

ModDI: 500W dimmer module

ModDI module allows the regulation, through the **CONTATTO** bus, of resistive, capacitive and inductive loads up to 500W, such as incandescent and halogen lamps (with or without transformer). ModDI module require MCP XT controller.

ModDI module uses the IGBT transistor technology, instead of TRIAC, to vary the "duty cycle" (on/off time) of the 230V~ line voltage; the control technique can be selected between "trailing edge" (for resistive and capacitive loads) and "leading edge" (for inductive transformer). This used technology allows to control the EM interferences avoiding the use of noisy chokes. The IGBT technology also allows to protect the module against overloads, short circuits and over voltages.

ModDI module performs the following main features:

- all functions are accomplished by the module and they may be controlled by any real or virtual input of the system
- Up/Down and Single commands
- one-touch function for recalling the last stored value or for recalling a user defined value
- 2 programmable ramps, range 1 to 60 seconds
- possibility to limit minimum and maximum levels
- dynamic lights scenes can be easily implemented
- the current brightness level may be stored and then recalled; up to 9 presets are available, allowing to create "real time" lighting scenes
- the brightness may be controlled by a supervisor, simply writing the desired brightness level to the module outputs
- the supervisor may read the current output level
- if a bus failure occurs, the brightness will be automatically set to a user-defined level

A removable 5-way terminal block allows the connection to the **CONTATTO** bus, while a fixed 4-way terminal block on the opposite side allows the connection to 230V~ power supply and to the lamps. 3 diagnostic LEDs on the front panel provide information about the operating status of the module (for details see the related paragraph). ModDI module is housed in a standard 3M modular box for rail mounting .

Note: this data sheet refers to ModDI with FW 1.1 or higher.

Mode of Operation

ModDI module can be controlled by one or more pushbuttons connected to input modules of the Contatto bus. The module may be controlled by two pushbuttons (Up/Down) and by a single pushbutton as here bottom described.

Up/Down pushbuttons: pushing and holding 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 and, after 1 second about, the brightness decreases to the min value, then it increases again and so on. Release the button at the desired level to hold it.



When the lamp is ON, a short pulse (one-touch) on any control button will cause the complete switching OFF, while if lamp is OFF it causes the switching ON to last brightness level or to a fixed programmable value. The one-touch function can be disabled: in this case, it is possible to install some buttons allowing the regulation of the brightness level among the minimum and maximum value.

ModDI module also allows to define one or more (real and/or virtual) inputs recalling some brightness levels that can be freely set during the setting up. These levels, called Pre-sets, can be also set by a supervisor simply sending to the module the desired brightness level in the range 0÷100%.

Address programming

ModDI module takes 1 output address, 4-channel 16-bit. The address has to be assigned by FXPRO programmer.

A white label on the front panel allows the writing of the programmed module address for an immediate visual identification.

Protections

ModDI module features an internal current limiting circuit; when the load current overrides a fixed threshold, the protection circuit switch OFF the power devices (IGBT). If the overload endures for less than a defined time, then the normal operation will be restored as soon as the overload is removed, otherwise the output will be held in OFF state until a new command is sent and however for the next 5 seconds starting from the protection occurrence. This circuit also protects the module against short circuit on the output.

ModDI module also features a protection circuit against over voltages on the output that can be generated, for instance, when a strongly inductive load has been connected. In this case too, the module will be maintained in lock condition until a new command is sent and however for the next 5 seconds starting from the protection occurrence.

Finally, ModDI module features a protection against over temperature: when the detected temperature overrides a fixed value, the load will be switched OFF, denying any further switching ON command until the temperature goes down under a fixed safety threshold.

LEDs meaning

Three LEDs on the front panel of ModDI module report some information about the operating status.

The meaning of the Line/Load LED is the following:

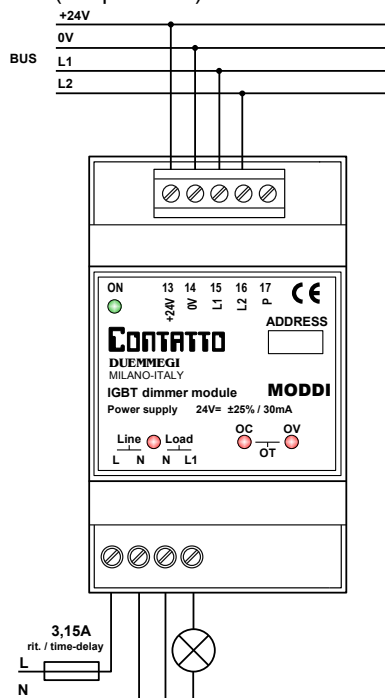
Line/Load	Meaning
Blinking	Line (230V~) loss
OFF	Output level is 0
ON	Output level is not 0 (load is ON)

The meaning of the two LEDs OC/OV/OT is the following:

OC	OV	Meaning
OFF	OFF	Normal operation
ON	OFF	Overload protection activated
OFF	ON	Over voltage protection activated
ON	ON	Thermal protection activated

Wiring diagram

The L-N supply circuit must be protected by 3,15A 250V time-delay fuse (not provided).

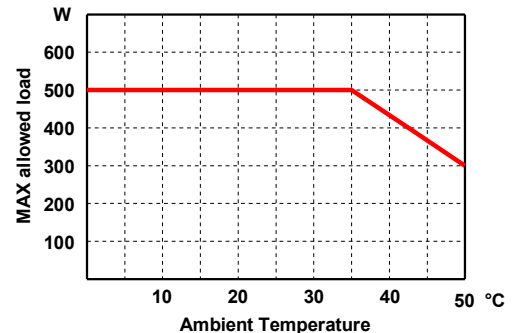


Installation hints, operating conditions and maintenance

Ensuring a good cooling is an essential condition for reliable and safe operation. ModDI module produces about 1.2% heat with regard to the connected load; for instance, with 300W connected load, the dissipated power is around 3.6W, therefore the installation must take in account this data and an adequate air volume and recirculation must be foreseen. If the natural air circulation cannot be guaranteed, a fan must be provided inside the cabinet.

The module must be mounted in vertical position, so that to allow an adequate air circulation through the ventilation holes on the housing.

The power section of ModDI module has been developed for 230V~ ±15%, 50Hz mains supply. The minimum power of the connected load must be 20W, and the maximum power must not override 500W at 35°C max ambient temperature; at higher temperatures, the max allowable load decrease as shown in the following diagram. Anyway, the ambient temperature cannot be higher than 50°C.



A time-delay 3,15A 250V protection fuse on line L is recommended, to be installed outside the module (see wiring diagram).

Periodically control, after having removed the line voltage, the correct tightening of the terminal block screws, the adequate air circulation and check that no humidity traces are present.

Commands and bus information

As said before, ModDI module takes 1 output address, 4-channel 16-bit, reporting the following information:

Point	CH1	CH2	CH3	CH4
1				
2				
3				
4				
5			Command	
6				
7	Set output level			
8	(0..100)	Not used		Reserved
9	and report current		-	
10	output level		-	
11			-	
12			-	
13			No Line	
14			I >	
15			V >	
16			T >	

The detailed meaning of this output information is here described.

Output channel CH1

This channel always reports the current level on the output as value in the range 0 to 100. Writing a number in the range 0 to 100 to this channel, that value will be set on the output. Values outside this range will be rejected.

Output channel CH2

At this moment this channel is not used.

Output channel CH3

The high byte of this channel reports some diagnostic information as follows:

- *point 13 - No Line*: it is activated when the 230V~ line is not connected or it is not present
- *point 14 - I >*: it is activated after the intervention of the overload or short circuit protection
- *point 15 - V >*: it is activated after the intervention of the over voltage protection (probably because the connected load is of inductive type, therefore not allowed)
- *point 16 - T >*: it is activated after the intervention of the thermal protection (over temperature)

These points, even if they are output points, cannot be modified from the bus and must be used only to report to the supervisor the related diagnostic information.

The low byte of this channel allows to set a value on the output or to execute a command.

Assigned the address **n** to the module, the executed function depends on the value of the byte written to channel 3 of output **on** as in the following table:

Data written to On : 3	Function
0÷100	Set the brightness to 0÷100% according to current ramp
101÷109	Save the current brightness to Preset 1÷9
110	Save the current ramp as default primary ramp
111÷119	Recall the brightness from Preset 1÷9 according to current ramp
120	Save the current ramp as secondary ramp
125	Up command without one-touch function
126	Down comm. without one-touch function
127	Single comm. without one-touch function
128	No operation
129	Up command with one-touch function
130	Down command with one-touch function
131	Single command with one-touch function
132	Switch ON to MAX with secondary ramp
133	Set the brightness to 0 with secondary ramp and store last value
134	Set the brightness to last level value with secondary ramp
135	Set the current brightness as MIN value
136	Set the current brightness as MAX value
137	Reset MIN level to default (5%)
138	Reset MAX level to default (100%)
140 ÷ 170	Set the current ramp to 0 ÷ 30 seconds (1 second steps)
171 ÷ 173	Set the current ramp to 40 ÷ 60 seconds (10 seconds steps)

Two ramps are available for changing from a brightness value to another: these ones are called current ramp (or primary) and secondary ramp. The current ramp must be set by the codes 140 ÷ 173; the code 110 allows to save the current value as default primary ramp and the code 120 allows to save the current value as secondary ramp. These values are stored in a non-volatile memory, avoiding the loss when a power supply failure occurs.

At module power-up, the default value of the primary ramp become the current value; this value affects all the brightness changes with the exception of switching ON and OFF by codes 132, 133 and 134 (for these codes the value of the secondary ramp will be used).

The using of two distinct ramps allows, for example, the possibility to control the outputs according to a (current) slow ramp to create light scenes, dynamic lights and automatic light controls and to have quick switching ON and OFF commands according to the (secondary) fast ramp.

Notes:

- the switching ON and OFF by one-touch function is made according to the current ramp
- the ramp used for the brightness control by Up, Down and Single command pushbuttons is fixed and cannot be modified

To send commands and values from MCP XT to the dimmer module, the equations for the Preset of analog values (on channel 3 of the module) have to be used as in the following example:

```
V1 = !(I1.1 | I1.2 | I1.3)
AO1:3 = P(129)I1.1 & P(130)I1.2 & \
        P(50)I1.3 & P(128)V1
```

where **I1.1** and **I1.2** are Up and Down inputs and **AO1:3** is the channel 3 of the dimmer; **I1.3** will cause the setting of brightness to 50%. At the releasing of each button, the value 128 will be sent (no operation, required to stop the Up, Down and Single commands at the releasing of the related button).

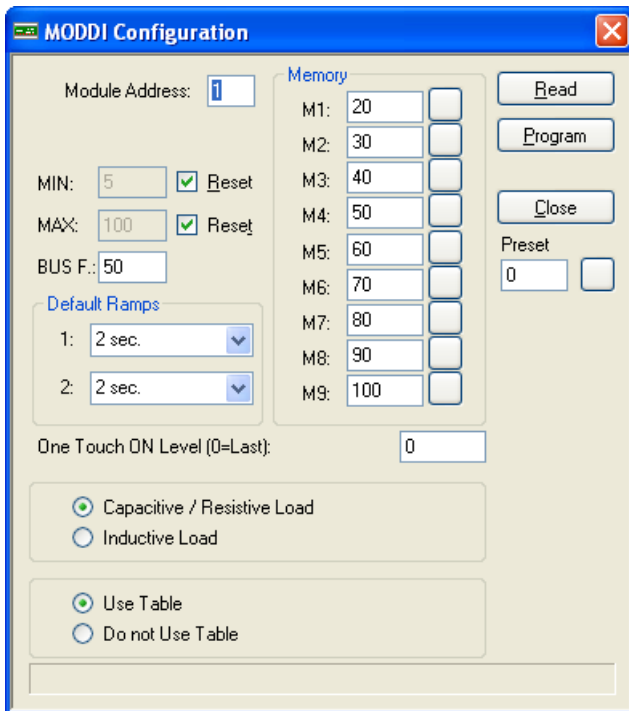
In the Configuration section of MCP Ide (release 3.0.0 or higher), for this same example, the following lines must be included:

```
MODDI = ( O1 )
FIELDtoRAM = ( AO1:1, O1:3.13..O1:3.16, \
AO1:4 )
```

The **FIELDtoRAM** directive, applied to channels 1 and 4 and to points 13 to 16 of channel 3, is absolutely required. Clicking on the “life jacket” icon (Keywords List) in the configuration section of MCP Ide and double clicking on ModDI, these two directive will be automatically proposed (to be completed with the proper address).

Setting the operating parameters

MCP Ide (release 3.0.7 or higher) allows to set the operating parameters of ModDI module during the setting up. From the menu of MCP Ide select *Programming* then *Modules Configuration* and finally *ModDI*; the following window will be shown.



The required parameters in this window are:

- Module Address: address of ModDI module to be configured
- MIN: minimum brightness level; select Reset checkbox to restore the default value (5%)
- MAX: maximum brightness level; select Reset checkbox to restore the default value (100%)
- BUS F.: the brightness level (%) to be loaded to the output when a bus failure occurs
- Default Ramps: the value of the primary and secondary ramps
- Memory: the values to be loaded to the 9 Presets; the button on the right side of each value allows to recall the related Preset currently stored in the module
- Preset: writing a value in the range 0 to 100 and clicking on the button on the right side, the brightness level will be forced to that value
- One Touch ON level (0=Last): this value is the ON level loaded by a one-touch command; if set to 0, a one-touch command while the lamp is OFF will switch ON to the last stored value. If this parameter is set to a value in the range MIN to MAX, the one-touch command while the lamp is OFF will switch ON to that same value
- Capacitive/Resistive Load: allow to set DFDI2 module according to the type of load to which it is connected

- Use Table: activates a conversion that linearize the relationship between the value sent to the module (0..100%) and the brightness; the opposite option (Do not Use Table) can be used to disable this correction and it can be useful when driving dimmable energy saving lamps (which have a value/brightness relationship very different in respect to incandescent lamps).

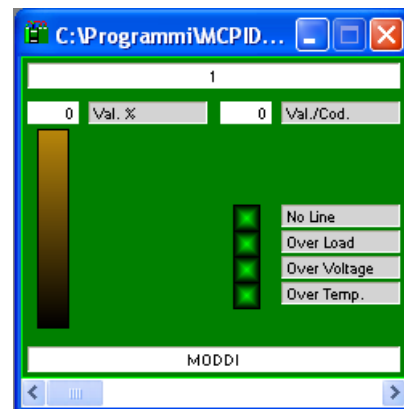
Fill out this window with the wanted values and then click on the *Program* button to transfer the shown configuration to the dimmer channel. The button *Read* allows to read the current configuration of the selected ModDI module and to show it in window.

Factory setting

The factory setting of the parameters is shown in the just described configuration panel.

Mapping

MCP Visio (release 3.0.7 or higher) allows to display the map of ModDI module as in the following figure.



The meaning of the several components in this module symbol are the following:

Val.%: shows the current output level (0÷100) and it is the channel 1 value; the vertical bar shows in a graphical way the same level. Writing a new value in the related text box, this one will be transferred to the output

Val./Cod.: allows to send a value or a command code to ModDI module writing it in the related text box; it is the channel 3

No Line: when activated means that 230V~ line is not present; this point cannot be written

Over Load: when activated means that an overload or short circuit occurred; this point cannot be written

Over Voltage: when activated means that an over voltage occurred; this point cannot be written

Over Temp.: when activated means that an over temperature occurred; this point cannot be written

As for all **CONTATTO** modules, the background of the module symbol is green if the module is connected and properly operating, otherwise the background is red.

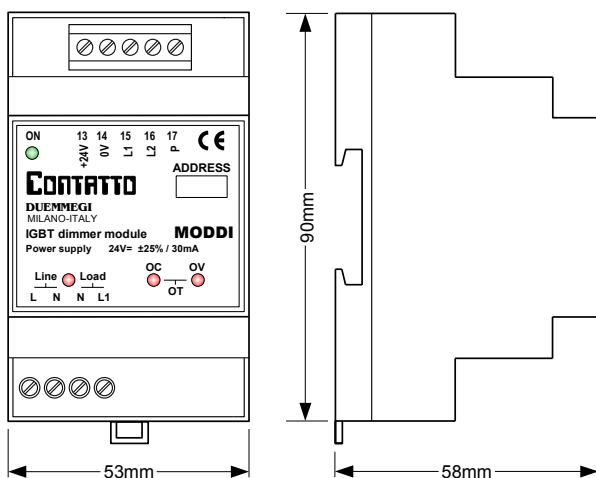
Technical characteristics

Supply voltage	24V \pm 25% SELV
MAX current consumption, bus side	30mA
Allowed load	<ul style="list-style-type: none"> Incandescent or halogen lamps: 20÷500 W, 230V~ 50Hz (also see the graph load/temperature) Ferromagnetic or electronic transformers with secondary winding closed on resistive load (low voltage halogen lamps): 20÷500 VA, 230V~ 50Hz (also see the graph load/temperature) dimnable LED lamps 230V~: up to 80W (*) dimnable energy saving lamps (ESL): up to 80W (*)
Dissipated power	1.2% of the nominal power of the connected load
Protection fuse for line L	3,15A / 250V time-delay, to be externally installed (not provided)
Electronic protections	Short circuit, overload, over voltage and over temperature
Operating temperature	-10 ÷ +50 °C (at 50 °C the MAX allowable load is 300W)
Storage temperature	-30 ÷ +85 °C
Protection degree	IP20

Notes: ModDI module cannot drive fluorescent lamps.

(*) For LED or ESL lamps, the operation closely depends on the exact type of used lamp; it is not possible to guarantee in advance the proper operation with this kind of lamps, even if they are declared as dimmable.

Outline dimensions



Correct disposal of this 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 literature indicates that the product 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. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

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 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. Keep out of the reach of children.

Setting up

The physical address assignment and the setting of parameters (if any) must be performed by the specific softwares provided together the device or by the specific programmer. For the first installation of the device 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

This device complies with the essential requirements of the following directives:

- 2004/108/CE (EMC)
- 2006/95/CE (Low Voltage)
- 2002/95/CE (RoHS)

Note

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