

TEMPERATURE CONTROLLER

TYPE 8400



Instruction Manual

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Always respect the safety instructions marked by the symbol opposite as well as those included in the manual.

1.1 Utilisation

The 8400 controller has only been designed to measure the temperature of a liquid or a gas.

There will be no manufacturer warranty for damages caused by unexpected handling or wrong usage of the device. The warranty on the device becomes invalid if any modification or change is made on the device.



The device should only be installed and repaired by specialist staff. The user is not allowed to work on the cables inside the housing. If any difficulties may occur with the product during installation, please contact your nearest Bürkert sales office for assistance.

1.2 Precautions at installation and commissioning

- When the device is powered and the cover is open, protection against electric shocks is not ensured.
- Always ensure the materials in contact with the medium to measure are chemically compatible.
- To clean the device, only use chemically compatible products.



When dismantling the controller from the pipe, take all the necessary precautions linked to the process.



Always ensure the tightness between the controller and the pipe.

1.3 Conformity to standards

EMC: EN 50 081-1, 50 082-2

Security: EN 61 010-1

2.1 Design

The temperature controller type 8400 is made up of an electronic module and a measuring element. It may switch a solenoid valve, activate an alarm or establish a control loop.

The switching point can be adjusted by means of the three keys located under the display. The adjustment can optionally be carried out by means of a 4-20 mA loop via an external controller.

The controller housing can be turned by 180°.

The controller type 8400 can be inserted in a Bürkert fitting type S005 or S001, before being mounted on any type of pipe.

The electrical connection is carried out via a 2508 (DIN 43 650) connector and/or an M12 multipin connector.

2.2 Measuring principle

The controller type 8400 uses a Pt100 measuring resistance.

2.3 Available versions

Order code table for the 8400 versions

Supply voltage	Input	Output	Connection	Order codes		
				G ^{1/2}	NPT ^{1/2}	RC ^{1/2}
12-30 VDC	---	NPN	DIN 43650 connector	434 872	434 877	427 448
12-30 VDC	---	PNP	DIN 43650 connector	434 876	434 878	427 449
12-30 VDC	---	NPN and PNP	M12 connector	436 501	436 507	436 504
12-30 VDC	---	Relay	M12 and DIN 43650 connectors	436 503	436 509	436 506
12-30 VDC	4...20 mA ext. setpoint	Relay	M12 and DIN 43650 connectors	440 456	440 460	440 458
AS-Interface	---	Relay and AS-Interface	M12 and DIN 43650 connectors	440 455	440 459	440 457

2.4 Accessories

Order code table for the accessories

	Order codes
M12 female connector, 5 pins, to be wired	917 116
M12 connector, 5 pins, moulded on a shielded cable (2 m)	438 680
M12 female coupler module for ribbon cable, 2 pins (AS-Interface version only)	440 653

3 TECHNICAL DATA

Temperature Controller type 8400

General features

Pipe diameter any type of pipe with a DN ≥ 15 and a 1/2 " threaded connection piece (G, NPT or Rc)
Medium temperature +125 °C (+257 °F) max.
Fluid pressure max. PN 16
Measuring range -40° C...+125° C (-40° F...+257° F)

(with ambient temperature between 0 and +40° C (+32° F and +104° F))

-40° C...+90° C (-40° F...+194° F)

(with ambient temperature above +40° C (+104° F))

Switching accuracy $\pm 0.5^\circ \text{C}$ (0...80° C)
 $\pm 1^\circ \text{F}$ (+32° F...+176° F)
 $\pm 1.5^\circ \text{C}$ (outside 0...80° C)
 $\pm 2.5^\circ \text{F}$ (outside +32° F...+176° F)

Repeatability 0.4%
Sensor element Pt100

Electrical features

Installation class
(overvoltage class) 2
Power supply 12-30 VDC
Max current consumption 750 mA (with load) (versions with PNP output)
80 mA (without load) (Relay version)

Protection against polarity reversal yes
Transistor output NPN and/or PNP, open collector, 700 mA max, NPN output: 0,2-30 VDC and PNP output: supply voltage (see example in the Annex)

or
Relay output 250 VAC, 3 A max. or 30 VDC, 3 A max. ; programmable

External setpoint input
 ASI interface
 Protection against
 short-circuits
 Type of cable recommended

4-20 mA (option)
 field bus (option)

 yes for the transistor output
 shielded, wire section between 0.14 and 0.5 mm²

Electrical connection

NPN version
 PNP version
 NPN/PNP version
 Relay version
 Relay and AS-Interface version

DIN 43650 connector (supplied)*
 DIN 43650 connector (supplied)*
 M12 female connector, 5 pins (not supplied)
 DIN 43650 connector (supplied)*
 DIN 43650 connector (supplied)* and M12 female connector, 4 pins (not supplied)
 * EaseOn with 2511 connector on request

Housing

Housing material
 Front plate
 Parts in contact
 with the medium
 Protection rating

polycarbonate +20% of fiber glass
 polyester

 stainless steel 316L (DIN 1.4404), FPM in the standard versions (EPDM as an option)
 IP 65, connectors being plugged-in and tightened

Environment

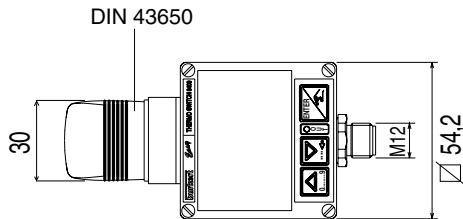
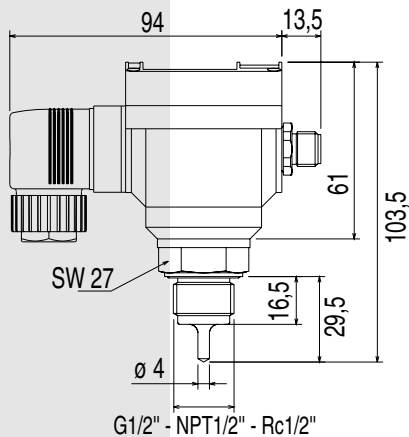
Ambient temperature
 Relative humidity

0 to +60° C (+32° F to +140° F)
 < 80%

3 TECHNICAL DATA

Temperature Controller type 8400

Dimensions (mm)



ENGLISH

ENGLISH

8400

11



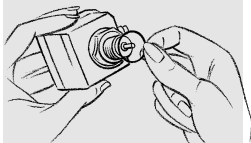
4.1 General recommendations

Avoid any contact of the device with the following products: alcohols, strong or concentrated acids, aldehydes, bases, esters, aliphatics, aromatics, ketones, aromatics or halogenated hydrocarbons, oxidizing agents and chlorinated products. For more information, please contact your Bürkert sales office.

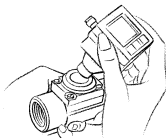
4.2 Mounting on the pipe

The controller 8400 can be inserted into a Bürkert fitting S001 or S005.

During mounting, follow the instructions given with the fitting.



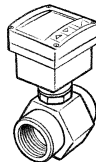
For G1/2^{''}-version, ensure the gasket is in place



Do not tight the controller using the housing ; use an appropriate tool.



Ensure you do not unscrew the metallic part from the pipe, when you re-position the housing.



Controller type 8400 mounted on a fitting type S001

4.3 Electrical connection

Always ensure the power supply is switched off before working on the device. All the connectors must be plugged out. Use:

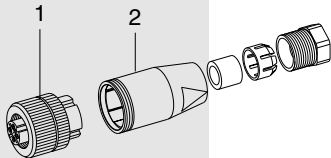
- a shielded cable with an operating temperature $> +80^{\circ}\text{C}$ ($+176^{\circ}\text{F}$).
- a high quality voltage supply (filtered and stable).

Install the following security devices:

- for the power supply: a 1-A fuse and an interrupter
- for the relay: a 3-A fuse and a circuit breaker (depending on the application).

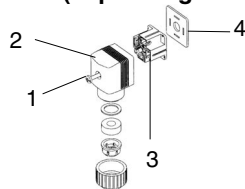


4.3.1 Connectors



Multipin M12 connector (not supplied)

- Loosen threaded ring [1]
- Remove part [2] from the connector.
- Wire according to pin assignment (see 4.3.2)



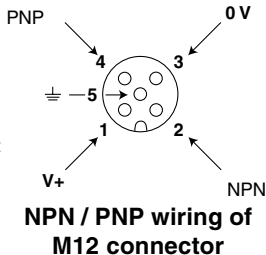
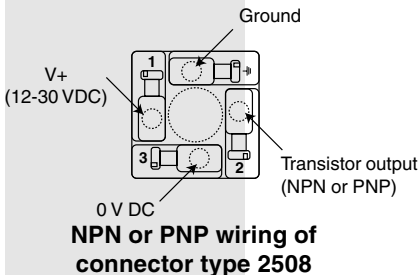
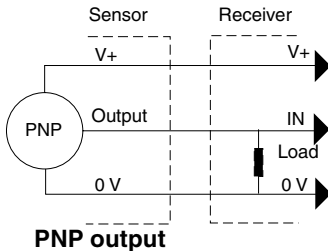
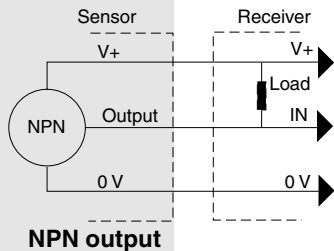
2508 (DIN 43 650) connector (supplied)

- Remove part [3] from part [2].
- Wire according to pin assignment (see 4.3.2 or 4.3.3)
- Replace part [3].
- Tighten the cable gland.
- Place gasket [4] between the 2508 connector and the fixed connector of the 8400.
- Connect the 2508 connector to the 8400.
- Tighten screw [1].

4 INSTALLATION

Temperature Controller type 8400

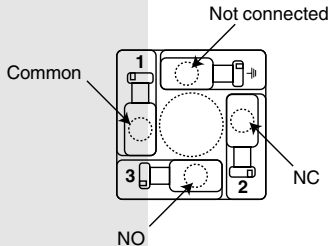
4.3.2 Version with transistor output (NPN / PNP)



M12 cable available as an option (reference 438 680);
correspondence between the connector pin numbers and the wire colours:

Pin	Wire colour
1	brown
2	white
3	blue
4	black
5	grey

4.3.3 Version with relay output



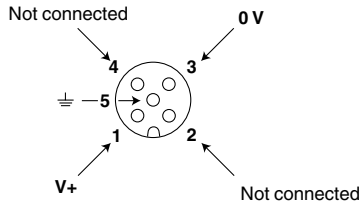
Wiring of the 2508 connector, relay output



Operating safety

When the voltage at the relay terminals is higher than 24 V and the connectors are not correctly plugged-in and tightened, there is a risk to electrocute yourself.

Always check all the connectors to ensure the good operating of the device.



Wiring of the M12 connector
(12-30 VDC power supply)



5.1 General recommendations

Keep in mind that the process may be influenced by all the parameter settings you make. Fill-in the table on page 22 with your settings of the controller type 8400.

5.2 Functionalities

The device has three operating modes :

Normal Mode

Display of the measured temperature and the switching thresholds programmed. From the Normal mode, you can access the Calibration and Simulation modes.

Calibration Mode

Access to the programming of all the parameters (unit, output, filter, bargraph, temperature adjustment, extension board parameters). From the Calibration Mode, you can go back to the Normal Mode.

Simulation Mode

Entering a theoretical temperature value to test the configuration programmed in the Calibration Mode. You may also calibrate the optional extension board. From the Simulation Mode, you can go back to the Normal Mode.

5.3 Programming keys

To display the measured value and the configuration (8 characters: 4 numeric et 4 alphanumeric charact.)



To indicate the status of the switching output (red LED)

To modify the digit value (0...9) ;
To go back to the previous function.

To validate a function;
To validate the entered data.

To select the character;
To go to the next function.

5.4 Default Configuration

At the first powering up, the configuration of the controller type 8400 is as follows:

Temperature unit:	°C
Output:	hysteresis, inverted
OLO:	130 °C (+266 °F)
OHI:	130 °C (+266 °F)
DEL:	0 s
Filter:	2
BGLO:	0 °C (+32 °F)
BGHI:	100 °C (+212 °F)
Temperature adjust.	000.0
Extension board:	no

5.5 Normal Mode

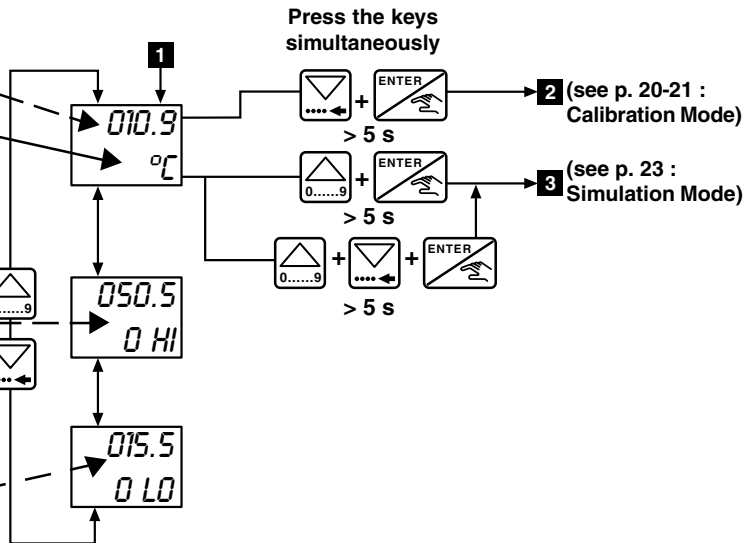
Display of the measured temperature.
N.B.: When the units flash, the min. or max. value of the authorized range has been exceeded.

To go back to the previous function.

To display the high threshold value (O HI).

To go to the next function.

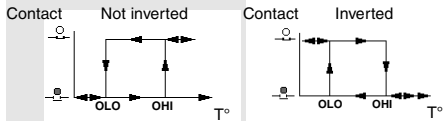
To display the low threshold value (O LO).



5.6 Possible switching modes of the 8400

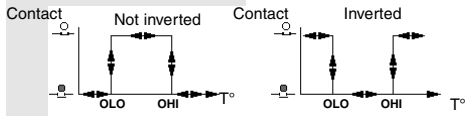
Hysteresis Mode

The change of state occurs when a threshold is detected (increasing temperature: high threshold (OHI) to be detected, decreasing temperature: low threshold (OLO) to be detected).

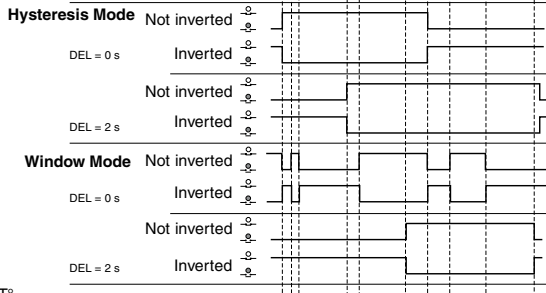
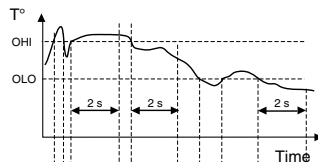


Window Mode

The change of state occurs when any threshold is detected.



The delay (DEL) is set for the both switching thresholds. The switching only occurs when either threshold value (OHI - OLO) is exceeded for a duration higher than the DEL delay.



Switching examples of the 8400 depending on the temperature and the switching mode chosen

5.7 Calibration Mode

To change the temperature unit (°C or °F).

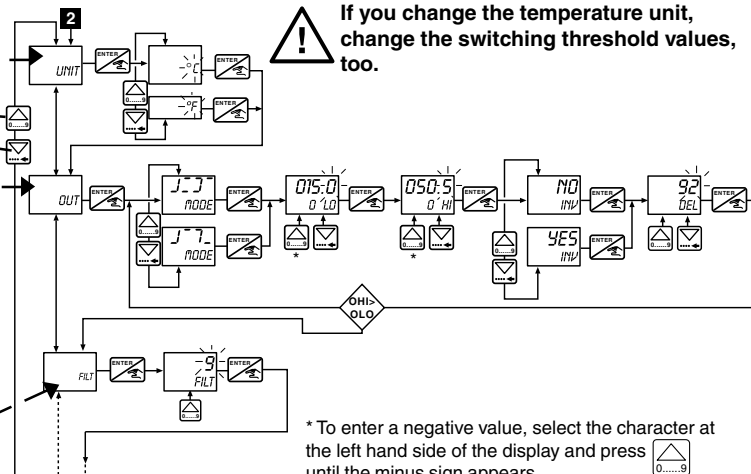
To go back to the previous function.

To go to the next function.

To choose :

- the switching mode of the output (Hysteresis or Window, see p. 19)
- the low (O LO) and high (O HI) switching thresholds
- whether the switching mode is inverted or not (INV, see p. 19)
- the delay before switching (DEL, in seconds).

To choose the filtering level (FILT) of the temperature displayed ONLY ; «0» means «all the temperature variations are displayed», «9» smoothes the displayed (only) temperature changes at the most.

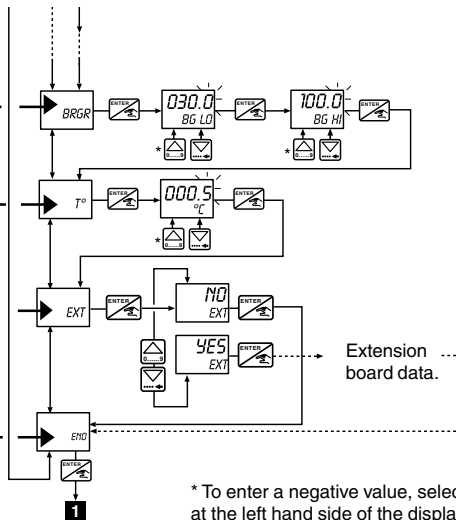


To define the min. (BG LO) and max. (BG HI) values of the bargraph at the bottom of the display.

To adjust the temperature (T°) in relation to the process.

To calibrate the extension board (EXT) detected by the software.

To return (END) to the display of the temperature in the Normal mode.



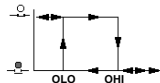
5 PROGRAMMING

Temperature Controller type 8400

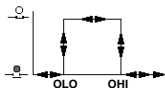
Configuration of the 8400 controller : complete with the values programmed within the Calibration mode.

Unit	Mode		Thresholds		Inverted		Delay	Filter	Bargraph		T°-adjust.	Date	Signature
UNIT	Hyst.	Win.	O LO	O HI	Yes	No	DEL (s)	FILT	BG LO	BG HI	T°		

Hysteresis mode:



Window mode:



5.8 Simulation Mode

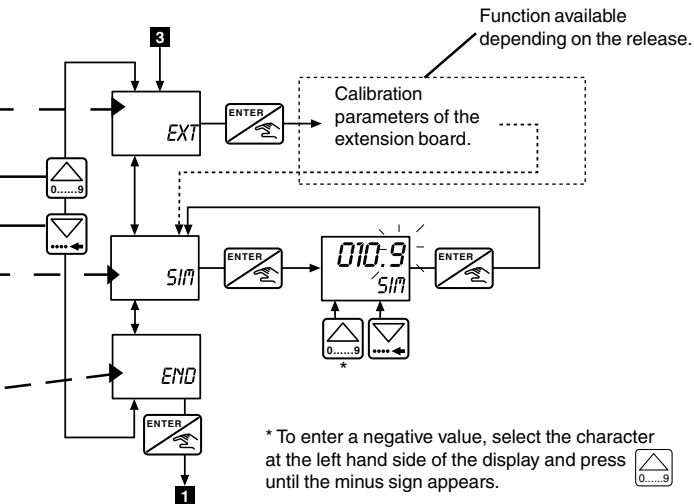
To calibrate the extension board (EXT) detected by the software.

To go back to the previous function.

To go to the next function.

To test the switching thresholds after entering a temperature value (SIM) and PRESSING THE ENTER KEY.

To return (END) to the display of the temperature in the Normal mode.



6.1 Cleaning

The controller type 8400 can be cleaned with water or any solution compatible with the materials the device is made of.

For more information, please contact your Bürkert sales office.

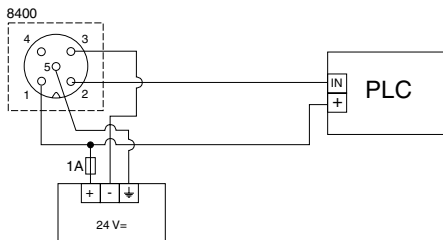
6.2 Error messages

Type of message	Description	Solution
ERR 0	<u>Calibration data are lost.</u> <u>Reading error: the process is stopped.</u>	Press the ENTER key to go back to the Normal mode. The device has returned to its default configuration: the device must be calibrated again. If the message appears frequently, send the device back to your Bürkert sales office.
ERR 1	<u>Calibration data cannot be saved.</u> <u>Write error: the process is stopped.</u>	Press the ENTER key to go back to the Normal mode. The device displays the configured data; BUT the data has not been saved: the device must be calibrated again. If the message appears frequently, send the device back to your Bürkert sales office.

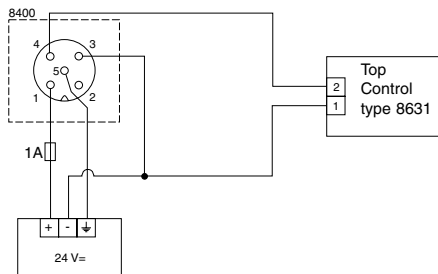
Type of message	Description	Solution
ERR 2	<p><u>The calibration parameters cannot be accessed.</u> <u>Menu reading error: the process goes on operating.</u></p>	<p>Press the UP and DOWN keys under the display to scroll through the menus.</p> <p>If the message appears frequently, send the device back to your Bürkert sales office.</p>
ERR 4	<p><u>The 8400 controller no more measures the temperature correctly: the process is stopped.</u></p>	<p>Switch the controller off than on again.</p> <p>If the message appears frequently, send the device back to your Bürkert sales office.</p>
ERR 5	<p>- <u>the connection with the Pt100 sensor is lost.</u> - <u>The medium temperature is out of the authorized range ($T^{\circ} \leq -50^{\circ}\text{C}$, -58°F or $\geq +170^{\circ}\text{C}$, $+338^{\circ}\text{F}$)</u></p>	<p>- Send the device back to your Bürkert sales office. - Check the temperature of the process.</p>

**NPN connection:
controller type 8400
(NPN/PNP version)
and a
Programmable
Logic Controller.**

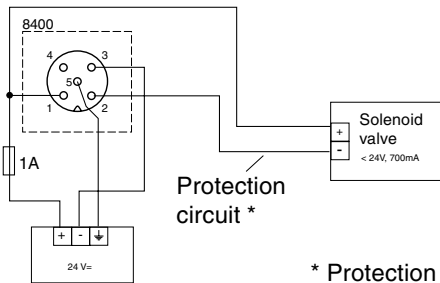
7.1 Examples of Easy Link[®] with the 8400



**PNP connection:
controller type 8400
(NPN/PNP version)
and a Top Control
type 8631.**

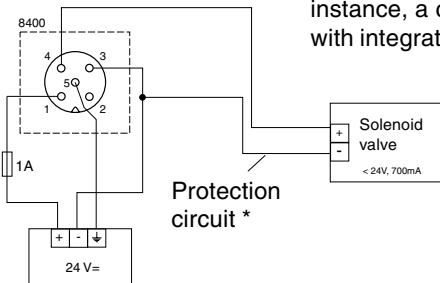


**NPN connection:
controller type 8400
(NPN/PNP version)
and a solenoid
valve type 6014.**

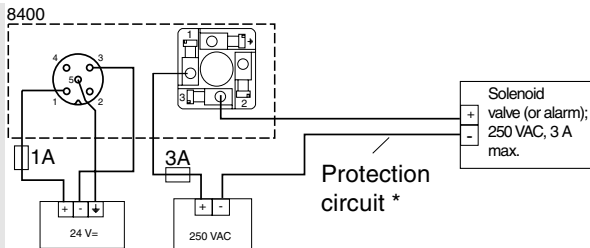


* Protection must be installed by the user depending on the load, for instance, a connector type 2508 with integrated varistor.

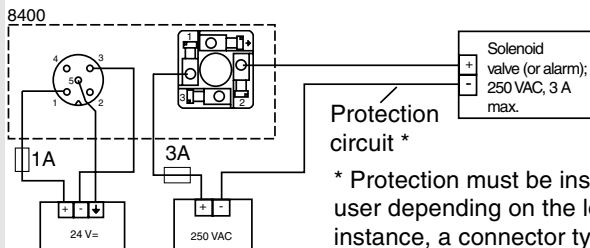
**PNP connection:
controller type 8400
(NPN/PNP version)
and a solenoid
valve.**



NO (Normally Open) connection: controller type 8400 (relay version) and a solenoid valve.

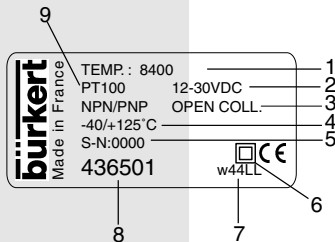


NC (Normally Closed) connection: controller type 8400 (relay version) and a solenoid valve.



* Protection must be installed by the user depending on the load, for instance, a connector type 2508 with integrated varistor.

7.2 Description of the label of the controller type 8400



1. Type of controller
2. Power supply
3. Output characteristics
4. Temperature range
5. Serial number
6. Protection class : protective insulation
7. Manufacturer code
8. Order number
9. Sensor type

NOTES

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