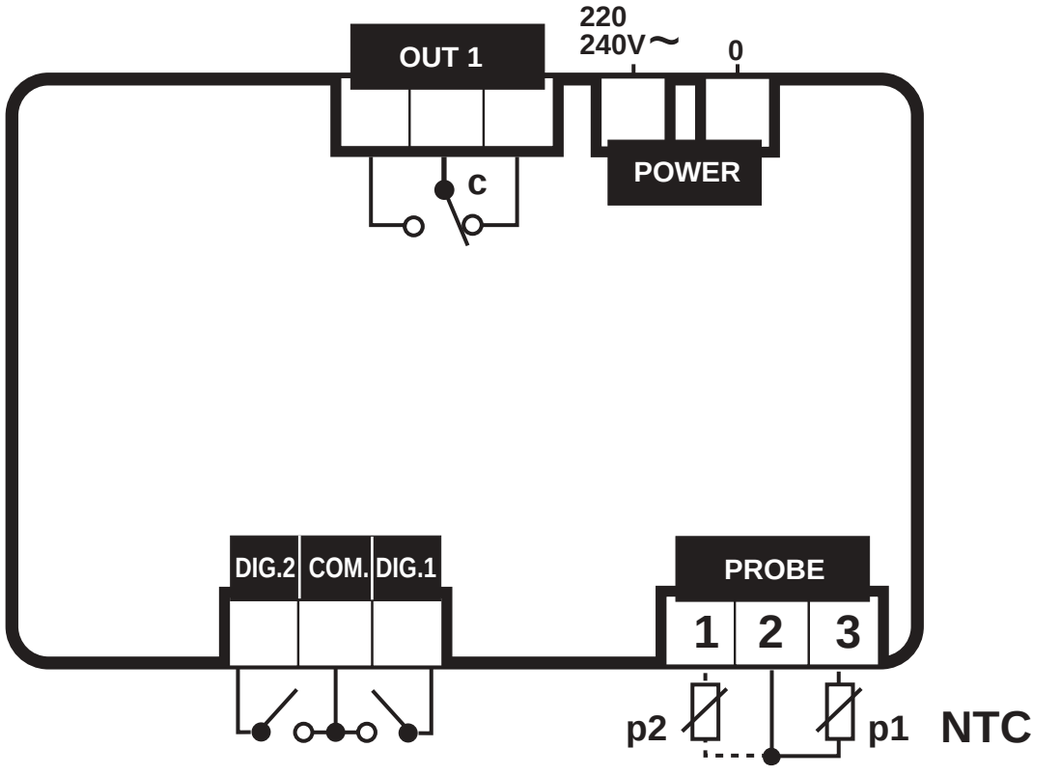
Versione Z, alimentazione 12÷24 Vac/Vdc e ingresso Pt100 o Tc J/K o V/I

Version Z, *power supply 12÷24Vac/Vdc and Pt100 or J/K Tc or V/I input*



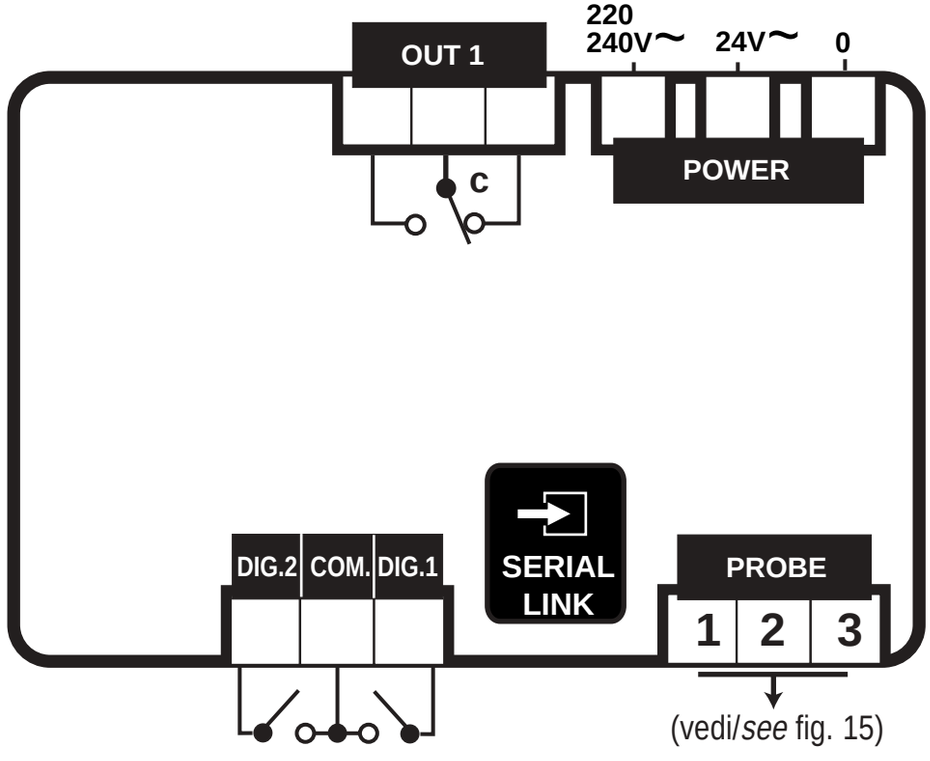
Versione TE, alimentazione 220÷240 Vac/Vdc, ingresso NTC

Version W, *power supply 220÷240Vac/Vdc, NTC input*



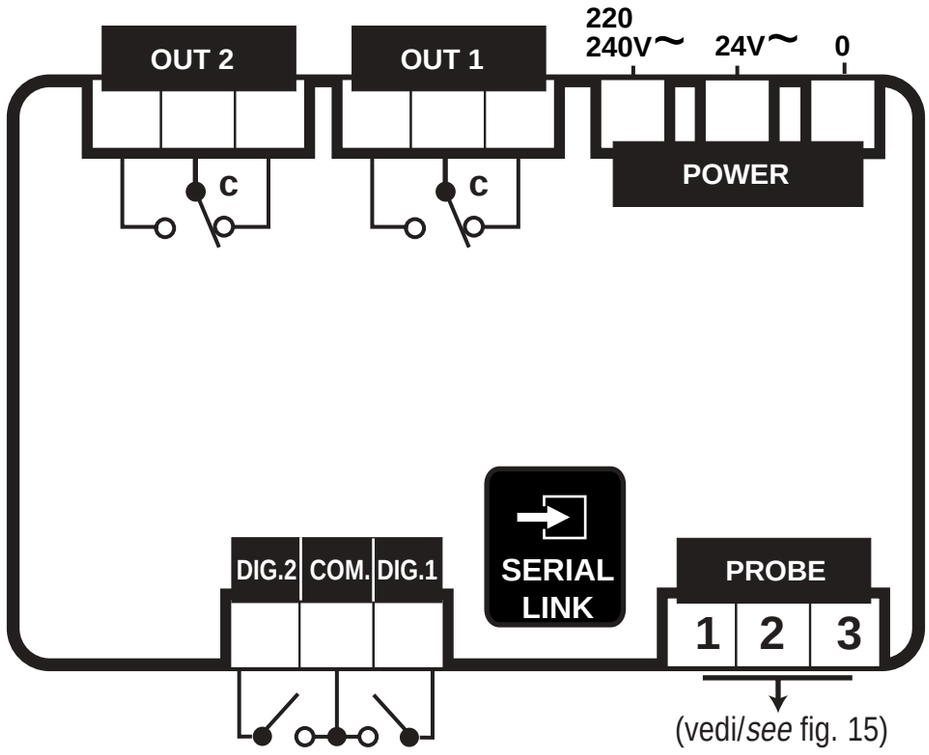
Versione V, alimentazione 24÷240 Vac/Vdc, ingresso NTC o Pt100 o Tc J/K o V/I

Version V, *power supply 24÷240Vac/Vdc, NTC or Pt100 or J/K Tc or V/I input*



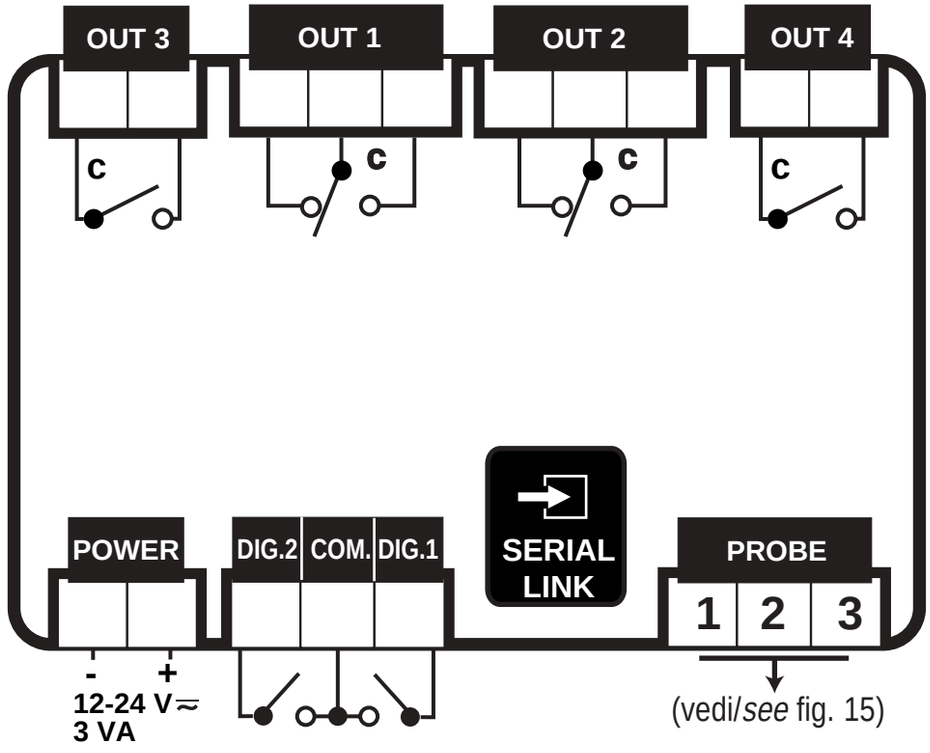
Versione W, alimentazione 24÷230 Vac/Vdc, ingresso NTC o Pt100 o Tc J/K o V/I

Version W, *power supply 24÷230Vac/Vdc, NTC or Pt100 or J/K Tc or V/I input*



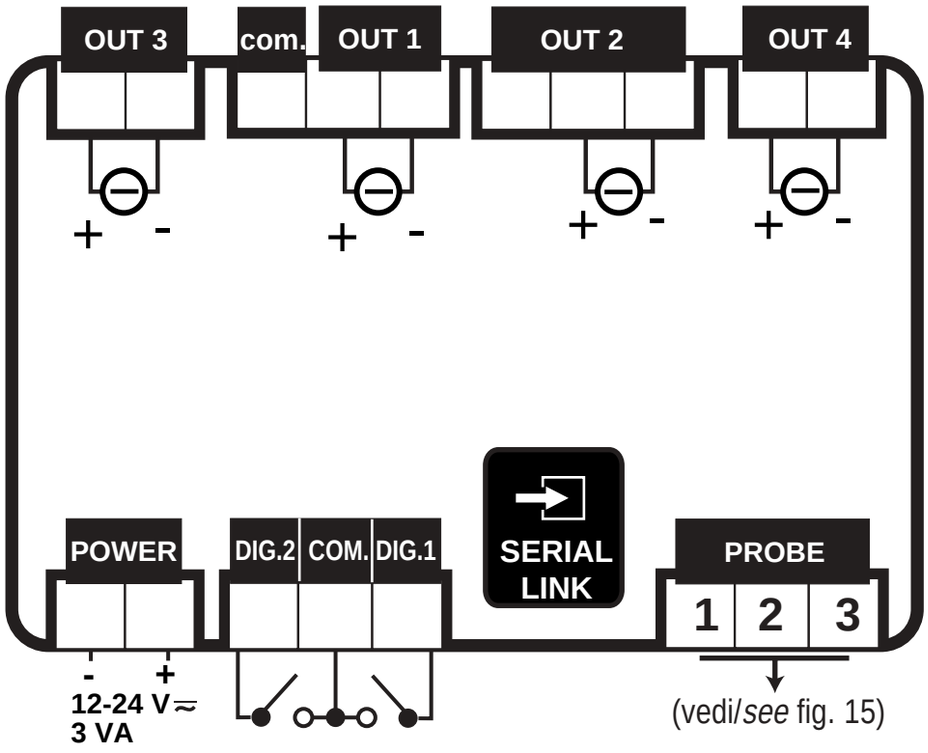
Versione Z, alimentazione 12÷24 Vac/Vdc, ingresso NTC o Pt100 o Tc J/K o V/I

Version Z, *power supply 12÷24Vac/Vdc, NTC or Pt100 or J/K Tc or V/I input*



Versione A, alimentazione 12÷24 Vac/Vdc, ingresso NTC o Pt100 o Tc J/K o V/I

Version A, *power supply 12÷24Vac/Vdc, NTC or Pt100 or J/K Tc or V/I input*



IR32

(*)Probe Connections/ *Connessione Sonde*

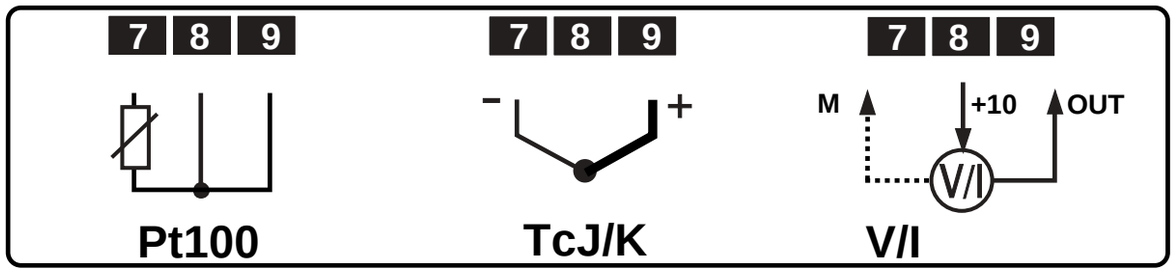


fig. 14

IRDR

(*)Probe Connections/ *Connessione Sonde*

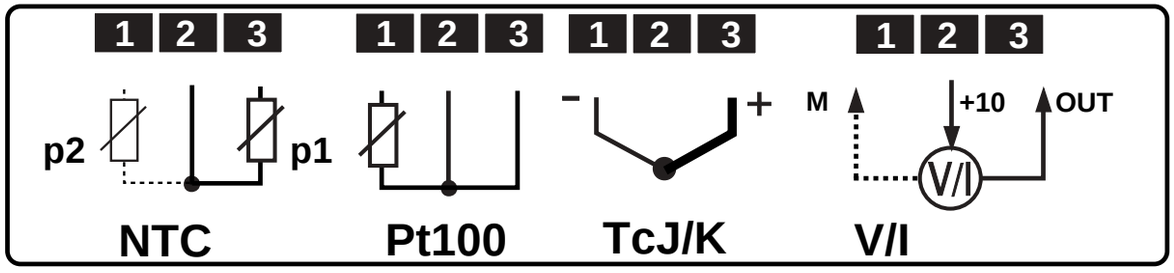


fig. 15

(*) ad ogni tipo di sonda corrisponde uno specifico modello
each probe type requires its specific model

Note

1) Nel caso di sonde Pt100 a 2 fili cortocircuitare i morsetti 8 e 9 (IR32) o 2 e 3 (IRDR)
2) Collegare l'eventuale schermatura della sonda alla terra del quadro elettrico. **Nel caso di termocoppie, è necessario usare sonde con cavo schermato** per avere una corretta immunità ai disturbi
3) Per le sonde in tensione e/o corrente considerare che la massima tensione fornita è 10 Vdc @ 30 mA (max 8Vdc per IRDRW).

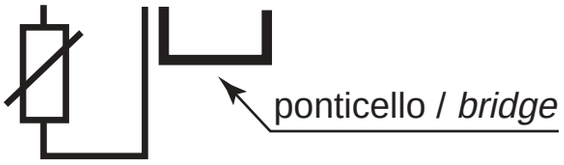
Notes

1) The use of Pt100 2 Wires requires you to short circuit connectors 8 and 9 (IR32) or 2 and 3 (IRDR)
*2) Connect the probe braiding to the electrical panel ground. **When using thermocouples, use screened probes to avoid noises**.*
3) When using voltage or current probes consider that the maximun voltage output is 10 V dc @ 30mA (max 8 Vdc for IRDRW).

IR32 7 8 9

IRDR 1 2 3

Pt100E

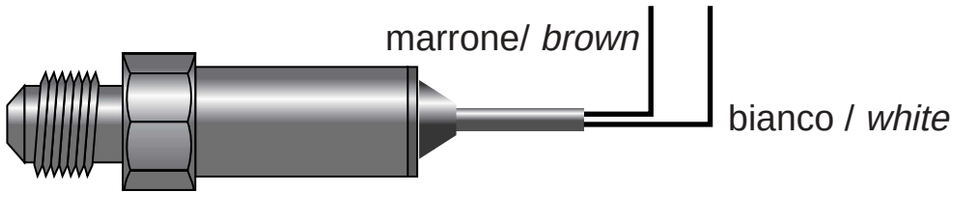


Pt100A1/A2

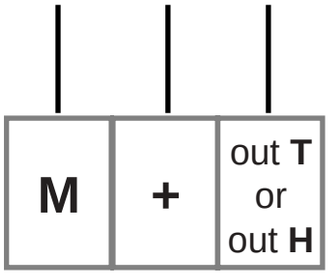
TcJ

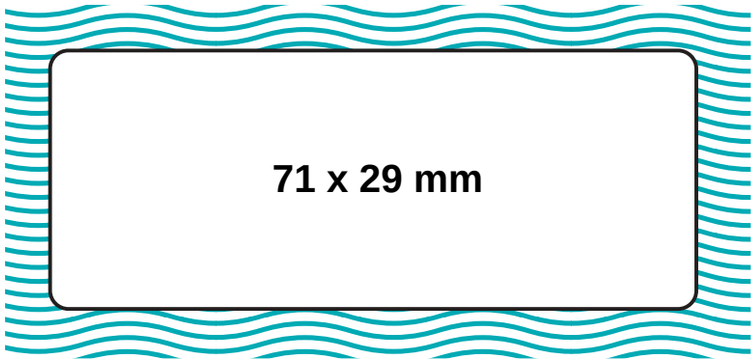
TcK

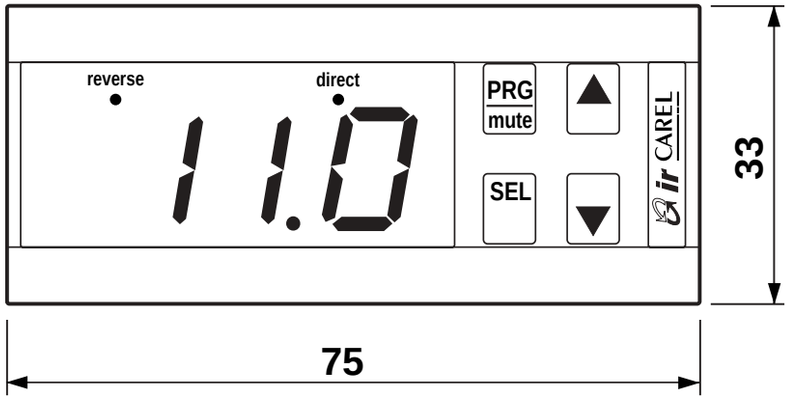
SpK

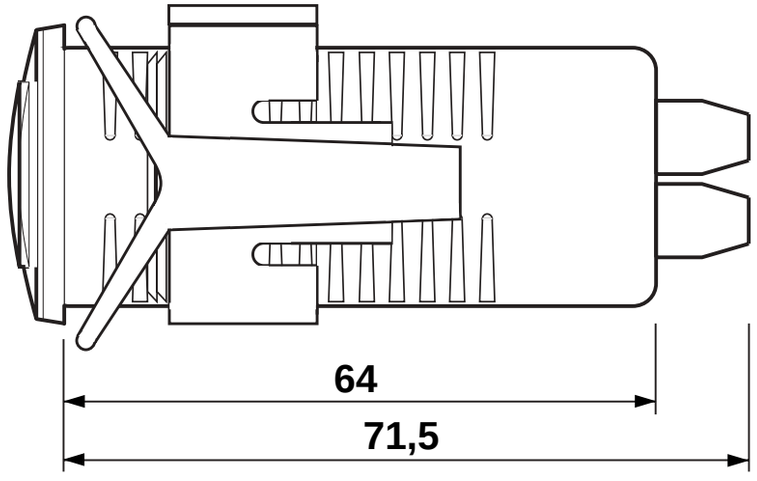


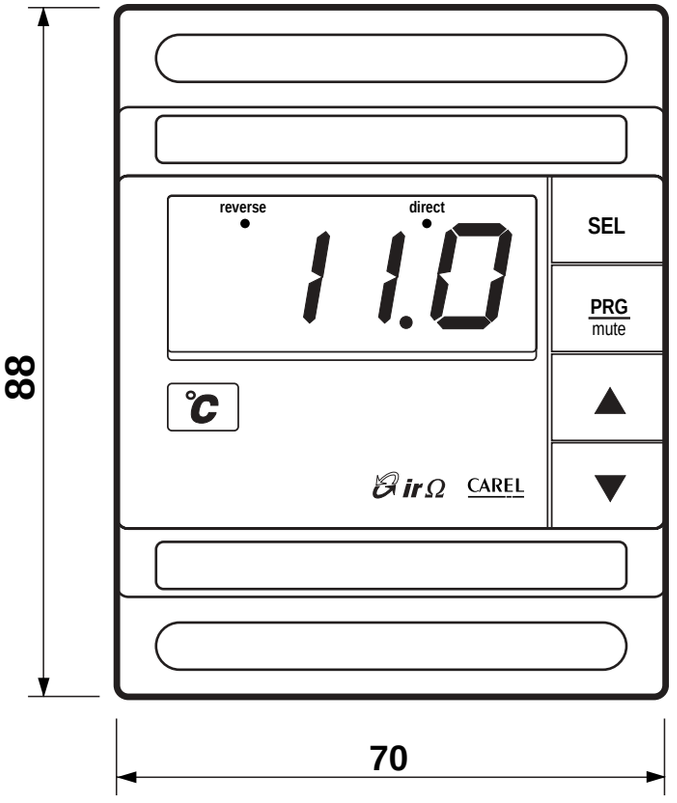
Sonde attive
Active probe

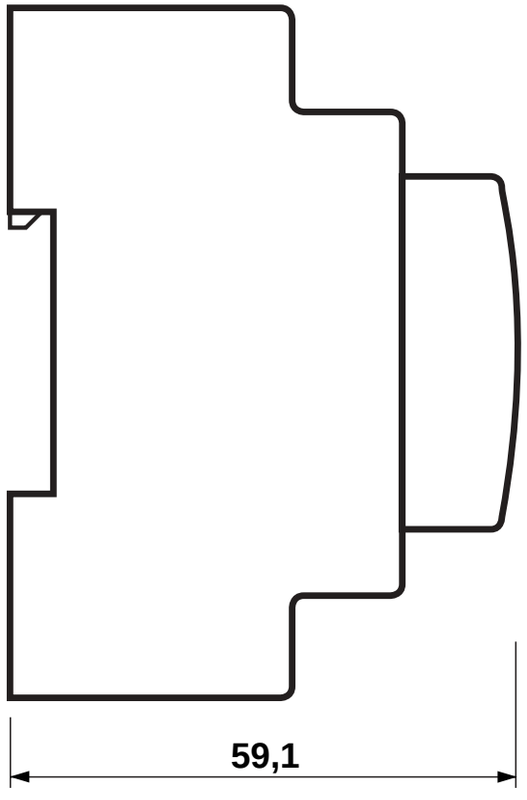



71 x 29 mm


reverse
direct
11.0
PRG
mute
SEL
CAREL
33
75


64
71,5


reverse
direct
11.0
SEL
PRG
mute
°C
CAREL
88
70


59,1

Note:

ir **Note:**

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CAREL S.p.A.
Via dell'Industria, 11 - 35020 Brugine - Padova (Italy)
Tel. (+39) 049.9716611 Fax (+39) 049.9716600
http://www.carel.com – e-mail: carel@carel.com