

ModDALI8: 8-channel DALI gateway

ModDALI8 module allows the management, through the **CONTACTTO** bus, of 8 DALI lines controlling up to 16 devices each one. This makes it possible to control and regulate up to 128 DALI devices (ballasts, dimmers and similar).

ModDALI8 has been specifically developed to simplify the setting up and, above all, the maintenance of plants using DALI technology. In fact, DALI is a system that allows individual control of each lamp, but to achieve this result it is necessary a good deal of time to the configure the required parameters for each device (address, group, and so on). When a faulty DALI device has to be replaced, it is important to know how it was configured to assign the same parameters to the new one; otherwise, the system may not operate properly.

The addressing of DALI devices and the assignment of the groups, normally, are essential operations when different ballast, connected to the same line, should be grouped for the management of different areas (eg. Offices); addressing and grouping could be avoided simply controlling each zone by a DALI line independent from the other ones.

This is the concept around which ModDALI8 module has been developed: a multi-line device featuring DALI broadcast commands, which means commands addressed to all the devices on that line regardless of whether or not they have an address. ModDALI8 module provides 8 independent DALI lines, and up to 16 devices can be connected to each line.

For each line it is possible to perform, via the **CONTACTTO** bus, the following functions: ON-OFF switching, output level regulation (dimming), setting to well defined levels; furthermore, the module provides, for each line, diagnostic information such as the current output level, lamp failure, disconnected line.

ModDALI8 module provides 5-way terminal block for connecting the module to the **CONTACTTO** bus, and two 9-way terminal block for the 8 DALI lines; all terminal blocks are removable type. The necessary power supply to the DALI lines is provided by the module itself, thus no additional power supply is required.

A green LED near to the bus terminal signals the power on condition. Eight yellow LEDs on the front panel show the communication activity on the related DALI line; these LEDs also indicate the presence of any faults on the lines.

Two buttons on the front panel, one for the selection of the line and one for commands, allow the manual control of connected devices; the possible functions by manual operation are the continuous adjustment of the brightness level (dimming) and on/off switching by one-touch command.

The ModDALI8 module is housed in a standard modular 6M housing for DIN rail.



ModDALI8 module performs, for each line, the following main features:

- all timing functions are accomplished by the module and it may be controlled by any real or virtual input of the system, by supervisor or by video terminal
- Up/Down and Single commands may be defined for the manual regulation of lighting level
- programmable ramp, in the range 0 to 60 seconds
- setting of minimum and maximum output levels
- dynamic lights scenes can be easily implemented through MCP XT or MCP4
- the current brightness level may be stored and recalled by the user; up to 16 presets are available to create "real time" lighting scenes; the preset will be stored in the non-volatile memory of the ballasts
- diagnostics of short circuit on the DALI lines and lamp failure, with information about the line where the failure occurred
- galvanic insulation between DALI and **CONTACTTO** buses

The 16 devices of each line can be controlled exclusively in "broadcast" mode: each command sent on a line will be executed by all the devices connected on that same line, then all the related devices will behave in the same way. The ModDALI8 module can operate exclusively in systems with MCP XT or MCP 4 controller.

Address programming

ModDALI8 module takes 1 output address (1 channel, 16-bit) through which the connected DALI devices can be controlled. ModDALI8 module also takes 2 input addresses (4 channels, 16-bit) for reporting the output levels on the 8 lines and the diagnostic information.

The two input addresses are consecutive and the start address is equal to the value of output address.

The address has to be assigned by FXPRO programmer. A white label on the front panel allows to write the assigned module address.

Operation

ModDALI8 gateway module allows to integrated DALI systems in a **CONTATTO** installation. As mentioned, it is not required any addressing activities of DALI devices; to each one of the 8 lines can be connected a maximum of 16 DALI devices, for a total of 128 devices per module.

Since the DALI devices are not addressed, all devices connected to the same line can be controlled only by “broadcast” commands, like if all lamps are parallel connected (all on, all off, all to the same light level); in practice each set of DALI devices for each line will function as a “group”. Therefore, each line has to be dedicated to the lighting of a single zone (eg. offices, corridors, bathrooms, etc.).

The ModDALI8 module is able to detect problems that may occur on 8 lines; these failure conditions are:

- lamp failure
- DALI line interrupted or no ballast connected
- Short circuit on the line DALI

The module reports on which line is present the problem.

The ModDALI8 module features one 16-bit 1-channel output address to which it is possible to send the commands in the form of a code among the possible ones (see sections below) to perform the intended function.

The easiest way to control the DALI devices on each line is using two pushbuttons (Up/Down) or a single pushbutton (single command); these pushbuttons can be connected to any **CONTATTO** input module, and the operation is as described below.

Up/Down pushbuttons: pushing and holding the Up (Down) button, the brightness increases (decreases) until the max (min) value is reached. When the brightness has reached the desired level, release the button to hold it.

Single Command: holding down the button, the brightness increases until the max value is reached. Releasing and pushing again the button the brightness decreases to minimum level. Release the button at desired level to hold it.

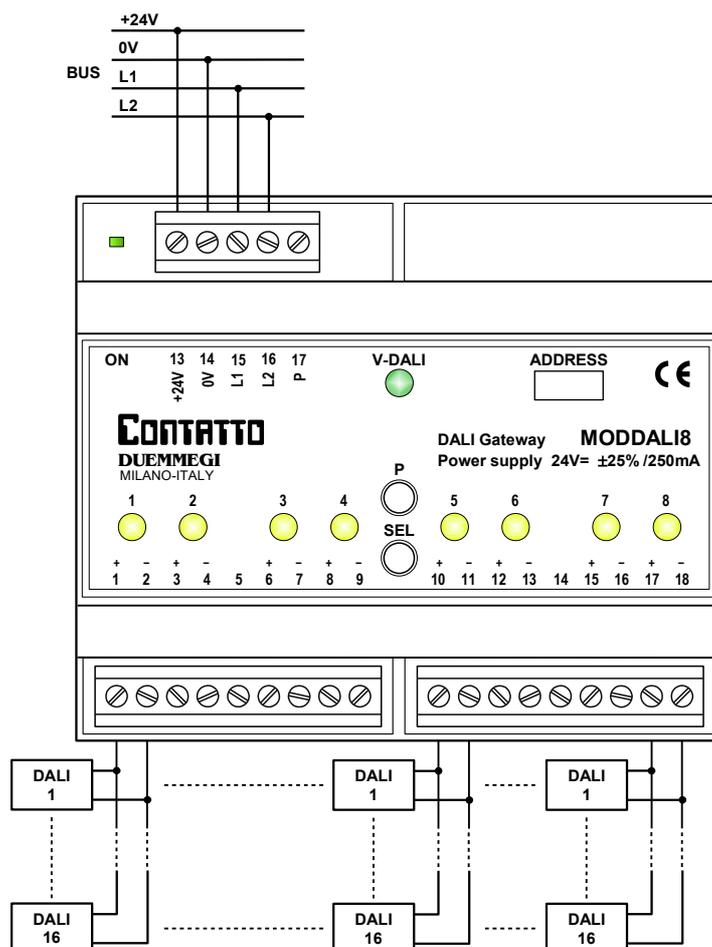


Figure 1: Schematic diagram

In addition to these these simple manual controls, it is possible to handle the DALI devices from a supervisor or a video terminal (eg. a touch screen), simply by writing to the output address the function code and the destination line.

Installation hints

The schematic diagram in Figure 1 shows the connections to be made between ModDALI8 module, the **CONTATTO** bus and the 8 DALI lines.

It is suggested the using, for the DALI lines, of a normal 2-core cables with double insulation. It's allowed to lay these cables in the same pipe in which there are power cables, provided that they have double isolation too.

It is recommended to avoid the using of multi core cables carrying both the two DALI signals and ballast supply, because the capacitive coupling between the signal wires and the power lines may cause very dangerous conditions for the human safety.

The following table gives some rules for the MINIMUM cable section. As said above, no special cables are required for the 4 DALI lines, provided that they have double insulation. In any case, the distance between ModDALI8 module and the farthest DALI device must not be more than 300 meters.

Connection	Suggested cable
CONTATTO bus	4 x 2.5 mmq unshielded
DALI lines	Up to: 2 x 0.50mmq
	Up to 175m: 2 x 0.75mmq
	Up to 230m: 2 x 1.00mmq
	Up to 300m: 2 x 1.50mmq

The buttons on the front panel are useful during the setting-up of the system to manually control the connected lights, and then check the good operation. 8 LEDs on the front panel report diagnostic information (see related paragraph).

Information from and to ModDALI8

ModDALI8 module features 4 channel per 2 input addresses, thus 8 input sections each one corresponding to a DALI line. ModDALI8 also features 1 output address 1-channel for sending commands to DALI devices.

The available information will be here described.

Input section

On each one of the two input addresses, four 16-bit channels are available for reporting the light level and the diagnostic information for each DALI line.

Said n the base address assigned to a ModDALI8 module, available information on the two input channels are described in the following tables:

Input address n:

Point	CH1=L1	CH2=L2	CH3=L3	CH4=L4
1	Current brightness line 1	Current brightness line 2	Current brightness line 3	Current brightness line 4
2				
3				
4				
5				
6				
7				
8				
9	-	-	-	-
10	-	-	-	-
11	No polling	No polling	No polling	No polling
12	Status ON	Status ON	Status ON	Status ON
13	-	-	-	-
14	Lamp Fail.	Lamp Fail.	Lamp Fail.	Lamp Fail.
15	No ballast	No ballast	No ballast	No ballast
16	Short Circ.	Short Circ.	Short Circ.	Short Circ.

Input address n+1:

Point	CH1=L5	CH2=L6	CH3=L7	CH4=L8
1	Current brightness line 5	Current brightness line 6	Current brightness line 7	Current brightness line 8
2				
3				
4				
5				
6				
7				
8				
9	-	-	-	-
10	-	-	-	-
11	No polling	No polling	No polling	No polling
12	Status ON	Status ON	Status ON	Status ON
13	-	-	-	-
14	Lamp Fail.	Lamp Fail.	Lamp Fail.	Lamp Fail.
15	No ballast	No ballast	No ballast	No ballast
16	Short Circ.	Short Circ.	Short Circ.	Short Circ.

The first available information (the 8 lower bits) for each channel is the brightness level of the DALI devices connected to the related DALI line. The value of the reported brightness level is in the range 0 to 100.

The diagnostic information available on the high byte of each channel is described here below:

No polling: During normal operation, the module constantly polls the connected DALI devices to detect the brightness levels and possible failures; if necessary, this polling activity can be stopped (by sending a command as described later): the point 11 indicates this condition (point=1 means polling stopped).

Status ON: point 12 is activated when the brightness level on the corresponding line is non-zero.

Lamp Fail.: point 14 is activated when one or more lamps on the corresponding line is faulty.

No ballast: point 15 is activated if the corresponding line is not connected to any DALI device.

Short Circ.: point 16 is activated in case of short circuit on the corresponding line.

ModDALI8

Output section

On the output addresses, one 16-bit channel is available for sending commands to the devices connected to the 8 lines, as described in the following table:

Point	Description
1	Function
2	
3	
4	
5	
6	
7	
8	
9	Destination
10	
11	
12	
13	
14	
15	
16	

The *destination* can assume values in the range 1 to 8 to identify to which line the command has to be sent; in addition, the destination can have value 0: in this case the command will be sent to all the 8 lines (thus to all DALI devices connected to the module).

The function executed by the module depends on the value written on the low byte of the channel, as described in the following table:

Written data		Function
HEX	DEC	
0x00 ÷ 0x64	0 ÷ 100	Set the brightness to 0÷100% according to the current ramp
0x70	112	Disable polling
0x71	113	Enable polling
0x7D	125	Up command without one-touch function
0x7E	126	Down command without one-touch function
0x7F	127	Single command without one-touch function
0x80	128	No operation
0x87	135	Set the current brightness a MIN value
0x88	136	Set the current brightness a MAX value
0x89	137	Reset MIN value to default (1%)
0x8A	138	Reset MAX value to default (100%)
0x8B	139	Save the current brightness as level to be loaded during bus failure condition
0x8C ÷ 0xAA	140 ÷ 170	Set the current ramp to 0 ÷ 30 seconds (1s step)
0xAB ÷ 0xAD	171 ÷ 173	Set the current ramp to 40 ÷ 60 seconds (step 10 s)
0xB5 ÷ 0xC4	181 ÷ 196	Save the current brightness to Preset 1÷16
0xC9 ÷ 0xD8	201 ÷ 216	Recall brightness from Preset 1÷16 according to current ramp

The value to be written in the channel to perform a given function to a given destination will be thus:

- in hexadecimal: 0xYYZZ where YY is the destination in hexadecimal format (HEX) and ZZ is the code of the function in hexadecimal format (HEX)
- in decimal: K where K is given by [(256 x YY) + ZZ], where YY is the destination in decimal format (DEC) and ZZ is the code of the function in decimal format (DEC)

Notes:

- ModDALI8 module, normally, polls all the devices connected to the 8 lines; this polling can be disabled, independently for each line, sending the code 112 (of course losing all information about the diagnostic and the current level). The code 113 enable again the polling; the current status of the polling is reported by the point 11 of the input channel (if enabled). At the module power up or after a reset the polling is always enabled by default.
- The code 128 is required only to inform ModDALI8 about when interrupt a running function. For instance, to perform an Up function, the code 125 must be sent: the brightness will increase until the sending of code 128.
- The code 139 saves, in the non volatile memory of the ballasts, the brightness level which will be automatically recalled when during a DALI bus failure condition or during a communication loss with MCP XT or MCP 4 controller.
- The change from a brightness level to another one will be executed according to a ramp that can be set as desired by the codes 140 to 173. The ramp value will be stored in the non volatile memory of the ballasts, therefore a power failure does not affect it.

The sending of commands or values to DALI devices can be performed through a supervisor simply writing the memory locations of MCP XT or MCP 4 related to the output channels of the installed ModDALI8 modules.

As option, or in addition, it is possible to send commands or value from MCP XT or MCP 4 to the desired DALI line through proper equations as in the following example:

```
V1 = !(I1.1 | I1.2 | I1.3)
AO10:1 = P(0x0180)V1 & \
        P(0x017D)I1.1 & P(0x017E)I1.2 & \
        P(0x0132)I1.3
```

where I1.1 and I1.2 are, for instance, the Up and Down inputs and AO10:1 is the channel 1 of ModDALI8 having address 10; I1.3 will set the brightness to 50%. The specified value, at each variation, will be transferred to the DALI output (AO10:1) line 1. At the releasing of each pushbutton, the value 128 will be sent (no operation, but needed to inform the module about the releasing of the buttons).

Commands from the front panel

ModDALI8 features two pushbuttons on the front panel: at each pushing of SEL button, one of the 8 lines will be selected; the currently selected line is indicated by the lighting of the related LED on the panel. The P button has the following functions: a short press causes alternately the switch ON or OFF, while holding down the button, the brightness increases or decreases depending on the previous action (every long press reverses the previous action).

Meaning of the LEDs on the front panel

For each DALI line, the related LED continuously flashes during normal operation. Since the 8 lines are sequentially polled, thus the LEDs flash in the same way, even if MCP controller is not connected.

The LEDs on the front panel will be fixed lighted when one or more of the following events will occur on the related DALI line:

- Lamp failure
- Dali line broken or no device connected
- Short circuit on DALI line

In the case of short circuit, an automatic procedure will try to restore the fault line, thus allowing to module to return to the normal operation with a maximum 15 sec delay after the short circuit condition has been removed.

All the LEDs will be instead switched off if the polling has been disabled or in case of module failure.

In any case, the occurred problem can be discriminated by MCP Visio or by a supervisor or video-terminal connected to MCP (reading input channel as described in the related paragraph).

Note:

- In lamp failure condition, it is not possible to know on which DALI device this event occurred: it is only possible to know on which of the 8 lines of ModDALI8 the failure is present.

Setting the operating parameters

MCP IDE allows to set the operating parameters of each DALI line during the system setting up and to perform some diagnostic functions.

ModDALI8 module features several customizing levels, thus allowing to adapt it to any specific application. The setting up is performed via the **CONTATTO** bus and MCP XT or MCP 4 through MCP Ide program, selecting, from the main menu, Configuration, Lighting Gateway and ModDALI8. The configuration window in Figure 2 will be shown.

The address of ModDALI8 to be managed has to be entered on the top side of the configuration window.

Three tabs in the window allow some well defined functions as described in the following.

The button ID & Ver. on the lower side allows to read the firmware version of the selected ModDALI8 module.

Global Settings

In this tab it is possible to set, for all ballasts on the selected line, the following parameters:

Line (1..8): the line number of ModDALI8 to be managed.

MIN: minimum brightness value (%); enabling the Reset check box, the default value will be restored (1%).

MAX: maximum brightness value (%); enabling the Reset check box, the default value will be restored (100%).

BUS F.: the brightness value (%) to be recalled by ballasts during bus failure conditions on **CONTATTO** and/or DALI bus; the value 101 means holding the previous value.

Ramp: the ramp value in seconds.

Pwr On: the value (%) to be recalled by ballasts at power ON; the value 101 means holding the last value.

Preset: writing a value (0 to 100) and clicking on the button on the right side, the brightness will be forced to that value.

M1 ÷ M16: the value to be loaded into the 16 presets; the button on the right side allows to recall the related preset stored into the ballast.

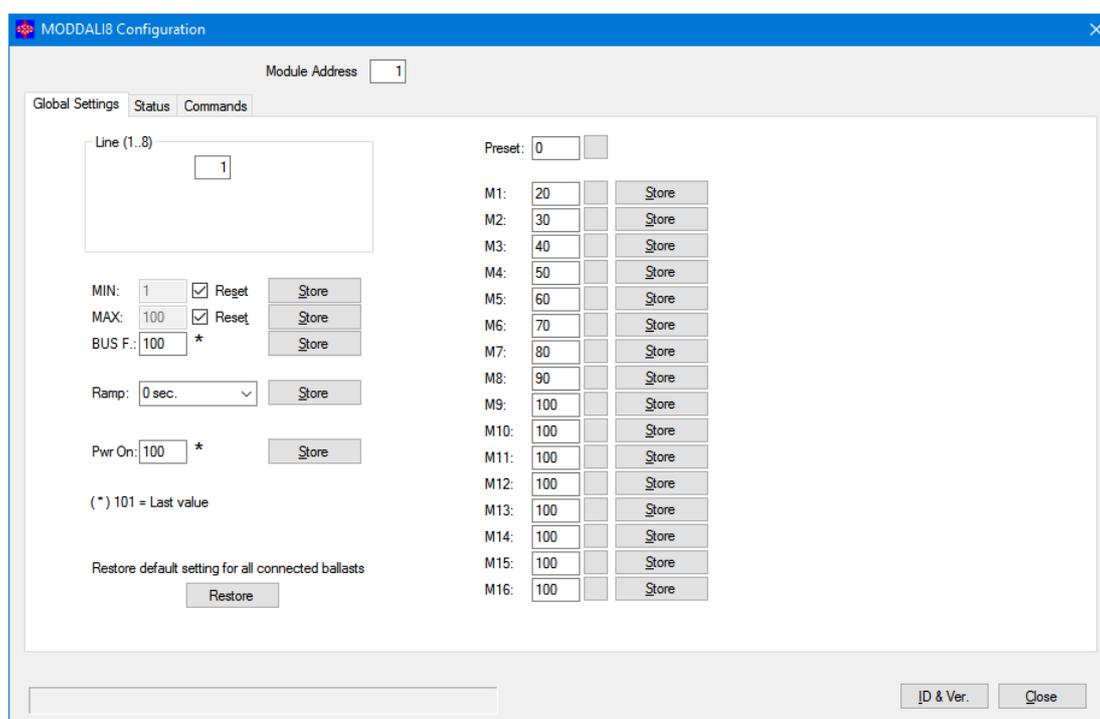


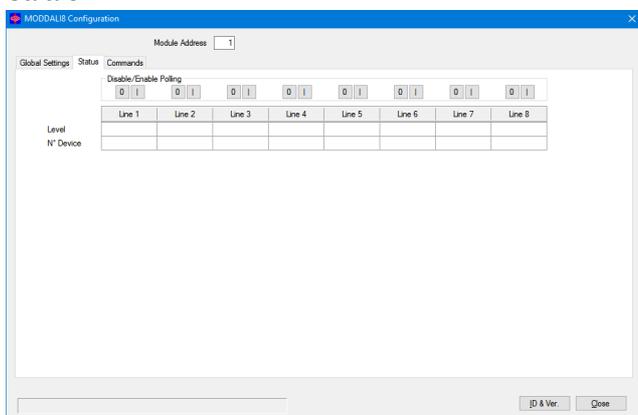
Figure 2: ModDALI8 Configuration window

Restore default setting for all connected ballasts: the DALI devices are factory set without any address and with a basic configuration for the main parameters; the following table shows a typical default configuration:

Parameter	Value
Minimum brightness level	1%
Maximum brightness level	100%
Brightness level in failure conditions	100%
Ramp value	0 seconds
Preset	None

These settings can be restored for all ballasts connected to the specified line.

Status

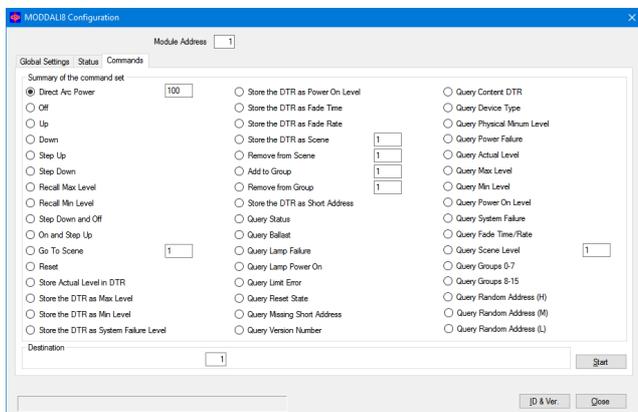


This tab shows the current brightness level of each DALI line. These values are in the range 1 to 100; it is possible to force the brightness by double-clicking on the related cell and entering the desired value.

The line N. Devices reports how many ballasts have been detected on each line.

8 buttons 0/1 on the top side of the table allow to enable and disable the polling independently for each line of the module. When the polling is disabled, the related label of the channel will be shown over a red background.

Commands

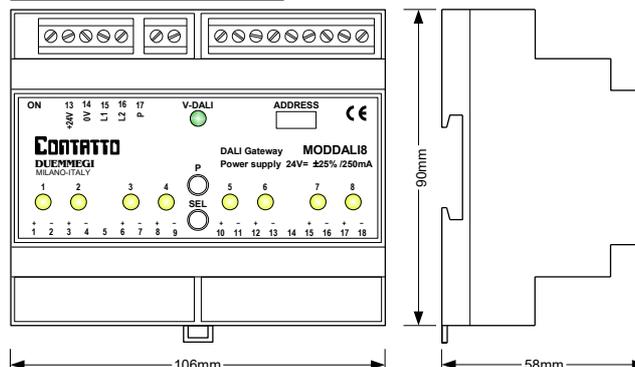


This tab provides various commands related to DALI protocol; using of this commands needs a well knowledge of this protocol and it is thus reserved to qualified personnel.

Technical characteristics

Supply voltage CONTATTO bus side	24V $\pm 25\%$
Supply voltage DALI bus side	Generated by the module
MAX current consumption CONTATTO bus side	250mA
Number of DALI lines	8, broadcast commands
Number of DALI devices for each line	16 MAX
Operating temperature	-10 ÷ +50 °C
Storage temperature	-30 ÷ +85 °C
Protection degree	IP20

Outline dimensions



Correct disposal of the product (waste electrical & electronic equipment)



(Applicable in the European Union and other European countries with separate collection systems). This marking on the product, accessories or documentation indicates that the product and its electronic accessories should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. Adequate disposal of the decommissioned equipment for recycling, treatment and environmentally compatible disposal contributes in preventing potentially negative effects on the environment and health and promotes the reuse and/or recycling of equipment materials. Abusive product disposal by the user is punishable by law with administrative sanctions.

Installation and use restrictions

Standards and regulations

The design and the setting up of electrical systems must be performed according to the relevant standards, guidelines, specifications and regulations of the relevant country. The installation, configuration and programming of the devices must be carried out by trained personnel.

The installation and the wiring of the **CONTATTO** bus line and the related devices must be performed according to the recommendations of the manufacturers (reported on the specific data sheet of the product) and according to the applicable standards.

All the relevant safety regulations, e.g. accident prevention regulations, law on technical work equipment, must also be observed.

Safety instructions

Protect the unit against moisture, dirt and any kind of damage during transport, storage and operation.

Do not operate the unit outside the specified technical data.

Never open the housing. If not otherwise specified, install in closed housing (e.g. distribution cabinet).

Earth the unit at the terminals provided, if existing, for this purpose.

Do not obstruct cooling of the units.

Setting up

The physical address must be assigned with the specific programmer and the setting of parameters (if any) must be performed by the specific configuration softwares; for more details refer to the specific data sheet of the product. For the first installation of the device, generally and unless otherwise specified on the specific data sheet of the product, proceed according to the following guidelines:

- Check that any voltage supplying the plant has been removed
- Assign the address to module (if any)
- Install and wire the device according to the schematic diagrams on the specific data sheet of the product
- Only then switch on the 230Vac supplying the bus power supply and the other related circuits

Applied standards

The devices belonging to **CONTATTO** line comply with the essential requirements of the following directives:

2014/30/UE (EMC)

2014/35/UE (Low Voltage)

2011/65/UE (RoHS)

Note

Technical characteristics and this data sheet are subject to change without notice.