DFLS / DFLS-P: module for ambient light measurement with integrated brightness and occupancy (-P type) sensors

DFLS module allows to transmit, over the **Domino** bus, the ambient brightness value detected by the sensor integrated in the module itself. DFLS-P version provides a built-in presence sensor.

DFLS module also provides two generic **Domino** digital inputs (ON/OFF with NO/NC settings); one of these ones can be set as input for additional presence sensors (for instance the **DUEMMEGI** module code SRP) that will be paralleled to the presence sensor integrated in the module (in the case of -P version).

DFLS module can be well applied in the brightness regulation of offices, stores and open spaces, allowing to develop applications complying with the new European norms about the energetic classification of the plants (European Norm EN 15232).

DFLS module is suitable for false ceiling mounting; the sensor detects the light reflected by the surface under it (for instance the floor or a desk). The special integrated sensor has the same spectral sensitivity of the human eye.

As for almost all modules of **Domino** family, the power supply required for the module operation is derived from the bus itself.

The module features a 5-way removable terminal block for the connection of **Domino** bus and of the two inputs. On a side of this terminal block, a small push-button allows the address programming and a green LED shows when the module is ready to receive the address itself; the same LED normally flashes every 2 seconds about to signal that the module is properly operating. A blue LED (-P version only) flashes when the presence sensor detects a movement.

DFLS module takes, inside the **Domino** bus, two consecutive input addresses. On the label of the module, a frame allows the writing of the programmed module base address for an immediate visual identification.
For more details about the programming, refer to the related documentation.
DFLS housing is made by plastic material with IP20 protection degree.

Address programming

DFLS module takes, inside the **Domino** bus, 2 consecutive input addresses. It is however enough to assign to the module a single base address which must be less or equal to 254; for details about the information related to each address refer to the following paragraphs.
For more details about the address assignment, refer to the related documentation.
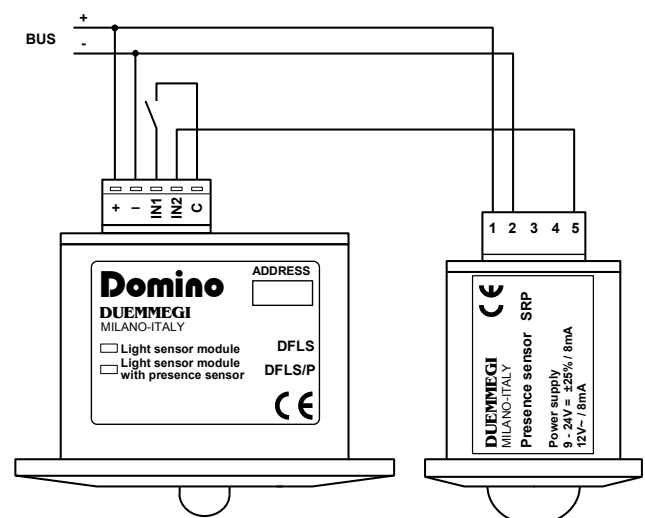
Wiring

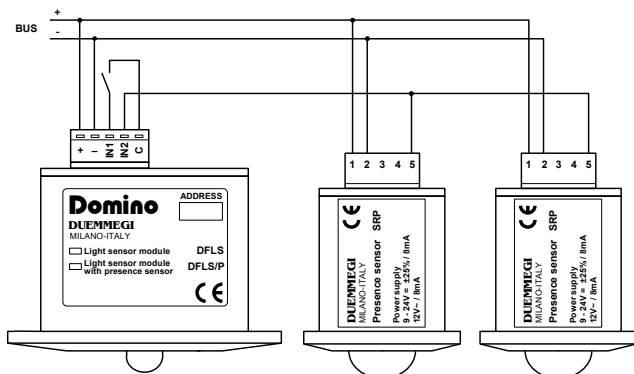The following schematic diagram shows the required connections for DFLS module.
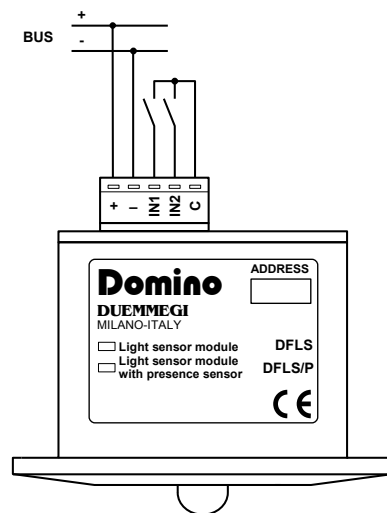
In the case of -P version, IN2 input can connected to an additional presence sensor which must operate in parallel with the built-in sensor; for the **DUEMMEGI** SRP sensor the wiring is the following:

If more SRP occupancy detection sensors are required, refer to the following schematic:


Detection characteristic (-P)

The occupancy sensor can detect a movement in the range of 5 meters under the sensor itself.

When a body is moving, thanks to the detection of infrared radiation emitted by the body itself, the sensor will be able to detect the movement.

For the calculation of the covered area refer to the following formula:

$$D = H \times 2.30$$

where D is the diameter of the cone basis and H is the mounting height, as shown in the following figure.
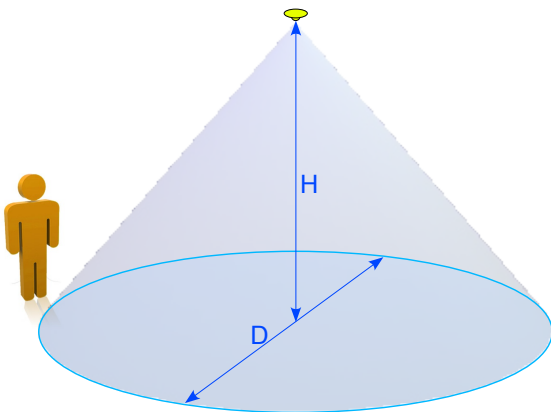
Installation hints

The correct positioning of the sensor plays a fundamental role in the application of automatic light regulation. Even if it is hard to give a general rule for the positioning of the sensor, because each specific case could be evaluated, as approximated general rule the sensor could be installed on the false ceiling in a proper position avoiding the _direct_ incidence of external light entering from windows or other openings (in practice the optimal position is the darker location of the ceiling in all the conditions).

This because, on the contrary, the direct light should be predominant in respect to the reflected light that is, at the end, the light to be regulated (because, generally, the purpose is to make constant the illumination of the working desks).

For instance, in the case of a room with two windows on the same wall, the sensor may be placed near to the same wall between the two windows. Also, a "stable" surface under the sensor is needed: this surface must be at a constant distance from the sensor and it must have always the same color (it may be the floor or a bookcase or other).

The height and position for proper installation must be however evaluated taking in account also the occupancy sensor and the physical shape of the room. Given that the occupancy detection is based on the detection of infrared emissions, it is good practice to take in account also the following aspects related to the use and to the installation of DFLS-P module, in order to avoid errors in the detection by the sensor itself.

Detection of heat sources other than a human body

The following cases show various situations where detection mistakes by the detection sensor may happen.

✗ small animals entering in the detection range

✗ infrared emissions from sunlight, incandescent light or some other sources of far infrared rays

✗ sudden change of the temperature due to the entry of cold or warm air from an air-conditioning or heating unit or water vapor from a humidifier

Bad conditions for the detection

✗ the detection of movement by the sensor could be disturbed by the occupancy of glasses objects, acrylic or other materials that may shield the infrared rays

✗ a heat source not moving or moving too quickly or moving too slowly may be undetected by the sensor

✗ the sensor is less sensible when the temperature of the moving body is near to the ambient temperature

Other handling cautions

✗ be careful to keep clean from dust or dirt accumulating on the lens because this will adversely affects the detection sensitivity

✗ the lens is made by a soft material (polyethylene); avoid applying a load or impact since this will deform or scratch the lens

✗ to cleaning the sensor avoid the use of fluids that may enter inside the sensor causing a deterioration

To install the sensor, make a hole of proper diameter for the introduction of the sensor in the false ceiling and execute the mounting as shown in the following figure. The sensor must be fixed to the false ceiling by means of the two proper mounting springs.

It is suggested to insert the two removable terminal blocks just before the mounting in the false ceiling and however after having executed the needed connections (see paragraph "Wiring diagram").
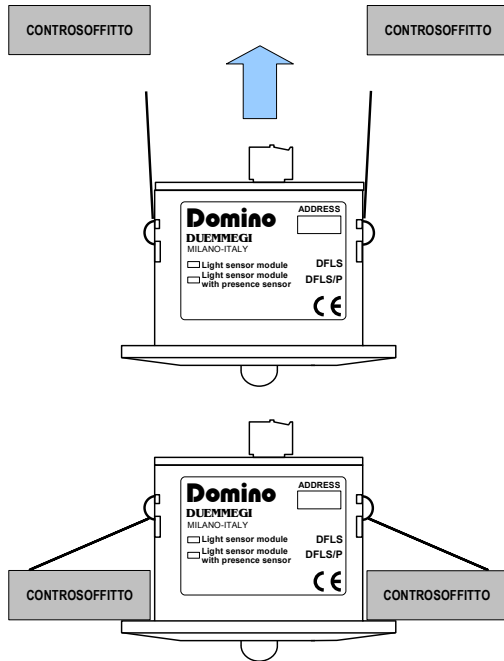
Functions of the local pushbutton

Pushing the local button, the module enters the addressing mode, during which the LED on the module is fixed lighted; the addressing mode will be active until the module receives the address and anyway no more than 10 seconds from the last release of the pushbutton.

Occupancy sensor and digital input

As said before, DFLS module provides two digital inputs (ON/OFF, which can be set as NO/NC).

For DFLS-P version, IN2 input can be set in order to use it for the connection, if required, of additional occupancy sensors like **DUEMMEGI** SRP that must be logically paralleled to the sensor inside DFLS.

When a presence is detected (and/or when activating IN2 if set for additional sensor), the point 3 of the input base address n of DFLS-P; when the presence detection falls, this point remains activated until the expiring of a delay time which can be configured, during the setting up, in the range 0 to 3600 seconds (1 hour). This behavior allows to send on the **Domino** bus the presence information including the the chosen delay (e.g. in order to switch off a light source with a given delay in respect to the last detected presence).

DFLS module allows, particularly, to realize energy saving lighting applications, complying with the new European norms about the energetic classification of the plants (European Norm EN 15232).

Information on the bus

Each one of the two input addresses of DFLS module provides the information listed in the following table (where n is the base address assigned to DFLS module.

Point	IN	
	n	n+1
1	Status of local input IN1	Value proportional to the brightness measured by the sensor
2	Status of local input IN2	
3	Status Presence+delay	
4	-	
5	-	
6	-	
7	-	
8	-	
9	-	
10	-	
11	-	
12	-	
13	-	
14	-	
15	-	
16	-	

The base address n reports digital type data, precisely the status of the two local inputs and presence sensor status including the chosen delay (see paragraph on configuration).

The address n + 1 reports instead the value proportional to the brightness detected by the sensor and it is a number between 0 and 1023.

Module type statement

When using DFLS modules in a Domino bus, it is mandatory to declare the type of module.

When using **DCP IDE 3.2.3 or higher**, it is enough to declare the modules in the Configuration tab.

If DFCP controller is not installed, and thus **BDTools version 8.2.3 or higher** is used, the declaration must be added to the "program body".

In both cases, the syntax is the same and it is described here below.

Also keep in mind that the statement **does not** configure the module, but simply it "declares" that the module has been installed in the plant.

Assuming that the base address assigned to a DFLS is 1, the syntax of the statement is as follows:

```
DFLS = ( I1, I2 )
```

For the meaning of each address, refer to the tables in the previous paragraph.

Settings

The various parameters of DFLS and DFLS-P module can be configured using BDTools or DCP Ide selecting, from the main menu, "Programming", then "Modules Configuration" and finally "DFLS"; the following window will be shown:
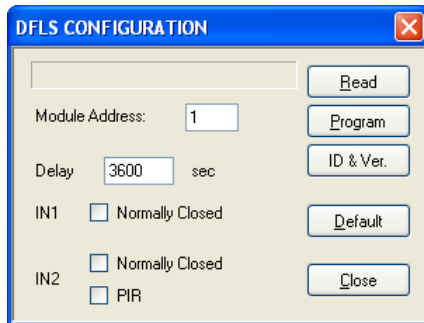
The meaning of the fields and of the buttons in this window will be here described.

Module Address: it is the address of DFLS module to be configured or to be read.

Delay: this parameter is the delay time (in seconds) after the last presence detection before the no presence information is sent on the bus.

Normally Closed: when checked, the related input is set for normally closed contact (useful when using presence sensors other than SRP).

PIR: when checked, input IN2 is set for the connection to additional presence sensors; in practice input IN2 will be delayed at the deactivation, with delay as set in the Delay field.

Read: to read the parameters from DFLS and to show them into the window.

Program: to transfer the parameters currently shown in the windows to DFLS module.

ID & Ver: to check that DFLS module with the specified address is connected to the BUS and to show the firmware version.

Default: to restore the parametrs in the window to the default values; these are:

- o Delay: 360 sec (6 minutes)
- o IN1 normally open
- o IN2 normally open
- o PIR on IN2 deactivated

Close: to close the configuration panel.

Mapping

BDTools and DCP Ide allow to display the map of DFLS.

The points identified IN1 and IN2 report the status of the related inputs on the terminal block; the status of these points is represented by a green filled circle if the related point is OFF or by a red filled circle if the point is ON.

The point "PIR + Delay" reports the status of the built-in presence sensor (or the status of IN2 input if set as PIR), including the chosen delay.

Brightness is the value proportional to the ambient light measured by the related sensor of DFLS.

As usual, the background of the module is in green color if the module is connected and properly working, otherwise the background is in red color.


Technical characteristics

Power supply (bus side)	By specific centralized power supply mod. DFPW2
Current	Equivalent to 3 standard **Domino** modules
Number of digital inputs	2, for potential-free contacts, can be set as NO/NC
Current for each digital input contact	1mA (closed contact), 0mA (open contact)
MAX allowed length for digital input wires	20 meters
Light sensor type	Photo sensor with spectral response equivalent to the human eye sensitivity
Full scale light sensor	1023 points
Occupancy sensor: Aperture angle Range of detection MAX	Passive infrared principle (PIR) 100° 5 meters
Operating temperature	-5 ÷ +50 °C
Storage temperature	-20 ÷ +70 °C
Protection degree	IP20

Outline dimensions
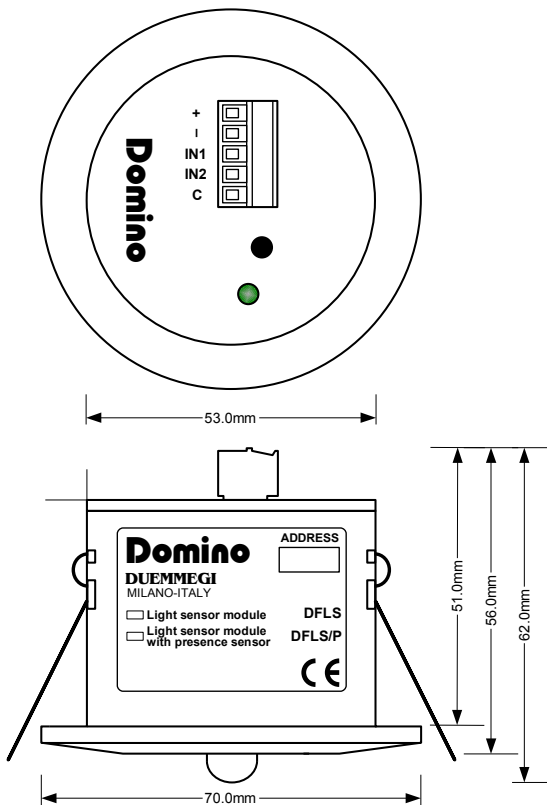
Correct disposal of this product

(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 re-use 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.