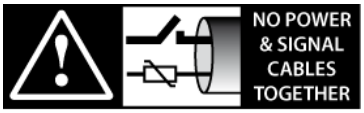
io.module

Product code: P+E1M00000000

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

ENG User manual



READ CAREFULLY IN THE TEXT!

High Efficiency Solutions

CAREL

ENG

IMPORTANT

CAREL bases the development of its products on decades of experience in HVAC/R, on the continuous investments in technological innovations to products, procedures and strict quality processes with in-circuit and functional testing on 100% of its products, and on the most innovative production technology available on the market. CAREL and its subsidiaries nonetheless cannot guarantee that all the aspects of the product and the software included with the product respond to the requirements of the final application, despite the product being developed according to start-of-the-art techniques. The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific final installation and/or equipment.

CAREL may, based on specific agreements, acts as a consultant for the positive commissioning of the final unit/application, however in no case does it accept liability for the correct operation of the final equipment/system.

The CAREL product is a state-of-the-art product, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.CAREL.com.
Each CAREL product, in relation to its advanced level of technology, requires setup/configuration/programming/commissioning to be able to operate in the best possible way for the specific application. The failure to complete such operations, which are required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases.
Only qualified personnel may install or carry out technical service on the product.
The customer must only use the product in the manner described in the documentation relating to the product.

In addition to observing any further warnings described in this manual, the following warnings must be heeded for all CAREL products:

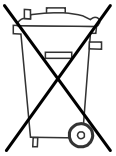
- Prevent the electronic circuits from getting wet. Rain, humidity and all types of liquids or condensate contain corrosive minerals that may damage the electronic circuits. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not install the device in particularly hot environments. Too high temperatures may reduce the life of electronic devices, damage them and deform or melt the plastic parts. In any case, the product should be used or stored in environments that comply with the temperature and humidity limits specified in the manual.
- Do not attempt to open the device in any way other than described in the manual.
- Do not drop, hit or shake the device, as the internal circuits and mechanisms may be irreparably damaged.
- Do not use corrosive chemicals, solvents or aggressive detergents to clean the device.
- Do not use the product for applications other than those specified in the technical manual.

All of the above suggestions likewise apply to the controllers, serial boards, programming keys or any other accessory in the CAREL product portfolio.
CAREL adopts a policy of continual development. Consequently, CAREL reserves the right to make changes and improvements to any product described in this document without prior warning.

The technical specifications shown in the manual may be changed without prior warning.

The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available on the website www.CAREL.com and/or by specific agreements with customers; specifically, to the extent where allowed by applicable legislation, in no case will CAREL, its employees or subsidiaries be liable for any lost earnings or sales, losses of data and information, costs of replacement goods or services, damage to things or people, downtime or any direct, indirect, incidental, actual, punitive, exemplary, special or consequential damage of any kind whatsoever, whether contractual, extra-contractual or due to negligence, or any other liabilities deriving from the installation, use or impossibility to use the product, even if CAREL or its subsidiaries are warned of the possibility of such damage.

DISPOSAL



INFORMATION FOR USERS ON THE CORRECT HANDLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

In reference to European Union directive 2002/96/EC issued on 27 January 2003 and the related national legislation, please note that:

- WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
- the public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment;
- the equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
- the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
- in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

Warranty of the materials: 2 years (from the date of production, excluding consumables).

Approval: the quality and safety of CAREL INDUSTRIES Hqs products are guaranteed by the ISO 9001 certified design and production system.

WARNING: separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel wiring) and signal cables in the same conduits.

The product must be installed with the earthconnected, using the special yellow-green terminal on the terminal block. Do not use the neutral for the earth connection.

KEY TO THE ICONS

	NOTE: to bring attention to a very important subject; in particular, regarding the practical use of the various functions of the product.
	IMPORTANT: to bring critical issues regarding the use of the NOSAMmPRBN to the attention of the user.
	TUTORIAL: some simple examples to accompany the user in configuring the most common settings

CONTENTS

1. INTRODUCTION

1.1 Main features

Part number	Description
P+E1M00000000	IO.MODULE 24V 4TI 4DI 2O 6DO 1BMS
P+E0C1M0B0	CONNECTOR KIT

List of functions:

Main features	Up to 10 different inputs depending on configuration.
Hardware	c.pCOe
User interface	Boss
Languages	EN
Unit of measure	Temperature: °C , Inputs: On/Off , Pressure: bar , Other: %
Alarms	Low and high alarms, digital input alarms
	Automatic reset
	Log from Boss
Supervisor protocol	Modbus and CAREL

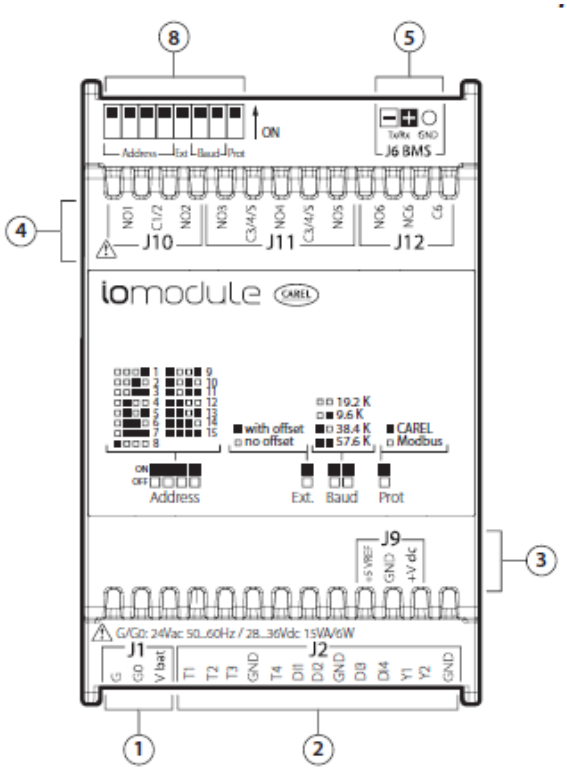
Old io.module IOM0023000; IOM0011500; IOM0002400

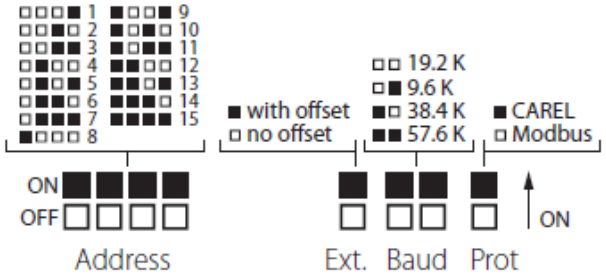
NEW io.module P+E1M00000000

	I/O Module (Old)	io.module (New)
HW	24 Vac / 115 Vac / 230 Vac power supply	24 Vac / 24-36 Vdc power supply
HW	Complete address setting by rotary dipswitches	Partial address setting by dipswitch. Complete address setting by dipswitches and parameters
HW	Reset button available	-
HW	Buzzer available	-
HW	1 electromechanical relay	*6* electromechanical relays
I/O	2 temperature inputs (4)	*4* temperature inputs
I/O	2 digital inputs (4)	*4* digital inputs
I/O	2 active probes (4-20 mA)	2 active probes (4-20 mA / *0-5 V / 0-10 V*)
Protocols	Carel	Carel and Modbus
Settings	Predefined operating modes for standard applications that can be selected by setting "macro-parameters"	Greater versatility given by the possibility of detailed parameter settings
Features	Correct management of high and low temperature alarms, with the possibility to delay notification	Correct management of high and low temperature alarms, with the possibility to delay notification
Features	Management of absent probes. In this case, the device communicates a default value	Management of absent probes. In this case, the device communicates a default value
Features	Association between probe and digital input to optimise management by supervisory systems	Association between probe and digital input to optimise management by supervisory systems
Features	Possibility to create a global alarm that summarises the unit status by connecting it, where necessary, to a relay.	Possibility to create a global alarm that summarises the unit status by connecting it, where necessary, to a relay.
Features	Possibility to add a manual calibration to the probe readings to accuracy in the specific use	Possibility to add a manual calibration to the probe readings to accuracy in the specific use

2. INSTALLATION

2.1 I/O P+EM100000000





Note: *it is necessary to restart the device to improve the changes to the dip-switches.*

	Temperature T1-T4	Digital input DI1-DI4	Analogue active Y1-Y2
J2	1, 2, 3, 4	5, 6, 7, 8	9, 10

1	Power supply connectors [G(+), G0(-), Vbat]
2	Inputs
3	+VDC: power supply for active probes +5V power supply for raziometric probes
4	Relay digital outputs
5	BMS connector
8	Configuration Dip-switch

Technical leaflet P+E1M00000000

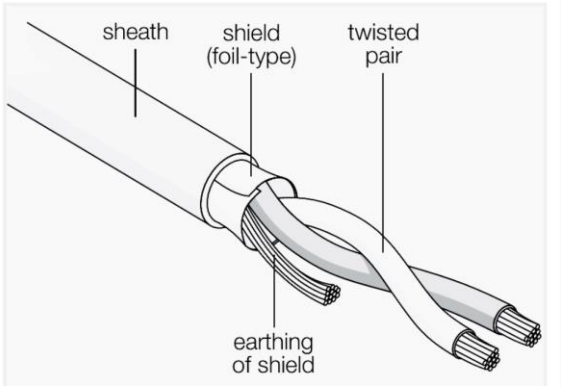
2.2 Connections RS485 communication

Modbus or CAREL RS485. Up to 15 io.modules can be connected in the serial network. Adress ranging from 1-15.

Connect to one of the available serial lines on the Boss

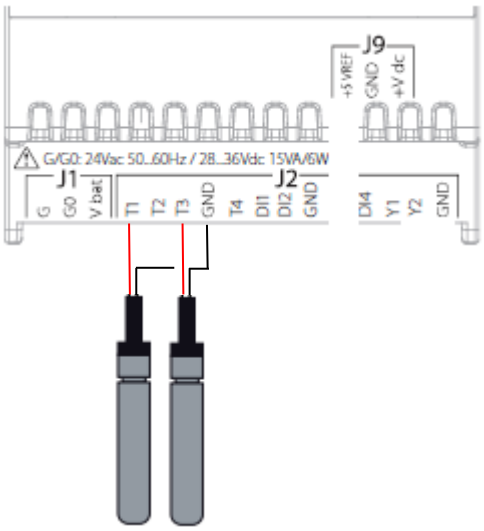
Connect to BMS port J6 of the io.module

Use a pair twisted cable (Belden 8762 or equal)



2.3 Connection temperature probes

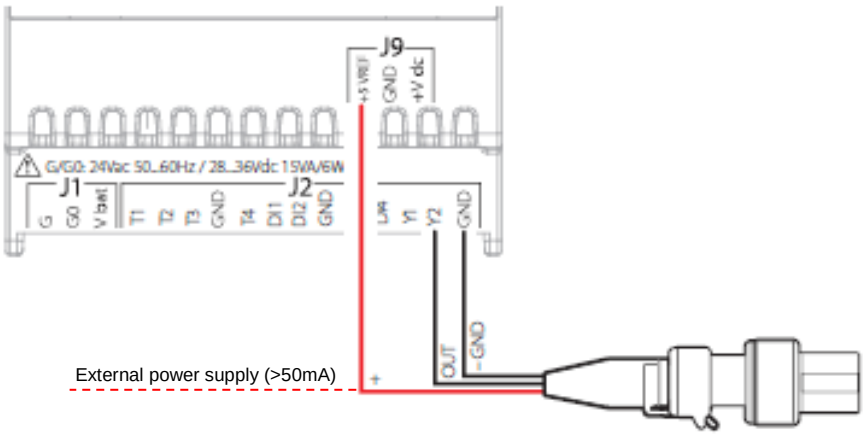
It's possible to connect up to 4 temperature probes, NTC, NTC-HT, NTC-LT and PT1000 (T1-T4).



2.4 Connection active probes 0-5V

It's possible to connect up to 2 active 0-5V probes (Y1,Y2).

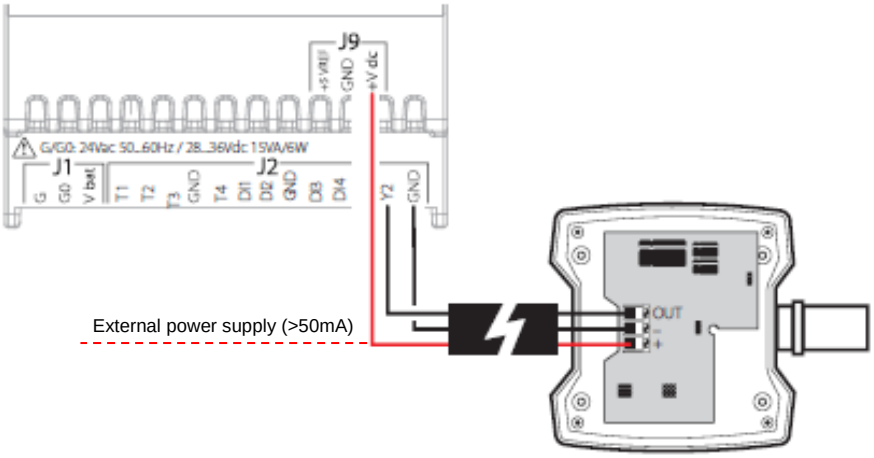
- 2 active probes powered by **internal supply voltage** (Max current available is 50mA, if the sensor requires more it has to be power supplied externally)



2.5 Connection active probes 4-20 mA

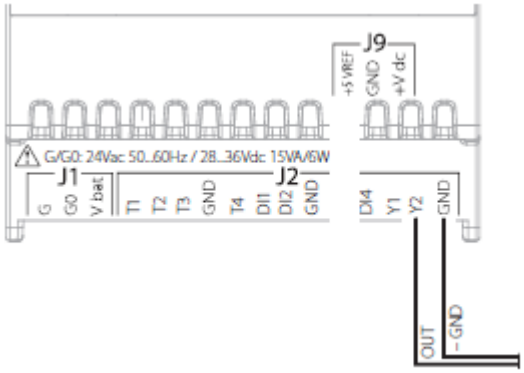
It's possible to connect up to 2 active 4-20 mA probes (Y1,Y2).

- 2 active probes powered by **internal supply voltage** (Max current available is 50mA, if the probe requires more it has to be power supplied externally)



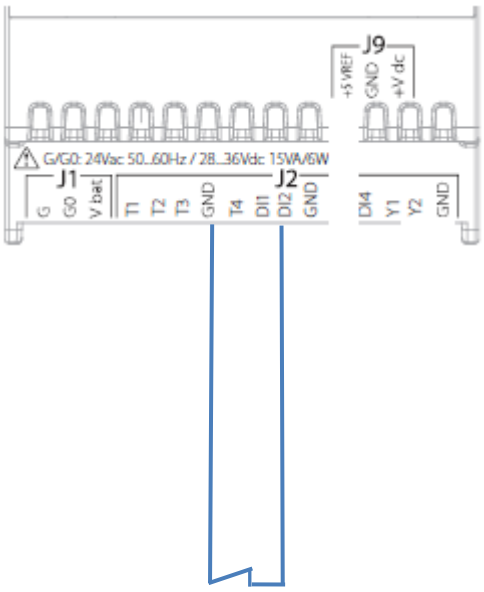
2.6 Connection analog signals

It's possible to connect up to 2 active 0-10V, 0-5V, 4-20mA analog signals (Y1,Y2).



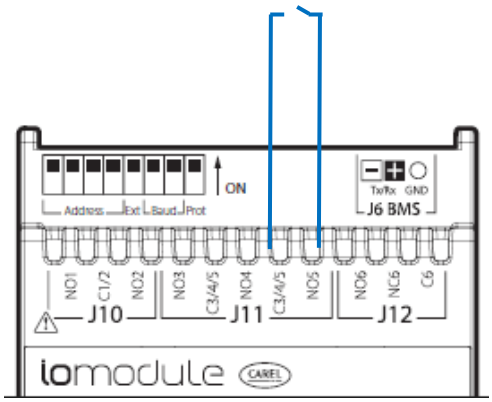
2.7 Connection digital inputs / digital outputs

It's possible to connect up to 4 digital inputs for alarm or status (DI1-DI4). 6 digital outputs (230VAC, see technical leaflet for max load)



Digital input (Voltage free)

Digital output

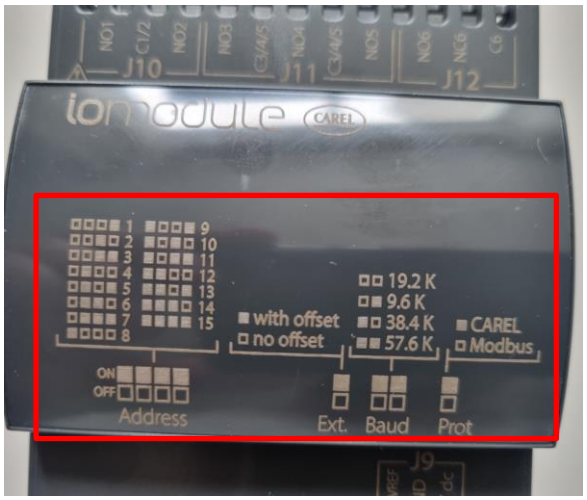


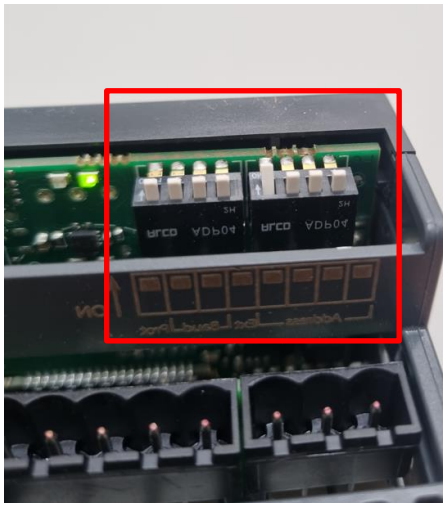
3. START UP

3.1 Setting the dipswitches for network configuration

In order to connect the io.module to a supervisory system the dip switches needs to be set up accordingly to the network configuration that will be used. It's necessary to restart the io.module to acknowledge the dip switch changes.

- Network address: 1-15 (Default: address 1)
- With or without offset (Default: without offset)
- Protocol: Modbus or CAREL (Default: Modbus)
- Baudrate, 9.6K, 19,2K, 38,4K, 57,6K (Default: 19.2K)





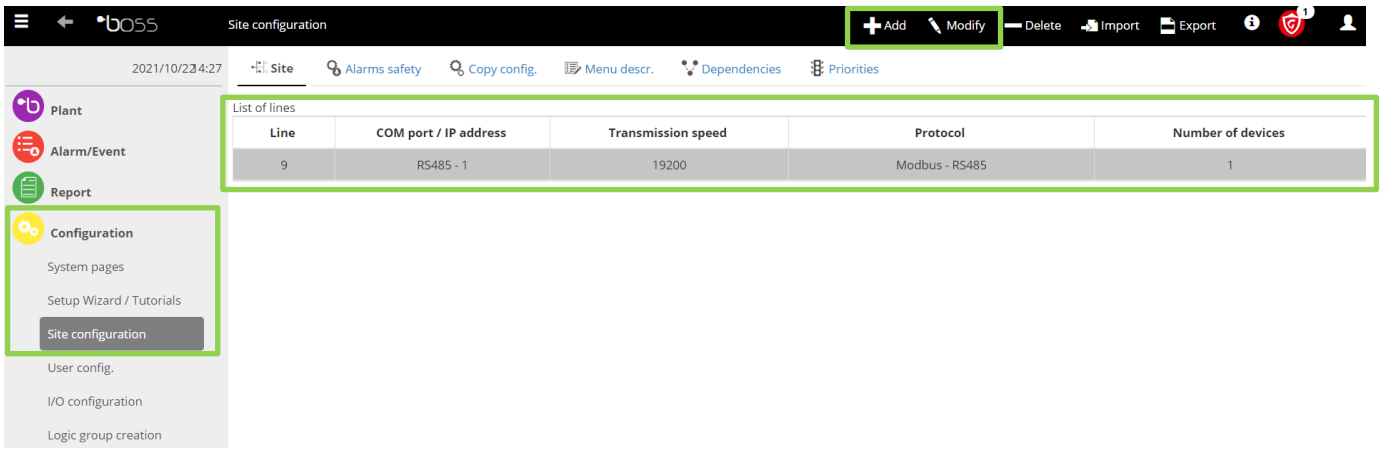
3.2 BOSS line configuration

When the network configuration and wiring to the io.module is completed the device can be read by the Boss.

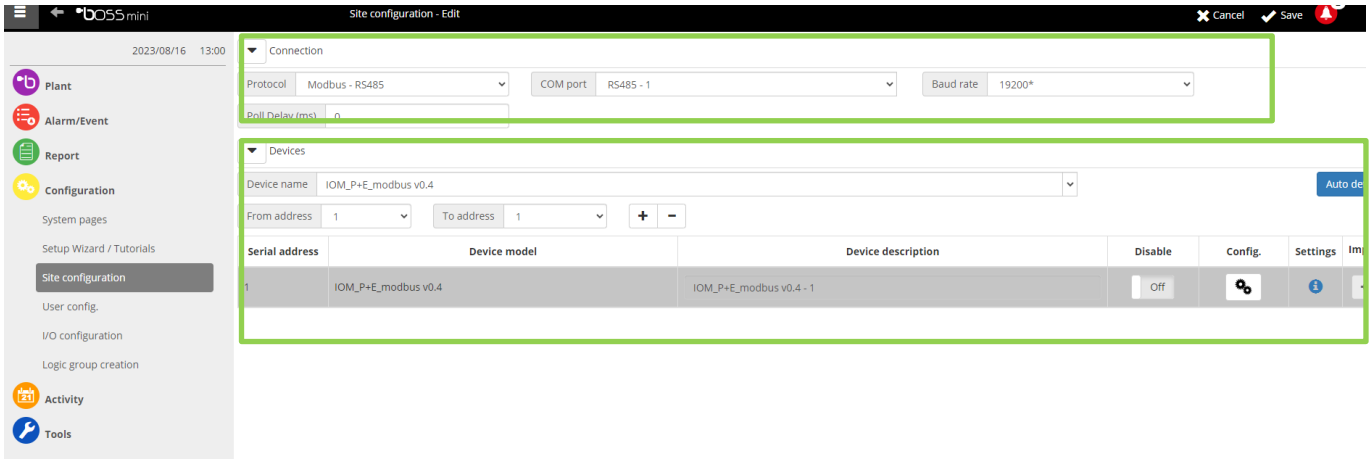
1. Select **Configuration**

2. Enter **"Site configuration"**

3. If a serial line hasn't been created press **"Add".** If a line you want to use is already present, press **"Modify".**



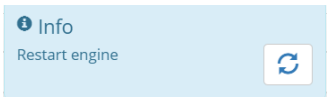
4. In **"Site configuration – Edit"** select the protocol in use, CAREL or Modbus, Baudrate and COM port (serial port) the communication line that the io.module is connected to. These settings needs to be exactly the same as the network settings configured with the dip switches.



5. In **"Device name"** Find the XML **IOM_P+E_modbus v0.4**

6. Set the device address that has been configured in the io.module Press + to add it to the serial line.

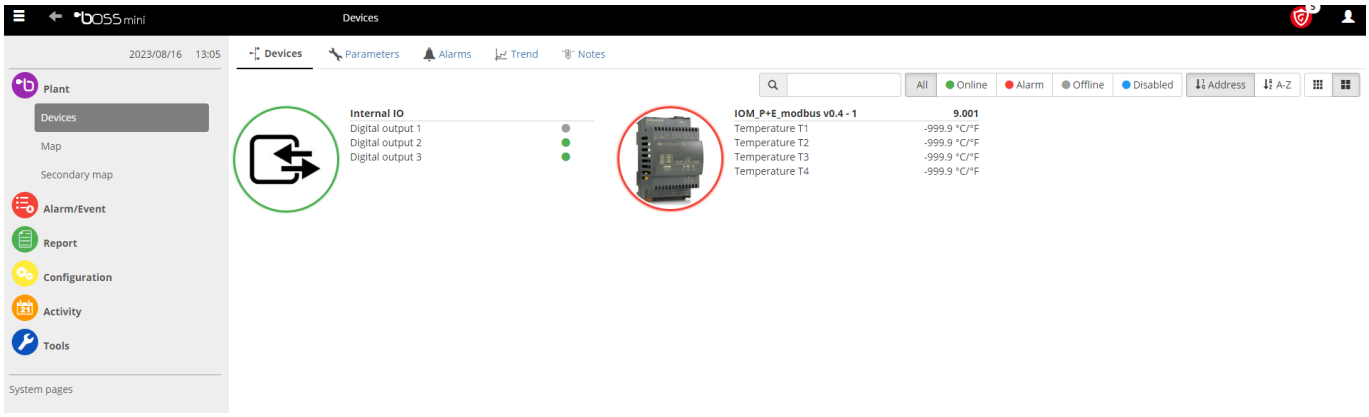
7. Press Save after loading the BOSS will ask you to restart the engine.



8. Select **Plant**

9. Enter **"Devices"**

10. If the installation has been successfull the io.module will have a red circle around the device indicating alarm status (device not configured).



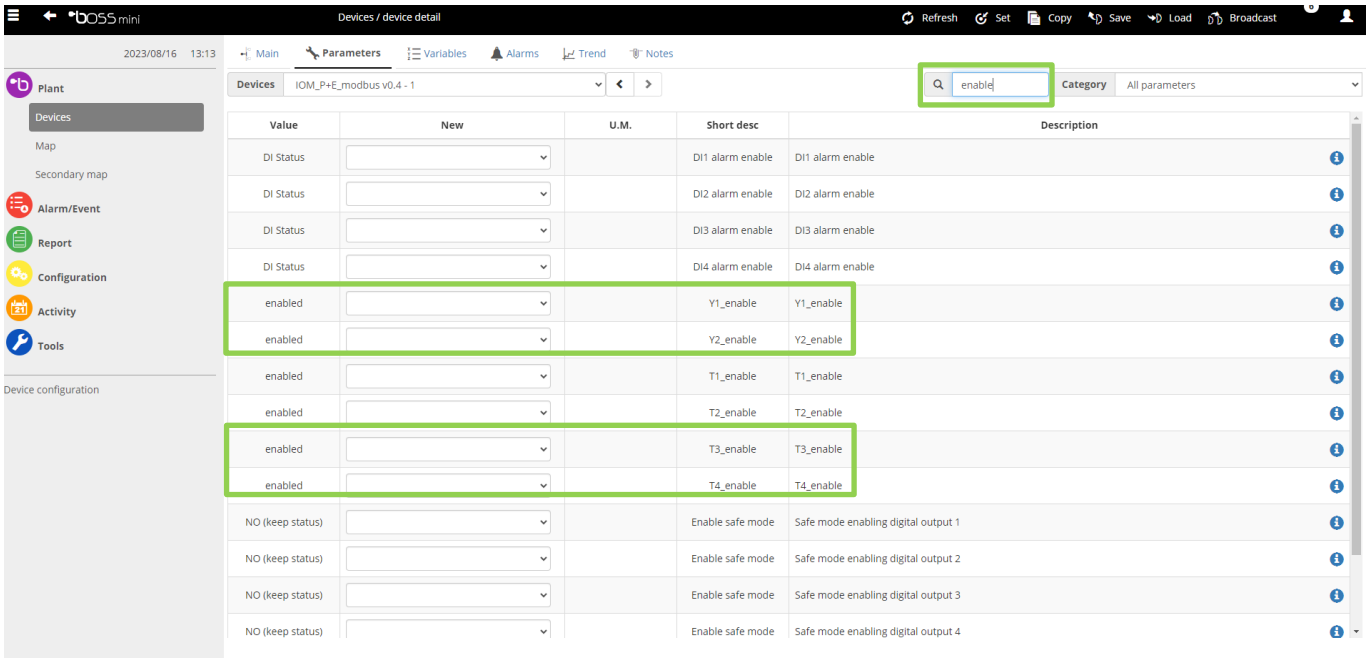
3.3 Configuration example: 2 temp sensors with high temp alarm and alarm output

Configuration of two temperature sensors connected to T1 and T2 with high temperature alarm. Alarm output NO1.

1. Click on the io module to enter the device page.

2. Enter **“Parameter”** and select **“All parameters”** in categories, search for **“Enable”** in the search bar.

3. Disable the analog inputs T3, T4, Y1 and Y2. Confirm by pressing Set. In this example analog input T1 and T2 is used.



5. Select “Configuration entreé T1” in the category menu.

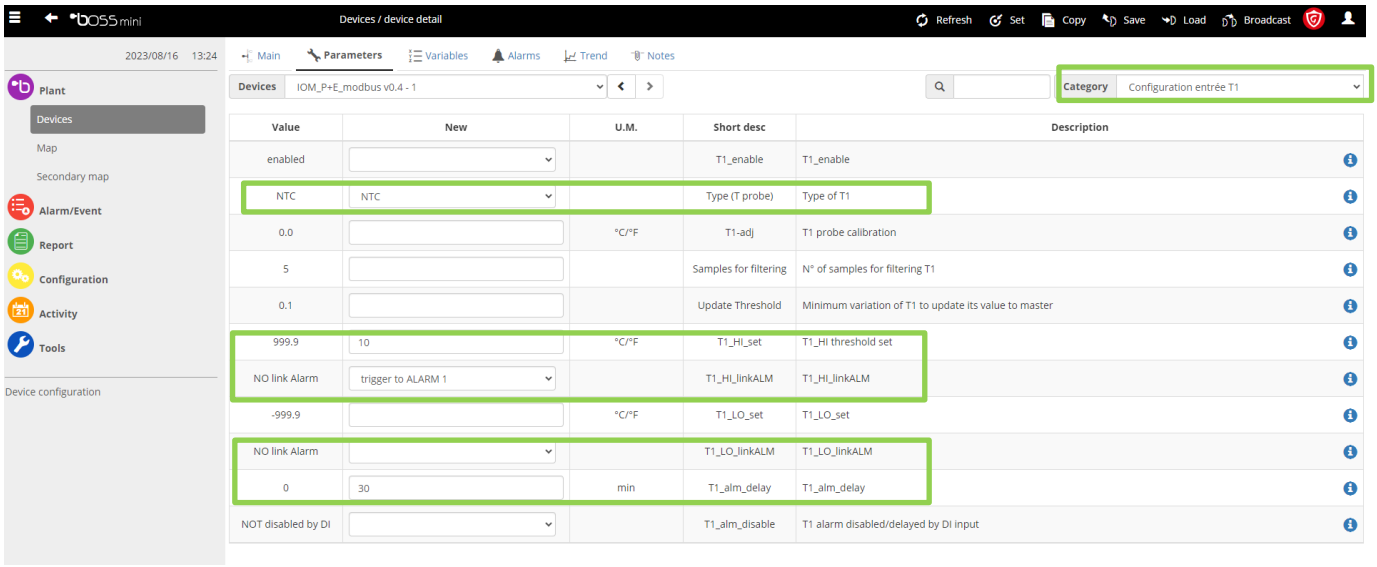
6. Configure the parameters below and and confirm by pressing Set

- Type of T1 - NTC, NTC-HT, NTC-LT or PT1000.
- T1_HI threshold set – E.g.10C (High emperature alarm set point)
- T1_HI linkALM – trigger to alarm 1(Assigned to alarm group 1)
- T1_alm_delay – E.g. 30 min (Alarm delay time for both high- and low temperature alarm)

7. Select “Configuration entreé T2” in the category menu.

8. Configure the parameters below and confirm by pressing Set

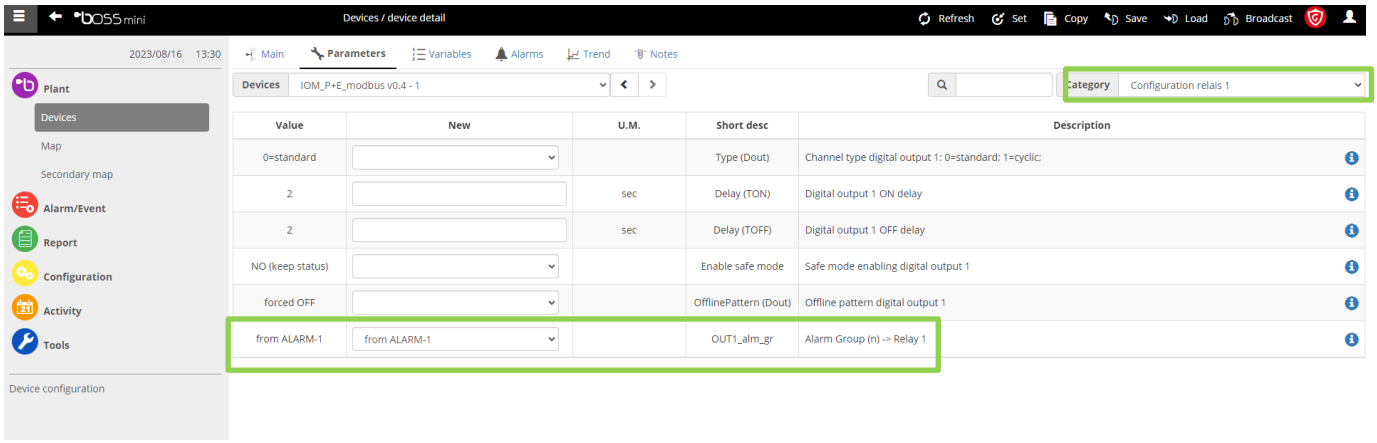
- Type of T2 - NTC, NTC-HT, NTC-LT or PT1000.
- T2_HI threshold set – E.g.10C (High emperature alarm set point)
- T2_HI linkALM – trigger to alarm 1(Assigned to alarm group 1)
- T2_alm_delay – E.g. 30 min (Alarm delay time for both high- and low temperature alarm)



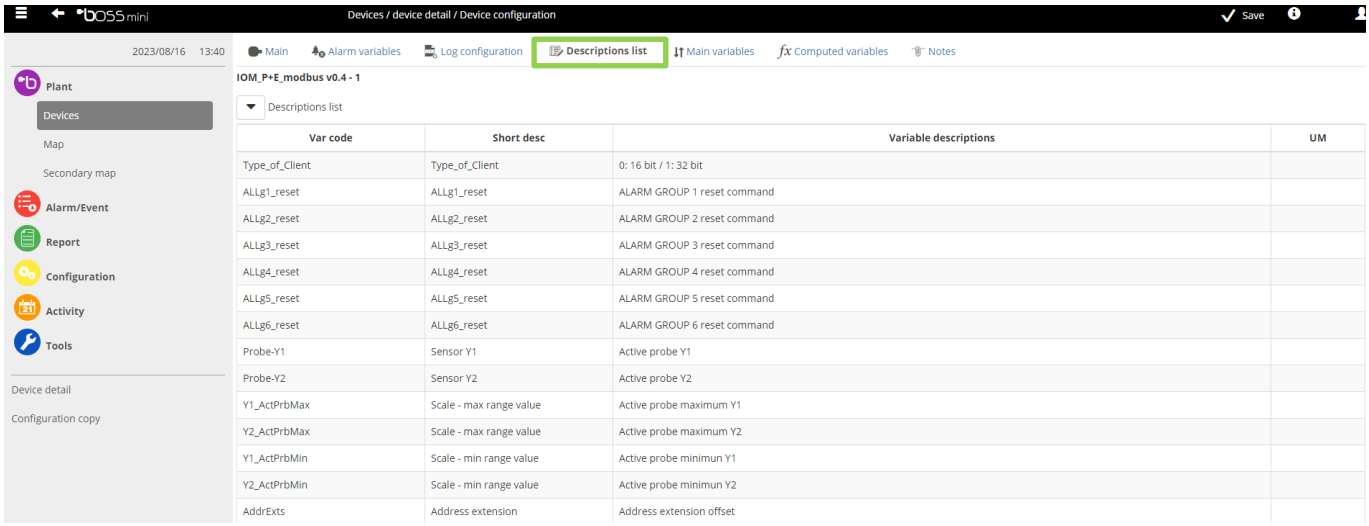
7. Select “Configuration relais 1”.

8. Configured the parameter below and confirm by pressing Set

- OUT1_alm_gr – from ALARM-1 (Assigning relay 1 (NO1) to be used as an alarm relay for group 1).



9. Description of all the I/O and alarm texts can be changed in device > device configuration > description list.



3.4 Configuration example: Gas detector and trapped personal alarm

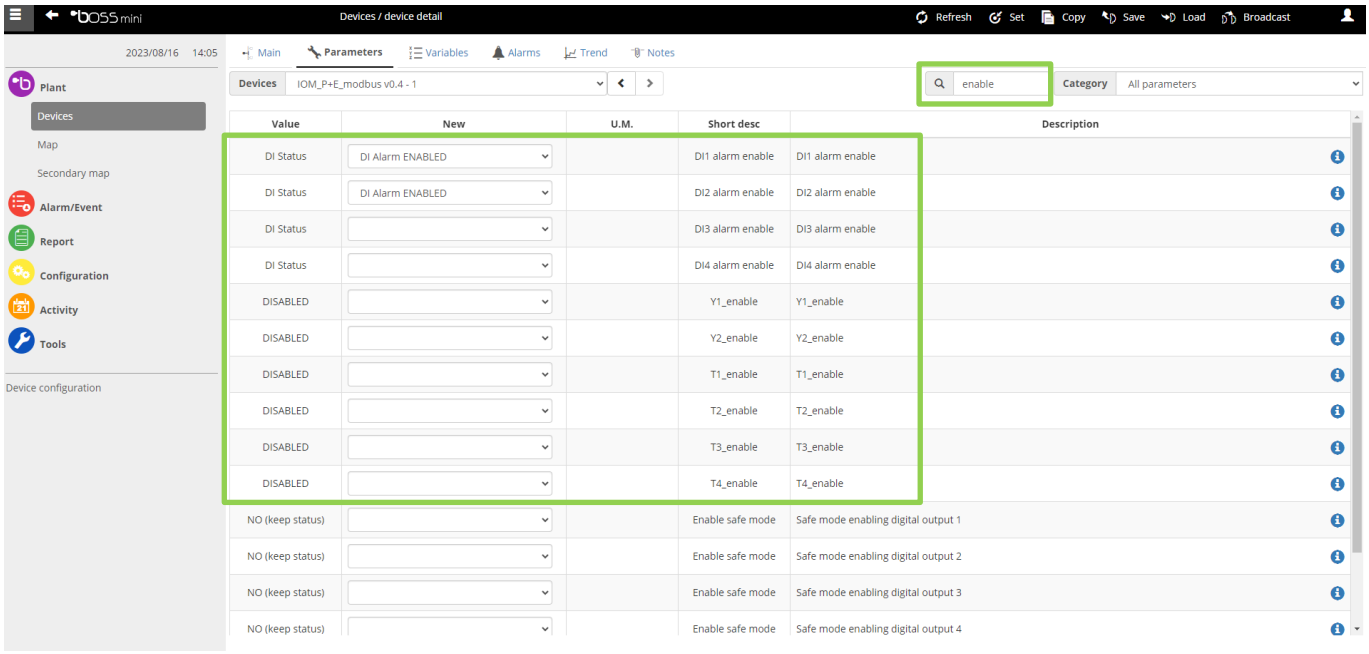
Configuration of two digital inputs with gas detection and trapped personal. Digital input DI1 is used for gas detector and DI2 for trapped personal.

1. Click on the io module to enter the device page.

2. Enter **“Parameter”** and select **“All parameters”** in categories, search for **“Enable”** in the search bar.

3. Disable the analog inputs T1-T4, Y1 and Y2. Enable DI1 and DI2 with “DI alarm ENABLED”. Confirm by pressing 

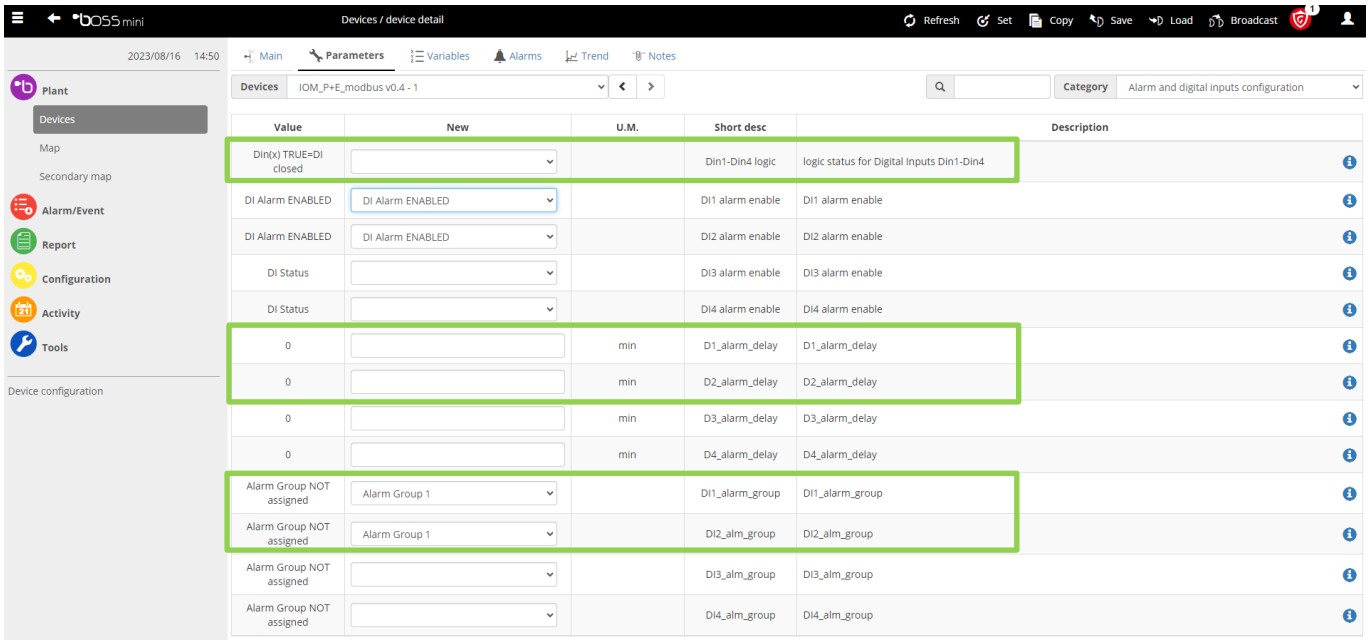
. In this example digital input 1 and 2 will be used.



4. Select “Alarm and digital inputs configuration” in the category menu.

5. Configured the parameters below and confirm by pressing Set

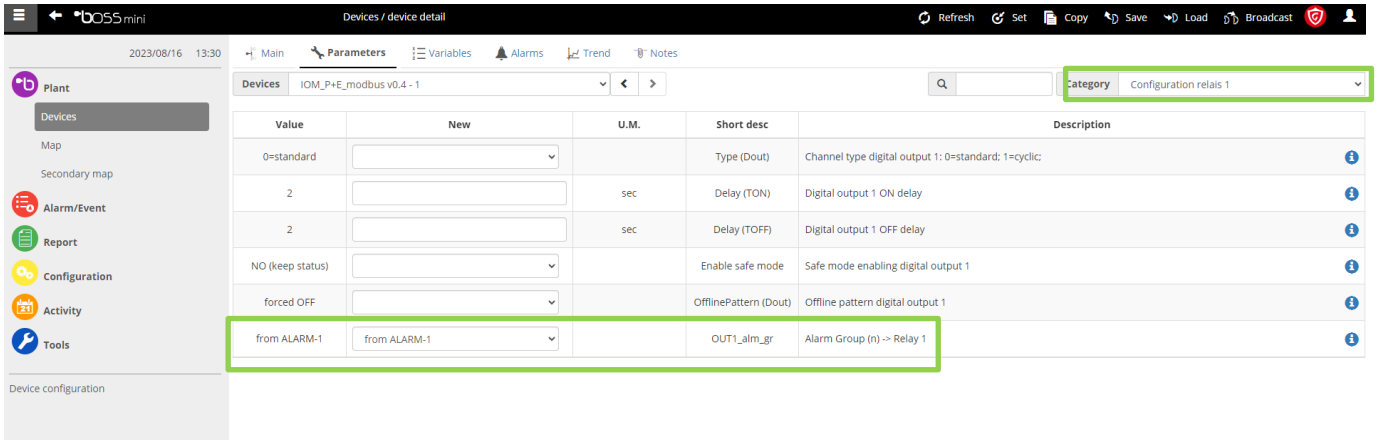
- Din1-Din4 logic – Alarm at open or closed digital input contact (Closed as default).
- D1_alarm_delay – X minutes (Alarm delay digital input 1)
- D2_alarm_delay – X minutes (Alarm delay digital input 2)
- DI1_alarm_group – Alarm group 1 (Assign DI1 to alarm group 1)
- DI2_alarm_group – Alarm group 1 (Assign DI2 to alarm group 1)



6. Select “Configuration relais 1”.

7. Configured the parameter below and confirm by pressing Set

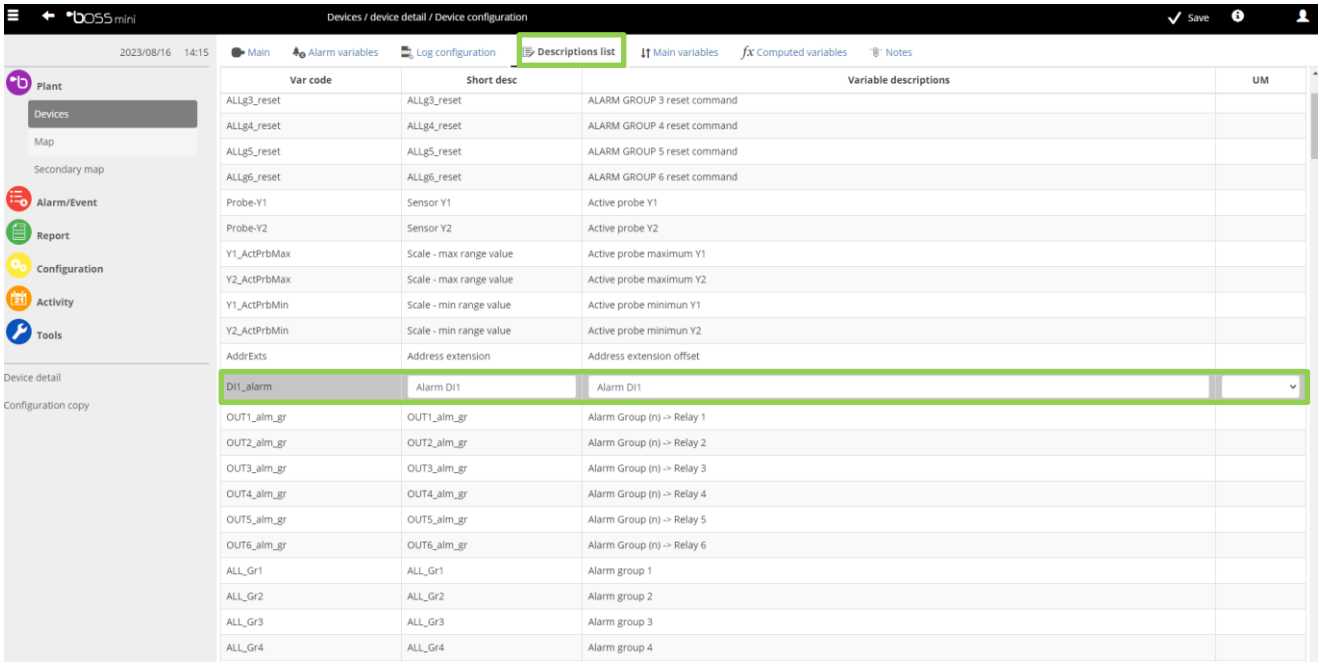
- OUT1_alm_gr – from ALARM-1 (Assigning relay 1 (NO1) to be used as an alarm relay for group 1).



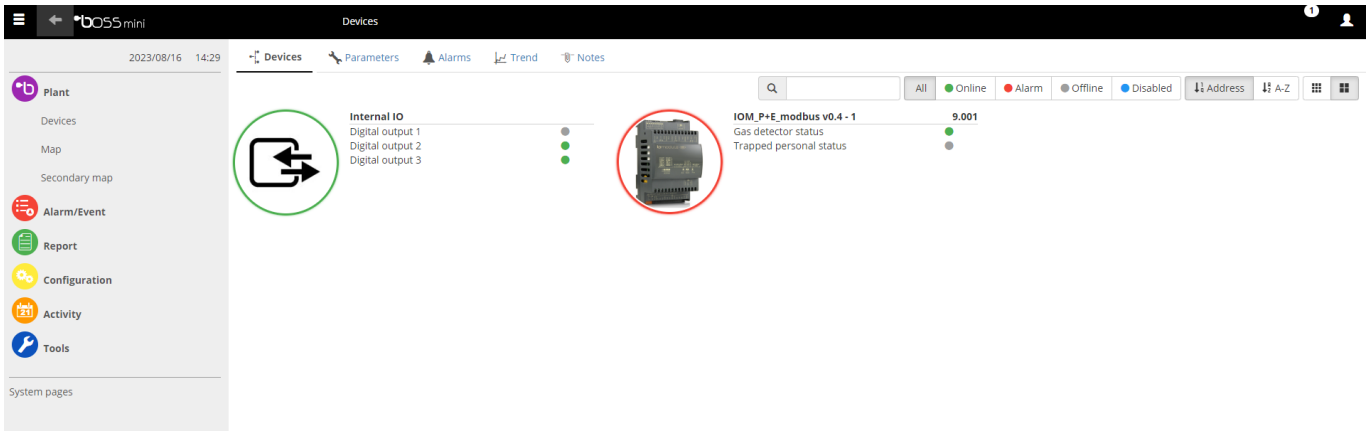
6. To change the alarm text of the digital inputs, enter device > device configuration > description list. Press Save to save the new alarm description.

Variable code:

- DI1_alarm – Gas detector alarm
- DI2_alarm – Trapped personal alarm
- DI1_status – Gas detector status
- DI2_ status – Trapped personal alarm



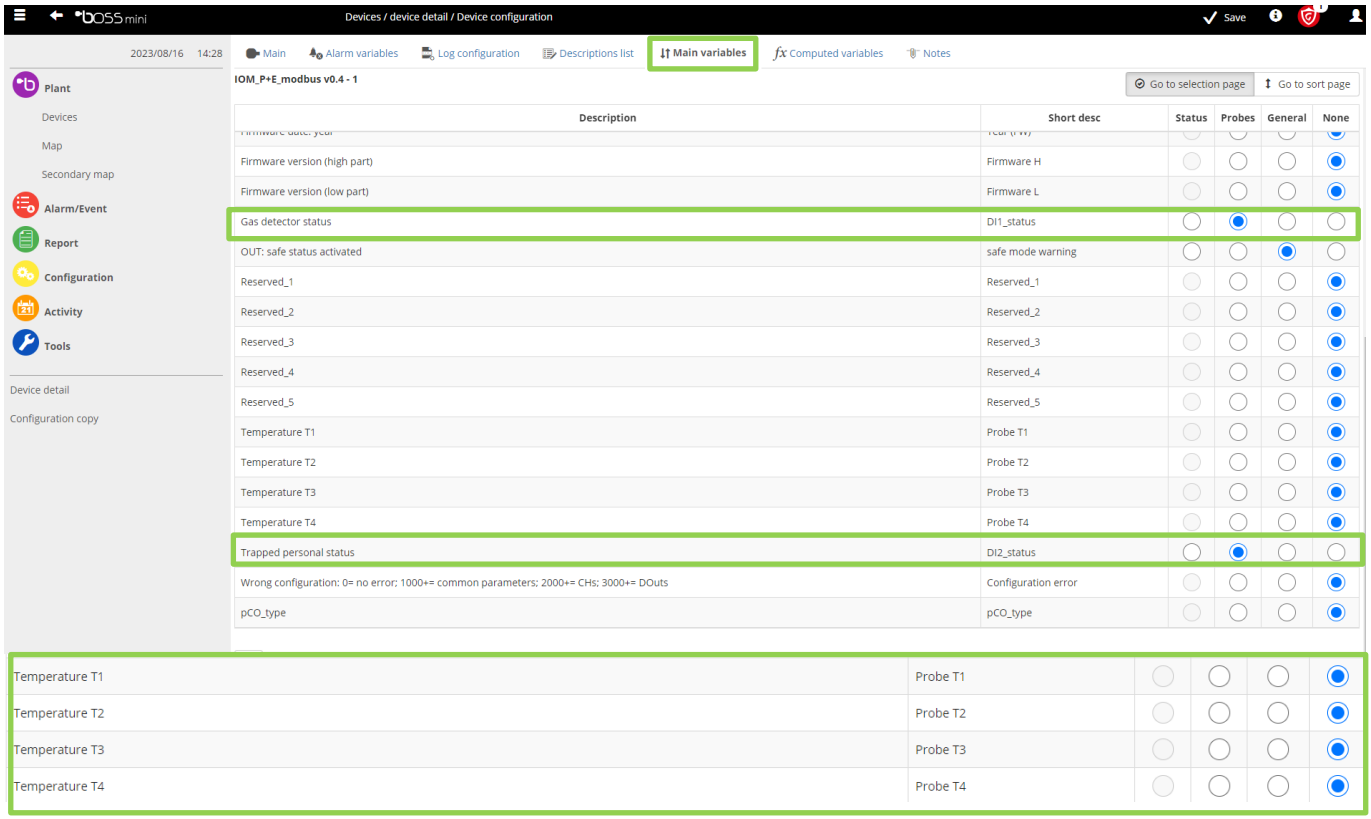
7. To see the DI1-2 status in the device overview instead of temperature sensors enter device > device configuration > main variables.



8. Change the following variables and confirm by pressing 

.

- Gas detector status – Probes
- Trapped personal status – Probes
- Temperature T1-T4 – None



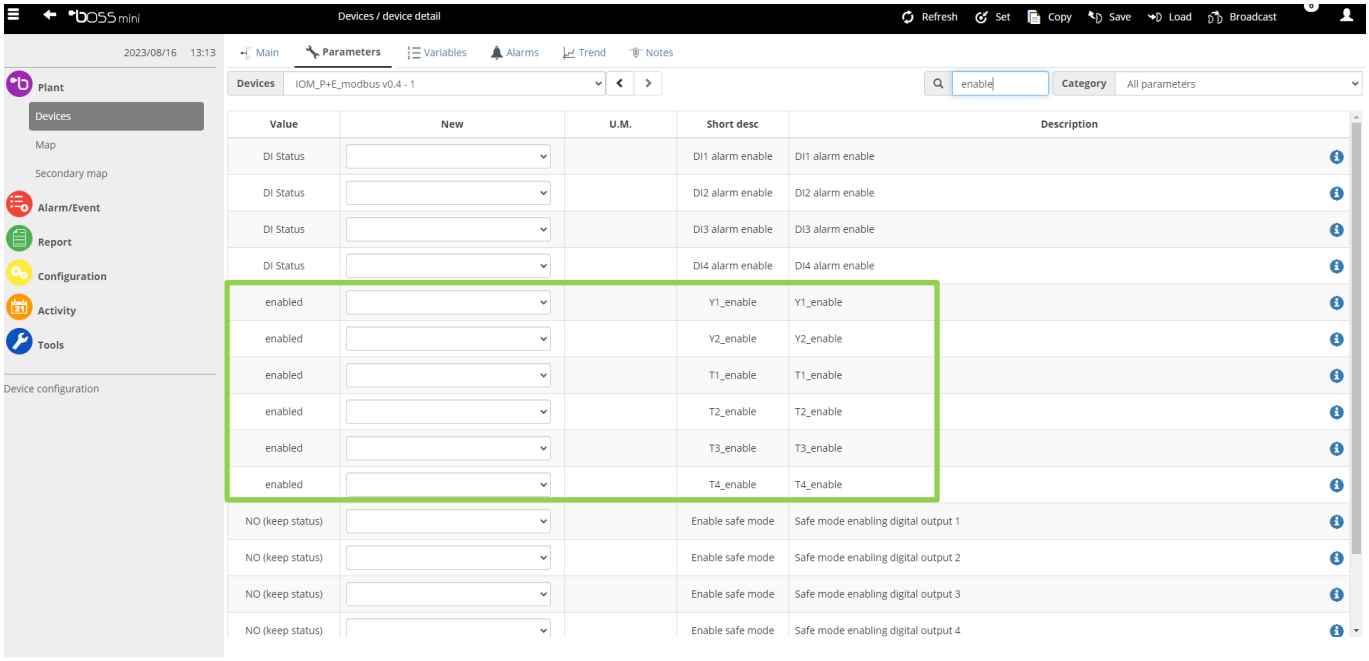
3.5 Configuration example: analog signal 0-10V

Configuration of one analog input Y1 used for 0-10V.

1. Click on the io module to enter the device page.

2. Enter **“Parameter”** and select **“All parameters”** in categories, search for **“Enable**” in the search bar.

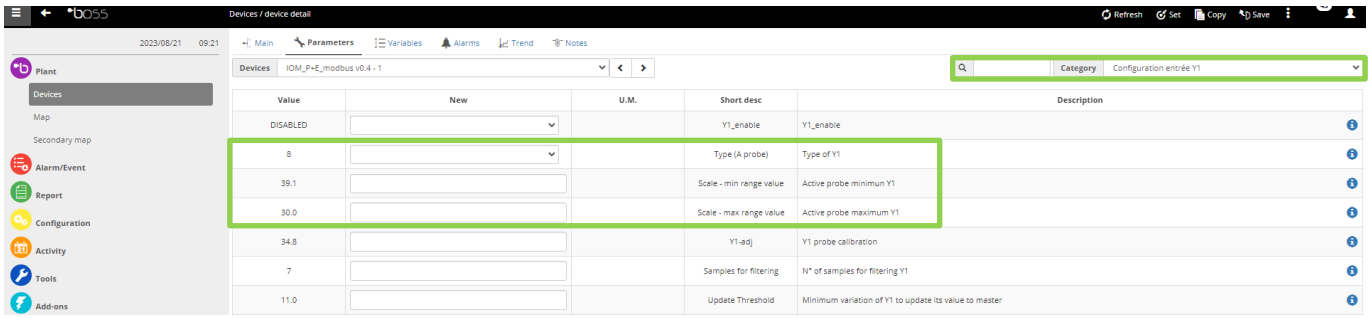
3. Disable the analog inputs T1-T4. Enable Y1. Confirm by pressing Set. In this example analog input Y1 will be used.



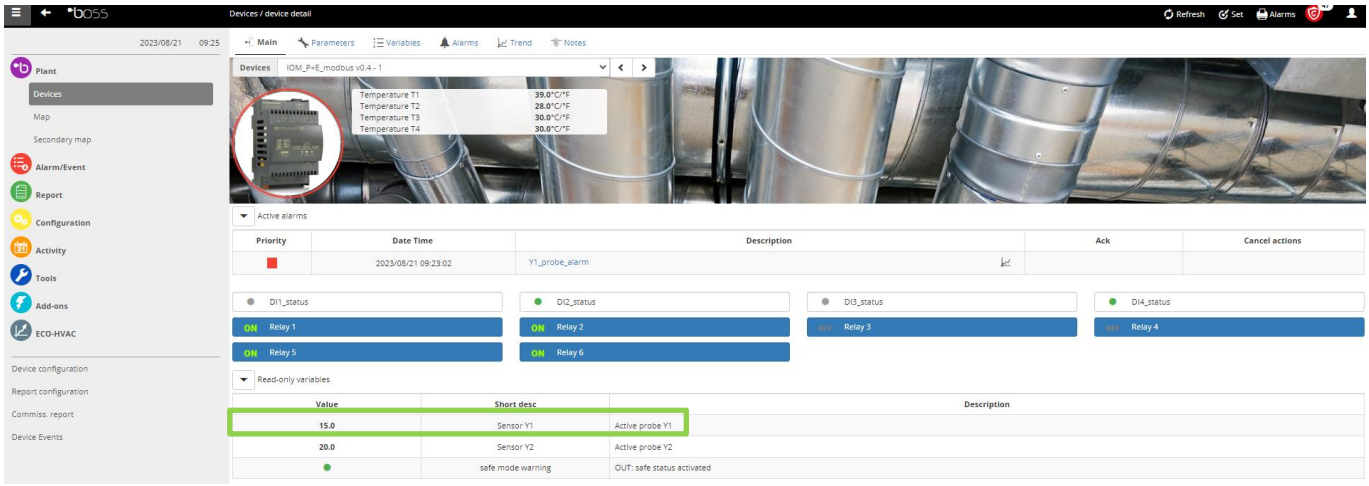
4. Select “Configuration entreé Y1” in the category menu.

5. Configured the parameters below and confirm by pressing Set

- Type (A probe) – Type of analog input (0.5-4.5V, 4-20mA, 0-10V)
- Scale – min range value – Minimum value for the analog input
- Scale – max range value – Maximum value for the analog input



7. The value of analog input can be found in the main page of the io.module. Compare it to the actual value of the external signal.



3.6 Table of alarms

Complete alarm table in Boss supervisory system.

Alarm Code	Description	Solution / parameter involved	Reset type
config_alarm	Configuration parameters error	See technical leaflet code, 100y, 2xxy and 3xxy	AUTO
ALL_Gr1	Alarm group 1	Temperature sensor, analog signal, digital input connected with alarm group 1	AUTO
ALL_Gr2	Alarm group 2	Temperature sensor, analog signal, digital input connected with alarm group 2	AUTO
ALL_Gr3	Alarm group 3	Temperature sensor, analog signal, digital input connected with alarm group 3	AUTO
ALL_Gr4	Alarm group 4	Temperature sensor, analog signal, digital input connected with alarm group 4	AUTO
ALL_Gr5	Alarm group 5	Temperature sensor, analog signal, digital input connected with alarm group 5	AUTO
ALL_Gr6	Alarm group 6	Temperature sensor, analog signal, digital input connected with alarm group 6	AUTO
T1_HI_alm	Temperature sensor 1 high temperature alarm	Parameter T1_HI_set	AUTO
T2_HI_alm	Temperature sensor 2 high temperature alarm	Parameter T2_HI_set	AUTO
T3_HI_alm	Temperature sensor 3 high temperature alarm	Parameter T3_HI_set	AUTO
T4_HI_alm	Temperature sensor 4 high temperature alarm	Parameter T4_HI_set	AUTO
T1_LO_alm	Temperature sensor 1 low temperature alarm	Parameter T1_LO_set	AUTO
T2_LO_alm	Temperature sensor 2 low temperature alarm	Parameter T2_LO_set	AUTO
T3_LO_alm	Temperature sensor 3 low temperature alarm	Parameter T3_LO_set	AUTO
T4_LO_alm	Temperature sensor 4 low temperature alarm	Parameter T4_LO_set	AUTO
Y1_HI_alm	Analog signal Y1 high alarm	Parameter Y1_HI_set	AUTO
Y2_HI_alm	Analog signal Y2 high alarm	Parameter Y2_HI_set	AUTO
Y1_LO_alm	Analog signal Y1 low alarm	Parameter Y1_LO_set	AUTO
Y2_LO_alm	Analog signal Y2 low alarm	Parameter Y1_LO_set	AUTO
T1_probe_alarm	Temperature sensor 1 probe error	Temperature sensor 1 out of range, wrong wiring, broken.	AUTO
T2_probe_alarm	Temperature sensor 2 probe error	Temperature sensor 2 out of range, wrong wiring, broken.	AUTO
T3_probe_alarm	Temperature sensor 3 probe error	Temperature sensor 3 out of range, wrong wiring, broken.	AUTO
T4_probe_alarm	Temperature sensor 4 probe error	Temperature sensor 4 out of range, wrong wiring, broken.	AUTO
Y1_probe_alarm	Analog signal Y1 probe error	Y1 signal out of range, wrong wiring, broken. Parameter Scale, min/max range value,	AUTO
Y2_probe_alarm	Analog signal Y2 probe error	Y2 signal 1 out of range, wrong wiring, broken. Parameter Scale, min/max range value	AUTO
DI1_alarm	Digital input 1 alarm	Digital input 1 alarm	AUTO
DI2_alarm	Digital input 2 alarm	Digital input 2 alarm	AUTO
DI3_alarm	Digital input 3 alarm	Digital input 3 alarm	AUTO
DI4_alarm	Digital input 4 alarm	10s	AUTO
OFFLINE	io.module OFFLINE	10s	AUTO

4. NOTE

4.1 Software release notes

SW release	Manual release	Modification description

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