DF8RIT: mixed module with 8 inputs, 8 outputs, 1 temperature and regulator

DF8RIT module for **Domino** bus performs, in a single box, the following features:

- 8 digital inputs for potential free contacts
- 8 power-relay outputs which can be set for the ON-OFF command of generic loads or, as pairs, for the management of rolling shutters, awnings and similar devices driven by double winding motors
- 1 analog input for temperature probe, measurement range -20 ÷ +50°C, suitable for both internal and external temperature detection
- ambient temperature regulator function, featuring weekly programming (chrono-thermostat, operationally identical to DFCT **Domino** module)

The chrono-thermostat function, if enabled, allows to regulate, through the **Domino** bus, the ambient temperature of a room of the house. This function allows to decentralize the ambient temperature regulation, thus considerably simplifying the programming of **Domino** system. The user interface can be realized by one or more DFTouch video-terminals or by a supervisor, touch screen terminals, Web Server via Internet or Intranet etc.; the remote control via GSM phone is also possible.

DF8RIT module provides a 2-way terminal blocks for the connection to the bus; like for almost all modules of **Domino** family, the power supply required for the operation of the module is derived from the bus itself.
Near to the bus 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 small 3-way connector (PRG) under the bus terminal cover allows the connection to the optional tester/programmer.
The module also provides:

- a 9-way terminal block for the connection to the 8 input contacts and the common signal
- a 2-way terminal block for the connection to the temperature probe
- 4 terminal blocks, 4-ways each one, connected to the contacts of the 8 output relays; these relays feature bistable coils in order to minimize the current consumption and keep the previous contact status even in power supply failure conditions

DF8RIT housing is a modular 6-unit box for DIN rail with reduced height.
The temperature sensor (to be ordered separately choosing among various available versions) is very small and can be easily inserted in the panel of the preferred wall box.

Address programming

Due to the numerous available parameters, DF8RIT module takes, inside the **Domino** bus, from 1 to 7 input addresses and from 1 to 10 output addresses, depending on the functions that have been enabled.
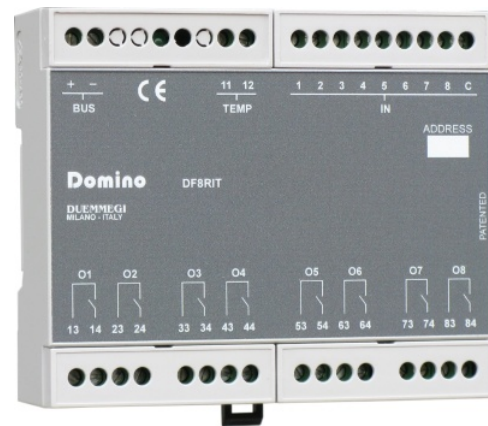
It is however enough to assign to the module a single base address which must be less or equal to 245; for details about the information related to each address and the possible configurations, refer to the following paragraphs.
A white label on the front panel allows to write the assigned base address for an immediate visual identification. For more details about the address assignment, refer to the related documentation.

Wiring

The following schematic diagram shows the connections for DF8RIT module.
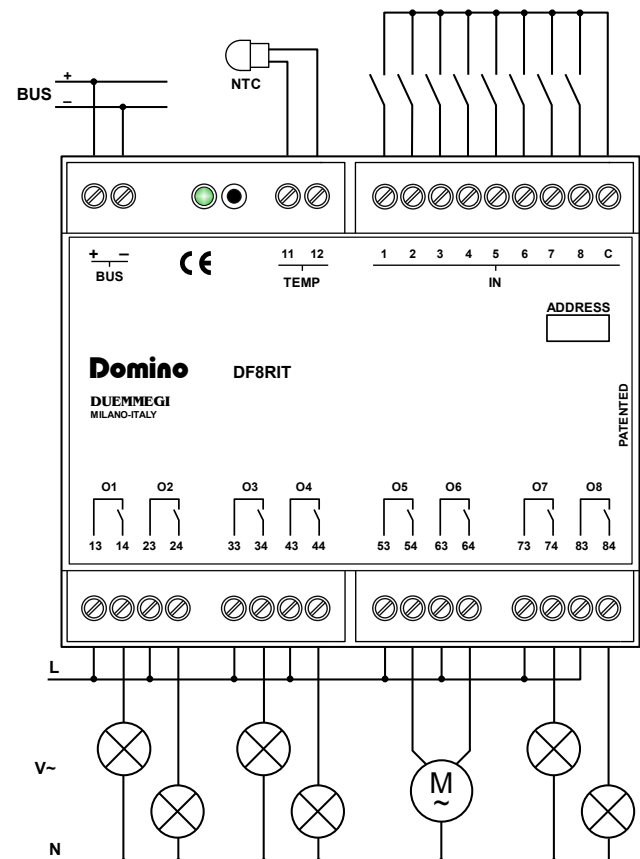
When connecting motors for shutter, it is mandatory to use the pairs 1-2, 3-4, 5-6, 7-8; It is not allowed to use pairs other than those listed.

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.
In addition, in the same conditions (green LED fixed ON), the temperature probe, if enabled, will be read with higher frequency (0.1s).

Information on the bus

DF8RIT module takes, inside **Domino** bus, a variable amount of input and output addresses depending on the functions that have been enabled, going from a minimum of 1 input and 1 output address to a maximum of 7 input and 10 output addresses. The maximum value of the base address must be less or equal to 245; greater values will be discarded by the module which will return an address assignment error.
Each one of the active addresses provides the information described in the following tables, where n is the base address assigned to DF8RIT module.

Input section

IN							
Point	n	+1	+2	+3	+4	+5	+6
1	In 1	Position SHUTTER 1	Position SHUTTER 2	Position SHUTTER 3	Position SHUTTER 4	Heat	Ambient Temperature (°K x 10)
2	In 2					Cool	
3	In 3					Smin	
4	In 4					Smed	
5	In 5					Smax	
6	In 6					Soff	
7	In 7					Sman	
8	In 8					Fail	
9	Out 1					SP1	
10	Out 2					SP2	
11	Out 3					SP3	
12	Out 4					OFF	
13	Out 5					SPM	
14	Out 6					Man	
15	Out 7					SUM	
16	Out 8					-	

Output section

OUT										
Point	n	+1	+2	+3	+4	+5	+6	+7	+8	+9
1	Out 1	Go to position (0-100%) SHUTTER 1	Go to position (0-100%) SHUTTER 2	Go to position (0-100%) SHUTTER 3	Go to position (0-100%) SHUTTER 4	-	SP1 (°K x 10)	SP2 (°K x 10)	SP3 (°K x 10)	SPM (°K x 10)
2	Out 2					-				
3	Out 3					Smin				
4	Out 4					Smed				
5	Out 5					Smax				
6	Out 6					Soff				
7	Out 7					Sman				
8	Out 8					-				
9	-					SP1				
10	-					SP2				
11	-					SP3				
12	-					OFF				
13	-					SPM				
14	-					Man				
15	-					SUM				
16	-					-				

The meaning of information in the previous tables will be detailed in the following paragraphs.

Module type statement

When using DF8RIT 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" as the module has been configured by the specific configuration panel or by the loaded equations.

Assuming that the base address assigned to a DF8RIT is 1, the syntax of the statement is as follows:

```
DF8RIT = ( I1, \
        I2, I3, I4, I5, \
        I6, I7, \
        O1, \
        O2, O3, O4, O5, \
        O6, O7, O8, O9, O10 )
```

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

The declaration shall, however, specify only the actually used addresses (depending on how the module has to be used and then configured); the examples below show several statements depending on how the module is used.

Examples:
1: DF8RIT set as 8 inputs and 8 ON-OFF outputs:
```
DF8RIT = ( I1, O1 )
```

2: DF8RIT set as 8 inputs e 4 shutters:
```
DF8RIT = ( I1, \
           I2, I3, I4, I5, \
           O1, \
           O2, O3, O4, O5 )
```

3: DF8RIT set as 8 inputs, 4 shutters and temperature (without temperature controller):
```
DF8RIT = ( I1, \
           I2, I3, I4, I5, \
           I7, \
           O1, \
           O2, O3, O4, O5 )
```

4: DF8RIT set as 8 inputs, 8 ON-OFF outputs and temperature (without temperature controller):
```
DF8RIT = ( I1, \
           I7, \
           O1 )
```

5: DF8RIT set as 8 inputs, 8 ON-OFF outputs and temperature controller:
```
DF8RIT = ( I1, \
           I6, I7, \
           O1, \
           O6, O7, O8, O9, O10 )
```

6: DF8RIT set as 8 inputs, 2 ON-OFF outputs, 1 shutter and the other 4 ON-OFF outputs:
```
DF8RIT = ( I1, \
           I3, \
           O1, \
           O3 )
```

ON-OFF inputs and outputs

The input and output addresses having the base value are always enabled and report the following information.

Input section n

IN	
Point	**n**
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6
7	Input 7
8	Input 8
9	Status of output 1
10	Status of output 2
11	Status of output 3
12	Status of output 4
13	Status of output 5
14	Status of output 6
15	Status of output 7
16	Status of output 8

The points 1 to 8 report the status of the related digital input of the module (1 = input contact closed), the points 9 to 16 report the status of the 8 relays (1 = relay contact closed); these last points allow to use the output status as input of the equations.

Output section n

OUT	
Point	**n**
1	Command output 1 (or Open 1)
2	Command output 2 (or Close 1)
3	Command output 3 (or Open 2)
4	Command output 4 (or Close 2)
5	Command output 5 (or Open 3)
6	Command output 6 (or Close 3)
7	Command output 7 (or Open 4)
8	Command output 8 (or Close 4)
9	-
10	-
11	-
12	-
13	-
14	-
15	-
16	-

The points 1 to 8 control the related relay outputs of the module (1 = close relay contact); in the case of outputs configured for shutter control, the commands will be Open and Close and they will be automatically mutually exclusive points with proper safety delay when inverting the direction of the shutter.

The ON-OFF outputs can be programmed using all the typical functions of **Domino** system, like in the following list:

- Logic combinations (& | !)
- Set/Reset (S R)
- Toggle (T S R, included actuation timeout on all 8 ON-OFF outputs)
- Timer (max 8 for module)
- Scheduler
- Analog threshold

For more details about the programming of ON-OFF outputs, refer to the **Domino** general programming manual.

Warning: when connecting a shutter actuator to a pair of outputs of DF8RIT module that have not been set for that function, the actuator and the module can be damaged if the two outputs are simultaneously activated

Rolling shutter function

Operation in rolling shutter mode

The outputs set for rolling shutter management automatically performs different functions as here described.

Assume that a pair of outputs has been programmed for opening and closing from two push-buttons (**Open** and **Close**) connected to an input module (or to inputs of DF8RIT itself).

Pushing and holding down the Open push-button or the Close push-button, the rolling shutter will be opened or closed; releasing the push-button, the rolling shutter will stop in the position reached at that moment.

If the limit switch has been reached before the push-button releasing, the rolling shutter will stop anyway (**provided that the motor assembly includes proper limit switches** to switch off the motor power; these limit switches have no connection with the **Domino** system).

A short touch on Open push-button or on Close push-button causes the movement of the motor until the limit switch is reached or until a programmable time out elapses (full opening and closing function, called automatic mode). If during the automatic movement any Open or Close button is pushed again, the shutter stops at that position (this operation is called counter-command).

It is also possible to define **centralized** commands ("**Open Priority**" and "**Close Priority**"), that work like local commands as previously defined except that **the priority command is only automatic** and it will be always executed regardless of the status of the rolling shutter (moving or not moving). In other words, if the rolling shutter was moving, **a priority command will be never executed as counter-command.**

It is possible to define additional commands performing the unconditional **Halt**, allowing to stop the motor regardless of the function currently in execution.

Finally, it is possible to add **GoTo** commands to perform partial movements, so as to close the shutter to a given percentage with respect to the total displacement. Since a position information is not generally available for standard shutter, this function is based on the timing of the command, after appropriate configuration (see related paragraph); please note that the time of opening and closing can vary with time and climatic conditions because of the variation of friction, therefore it is possible a certain error in the positioning.

Notes:

- *As previously mentioned, DF8RIT module cannot identify the reaching of the limit of allowed movement; check that the selected actuator integrates the proper limit switches, otherwise the motor and the module may be damaged.*
- *To avoid damages to the motor and dangerous inrush currents, DF8RIT module automatically wait for 1 second about before to invert the motor direction.*

During the automatic opening and closing functions, the relays driving the motor remain excited even if the limit switch has been reached; DF8RIT module automatically switch off relays after a fixed time (Actuation Timeout). This time, by default, is 60 seconds but its value can be in the range 1 to 254 seconds, see paragraph about setting and programming. If the Actuation time out value has not been specified in the equation, it will be automatically set to the default value (60).

Setting Actuation Time out to 0 (zero), the automatic function will be disabled (but this is not true for centralized commands).

It is also possible to define a time, called "Delay from command", which will delay the starting of the shutter in respect to a centralized command; this avoids that all rolling shutters start at the same time.

The "Delay from command", is set by default to 0, but it can be increased up to 255s (4 minutes and 15 seconds).

Rolling shutter programming

Note: *the following equations are those to be loaded into the module; these equations cannot be loaded into DFCP.*

When connecting motors for movement of rolling shutters, it is mandatory to use the pairs 1-2, 3-4, 5-6, 7-8; in the related equations, however, only the odd point of the pair must be specified, therefore O1.1 - O1.3 - O1.5 - O1.7.

Supposing to have assigned the base address 1 to DF8RIT, the equation controlling a rolling shutter output of the module looks like that in the following example:

```
DF8RIT = ( I1, I2, O1, O2 )

O1.1 = OI1.1 | CI1.2 | OPI9.1 | CPI9.2 | \
       HI15.1 | G(50)I17.1 | G(80)I17.2
```

Remember that the statement `DF8RIT = (...)` is mandatory and if omitted some errors will occur when compiling or transferring the program.

In this example, O1.1 is the first output of the DF8RIT, I1.1 and I1.2 are the inputs controlling the opening and the closing, I9.1 and I9.2 are the inputs for the centralized opening and closing. Input I15.1 is the Halt command, while I17.1 and I17.2 force the closing to 50% and 80% respectively (GoTo).

Note that, in this example, I1.1 and I1.2 are inputs of the same DF8RIT, but inputs of other modules (e.g. DF4I, DF8I) can be of course used.

More opening, closing (local and centralized), Halt and GoTo commands are allowed, simply adding them to the equation.

In the previous example the Actuation Time out, being not specified, is equal to 60 seconds default value; if another value is required by the specific application, for example 40 seconds, simply specify it in the equation as follows:

```
O1.1(40)= OI1.1 | CI1.2 | OPI9.1 | \
         CPI9.2 | HI15.1 | \
         G(50)I17.1 | G(80)I17.2
```

To delay the motor start after a centralized command (Delay from command), for example 5 seconds for opening and 10 for closing, simply specify these values in the equation as follows:

```
O1.1(40)= OI1.1 | CI1.2 | OP(5)I9.1 | \
         CP(10)I9.2 | HI15.1 | \
         G(50)I17.1 | G(80)I17.2
```

If not specified, the Delay from command will be zero.

Rolling shutter configuration

Note: *If the program loaded into the module includes equations that determine the functioning of the related outputs as ON-OFF or shutter, the module will auto-configure itself accordingly; in this case they will be rejected different configurations that may be sent from the configuration panel described below.*

The parameters of DF8RIT module can be set by BDTools or DCP Ide selecting, from main menu, "Programming", then "Modules Configuration", "DF8RIT" and "Outputs Configuration"; the following window will be shown:
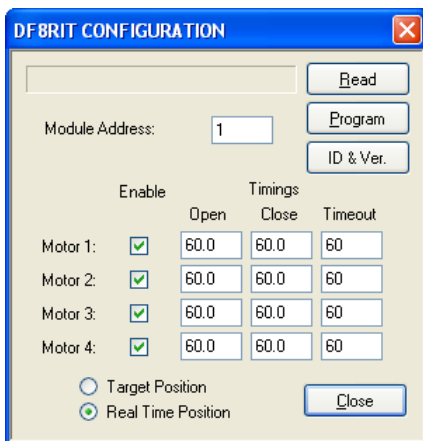
Enter, in the related text box, the address of DF8RIT module to be configured (or read), then remove the check mark to outputs not used as rolling shutter control.
Enter, in the Timings section, the exact times measured to perform a whole opening and closing, for all motors connected to the module. The maximum allowed value of the opening and closing times is 127.5 seconds (2 minutes about) with resolution of 0.5 seconds.

Timeout is the maximum time for the motor command and a value greater than the opening and closing time must be chosen (e.g., if the opening and closing times are 30 seconds, the Timeout may be set to 45 seconds).

The other options in the window allow to choose the type of the answer of the module (in shutter mode) to a status request, as here described: DF8RIT module reports, at input addresses n+1, n+2, n+3 or n+4 (depending on the motor and stated that related outputs have been configured for shutter mode), the current percentage position of the related shutter. During the movement of the shutter, this information can be configured among the following 2 options:

- Target Position
- Real Time Position

In the first case, the reported information will be the percentage value, in respect to full closing, toward which the shutter is moving. In the second case, instead, the value is continuously variable during the movement of the shutter.
In all cases, the reported value is the position of the shutter as percentage 0...100% of the fully closed position (0=fully open, 100=fully closed).

Input and output addresses for shutter mode

When the program loaded into DF8RIT contains an equation for the shutter management, the related input and output address will be automatically activated.
For instance, if outputs 1-2 and 5-6 have been programmed for shutter control, the input and outputs addresses n+1 and n+3 will be activated, while addresses n+2 and n+4 will be deactivated. The information reported at these optional addresses will be detailed in the two following tables.

Input section n+1, n+2, n+3, n+4

	IN			
Point	n+1	n+2	n+3	n+4
1				
2				
3				
4				
5	Current position (0-100%) SHUTTER 1	Current position (0-100%) SHUTTER 2	Current position (0-100%) SHUTTER 3	Current position (0-100%) SHUTTER 4
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Each one of these inputs, when activated, reports a value in the range 0 to 100 whose meaning is the percentage of closing of the shutter (0=fully open, 100=fully closed).

Output section n+1, n+2, n+3, n+4

Point	OUT			
	n+1	n+2	n+3	n+4
1	Go to position (0-100%) SHUTTER 1	Go to position (0-100%) SHUTTER 2	Go to position (0-100%) SHUTTER 3	Go to position (0-100%) SHUTTER 4
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Writing a value to one of these output addresses, if activated, in the range 0 to 100, the related shutter will be moved to the wanted closing percentage position (0=fully open, 100=fully closed).

Shutter commands by Master devices
The master modules, e.g. DFCP, DFWEB and DFTouch, must be able to send commands to shutter modules in order to properly activate the motors.
The commands may be of the type "Open/Close" or "Go to position *x*". Generally, the several Masters belonging to **Domino** family manage themselves these commands; in all other cases (e.g. ModBUS supervisors) the syntax of the Word to be sent to the module must be as here bottom described.

Open/Close Commands
In this case it is enough that the master writes the points Open and Close of the output base address (see output section n). Writing "1", the shutter will move in the related direction, writing "0" the shutter will stop. Activating the Open command while the shutter is closing (or vice versa), the motor will be stopped before reversing the movement; in other words the Open and Close are mutually exclusive commands.

"Go to position x" (GOTO) commands
In this case the Master has simply to write to output address n+1, n+2, n+3 or n+4 (depending on the shutter to be moved and stated that that related output has been configured for shutter mode) the percentage value at which the shutter must be closed (0=fully open, 100=fully closed).

Temperature controller function

DF8RIT module allows the ambient temperature regulation through the probe connected to the related terminals.

The module features two main regulation modes, one for the Winter season and one for the Summer season. For each one of these two seasons, the regulation takes place controlling the related point of the input section of the module (heat request in Winter and cooling request in Summer).

In addition, DF8RIT module controls 3 points of the input section which can be used, if needed, for the management of a 3-speed fancoil.

For each season, DF8RIT can be set for Automatic and Manual mode. In Automatic mode, the module allows to specify 3 setpoints: SP1, SP2, SP3. It is recommended to set SP3 as the setpoint with the highest temperature and SP1 as the one with the lowest temperature, regardless of the season.

In Manual mode, DF8RIT allows to specify an additional "manual" setpoint SPM.

All setpoints can be set in the range 10.0 to 35.5°C and they can be changed in any moment through the bus. It is also available an OFF status, both in Automatic and in Manual mode; in Winter season, the OFF position causes the imposition of the no-frost setpoint, while in Summer it means completely OFF. The no-frost setpoint can be set, during the setting up, in the range 0 to 25.5°C.

DF8RIT also features a weekly programmer whit half hour resolution; for each day of the week, the module allows to specify the relationship between the time and the desired setpoint. The scheduling is performed in a graphical way by DFTouch or another master device, in order to see the whole program of each day with a single look.

Types of temperature regulation
The temperature regulation performed by DF8RIT module can be chosen, during the setting up, among the ON/OFF with hysteresis type and the time modulation type.

ON/OFF regulation with programmable hysteresis
In this case the temperature regulation will be executed activating or less the related point of the input section (heat or cooling request depending on the season), comparing the temperature detected by the module with the current setpoint, also taking in account the chosen hysteresis value.

The hysteresis around the setpoint can be defined, with 0.1°C resolution, during the setting up and this step needs the choice of two values, for each season, corresponding to the positive and negative delta in respect to the setpoint.

In Winter, when the ambient temperature exceeds the set-point summed to the positive delta, the regulation will be switched OFF, and then switched ON again when the temperature goes below the setpoint decreased by the negative delta; in Summer the algorithm will be reversed.

The fan speed of the fan coils is also determined by the difference between ambient temperature and the setpoint. The switching thresholds between a speed and the other one (that can be different for Winter and Summer) can be defined during the setting up of the module. When the heat request is activated (or cooling, depending on the season), the fancoil is always ON at least at the minimum speed.

Time modulation regulation
In this case, DF8RIT module regulates according to a proportional-integral type algorithm with fixed timebase. The module regulates modulating the points "heat" or "cooling request" of the input section (depending on the season) in respect to a fixed time. At the beginning of each regulation cycle, the module evaluates the difference between the ambient temperature and the current setpoint.The ratio (Time_ON / Time_OFF) will be then calculated according to the detected difference.

In this case too, the speed of the fancoil is determined according to the difference between the ambient temperature and the setpoint; the switching thresholds of the fancoil can be set for each season.

Automatic and Manual mode for regulation
The switching between Automatic and Manual mode occurs activating the point 14 of the output section having base address +5. In Automatic mode, the temperature regulation (intended as control of the heating/cooling device) occurs according to the scheduler which impose one of the 4 setpoints SP1, SP2 , SP3 or OFF.

In Manual mode, the temperature regulation (intended as control of the heating/cooling device) occurs instead by the imposition of one of the setpoints SPM or OFF, regardless of the current time.
The values of all setpoints SP1-2-3-M can be changed in any moment writing to the last 4 output address of DF8RIT module (n+6, n+7, n+8, n+9).

Note: DF8RIT does not features an internal timekeeper; therefore, to allow the scheduler operation, a DFCK3 module or a DFCP controller must be installed on the bus.

Automatic and Manual mode for fancoil
Generally, the speed of the fancoil is decided by DF8RIT module itself, according to the difference between the ambient temperature and the current setpoint; in this case the speed of fancoil is managed in Automatic mode.
It is however possible to select a different speed replacing that one decided by the system, simply acting on the point 3-4-5-6 of the output section having base address +5.
Each one of these points corresponds to the speed MIN, MED, MAX, OFF; at the activation of a speed other than that one decided by the system, also point 7 of the output base address section +5 will be activated; this point means that the speed of fancoil has been switched to Manual

mode. Resetting the point 7 of the same output section, the fancoil will be controlled again in Automatic mode.

Inputs and outputs of temperature regulator
The following 2 input and 5 output addresses will be activated only if the temperature regulation function has been enabled in the configuration panel; if instead only the temperature reading has been enabled, only the input address n+6 will be activated.

Input section n+5, n+6

	IN	
Point	**n+5**	**n+6**
1	Heat request	
2	Cooling request	
3	Speed MIN	
4	Speed MED	
5	Speed MAX	
6	Speed OFF	
7	Speed is in MAN mode	
8	Temperature probe failure	Ambient Temperature (°K x 10)
9	Setpoint is SP1	
10	Setpoint is SP2	
11	Setpoint is SP3	
12	Setpoint is OFF	
13	Setpoint is SPM	
14	Temp. Regulation is MAN	
15	Season is Summer	
16	-	

The meaning of the input digital points at address n+5 is:
- **Point 1:** point=1 means that the regulator requires to switch ON the heating device (in Winter).
- **Point 2:** point=1 means that the regulator requires to switch ON the cooling device (in Summer).
- **Points 3..5:** mutually exclusive points; point=1 means that the regulator requires to switch ON the related speed (MIN, MED, MAX). If all points are OFF, then the fancoil is stopped (and in this case the following point 6 will be activated).
- **Point 6:** point=1 means that the fancoil is stopped.
- **Point 7:** point=1 means that the fancoil speed is set to Manual mode.
- **Point 8:** point=1 means temperature sensor failure (opened or in short circuit).
- **Point 9..13:** mutually exclusive points; point=1 means that DF8RIT is regulating at the related setpoint (SP1, SP2, SP3, OFF or SPM).
- **Point 14:** point=1 means that the regulation is set to Manual mode; point=0 means that it is set to Automatic mode.
- **Point 15:** point=1 means that temperature regulator is set to Summer season; point=0 means that it is set to Winter season.

The input address n+6 reports the **temperature** value detected by the probe connected to DF8RIT module, expressed as °Kx10; for instance 2980 means: (2980 – 2730) / 10 = 25.0°C. If a probe connected to another module is used (see Configuration of temperature controller), the value reported by input address n+6 will be the temperature of that probe.

Output section n+5, n+6, n+7, n+8, n+9

OUT					
Point	n+5	n+6	n+7	n+8	n+9
1	-				
2	-				
3	Set speed MIN				
4	Set speed MED				
5	Set speed MAX				
6	Set speed OFF				
7	Set speed MAN	SP1 (°K x 10)	SP2 (°K x 10)	SP3 (°K x 10)	SPM (°K x 10)
8	-				
9	Set SP1				
10	Set SP2				
11	Set SP3				
12	Set OFF				
13	Set SPM				
14	Set MAN reg.				
15	Set Summer				
16	-				

The meaning of the output digital points at address n+5 is:

- **Point 3..6:** mutually exclusive points; setting to ON one of these points, the fancoil will be set to the related speed (MIN, MED, MAX or OFF). If one of these points is active, the automatic control of the fan is suspended. When enabling one of these points, point 7 too will be activated on both input and output address n+5, thus reporting that speed has been forced to manual mode.
- **Point 7:** setting this point to 1, the fancoil speed control will be changed to manual mode, and this means that the speed will not be decided by DF8RIT module, but by the status of point 3..6 described before. Setting this point to 0, the speed control of the fancoil will return to automatic mode.
- **Points 9..13:** mutually exclusive points; setting to ON one of these points, DF8RIT changes the regulation to the related setpoint (SP1, SP2, SP3, OFF, SPM). When the Auto mode is active, the imposition of a setpoint SP1-2-3 and OFF different from that one decided by the scheduler does NOT cause the switching to manual mode, but the new setpoint will be maintained until a different one will be imposed by the scheduler. When activating SPM while DF8RIT is in Auto mode, the mode will be forced to Man (which means that the scheduler will be disabled).
- **Point 14:** setting this point to 1, the temperature regulation will be changed to manual mode, and this means that setpoint SPM will be imposed; this setpoint can be however changed with one of the others acting on points 9..13 seen before. Setting this point to 0, the regulator returns to Auto mode.

- **Point 15:** setting this point to 1, the temperature controller will be set to Summer operation; setting it to zero, it will be set to Winter operation.

Output addresses n+6 to n+9 allow to set the value of the related setpoints. These values must be in the format °Kx10 (e.g. for instance 2980 means: (2980 – 2730) / 10 = 25.0°C).

The points of the input address section n+5 must be used in the programming of the **Domino** system in order to perform the desired actions.
For instance, assuming to have assigned the address 41 to DF8RIT, the command to the heating device must be implemented, for example directly in an output module, by a simple equation like the following one:

$$O31.1 = I46.1$$

where $O31.1$ is the relay output connected to the heating device and $I46.1$ is the related point of DF8RIT.

If the 3-speed fancoil management is required, another output module may be programmed as follows:

```
O50.1 = I46.3  //MIN speed
O50.2 = I46.4  //MED speed
O50.3 = I46.5  //MAX speed
```

Configuration of temperature controller

This paragraph describes the parameters setting of DF8RIT module related to temperature controller; this procedure, to be executed during the setting up of the installation, allows to adjust the operation of the controller according to the requirements of the application. To execute the setting of the parameters, BDTools or DCP Ide program is required.
From main menu of the program, select "Programming", "Modules Configuration", "DF8RIT" and "Temperature Control"; the window shown in Figure 1 will appear.

On the left top side, the text box Address allows to enter the base address of DF8RIT module to be configured and/or to be read. Near to address box, it is possible to choose the Mode of regulation (ON/OFF or Modulation). The section Season allows to select Winter or Summer (this choice, however, can be made also via bus).

Checking the Ext. Probe option, it is possible to use, instead of the temperature probe connected to DF8RIT, a remote probe connected to another module (e.g. DFTA, DFRHT); in this case, the address of the module detecting the temperature must be entered; this temperature will be shown in the input address section n+6 of DF8RIT. Enable Temperature will activate the probe as simple temperature meter, Enable Regulation will instead also activate the temperature controller.

The **Set Point** section lists the several setpoints to be used in Winter and Summer operation. Allowed values are in the range 10.0 to 35.5°C for SP1-2-3-M and 0.0 to 25.5°C for no-frost setpoint. Even if the setpoints can be freely set, it is recommended to choose SP3 always greater than SP2 and SP2 always greater than SP1, for both seasons.

The section **Hysteresis for ON/OFF Mode** allows to define, with the help of an effective graphical representation and separately for Winter and Summer, the two values of the temperature delta in respect to the current setpoint (Spx) which the regulator uses to switch ON and OFF the heating or the cooling device. These values must be in the range -12.8 to 12.7°C; the absolute value of negative delta and positive delta can be different each one to the other.

The section **Delta for fancoil** allows to define, with the help of an effective graphical representation, the several deltas to be used to change from a speed to the other one, separately for Winter and Summer.
Each delta is intended to be in respect to the current setpoint (Spx) and it can be both a positive or negative value. These values must be in the range -12.8 to 12.7°C.
The values of the delta values depend on the specific application, but the default values should be suitable for the majority of the cases.

The section **Recall from I/V** is useful when the settings of DF8RIT regulator have to be changed acting on pushbuttons or other similar device connected to **Domino** bus. In other words, this section allows to specify some optional input points (both real and virtual) that, when activated, must recall a well defined setting.
For instance, some input points may be specified in order to switch Auto and Man mode, to force the setpoints SP1, SP2, SP3, SPOff and SPMan), the fan mode (V Auto and V Man), the fan speed (V1, V2, V3, VOff) or to force Winter or Summer season.

These optional input points can be assigned as wanted; an empty text box means that the related function has not been set for control via I/V point.

The section **Sampling and Settings** displays some operating parameters of the temperature controller. The unique parameter that normally can be changed is the correction probe; if it should be necessary to change other parameters, contact **Duemmegi** offices.

In certain situations it may be needed to correct the temperature value read by the sensor; this is possible entering desired correction value in the related text box. For example, entering a probe correction value +0.2, then DF8RIT module will add the 0.2 to the temperature "read" by the sensor; if the sensor measures 25.3° C, then the temperature value sent on the bus will be: 25.3 + 0.2 = 25.5°C. Entering instead a correction value -0.2, then the temperature value sent on the bus will be: 25.3 - 0.2 = 25.1°C

Note: The offset value selected will remain stored in the module even in case of power failure.

Once entered all wanted parameters, press the button "Program" to send to DF8RIT module the parameter displayed on the configuration window. The "Read" button executes the reverse operation.
Of course, before to begin the transfer, the communication between BDTools or DCP Ide program and the bus interface (e.g. DFRS or DFCP or others) must be enabled.

Figure 1: Configuration of Temperature Controller
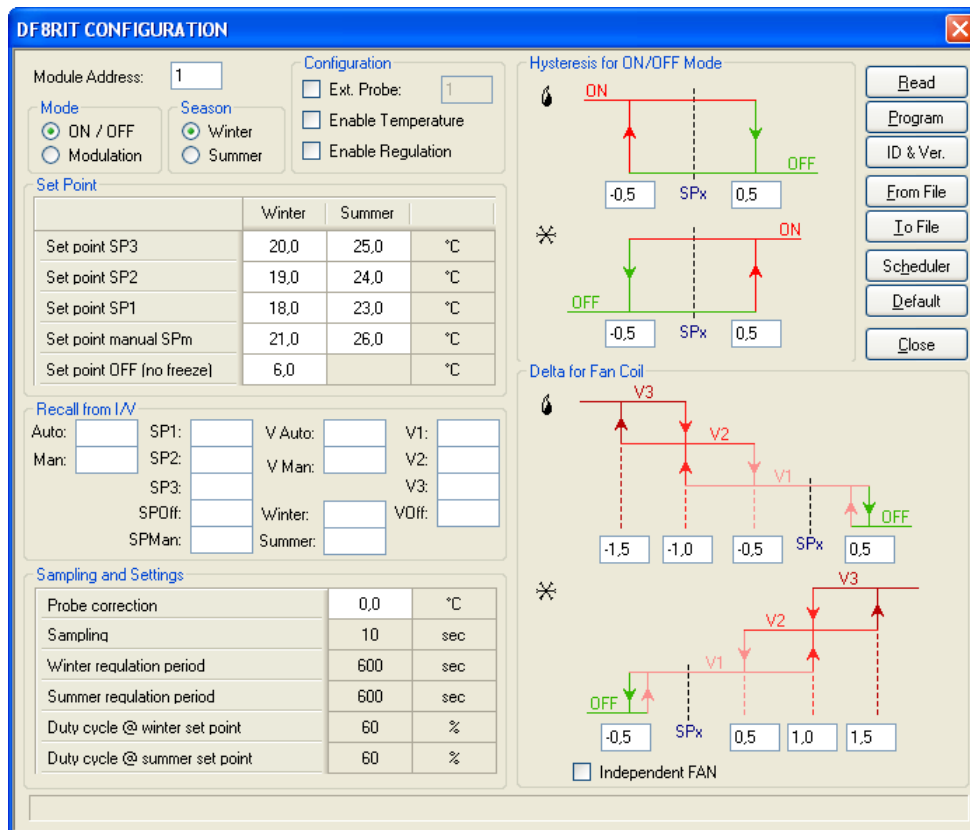
The "Id & Ver." button asks to DF8RIT module its currently loaded firmware version. The "Default" button restores all parameters in the window to the default values.

The configuration window allows to save in a file, with .DCT extension, the parameters shown in the configuration window ("To File"). Of course, the reverse operation can be also performed ("From File").

The configuration window also allows to recall the **Scheduler** window (the schedule needs a DFCK3 module or a DFCP controller installed on the bus). The DF8RIT Scheduler window shown in Figure 2 will be shown.

This window is divided in two vertical section, one for Winter season and one for Summer season. For each season it is possible to choose the scheduled times for each day of the week. The result of the scheduled times will be a graph, for each day.
Moving the mouse cursor on the cells of the grids, the related time will be shown on the left side, with half-hour resolution. Left clicking on the cells, one of the 3 setpoints SP1-2-3 (from bottom to top) will be activated; right clicking on the cells, the OFF setpoint will be set.
The following figure shows a programming example: from 0:00 to 6:00 SP1 will be activated, then SP2 will be activated until 12:00, then SP3 until 21:00 and then OFF until 24:00.
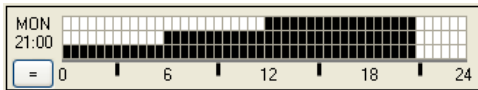
The buttons "=" in the Scheduler window allow to copy the whole program of a a day to the next one.

The buttons "Program" and "Read" perform the transfer of the program to the module and vice-versa.
The DF8RIT Scheduler window too allows to save all shown data in a file with .DCT extension ("To File"); the reverse operation is possible too ("From File").
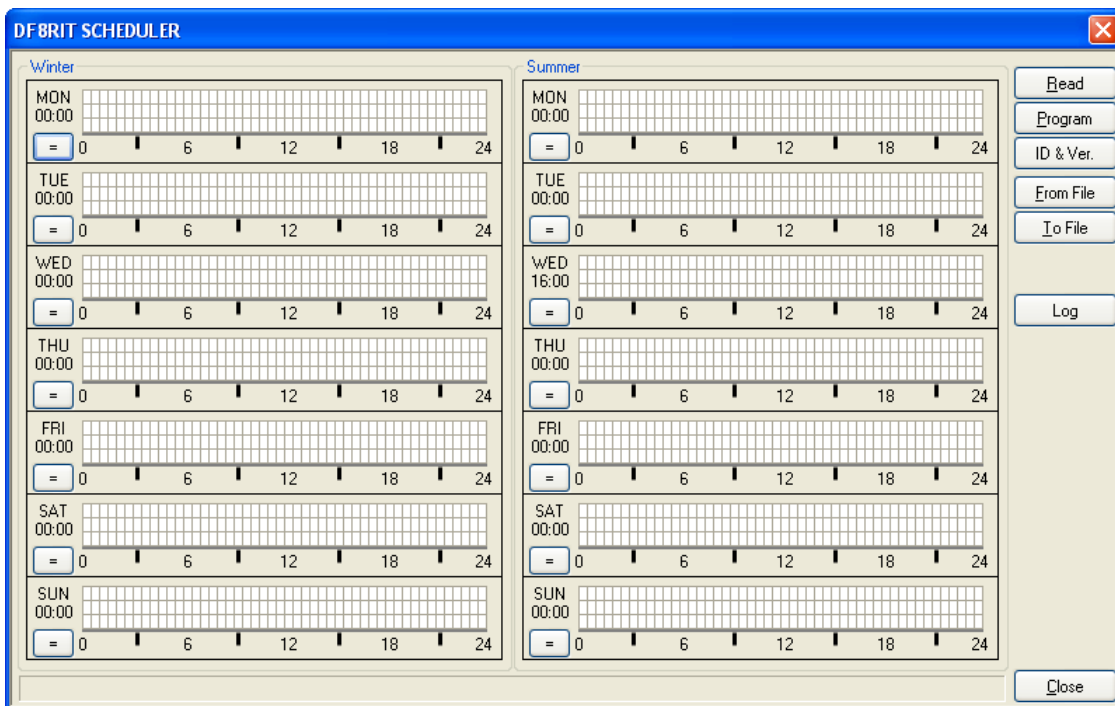

Figure 2: Scheduler

Mapping

BDTools and DCP Ide allow to display the map of DF8RIT module. The shown graphics will change depending on how the module has been configured; in the examples shown in Figure 3, DF8RIT module has been configured in 3 different modes and precisely (from top to bottom):

- 4 ON-OFF outputs, 2 rolling shutters and temperature controlled disabled
- 8 ON-OFF outputs, no rolling shutters and temperature controller enabled
- 4 ON-OFF outputs, 2 rolling shutters and temperature controller enabled

The points identified IN1..IN8 belong to the base input address; 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 points identified OUT1..OUT8 belong to the base output address; the status of these points is represented by a green filled square if the related point is OFF or by a red filled square if the point is ON. In the case of rolling shutter output, the symbol change as shown in the figures.

The addresses related to the rolling shutters, when enabled, (addresses 4 and 5 in the examples shown in Figure 3) are input and output addresses at the same time and they provide an evaluation of the closing percentage of the related rolling shutter.
The temperature, in the examples, is shown at address 7.

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.
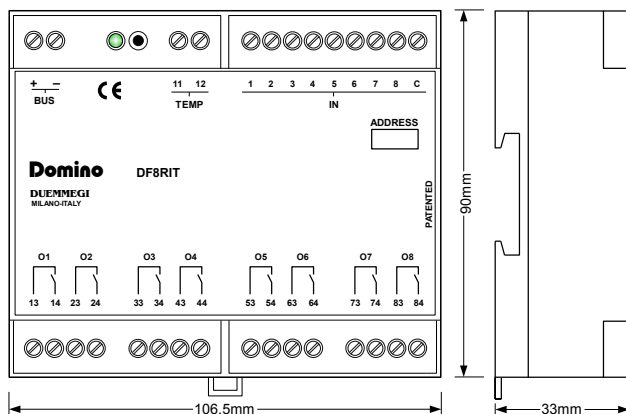

Figure 3: Map of the module

Technical characteristics

Power supply (bus side)	By specific centralized power supply mod. DFPW2
Current consumption	Equivalent to 2 standard **Domino** modules
Number of digital inputs	8, for potential-free contacts
Current for each digital input contact	1mA (closed contact), 0mA (open contact)
MAX allowed length for digital input wires	20 meters
Temperature sensor	NTC
Temper. measurement range	-20 ÷ +50 °C
Temper. measurement resolution	0.1 °C
Temper. measur. Linearity	±0.3 °C
Temper. measur. MAX error	±0.3 °C
MAX length of cables for the connection to temperature sensor	10 meters, with shielded cable, shield connected to terminal 12
Number of regulated zones	1
Type of regulation	Selectable among ON/OFF with hysteresis and PID
Intervention points (needed DFCK3 or DFCP modules)	48 for each day of the week
Setpoints	5 for Winter and 4 for Summer
Number of outputs	8, power relays with 2 coils latching type
MAX Contact rating (each output)	• Resistive load (cosfi = 1): 12A at 250V~ (3000VA) • Inductive load (cosfi = 0.5): 3.6A at 250V~ (900VA) • Incandescent lamps: 8A at 250V~ (2000VA) • Fluorescent lamps: 350W with 42uF MAX power factor correction capacitor
Rating on single phase motor	550VA (0.75HP)
MAX switching voltage	250V~
Housing	Modular box for DIN rail, width 6 modules, reduced height
Operating temperature	-5 ÷ +50 °C
Storage temperature	-20 ÷ +70 °C
Protection degree	IP20

Outline dimensions

Correct disposal of this product

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.