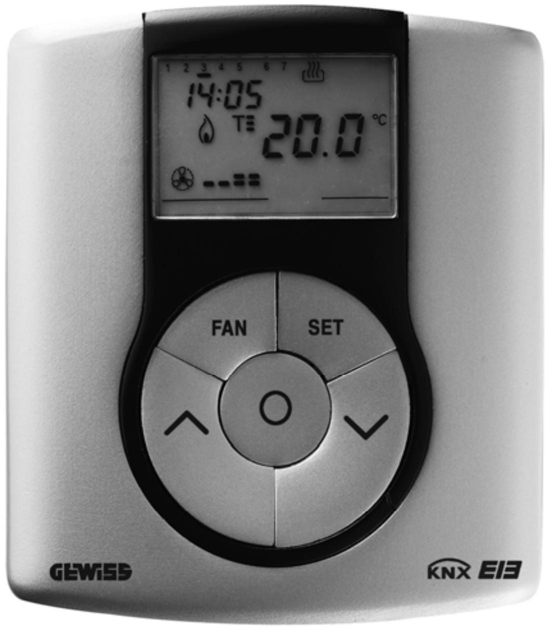
Chorus

GEWISS

KNX thermostat - wall mounting



GW 10 793 - GW 14 793

Technical Manual

Summary

1 Introduction

This manual describes the functions of the device named GW1x793 and how to use the ETS configuration software to change the settings and configurations.

2 Application

The KNX wall thermostat is a device that manages the HVAC system. It is able to regulate the temperature in the environment in which it is installed, using the KNX system to manage the actuators that control the solenoid valves, boilers, fan coils etc that comprise the heating and air-conditioning systems. This device, combined with the KNX wall timed thermostat, can regulate the temperatures per zone and act as a slave device when a master-slave system is setup.
The device manages two operating modes, HEATING and AIR CONDITIONING, and controls both systems whilst providing 4 different operating modes for each operating mode (ECONOMY/PRECOMFORT/COMFORT/OFF), each with its own customisable setpoint.
The device is always able to autonomously manage the temperature in the environment it is installed in, using control algorithms (two points or proportional) or the use of fan coils, depending on the type of system built.
If the use of fan coils is not foreseen, the thermostat is only able to manage the heating and air conditioning system if it is a 4-way configuration as it is designed to manage one actuator for the heating system and another for the air-conditioning system; however, if there is the need to control the fan coils, the thermostat is able to manage 2/4 way systems to control the zone valves.
This manual refers solely to the configuration using the ETS software. Please refer to the INSTALLATION AND USER MANUAL supplied with the product for instructions on how to use the internal menu and the various local key functions.

2.1 Limits to the associations

The maximum number of logical associations that the device is able to memorize is 110; this means that the maximum number of logical connections between communication objects and group addresses is 110.
The maximum number of group addresses that the device is able to memorize is 110; this means that it is possible to associate the communication objects to a maximum of 110 group addresses.

3 “Main” menu

The ***Main*** menu lists all the parameters needed to configure the behaviour of the device in HVAC system (see Fig. 3.1); the structure and the options displayed in the ***Main*** menu change according to the settings for the various options.

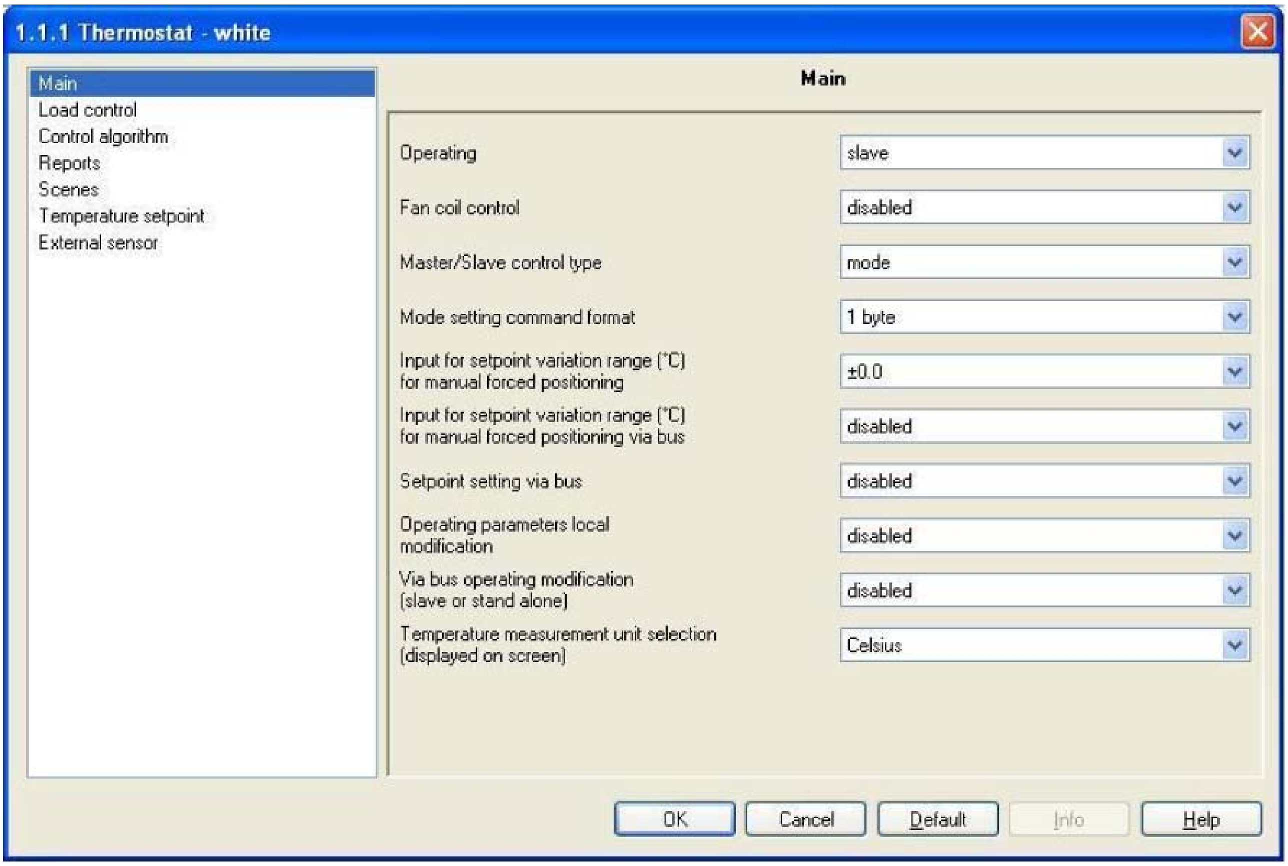


Fig. 3.1

3.1 Parameters

➢ 3.1.1 Operating

This allows you to configure how the device is used; the settings are:

- ***slave***

The device is configured to manage the HVAC system using the master device as a timer-thermostat. With this configuration the device does not control the entire system, but only a part of it, called a zone, whilst a master device is installed which controls the operating and operating modes; in this case the thermostat controls the ambient temperature where it is installed, whilst the master device manages the operating functions according to the settings configured by the operator. It is not possible to locally modify the operating mode of the device.
Once the ***slave*** mode functions have been set, you will see that it is possible to set the control type that the master device has over the thermostat.

- ***stand alone***

The device is configured to autonomously manage the HVAC system, without the use of timer-thermostats that control the device functions; with this configuration you create a single ambient temperature control centre.
With this setting, the ***Main*** menu changes considerably as the ***Master/Slave control type, Input for setpoint variation range (°C) for manual forced positioning, Input for setpoint variation range (°C) for manual forced positioning via bus*** and ***Via bus operating modification (slave or stand alone)***

indicated in Diag. 3.1 are not visible, whilst a new option, ***Mode and type remote setting*** appears which will be analysed in paragraph ***3.1.4***.
Fig. 3.2 shows the ***Main*** menu for the device in stand alone mode.

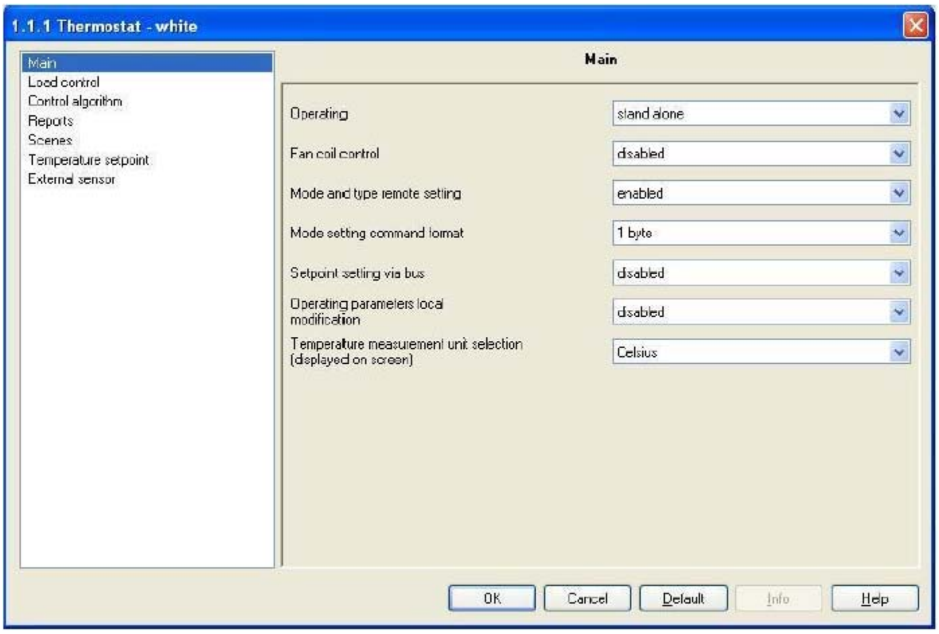


Fig. 3.2

➢ *3.1.2 Fan coil control*

This allows you to enable the device to control the fan coils; the settings are:

- ***disabled***

The device is not able to control the fan coils; it can manage the air-conditioning/heating systems using control algorithms (two points or proportional) as the timer-thermostat does.

- ***enabled***

The device is able to control the fan coils; the ***Control algorithm*** menu is no longer visible and is replaced by the ***Fan coil management*** menu (see Chapter ***8***) and the options in the ***Load control*** menu also change.

➢ *3.1.3 Master/slave control type*

This allows you to configure the control type that the master device has over the thermostat; the settings are:

- ***mode***

The master device controls the thermostat using the bus to set the operating modes (ECONOMY, PRECOMFORT, COMFORT, OFF).

- ***setpoint***

The master device controls the thermostat using the bus and sets the setpoint value to use when applying the control algorithms or to control the fan coils. With these settings the ***Mode setting command format*** and ***Via bus operating modification (slave or stand alone)*** options are not visible, whilst the ***Behaviour on receiving new setpoint*** option appears (see paragraph ***3.1.7*** for further details).

➢ *3.1.4 Mode and type remote setting*

This enables the device to receive the HVAC mode and operating mode setting commands from the bus; the settings are:

- ***disabled***

It is not possible to modify the HVAC mode or operating mode on the device by bus command; both parameters can only be set using the local keyboard.

The ***Mode setting command format*** option is not visible.

- ***enabled***

It is also possible to modify the HVAC mode or operating mode on the device by bus command; both parameters can however be set using the local keyboard.
The ***Mode setting command format*** option is now visible.

3.1.5 Mode setting command format

Here you can configure the command format used to remotely control the device operating mode; the settings are:

- ***1 byte***

Here you can configure the remote control of the operating mode of the device by bus telegrams sent to a single communication object with a 1 byte format. With this setting enabled, the ***HVAC mode input*** communication object becomes visible.

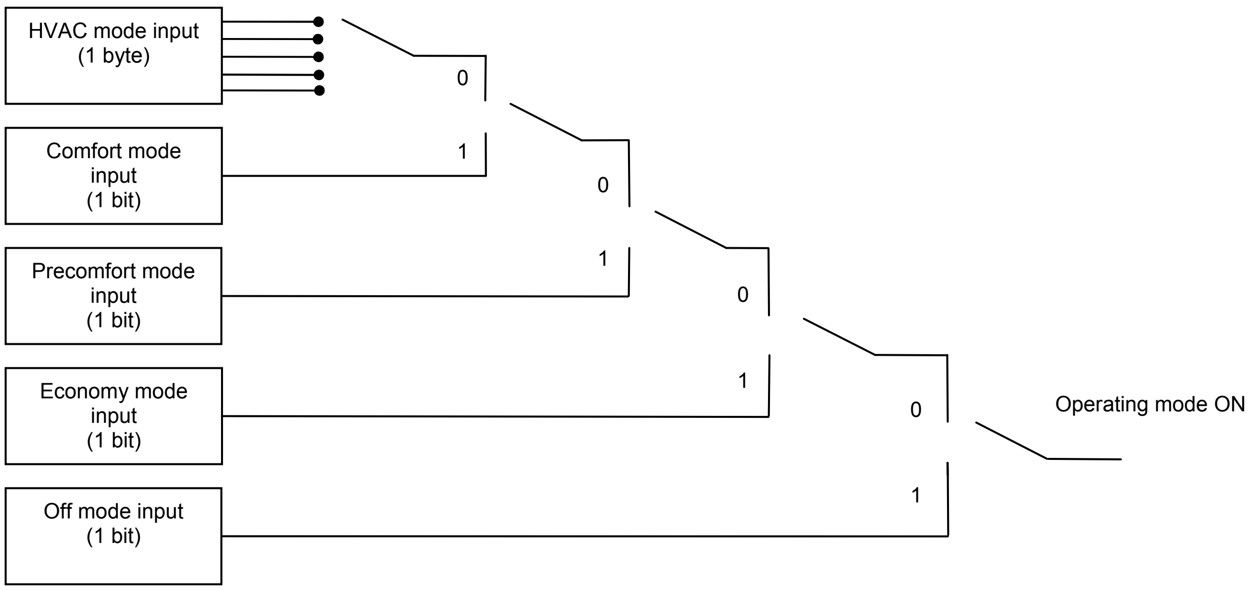
- ***1 bit***

Here you can configure the remote control of the operating mode of the device by bus telegrams sent to a series of communication objects with a 1 bit format; to be precise, one per mode. With this setting enabled, the ***Off mode input, Economy mode input, Precomfort mode input,*** and ***Comfort mode input*** communication objects become visible. There is priority when using these communication objects, that will be illustrated at the end of the paragraph. In this case, to enable an operating mode with a lower priority compared to the current mode, it is necessary to enable the new mode and disable the one with higher priority; the device will not perform this operation automatically.

- ***both***

It is possible configure the remote control of the operating mode of the device by bus telegrams sent to a single communication object with a 1 byte format or to a series of communication objects with a 1 bit format; to be precise, one per mode. With this setting enabled, the ***HVAC mode input, Off mode input, Economy mode input, Precomfort mode input,*** and ***Comfort mode input*** communication objects become visible. There is priority when using these communication objects that is illustrated below.

There is a priority among the communication objects which set the operating modes for the device by remote bus commands, that prevents the problem of more than one object being enabled at the same time; this can be seen more clearly in the layout drawing below:



The above graph can be summarized as follows

Priority	Object	Size
Maximum	Off mode input object	1 bit
	Economy mode input object	1 bit
	Precomfort mode input object	1 bit
	Comfort mode input object	1 bit
Minimum	HVAC mode input object	1 byte

The 1 bit set mode objects all have a higher priority compared to the 1 byte set mode objects; this is due to the fact that, when enabling both the set mode options, the 1 bit objects can be used to set the mode when specific events occur, such as for instance the window contact function, that is when a window is opened the device contact that controls this condition generates the bus command that forces the thermostat into OFF mode; when the window is closed again, this will generate a disable OFF mode command and the thermostat will return to its previous condition.
There is naturally a run command priority among the 1 bit set mode objects too, especially as if only 1 bit format is used to set the operating modes, if more than one object was enabled at any time, it would be necessary to determine which of these has priority to determine the operating mode enabled on the device; to therefore enable an operating mode with a lower priority than the current mode, it is necessary to enable the new mode and disable the current mode with the higher priority.

➢ *3.1.6 Input for setpoint variation range (°C) for manual forced positioning*

Here you can set the maximum variation in the setpoint value used by the device for temporary forced positioning of the same setpoint using the local keyboard; the settings are provided in the drop-down menu and range from "±0.0" (no variation) to "±5.0" °C.
It is possible to modify this value also from the local navigation menu if the ***Operating parameters local modification*** option has been ***enabled***.

➢ *3.1.7 Behaviour on receiving a new setpoint*

Here you can define how the device should behave when the enabled setpoint is temporarily forced and a new setpoint value is received by the master device; the settings are:

- ***cancel temperature forced positioning***

If the setpoint enabled on the device is temporarily forced, when it receives a new setpoint through a bus telegram the forced positioning is cancelled and the new setpoint value is not applied.

- ***maintain temperature forced positioning***

If the setpoint enabled on the device is temporarily forced, when it receives a new setpoint through a bus telegram the forced positioning is applied to the new setpoint value.

➢ *3.1.8 Input for setpoint variation range (°C) for manual forced positioning via bus*

This is used to enable a communication object through which it will be possible to use a bus telegram to configure the setpoint variation interval value for temporary forced positioning; the settings are:

- ***disabled***

The communication object is not visible and therefore it is not possible to configure the setpoint variation interval for temporary forced positioning by bus command.

- ***enabled***

The ***Setpoint regulation range setting*** communication object is now visible through which it is possible to configure the setpoint variation interval for temporary forced positioning by bus command.

➢ *3.1.9 Setpoint setting via bus*

This allows you to enable the communication objects required to configure the setpoints for each device operating mode by bus telegram; the settings are:

- ***disabled***

It is not possible for the bus telegrams to change the HVAC mode setpoints; no communication object is therefore visible for the setpoint configuration.

- ***enabled***

It is possible to change the HVAC mode setpoints by bus telegrams; with this setting the ***Heating antifreeze setpoint, Heating economy setpoint, Heating precomfort setpoint, Heating comfort setpoint, Air cooling high temp. protect. setpoint, Air cooling economy setpoint, Air cooling precomfort setpoint*** and ***Air cooling comfort setpoint*** are all visible; these can be used to set the setpoints for each device operating mode by bus command.
Please remember that among the various setpoints belonging to the same function type, there is a setting value threshold determined from what seen below:
− $T_{antifreeze} \leq T_{economy} \leq T_{precomfort} \leq T_{comfort}$ in heating ("T" indicates the standard mode setpoint value)
− $T_{comfort} \leq T_{precomfort} \leq T_{economy} \leq T_{high\ temp.\ protect.}$ in air conditioning ("T" indicates the standard mode setpoint value)

Whilst a control is made over the modifications to setpoints from the local menu to make sure the threshold is not exceeded, the settings triggered by the bus do not undergo the same control to prevent that, if a supervisor updates a series of parameters, there will be no need to establish an order in which to make the updates to the various setpoints; however, the operator is requested to avoid setting setpoints for bus commands that do not comply with the above threshold as this could cause the device to malfunction.

➢ *3.1.10 Operating parameters local modification*
This allows you to enable the viewing of the device operating parameters in the local navigation menu; the settings are:

- ***disabled***

When you access the local navigation menu the parameters that allow you to modify the operating modes on the device are not visible (for further information on these parameters, please consult the INSTALLATION AND USER MANUAL).

- ***enabled***

When you access the local navigation menu the parameters that allow you to modify the operating modes on the device are visible (for further information on these parameters, please consult the INSTALLATION AND USER MANUAL).

➢ *3.1.11 Via bus operating modification (slave or stand alone)*
This is used to enable a communication object through which it will be possible to use a bus telegram to configure the operating settings for the device (slave or stand alone); the settings are:

- ***disabled***

The communication object is not visible and therefore it is not possible to configure the device operating settings (slave or stand alone) by bus command.

- ***enabled***

The ***Enabling slave function*** communication object is now visible and therefore it is possible to configure the device operating settings (slave or stand alone) by bus command.

➢ *3.1.12 Temperature measurement unit selection (display on screen)*
This allows you to set the unit of measure used to express the temperature value displayed on the screen; the settings are:

- ***Fahrenheit***

The unit of measure used to display the temperature value on the screen is Fahrenheit. Remember that it is always possible to change the unit of measure used to display the temperature using the local navigation menu.

- ***Celsius***

The unit of measure used to display the temperature value on the screen is Celsius. Remember that it is always possible to change the unit of measure used to display the temperature using the local navigation menu.

3.2 Communication objects

The communication objects, whose visibility depends on the settings in the items of the ***Main*** menu, are those indicated in Fig. 3.3.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
0	Day/Hour input	Update day/hour	3 Byte	C	-	W	-	-	Time DPT_TimeOfDay	Low
1	Operating type input	Heating/Air conditioning	1 bit	C	-	W	-	-		Low
2	Setpoint input	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
3	HVAC mode input	Auto/Eco/Precom/Comf/Off	1 Byte	C	-	W	-	-		Low
13	Heating antifreeze setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
14	Heating economy setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
15	Heating precomfort setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
16	Heating comfort setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
17	Air cooling high temp. protect. setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
18	Air cooling economy setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
19	Air cooling precomfort setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
20	Air cooling comfort setpoint	Setpoint value	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
21	Setpoint regulation range setting	Value °C	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low
22	Enabling slave function	Enable/Disable	1 bit	C	-	W	-	-	1 bit DPT_Enable	Low
23	Off mode input	Enable/Disable	1 bit	C	-	W	-	-	1 bit DPT_Enable	Low
24	Economy mode input	Enable/Disable	1 bit	C	-	W	-	-	1 bit DPT_Enable	Low
25	Precomfort mode input	Enable/Disable	1 bit	C	-	W	-	-	1 bit DPT_Enable	Low
26	Comfort mode input	Enable/Disable	1 bit	C	-	W	-	-	1 bit DPT_Enable	Low

Fig. 3.3

➢ *3.2.1 Day/hour input*

Using this communication object the device is able to update the date and time on its internal clock when it receives a bus telegram; it is always possible to modify the day and time using the local navigation menu on the device.
The enabled flags are C (communication) and W (written by bus) .
The standard format of the object is *10.001 DPT_TimeOfDay*, so the size of the object is *3 byte* and the information it receives is *update day and time.*

➢ *3.2.2 Operating type input*

Here you can configure the remote control of the device function type by bus command. When this object receives a telegram with a "1" logic value, the device sets the operating type to HEATING, indicated by a pilot light on the display, maintaining the same operating mode as before; vice versa, when this object receives a telegram with a "0" logic value, the device sets the operating type to AIR CONDITIONING, indicated by a pilot light on the display, maintaining the same operating mode as before.
In any case, it is however possible to modify the operating type using the local navigation menu on the device.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *1.100 DPT_Heat/Cool*, so the size of the object is *1 bit* and the commands it receives are *operating type* commands. *Heating/Air conditioning.*

➢ *3.2.3 Setpoint input*

This allows the thermostat to receive from the master device the setpoint value to use when applying the set control algorithm or to control the fan coils.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *9.001 DPT_Value_Temp*, so the size of the object is *2 byte* and the commands it receives are *setpoint values expressed in degrees centigrade (rounded off to a tenth of a degree)*.

➢ *3.2.4 HVAC mode input*

Here you can configure the remote control of the device operating mode (HVAC mode) by bus command. When this communication object receives a telegram with the operating mode information that is to be set, the device sets the operating mode according to the command received, indicated by a pilot light on the display, only if there are no 1 bit operating mode objects enabled.

If the device has been configured in stand alone mode, it is still possible to modify the operating mode using the local navigation menu on the device, which does nothing more than replicate the command

reception event on the communication object in question to modify, with each pressing, the operating mode.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *20.102 DPT_HVACMode*, so the size of the object is *1 byte* and the commands it receives are *Operating mode* commands. *Economy/Precomfort/Comfort/Off.*

➢ *3.2.5 Heating antifreeze setpoint*

Here you can configure the remote control by bus command of the OFF mode setpoint for the HEATING operating mode; it this communication object receives an enable setpoint telegram with a value of less than 2°C and more than 40°C, the command will be ignored for safety reasons. However, the setpoint for this mode must be between 2°C and 7°C and also lower than the setpoint value set for the ECONOMY mode and, if a value is received that does not respect the thresholds indicated in ***3.1.9***, the value will become effective until the local navigation menu is accessed; once you access the setpoint parameters on the local menu, the device controls that all the setpoint thresholds are complied with and, if this is not the case, the device will automatically modify the setpoint so that it complies with the configuration threshold.
It is however possible to modify the HEATING mode OFF setpoint at any time using the local navigation menu on the device.
If the setpoint is modified manually or by bus command through this communication object, the temporary forced positioning is maintained, within the limits established by the value set for the ***Input for setpoint variation range (°C) for manual forced positioning*** option or the value received on the ***Setpoint regulation range setting*** object if enabled (limits imposed by the device “slave” configuration).
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *9.001 DPT_Value_Temp*, so the size of the object is *2 byte* and the commands it receives are *HEATING mode OFF mode setpoint values expressed in degrees centigrade (rounded off to a tenth of a degree)*.

The above described features and functions also apply to the following parameters ***Heating economy setpoint, Heating precomfort setpoint***, ***Heating comfort setpoint*** for the HEATING operating type, and also for ***Air cooling high temp. protect. setpoint,*** (equivalent to OFF mode), ***Air cooling economy setpoint***, ***Air cooling comfort setpoint,*** and ***Air cooling precomfort setpoint*** for the AIR CONDITIONING operating type.
The setpoint thresholds illustrated in paragraph ***3.1.9*** remain the same*.*

➢ *3.2.6 Setpoint regulation range setting*

Here you can configure the remote control by bus command of the setpoint variation interval value for the temporary forced positioning of the same setpoint; if this communication object receives a setpoint regulation range setting telegram with a value of less than 0°C and more than 5°C, the value will be limited within the aforementioned limits for safety reasons; this means that the values below 0°C will be interpreted as 0°C and, likewise, the values over 5°C will be interpreted as 5°C.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *9.001 DPT_Value_Temp*, so the size of the object is *2 byte* and the commands it receives are *setpoint variation interval values for temporary forced positioning expressed in degrees centigrade (rounded off to a tenth of a degree)*.

➢ *3.2.7 Enabling slave function*

Here you can configure the remote control of the device functions by bus command, changing it from slave to stand alone mode and vice-versa. When this object receives a bus telegram with a “1” logic value, the device switches to SLAVE mode; vice-versa if the object receives a "0" logic value, the device switches to STAND ALONE mode with remote control disabled.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *1.003 DPT_Enable*, so the size of the object is *1 bit* and the commands it receives are *slave/stand alone operating mode.*

➢ *3.2.8 Off mode input*

Here you can enable the remote control of the device OFF operating mode (or HVAC mode) by bus command. When this object receives a telegram with a "1" logic value, the device instantly switches to OFF mode, indicated by a pilot light on the display, given the enabling of this object has a higher priority than any other HVAC setting; vice versa, when this object receives a "0" logic value, the device instantly disables the OFF operating mode and the new operating mode is enabled automatically by the device according to the priority table illustrated in paragraphs ***3.1.5***.

When the device is in STAND ALONE mode with remote controls disabled, please remember that, until the OFF operating mode is disabled, it is not possible to modify the operating mode using the local navigation menu on the device, as the latter does nothing more than replicate the command reception event on the ***HVAC mode input*** communication object which has a lower priority than the object in question.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *1.003 DPT_Enable*, so the size of the object is *1 bit* and the commands it receives are *enable/disable OFF operating mode commands*.

The above described features and functions also apply to the ***Economy mode input, Precomfort mode input, Comfort mode input*** communication objects, so please refer to the description provided in ***3.2.8***, the difference being that reference is made to the relative operating modes.
The priority table illustrated in paragraph ***3.1.5.*** remains the same.

4 "Load control" menu (fan coil disabled)

In the ***Load control*** menu that, in this chapter will be presented with the *"fan coil disabled"* configuration, that is the one you see if the ***Fan coil control*** option in the ***Main*** menu is set to ***disabled***; here you have all the parameters used to set the format of commands sent to the controlled loads (see Fig. 4.1); according to the setting entered for this option, the Load control algorithms that can be configured in the ***Control algorithm*** menu will change, and consequently the conformation of the actual menu.

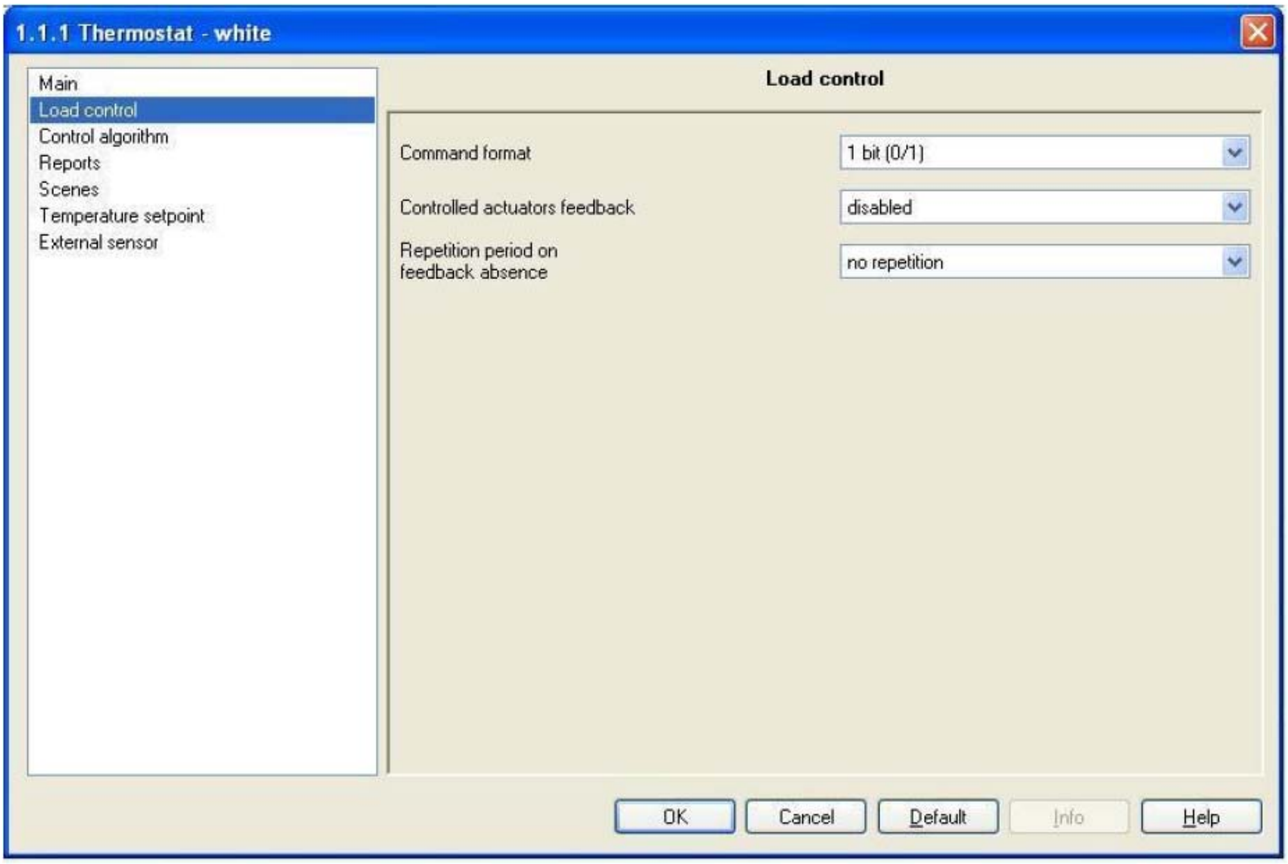


Fig. 4.1

4.1 Parameters

➢ 4.1.1 Command format

Here you can configure the format for the communication objects that control the loads, and also the control algorithms that allow the loads to be managed; the settings are:

- ***1 bit (0/1)***

The format of the communication objects that manage the loads is 1 bit; with this configuration the Load control algorithms that can be configured, and analysed in detail in Chapter **6** ***Control algorithm menu (1 bit)*** are as follows: 2 on/off and PMW proportional points. The ***Heating switching*** and ***Air cooling switching*** communication objects are visible and allow the loads to controlled.

- ***1 byte (value %)***

The format of the communication objects that manage the loads is 1 byte; with this configuration the Load control algorithms that can be configured, and analysed in detail in Chapter **7** ***Control algorithm menu (1 byte)*** are as follows: 2 0%/100% and continuous proportional points
The ***Heating continuous command*** and ***Air cooling continuous command*** communication objects are visible and allow the loads to be controlled.

➢ *4.1.2 Controlled actuators feedback*

This allows you to enable the device so it can receive feedbacks from the actuators (loads) it controls; the settings are:

- ***disabled***

The device is not able to receive feedback from the actuators (loads) that the command sent has actually been performed. The ***Repetition period on feedback absence*** option appears which allows you to define the repetition interval for the commands sent to the loads.

- ***enabled***

The device is able to receive feedback from the actuators (loads) that the command sent has actually been performed. The ***Heating status feedback*** and the ***Air cooling status feedback*** communication objects are visible if the ***Command format*** option is set to ***1 bit (0/1)*** whilst if this option is set to ***1 byte (% value)*** the ***Heating continuous control feedback*** and the ***Air cooling continuous control feedback*** communication objects are visible.
The ***Repetition period on feedback absence*** option is not visible as the device is always aware of the status of the loads it commands; in fact, if within one minute from sending a command to a load, the latter does not send confirmation of execution of the command to the thermostat, it will send the command again every minute until it receives due confirmation from the load; the heating/air conditioning system pilot light will blink to signal this anomaly.

➢ *4.1.3 Repetition period on feedback absence*

Here you can set the retransmission period of the command to the loads; the settings are provided in the drop-down menu (an interval of from “no repetition” to 30 minutes).

4.2 Communication objects

The communication objects, whose visibility depends on the settings in the items of the ***Load control*** menu, are those indicated in Fig. 4.2.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
4	Heating status feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
6	Air cooling status feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
30	Heating switching	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
32	Air cooling switching	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
5	Heating continuous control feedback	% Value	1 Byte	C	-	W	-	-	8 bit unsigned value DPT_Scaling	Low
7	Air cooling continuous control feedback	% Value	1 Byte	C	-	W	-	-	8 bit unsigned value DPT_Scaling	Low
31	Heating continuous command	% Value	1 Byte	C	R	-	T	-	8 bit unsigned value DPT_Scaling	Low
33	Air cooling continuous command	% Value	1 Byte	C	R	-	T	-	8 bit unsigned value DPT_Scaling	Low

Fig. 4.2

➢ *4.2.1 Heating status feedback*

This allows the device to be informed on the status of the actuator that manages the heating system controlled by the thermostat; once the command has been sent to this actuator, if the device does not receive confirmation within one minute that the load has executed the command by bus telegram to the communication object in question, it will instantly send the command again every minute until it receives due confirmation from the load; the heating/air conditioning system pilot light will blink to signal this anomaly (according to which is displayed on the screen). If a feedback is received by the actuator that does not copy the command sent, the device will instantly send another command and trigger the above described control.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it receives are the *heating system actuator status On/Off*.

➢ *4.2.2 Air cooling status feedback*

The same applies as indicated in the previous paragraph, but in relation to the air conditioning system actuator (please refer to ***4.2.1*** for further details).

4.2.3 Heating switching

This allows the device to send ON/OFF commands to the actuator that manages the heating system controlled by the thermostat; according to the control algorithm set, the device calculates when it has to intervene on the heating system to regulate the ambient temperature and therefore sends a telegram with a “1” logic value to activate the system, and “0” logic value to deactivate the same system.
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it sends are *heating system On/Off*.

4.2.4 Air cooling switching

The same applies as indicated in the previous paragraph, but in relation to the air conditioning system actuator (please refer to ***4.2.3*** for further details).

4.2.5 Heating continuous control feedback

This allows the device to be informed on the status of the actuator that manages the heating system controlled by the thermostat; once the command has been sent to this actuator, if the device does not receive confirmation within one minute that the load has executed the command by bus telegram to the communication object in question, it will instantly send the command again every minute until it receives due confirmation from the load; the heating/air conditioning system pilot light will blink to signal this anomaly (according to which is displayed on the screen). If a feedback is received by the actuator that does not copy the command sent, the device will instantly send another command and trigger the above described control.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it interprets are the *heating system actuator percentage status*.

4.2.6 Air cooling continuous control feedback

The same applies as indicated in the previous paragraph, but in relation to the air conditioning system actuator (please refer to ***4.2.5*** for further details).

4.2.7 Heating continuous command

This allows the device to send percentage regulation commands to the actuator that manages the heating system controlled by the thermostat; according to the control algorithm set, the device calculates when it has to intervene on the heating system to regulate the ambient temperature and therefore sends a telegram with the system activation percentage information.
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it interprets are the *heating system percentage values*.

4.2.8 Air cooling continuous command

The same applies as indicated in the previous paragraph, but in relation to the air conditioning system actuator (please refer to ***4.2.7*** for further details).

5 *“Load control” menu (fan coil enabled)”*

In the ***Load control*** menu that, in this chapter will be presented with the *“fan coil enabled”* configuration, that is the one you see if the ***Fan coil control*** option in the ***Main*** menu is set to ***enabled***; here you have all the parameters used to enable the device to receive feedbacks from the actuators that control the speed of the fan coils and the solenoid valves on the heating and air-conditioning systems (see Fig. 5.1).

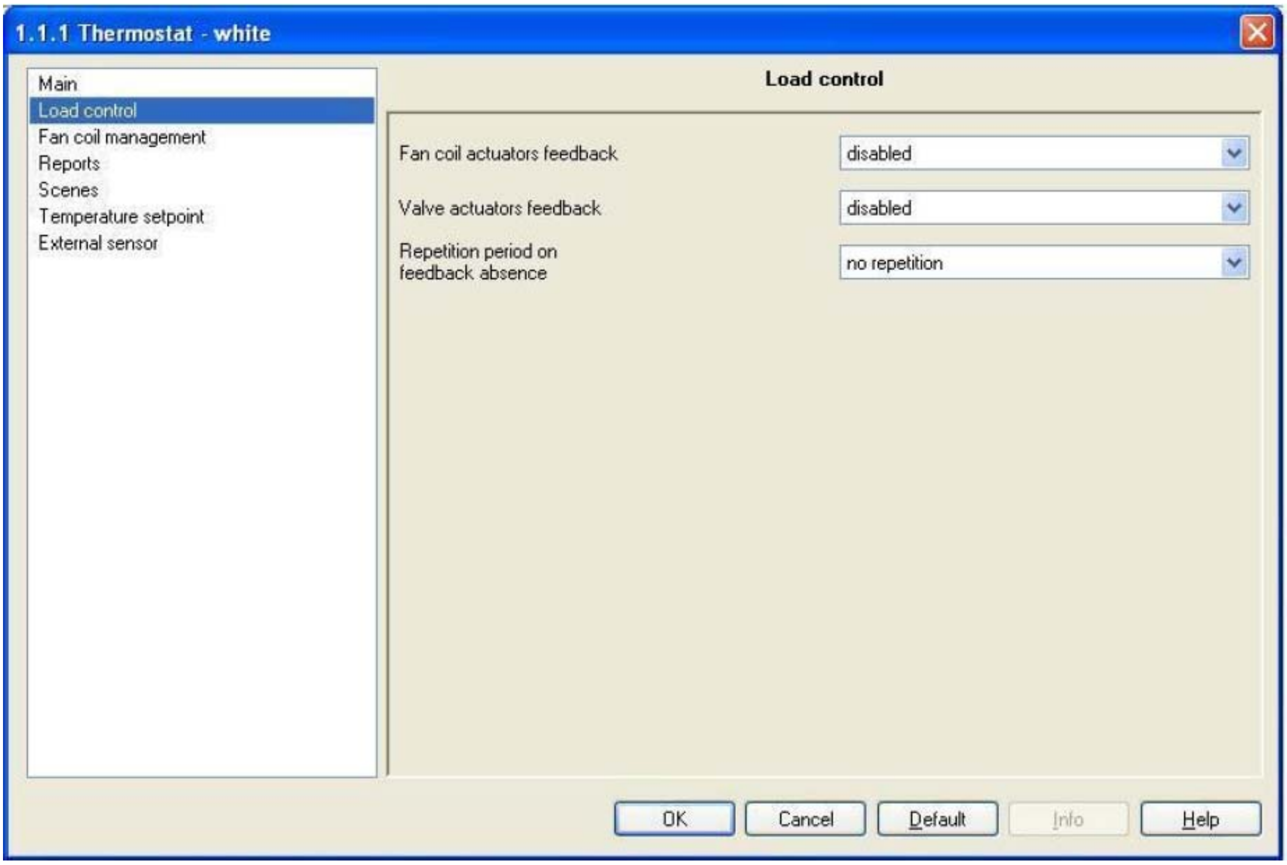


Fig. 5.1

5.1 Parameters

➢ *5.1.1 Fan coil actuators feedback*

This allows you to enable the device so it can receive feedbacks from the actuators that manage the fan coil speeds it controls; the settings are:

- ***disabled***

The device is not able to receive feedback from the actuators that the command sent has actually been performed; the ***Repetition period on feedback absence*** option appears which allows you to enter a repetition period for the commands sent to the actuators that control the fan coils and those which control the solenoid valves.

- ***enabled***

The device is able to receive feedback from the actuators that the command sent has actually been performed; the ***V1 fan status feedback, V2 fan status feedback*** and the ***V3 fan status feedback*** communication objects are visible if the ***Command format*** option in the ***Fan coil management*** menu is set to ***1 bit (0/1)*** whilst of this option is set to ***1 byte (% value)*** the ***Fan coil continuous feedback*** communication object is visible.
The device is always aware of the status of the loads it commands; in fact, if within one minute from sending a command to a load, the latter does not send confirmation of execution of the command to the thermostat, it will send the command again every minute until it receives due confirmation of the same;

the fan coil pilot light will blink to signal this anomaly. The device software also has a logic interlock function that allows you to activate a different fan coil speed from that currently activated only if the correct feedback has been received by the latter that the speed has been deactivated; until the thermostat receives feedback that the enabled speed has been deactivated, it will not send activation commands for the new speed, to prevent a series of fan coil windings being powered at the same time which would break the fan coil.

➢ *5.1.2 Valve actuators feedback*

This allows you to enable the device so it can receive feedbacks from the actuators that manage the heating and air conditioning system solenoid valves it controls; the settings are:

- ***disabled***

The device is not able to receive feedback from the actuators that the command sent has actually been performed; the ***Repetition period on feedback absence*** option appears which allows you to enter a repetition period for the load commands.

- ***enabled***

The device is able to receive feedback from the actuators (loads) that the command sent has actually been performed; the following communication objects are now visible:

- ***Heating valve feedback*** and ***Air conditioning valve feedback*** if the ***Valves management*** option in the ***Fan coil management*** menu is set to ***4-pipes on/off.***
- ***Heating/Air conditioning valve feedback*** if the ***Valves management*** option in the ***Fan coil management*** menu is set to ***2-pipes on/off***
- ***Heating valve % feedback*** and ***Air conditioning valve % feedback*** if the ***Valves management*** option in the ***Fan coil management*** menu is set to ***4-pipes control percentage 0%/100%***
- ***Heating/Air conditioning valve % feedback*** if the ***Valves management*** option in the ***Fan coil management*** menu is set to ***2-pipes control percentage 0%/100%***

The ***Repetition period on feedback absence*** option is not visible as the device is always aware of the status of the valves it commands; in fact, if within one minute from sending a command to a valve, the latter does not send confirmation of execution of the command to the thermostat, it will send the command again every minute until it receives due confirmation; the heating/air conditioning system pilot light will blink to signal this anomaly.

➢ *5.1.3 Repetition period on feedback absence*

Here you can set the retransmission period of the command to the fan coils and/or the valves as the device is not informed, in this case, of the actual status of the same.
The settings are provided in the drop-down menu, with an interval of from “no repetition” to 30 minutes.
If both fan coil and valve feedbacks are disabled, the value set for this option will naturally refer to both.

5.2 Communication objects

The communication objects, whose visibility depends on the settings in the items of the ***Load control*** menu, are those indicated in Fig. 5.2.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
4	Heating/Air conditioning valve feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
4	Heating valve feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
6	Air conditioning valve feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
5	Heating/Air conditioning valve % feedback	0%/100%	1 Byte	C	-	W	-	-	8 bit unsigned value DPT_Scaling	Low
5	Heating valve % feedback	0%/100%	1 Byte	C	-	W	-	-	8 bit unsigned value DPT_Scaling	Low
7	Air conditioning valve % feedback	0%/100%	1 Byte	C	-	W	-	-	8 bit unsigned value DPT_Scaling	Low
9	V1 fan status feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
10	V2 fan status feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
11	V3 fan status feedback	On/Off status	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
12	Fan coil continuous feedback	% Value	1 Byte	C	-	W	-	-	8 bit unsigned value DPT_Scaling	Low

Fig. 5.2

➢ 5.2.1 Heating/Air conditioning valve feedback

This allows the device to be informed on the status of the actuator that manages the heating and air conditioning system valve controlled by the thermostat; once the command has been sent to this actuator, if the device does not receive confirmation within one minute that the actuator has executed the command by bus telegram to the communication object in question, it will instantly send the command again every minute until it receives due confirmation; the heating/air conditioning system pilot light will blink to signal this anomaly (according to which is displayed on the screen). If a feedback is received by the actuator that does not copy the command sent, the device will instantly send another command and trigger the above described control.

The enabled flags are C (communication), W (written by bus).

The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it receives are *heating and air conditioning system actuator valve status*: *On/Off*.

➢ 5.2.2 Heating valve feedback

The same characteristics and function apply as indicated in the previous paragraph, the different being that they refer to the actuator that controls the heating system solenoid valve (see ***5.2.1***).

➢ 5.2.3 Air conditioning valve feedback

The same characteristics and function apply as indicated in the previous paragraph, the different being that they refer to the actuator that controls the air conditioning system solenoid valve (see ***5.2.1***).

➢ 5.2.4 Heating/Air conditioning valve % feedback

This allows the device to be informed on the status of the actuator that manages the heating and air conditioning system valve controlled by the thermostat; once the command has been sent to the actuator that controls the heating and air conditioning system valve, if the device does not receive confirmation within one minute that the actuator has executed the command by bus telegram to the communication object in question, it will instantly send the command again every minute until it receives due confirmation; the heating/air conditioning system pilot light will blink to signal this anomaly (according to which is displayed on the screen). If a feedback is received by the actuator that does not copy the command sent, the device will instantly send another command and trigger the above described control.

The enabled flags are C (communication), W (written by bus).

The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it receives are *heating system valve opening percentage status*.

➢ 5.2.5 Heating valve % feedback

The same characteristics and function apply as indicated in the previous paragraph, the different being that they refer to the actuator that controls the heating system valve (see ***5.2.4***).

➢ 5.2.6 Air conditioning valve % feedback

The same characteristics and function apply as indicated in the previous paragraph, the different being that they refer to the actuator that controls the air conditioning system valve (see ***5.2.4***).

5.2.7 V1 fan status feedback

This allows the device to be informed on the status of the actuator that manages the speed 1 on the fan coil; once the command has been sent to this actuator, if the device does not receive confirmation within one minute that the speed has been activated by bus telegram to the communication object in question, it will instantly send the command again every minute until it receives due confirmation; the fan coil control pilot light will blink to signal this anomaly. If a feedback is received by the actuator that does not copy the command sent, the device will instantly send another command and trigger the above described control.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it receives are *fan coil speed 1 status: On/Off*.

5.2.8 V2 fan status feedback

The same characteristics and function apply as indicated in the previous paragraph, the different being that they refer to the actuator that controls speed 2 on the fan coil (see ***5.2.7***).

5.2.9 V3 fan status feedback

The same characteristics and function apply as indicated in the previous paragraph, the different being that they refer to the actuator that controls speed 3 on the fan coil (see ***5.2.7***).

5.2.10 Fan coil continuous feedback

This allows the device to be informed on the status of the actuator that manages the speed on the fan coil; once the command has been sent to this actuator, if the device does not receive confirmation within one minute that the speed has been activated by bus telegram to the communication object in question
it will instantly send the command again every minute until it receives due confirmation; the fan coil control pilot light will blink to signal this anomaly. If a feedback is received by the actuator that does not copy the command sent, the device will instantly send another command and trigger the above described control.
The enabled flags are C (communication), W (written by bus).
The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it receives are the *fan coil speed percentage values*.

6 *“Control algorithm (1 bit)” menu*

The ***Control algorithm*** menu lists all the parameters used to set the Load control algorithms for the heating and air conditioning system; in this chapter you will find the menu and relative options when the ***Command format*** option in the ***Load control (fan coil disabled)*** menu is set to ***1 bit (0/1)*** (see Fig. 6.1).

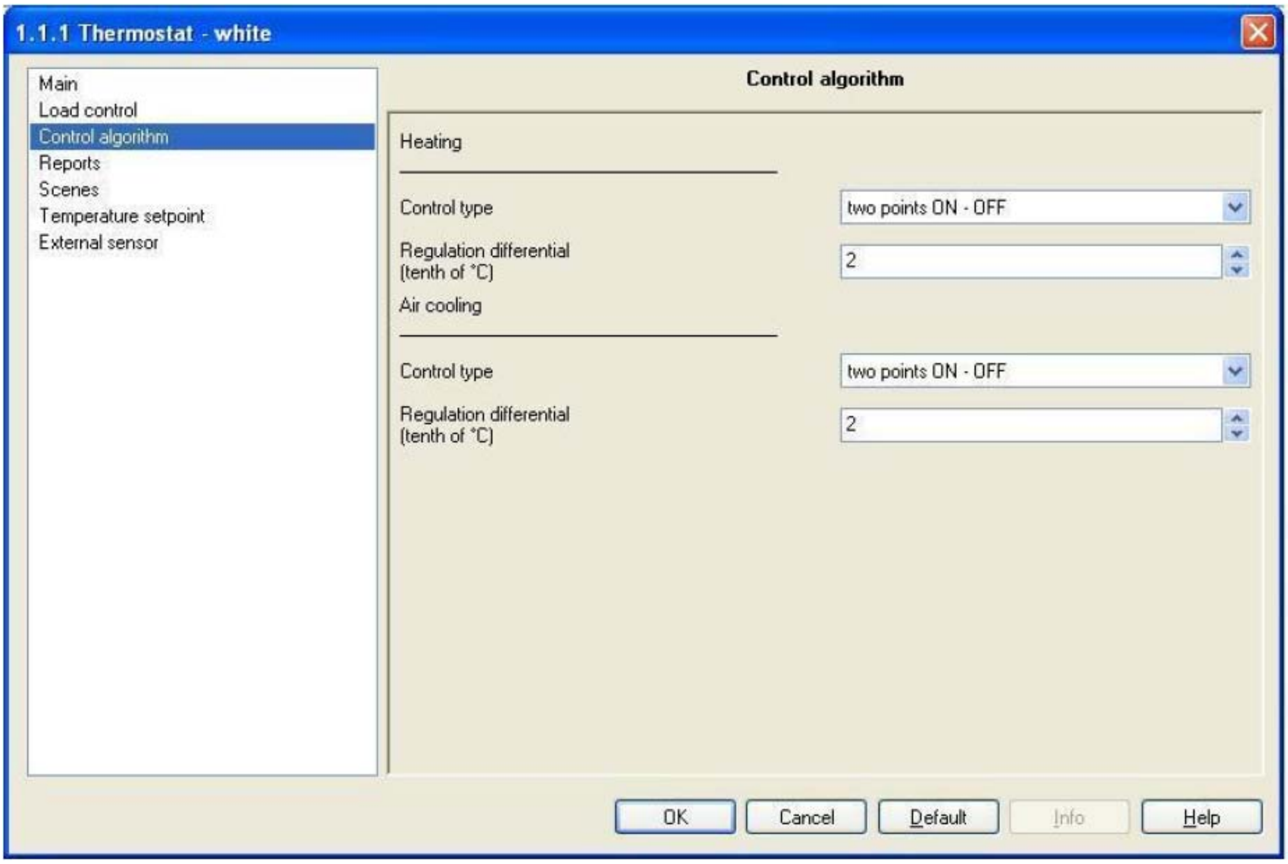


Fig. 6.1

6.1 Parameters

➢ *6.1.1 Control type*

Here you can set the Load control algorithms applied to the heating system, given that this item is found in the heating menu (see subtitle in Diag. 6.1); the settings are:

- ***two points ON - OFF***

The algorithm used to control the heating system is the classic algorithm defined as a two points control. This control type turns the heating system ON and OFF according to a hysteresis cycle, that is there is no single threshold that discriminates the ON and OFF command but two are identified (see Diag. 6.2).

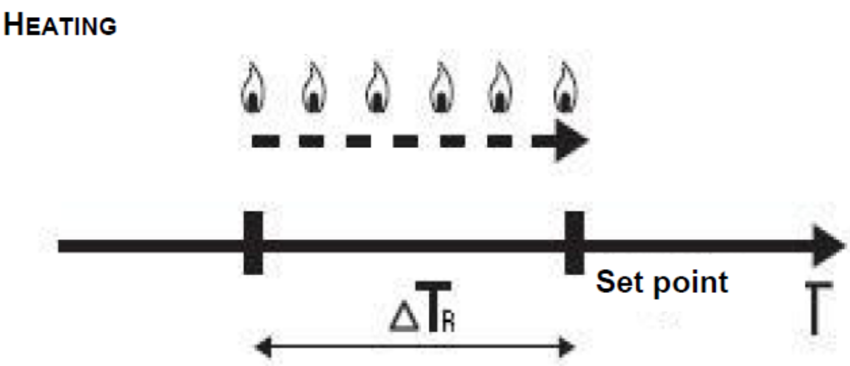


Fig. 6.2

When the measured temperature is below the “setpoint-ΔT_R“ value (where ΔT_R identifies the heating regulation differential value) the device starts the heating system by sending the relative bus command to the actuator that manages it; when the measured temperature reaches the indicated setpoint value, the device switches off the heating system by sending the relative bus command to the actuator that controls it.
You can see in this diagram that there are two thresholds which control the ON and OFF commands for the heating system; the first consists in the “setpoint-ΔT_R“ value, below which the device switches the system ON, the second consists in the indicated setpoint value, over which the device switches the system OFF.
With this setting, the ***Regulation differential (tenth of °C)*** option is visible.

- ***proportional PWM***

The algorithm used to control the heating system is the algorithm which allows you to reduce heat inertia times caused by a two points control, called a PMW control. This control type foresees the modulation of the pulse duty-cycle, represented by the heating system activation time, according to the difference between the indicated setpoint and the detected temperature. (see Fig. 6.3).

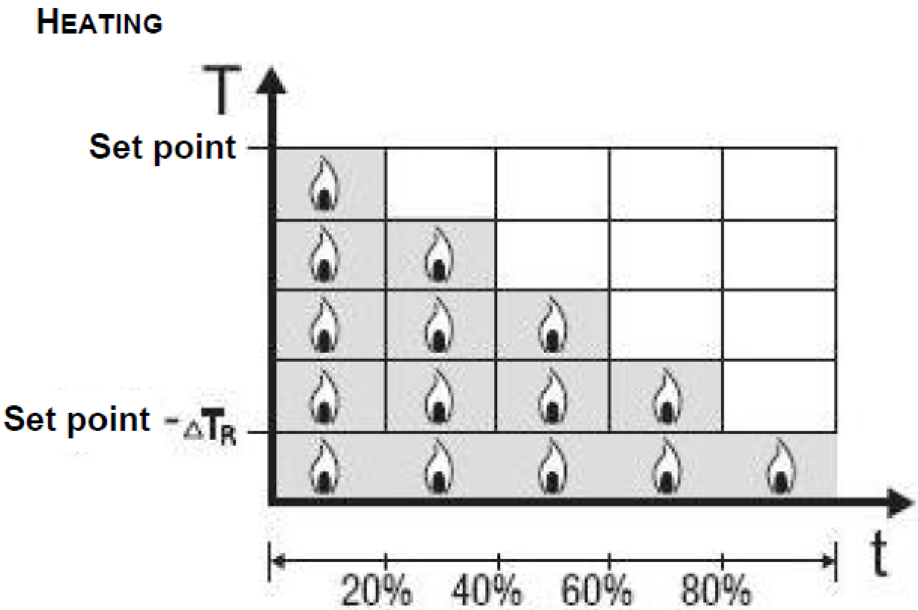


Fig. 6.3

The device keeps the heating system ON for a percentage of time that depends on the difference between the measured temperature and the indicated setpoint; the setpoint and “setpoint-ΔT_R“ values

are indicated on the ordinate axis, that determines the proportional band limits within which the device constantly regulates the heating system, modulating the system’s ON and OFF times.
With this type of algorithm there is no hysteresis cycle on the heating element and therefore the inertia time (system heating and cooling time) introduced by the two points control is eliminated. This also leads to energy savings as the system does not stay ON for no reason and, once the desired temperature has been reached, it continues to supply amounts of heat just to compensate any dispersion of heat in the environment.
With this setting the ***Regulation differential (tenth of °C)*** disappears and is replaced by new options, namely ***Cycle time*** and ***PWM regulation differential***.

➢ *6.1.2 Regulation differential (tenth of °C)*

Here you can set the heating regulation differential value which, subtracted from the indicated setpoint value, determines the threshold value below which the heating system is switched ON upon two points control.
The settings range from 2 (tenths of degrees centigrade) to 20 (tenths of degrees centigrade).

➢ *6.1.3 Cycle time*

Here it is possible to set the time within which the device must perform PWM modulation. The settings are provided in the drop-down menu (an interval of from 5 to 60 minutes).
The settings are all multiples of 5 because, as you can see in Diag. 6.3, the duration of the heating system activation time is expressed as a percentage compared to the cycle time with a step of 20%. This means that, should the result of the control algorithm lead to a system activation time equal to 40% of the cycle time, if the value of the latter is 20 minutes, the device will activate the system for 8 minutes and then deactivate it until the end of the cycle time; at this point the PMW control algorithm is applied again and the activation time will be duly modified.

➢ *6.1.4 Regulation differential*

Here you can set the heating PMW regulation differential value which, subtracted from the indicated setpoint value, determines the lowest limit of the proportional band limits used to modulate the time when the heating system is switched ON upon PWM proportional control. The settings are provided in the drop-down menu (an interval of from 0.4°C to 3.2°C).
The settings are all multiples of 0.4 because, as you can see in Diag. 6.3, the proportional band is divided into four zones and the minimum resolution for the device is 0.1 °C. This value set for this option, divided by 4, determines the width of the proportional sub-band within which the device determines the system ON and OFF times.

As the air conditioning parameters have the same characteristics and functions, with the sole difference being that they refer to the AIR CONDITIONING operating mode, please refer to the paragraphs above (from ***6.1.1*** to ***6.1.4***) for further information.

6.2 Communication objects

There are no communication objects enabled by the ***Control algorithm (1bit)*** menu.

7 "Control algorithm (1 byte)" menu

The ***Control algorithm*** menu lists all the parameters used to set the Load control algorithms for the heating and air conditioning system; in this chapter you will find the menu and relative options when the ***Command format*** option in the ***Load control (fan coil disabled)*** menu is set to ***1 byte (% value)*** (see Fig. 7.1).

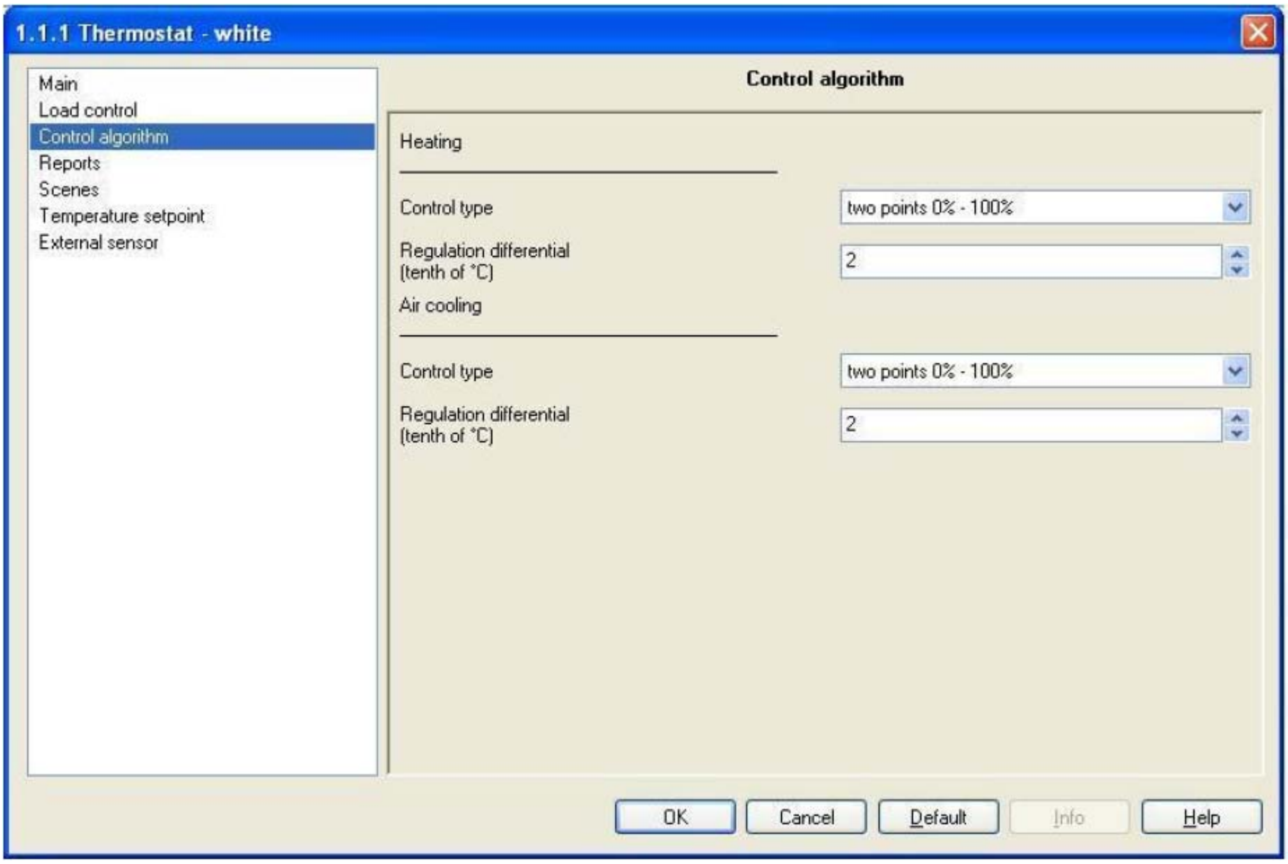


Fig. 7.1

7.1 Parameters

➢ 7.1.1 Control type

Here you can set the Load control algorithms applied to the heating system, given that this item is found in the heating menu (see subtitle in Diag. 7.1); the settings are:

- ***two points 0% - 100%***

The functions and characteristics are the same as those illustrated for 1 bit control algorithm therefore please refer to ***6.1.1.*** With this setting, the ***Regulation differential (tenth of °C)*** option is visible.

- ***continuous proportional***

The algorithm used to control the heating system is the algorithm which allows you to reduce heat inertia times caused by a two points control, called continuous control. This control type foresees the continuous control of the difference between the measured temperature and the indicated setpoint and consequently the sending of power modulation commands to the heating system (see Fig. 7.2).

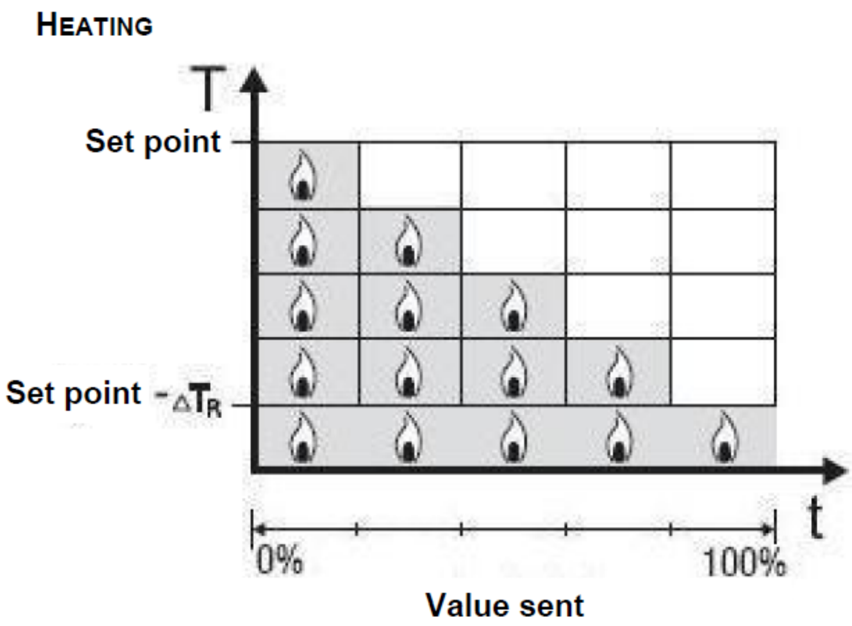


Fig. 7.2

The device sends the commands to the actuator that manages the heating system according to the difference between the measured temperature and the indicated setpoint; the setpoint and "setpoint-ΔT_R" values are indicated on the ordinate axis, that determines the proportional band limits within which the device constantly regulates the heating system, modulating the power supplied to the same.
With this type of algorithm there is no hysteresis cycle on the heating element and therefore the inertia time (system heating and cooling time) introduced by the two points control is eliminated. This also leads to energy savings as the system does not stay ON for no reason and, once the desired temperature has been reached, it continues to supply amounts of heat just to compensate any dispersion of heat in the environment.
With this setting the ***Regulation differential (tenth of °C)*** disappears and is replaced by new options, namely ***Cycle time*** and ***PWM regulation differential***.
Furthermore, a new option appears in the air conditioning system configuration menu, namely ***Min % variation for continuous proportional command sending*** (see Fig.7.3).

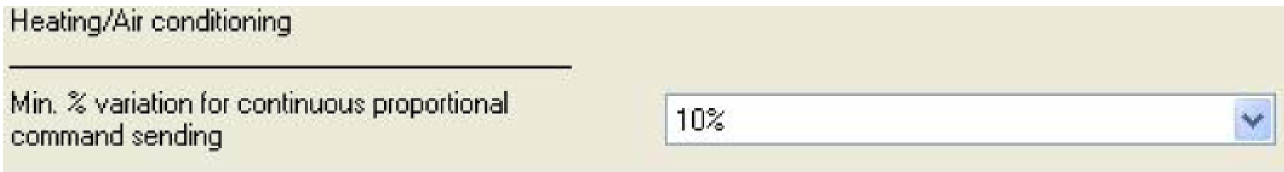


Fig. 7.3

- ***7.1.2 Regulation differential (tenth of °C)***

Here you can set the heating regulation differential value which, subtracted from the indicated setpoint value, determines the threshold value below which the heating system is switched ON upon two points control. The settings range from 2 (tenths of degrees centigrade) to 20 (tenths of degrees centigrade).

- ***7.1.3 Cycle time***

Here you can set the value that defines the period between the various applications of the continuous proportional control algorithm and the period for sending telegrams to the load. Once the algorithm has been applied and the percentage power value for the heating system has been sent, this value remains in force until the cycle time ends and a new algorithm is used to calculate the new value for the power to be applied.
The settings are provided in the drop-down menu, in an interval of from 5 to 60 minutes.

➢ *7.1.4 Regulation differrential PWM*

Here you can set the heating proportional regulation differential value which, subtracted from the indicated setpoint value, determines the lowest limit of the proportional band limits used to modulate the power supplied to heating system upon continuous proportional control. The settings are provided in the drop-down menu, with an interval of from 0.4°C to 3.2°C.
The settings, multiplied by the value set in the ***Min. % variation for continuous proportional command sending*** option, determines the width of the proportional sub-band within which the device determines the power to be supplied to the system.

As the air conditioning parameters have the same characteristics and functions, with the sole difference being that they refer to the AIR CONDITIONING operating mode, please refer to the paragraphs above (from ***7.1.1*** to ***7.1.4***) for further information.

➢ *7.1.5 Min. % variation for continuous proportional command sending*

The seventh and final option on the ***Control algorithm*** menu (that appears under the heating/air conditioning sub-title, see Diag. 7.3), visible if the ***Control type*** is set to ***continuous proportional***, is the ***Min. % variation for continuous proportional command sending*** option; here you can set the minimum variation value for sending commands to the actuator that controls the heating system and/or to the actuator that controls the air conditioning system.
The settings are: 5% - 10% - 20%.
This value determines the number of proportional sub-bands within which the device determines the value of the power to be sent to the system; in this case, in fact, there is no fixed number of proportional sub-bands, and this depends on the value set for this option. This means that it is necessary to pay careful attention when setting this value as, bearing in mind that the temperature measure resolution is 0.1 °C, the sub-bands that are created can not be lower in dimension than the resolution.
If, for instance the regulation differential value is 0.4°C, the minimum variation for a send command event would have to be 20% (generating in this case 4 sub-bands each with a width of 0.1 °C) whilst, if the regulation differential value is 1.2°C, the minimum variation for a send command event would have to be 10% (generating in this case 10 sub-bands each with a width of 0.12°C).
A value of 5% can only be set where the regulation differential value is over 2°C.
Please note that this option appears when the heating and air conditioning control is switched to continuous proportional mode, and also when only one is in continuous proportional mode; in the former case, the value set for this option is applied to both operating types.

7.2 Communication objects

There are no communication objects enabled by the ***Control algorithm (1 byte)*** menu**.**

8 *“Fan coil management” menu*

The ***Fan coil management*** menu, visible if the ***Fan coil control*** function in the ***Main*** menu is set to ***enabled***, displays the parameters which are used to control the fan coil (see Fig. 8.1).

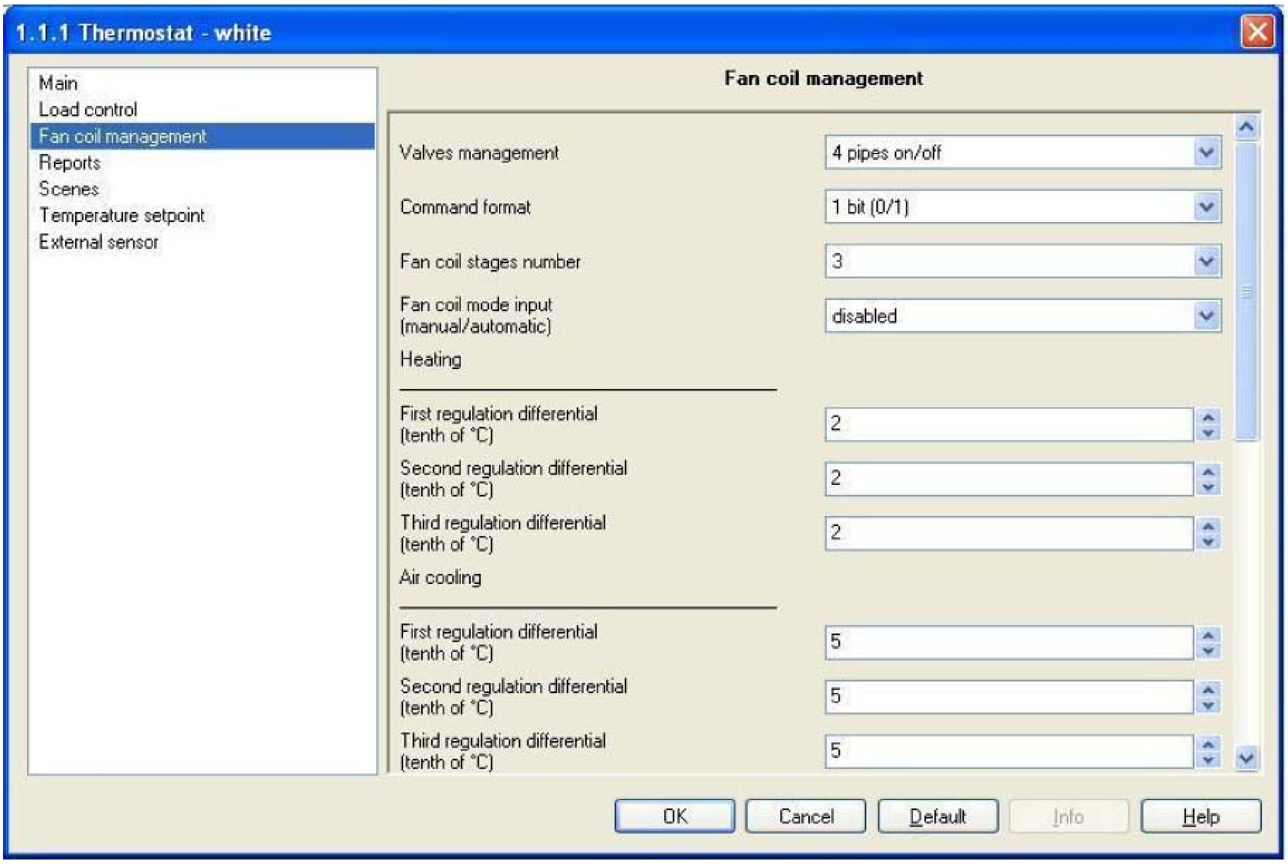


Fig. 8.1

The control type applied if the fan coil control is enabled, is similar to the two points control analysed in the previous chapters; that is it activates/deactivates the fan coil speeds according to the difference in the configured setpoint and the measured temperature.

The actual difference between the 2 points algorithm is that, in this case, there is not one stage when the hysteresis cycle is performed to set the ON and OFF speed thresholds, but there are three; this means that each stage corresponds to a speed and when the difference between the measured temperature and the configured setpoint determines the activation of a specific speed, the other two must be deactivated before the new speed can be activated. There are two diagrams below which illustrate how the speeds to be activated are determined, according to the measured temperature for both the heating (Fig. 8.2), and air conditioning systems (Fig. 8.3).

HEATING

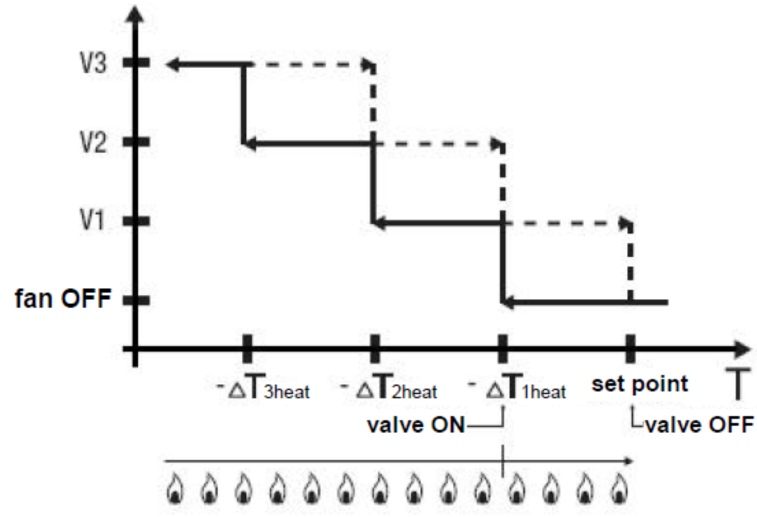


Fig. 8.2

The diagram refers to the speed control of the fan coil with three function stages for the heating system. Looking at the graph, you can see that there is a hysteresis cycle for each stage, and two thresholds are associated to each speed that determine activation and deactivation. The thresholds are calculated by the values set for the various regulation differentials, and can be summarised as follows:

− Speed V1 (stage 1): the speed is activated when the value of the temperature is less than the "setpoint-$\Delta T_{1\ heat}$" value and deactivated when the temperature reaches the configured setpoint value (remember that speed 1 is deactivated also when a higher speed is activated)
  − Speed V2 (stage 2): the speed is activated when the value of the temperature is less than the "setpoint-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$" value and deactivated when the temperature reaches the "setpoint-$\Delta T_{1\ heat}$" value (remember that speed 2 is deactivated also when a speed V3 is activated)
  − Speed V3 (stage 3): the speed is activated when the value of the temperature is less than the "setpoint-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$-$\Delta T_{3\ heat}$" value and deactivated when the temperature reaches the "setpoint-$\Delta T_{1\ heat}$-$\Delta T_{2\ heat}$" value

You can see that, once the measured temperature is lower than the "setpoint-$\Delta T_{1\ heat}$", value, further to activate the fan coil speed according to the algorithm analysed before, the thermostat also sends an open command to the solenoid value that controls the heating system; the solenoid valve is however closed when the measured temperature reaches the configured setpoint value.
The diagram concerning the air conditioning system can be seen in the diagram below.

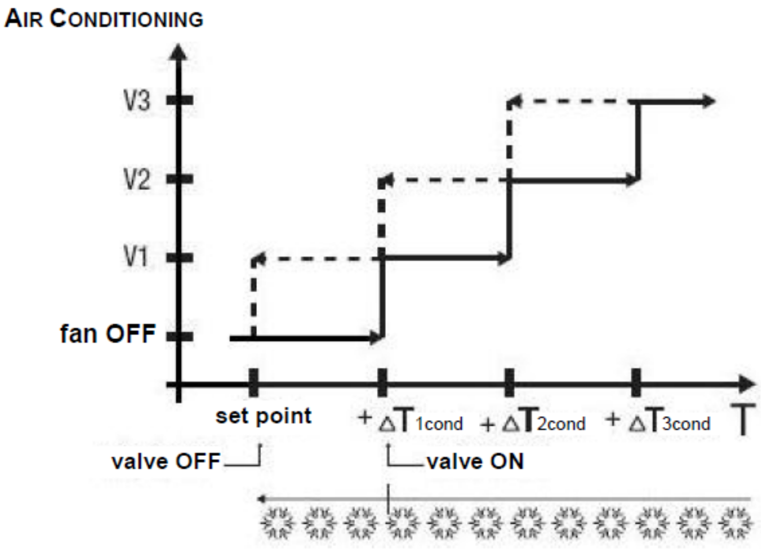


Fig. 8.3

The diagram refers to the speed control of the fan coil with three function stages for the air conditioning system. Looking at the graph, you can see that there is a hysteresis cycle for each stage, and two thresholds are associated to each speed that determine activation and deactivation. The thresholds are calculated by the values set for the various regulation differentials, and can be summarised as follows:

- Speed V1 (stage 1): the speed is activated when the value of the temperature is greater than the "setpoint-$\Delta T_{1\ cond}$" value and deactivated when the temperature reaches the configured setpoint value (remember that speed 1 is deactivated also when a higher speed is activated)
- Speed V2 (stage 2): the speed is activated when the value of the temperature is greater than the "setpoint-$\Delta T_{1\ cond}$+ΔT_{2cond}" value and deactivated when the temperature reaches the setpoint+$\Delta T_{1\ cond}$" value (remember that speed 2 is deactivated also when a speed V3 is activated)
- Speed V3 (stage 3): the speed is activated when the value of the temperature is less than the "setpoint-$\Delta T_{1\ cond}$ -$\Delta T_{2\ cond}$ -$\Delta T_{3\ cond}$" value and deactivated when the temperature reaches the "setpoint-$\Delta T_{1\ cond}$-$\Delta T_{2\ cond}$" value

You can see that, once the measured temperature is higher than the "setpoint-$\Delta T_{1\ cond}$", value, further to activate the fan coil speed according to the algorithm analysed before, the thermostat also sends an open command to the solenoid value that controls the air conditioning system; the solenoid valve is however closed when the measured temperature reaches the configured setpoint value.
Both these diagrams refer to the three stage control of the fan coil, as the explanations provided herein are exhaustive and, in the case of one or two stage setups, the functions are the same as those analysed above, the sole difference being that not all the speeds will be controlled. The functions described are applied when the fan coil operating mode is set to AUTO, whilst if it is in MANUAL mode and the operator sets a specific speed, the speed activation command is set when the measured temperature is lower than the "setpoint-$\Delta T_{1\ heat}$" value in heating mode, and lower that the "setpoint+$\Delta T_{1\ cond}$" value in air conditioning mode.

8.1 Parameters

➢ 8.1.1 Valves management

Here you can configure the management of the solenoid valves used by the heating and air conditioning systems, according to the type of hydraulic system installed; the settings are:

- ***2 ways on/off***

  The thermostat is configured to manage one valve that controls both the air conditioning system and the heating system; with this configuration, the device controls one single actuator to which it sends ON/OFF commands according to whether the system must be activated or deactivated. On setting this value, the ***Heating/Air conditioning valve switch*** communication object appears, and this allows command telegrams to be sent to the actuator that controls the solenoid valve; moreover, if the feedback option is enabled on the actuators that control the valves (see paragraph ***5.1.2***) the ***Heating/Air conditioning valve feedback*** object appears through which the device is able to receive status feedback bus telegrams from the actuator that controls the solenoid valve.

- ***4 ways on/off***

The thermostat is configured to manage two different valves, one that controls the air conditioning system and one that controls the heating system; with this configuration, the device controls two different actuators to which it sends ON/OFF commands according to whether the system must be activated or deactivated depending on the set operating type (heating/air conditioning). On setting this value, the ***Heating valve switch*** and ***Air conditioning valve switch*** communication objects appears, and these allow command telegrams to be sent to the actuators that control the solenoid valves for the heating system and the air conditioning system; moreover, if the feedback option is enabled on the actuators that control the valves (see paragraph ***5.1.2***) the ***Heating valve feedback*** and ***Air conditioning valve feedback*** objects appears through which the device is able to receive status feedback bus telegrams from the actuators that control the two systems.

- ***2 ways percentage command 0%/100%***

The thermostat is configured to manage one valve that controls both the air conditioning system and the heating system; with this configuration, the device controls one single actuator to which it sends ON (100%) / OFF(0%) commands according to whether the system must be activated or deactivated. On setting this value, the ***Heating/Air conditioning valve % command*** communication object appears, and this allows command telegrams to be sent to the actuator that controls the solenoid valve; moreover, if the feedback option is enabled on the actuators that control the valves (see paragraph ***5.1.2***) the ***Heating/Air conditioning valve % feedback*** object appears through which the device is able to receive status feedback bus telegrams from the actuator that controls the solenoid valve.

- ***4 ways percentage command 0%/100%***

The thermostat is configured to manage two different valves, one that controls the air conditioning system and one that controls the heating system; with this configuration, the device controls two different actuators to which it sends ON (100%) /OFF (0%) commands according to what type of system must be activated or deactivated (heating/air conditioning). On setting this value, the ***Heating valve % command*** and ***Air conditioning valve % command*** communication objects appears, and these allow command telegrams to be sent to the actuators that control the solenoid valves for the heating system and the air conditioning system; moreover, if the feedback option is enabled on the actuators that control the valves (see paragraph ***5.1.2***) the ***Heating valve % feedback*** and ***Air conditioning valve % feedback*** objects appears through which the device is able to receive status feedback bus telegrams from the actuators that control the two systems.

➢ *8.1.2 Command format*

This allows you to configure the format for the communication objects used to control the fan coil; the settings are:

- ***1 bit (0/1)***

The format for the communication objects used to control the fan coil is 1 bit. The number of communication objects enabled is equal to those indicated in the setting in the ***Fan coil stages number*** option; in fact, this value is entered when there is an actuator for each fan coil speed to be controlled, each of which powers the winding at the speed it controls.

- ***1 byte (value %)***

The format for the communication object used to control the fan coil is 1 byte.
One single communication object is enabled through which percentage speed commands are to sent to the actuator that controls the fan coil. In this case, a speed percentage value corresponds to each speed, which depends on the value set in the ***Fan coil stages number*** option; this value is entered when there is an actuator for each fan coil speed to be controlled, changing the speed of the latter according to the percentage values sent.

➢ *8.1.3 Fan coil stages number*

This allows you to configure the number of stages to control the fan coil speed, according to the type of fan coil used; the settings are:

- ***1***

The number of stages used to control the fan coil speed is 1; it is presumed that the fan coil being used has just one operating speed. According to the settings under the ***Command format*** option, the following communication objects are enabled:

− if the value set for this option is ***1 bit (0/1)***, the ***Fan V1 switch*** communication object is enabled to control the first and only fan speed; if the fan coil actuator feedbacks are enabled in the ***Load control*** menu, the ***V1 fan status feedback*** object is visible.

− if the value set for this option is ***1 byte (% value)***, the ***Fan coil continuous command*** communication object is enabled to control the fan coil speed; if the fan coil actuator feedbacks are enabled in the ***Load control*** menu, the ***Fan coil continuous feedback*** object is visible. In this case the commands sent are percentage values of the fan coil speed, that are summarised below:

Fan coil speed	***Percentage value sent***
Fan OFF	0%
Speed 1 (V1)	100%

- ***2***

The number of stages used to control the fan coil speed is 2; it is presumed that the fan coil being used has two operating speeds.

According to the settings under the ***Command format*** option, the following communication objects are enabled:

− if the value set for this option is ***1 bit (0/1)***, the ***Fan V1 switch and Fan V2 switch*** communication objects are enabled to control the first and second fan speeds; if the fan coil actuator feedbacks are enabled in the ***Load control*** menu, the ***V1 fan status feedback*** and ***V2 fan status feedback*** objects are visible.

− if the value set for this option is ***1 byte (% value)***, the ***Fan coil continuous command*** communication object is enabled to control the fan coil speed; if the fan coil actuator feedbacks are enabled in the ***Load control*** menu, the ***Fan coil continuous feedback*** object is visible. In this case the commands sent are percentage values of the fan coil speed, that are summarised below:

Fan coil speed	***Percentage value sent***
Fan OFF	0%
Speed 1 (V1)	50%
Speed 2 (V2)	100%

- ***3***

The number of stages used to control the fan coil speed is 3; it is presumed that the fan coil being used has three operating speeds.

According to the settings under the ***Command format*** option, the following communication objects are enabled:

− if the value set for this option is ***1 bit (0/1)***, the ***Fan V1 switch, Fan V2 switch*** and ***Fan V3 switch*** communication objects are enabled to control the first, second and third fan speeds; if the fan coil actuator feedbacks are enabled in the ***Load control*** menu, the ***V11 fan status feedback, V2 fan status feedback*** and ***V3 fan status feedback*** objects are visible.

− if the value set for this option is ***1 byte (% value)***, the ***Fan coil continuous command*** communication object is enabled to control the fan coil speed; if the fan coil actuator feedbacks are enabled in the ***Load control*** menu, the ***Fan coil continuous feedback*** object is visible. In this case the commands sent are percentage values of the fan coil speed, that are summarised below:

Fan coil speed	*Percentage value sent*
Fan OFF	0%
Speed 1 (V1)	33%
Speed 2 (V2)	67%
Speed 3 (V3)	100%

➢ *8.1.4 Fan coil mode input (manual/automatic)*

Here you can set the control mode (automatic or manual) of the fan coil speed through a telegram received from the bus; the settings are:

- ***disabled***

It is not possible to modify the control mode (automatic or manual) of the fan coil speed using a telegram received from the bus; it is however possible to modify the fan coil speed control mode using the local keyboard on the device.

- ***enabled***

It is possible to modify the control mode (automatic or manual) of the fan coil speed using a telegram received from the bus; the ***Fan coil mode input*** communication object is visible and here you can enable the receipt of telegrams to modify the fan coil speed control mode. It is however possible to modify the fan coil speed control mode using the local keyboard on the device.

➢ *8.1.5 First regulation differential (tenth of °C)*

Here you can set the first heating fan coil speed regulation differential ($\Delta T_{1\ heat}$), given that this item is found in the heating menu (see subtitle in Fig. 8.1). The settings range from 2 (tenths of degrees centigrade) to 20 (tenths of degrees centigrade).

➢ *8.1.6 Second regulation differential (tenth of °C)*

The same applies as indicated in the previous paragraph, but in relation to the second heating fan coil speed regulation differential ($\Delta T_{2\ heat}$), so please refer to ***8.1.6*** for further details.

➢ *8.1.7 Third regulation differential (tenth of °C)*

The same applies as indicated in the previous paragraph, but in relation to the third heating fan coil speed regulation differential ($\Delta T_{3\ heat}$), so please refer to ***8.1.6*** for further details.

➢ *8.1.8 First regulation differential (tenth of °C)*

Here you can set the first air conditioning fan coil speed regulation differential ($\Delta T_{1\ cond}$), given that this item is found in the air conditioning menu (see subtitle in Fig. 8.1). The settings range from 2 (tenths of degrees centigrade) to 20 (tenths of degrees centigrade).

➢ *8.1.9 Second regulation differential (tenth of °C)*

The same applies as indicated in the previous paragraph, but in relation to the second air conditioning fan coil speed regulation differential ($\Delta T_{2\ cond}$), so please refer to ***8.1.8*** for further details.

➢ *8.1.10 Third regulation differential (tenth of °C)*

The same applies as indicated in the previous paragraph, but in relation to the third air conditioning fan coil speed regulation differential ($\Delta T_{3\ cond}$), so please refer to ***8.1.8*** for further details.

8.2 Communication objects

The communication objects, whose visibility depends on the settings in the items of the ***Load control*** menu, are those indicated in Diag. 8.4.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
8	Fan coil mode input	Automatic/Manual	1 bit	C	-	W	-	-	1 bit DPT_Switch	Low
30	Heating/Air conditioning valve switch	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
30	Heating valve switch	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
32	Air conditioning valve switch	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
31	Heating/Air conditioning valve % command	0%/100%	1 Byte	C	R	-	T	-	8 bit unsigned value DPT_Scaling	Low
31	Heating valve % command	0%/100%	1 Byte	C	R	-	T	-	8 bit unsigned value DPT_Scaling	Low
33	Air conditioning valve % command	0%/100%	1 Byte	C	R	-	T	-	8 bit unsigned value DPT_Scaling	Low
35	Fan V1 switch	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
36	Fan V2 switch	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
37	Fan V3 switch	On/Off	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
38	Fan coil continuous command	% Value	1 Byte	C	R	-	T	-	8 bit unsigned value DPT_Scaling	Low

Fig. 8.4

➢ 8.2.1 Fan coil mode input

Here you can configure the remote control of the fan coil speed control mode by bus command, changing it from automatic to manual mode and vice-versa. When this object receives a bus telegram with a “1” logic value, the device sets the fan coil speed control mode to AUTOMATIC mode; vice-versa if the object receives a "0" logic value, the device sets the fan coil speed control mode to MANUAL and sets speed V1. The configuration of the fan coil speed control mode with a bus command only allows the setting of speed V1; the other speeds, again in MANUAL speed control mode, can be enabled using the local keyboard.
The enabled flags are C (communication), W (written by bus).
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it receives are *fan coil speed control mode: automatic/manual.*

➢ 8.2.2 Heating/air conditioning valve switch

This allows the device to send ON/OFF commands to the actuator that manages the control valve on the heating system and the air conditioning system. The device not only triggers the fan coil speed, but it also sends the open/close command to the solenoid valve that controls in this case both the HVAC systems; to be precise, the thermostat will send a telegram with a "1" logic value to open the solenoid valve and "0" a logic value to close the same valve.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it sends are *heating/air conditioning valve open/closed*.

➢ 8.2.3 Heating valve switch

This allows the device to send ON/OFF commands to the actuator that manages the control valve on the heating system. The device not only triggers the fan coil speed, but it also sends the open/close command to the solenoid valve that controls in this case only the heating system; to be precise, the thermostat will send a telegram with a "1" logic value to open the solenoid valve and a "0" logic value to close the same valve.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it sends are *heating valve open/closed*.

➢ 8.2.4 Air conditioning valve switch

This allows the device to send ON/OFF commands to the actuator that manages the control valve on the air conditioning system. The device not only triggers the fan coil speed, but it also sends the open/close command to the solenoid valve that controls in this case only the air conditioning system; to be precise, the thermostat will send a telegram with a "1" logic value to open the solenoid valve and a "0" logic value to close the same valve.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it sends are *air conditioning valve open/closed*.

8.2.5 Heating/air conditioning valve % command

This allows the device to send open (100%) / closed (0%) commands to the actuator that manages the control valve on the heating system and the air conditioning system. The device not only triggers the fan coil speed, but it also sends the open/close command to the solenoid valve that controls in this case both the HVAC systems; to be precise, the thermostat will send a percentage value of 100% to open the solenoid valve and a percentage value of 0% to close the same valve.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it sends are *heating/air conditioning valve open (100%)/closed (0%)*.

8.2.6 Heating valve % command

This allows the device to send open (100%) and close (0%) commands to the actuator that manages the control valve on the heating system. The device not only triggers the fan coil speed, but it also sends the open/close command to the solenoid valve that controls in this case only the heating system; to be precise, the thermostat will send a percentage value of 100% to open the solenoid valve and a percentage value of 0% to close the same valve.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it sends are *heating valve open (100%)/closed (0%)*.

8.2.7 Air conditioning valve % command

This allows the device to send open (100%) and close (0%) commands to the actuator that manages the control valve on the air conditioning system. The device not only triggers the fan coil speed, but it also sends the open/close command to the solenoid valve that controls in this case only the air conditioning system; to be precise, the thermostat will send a percentage value of 100% to open the solenoid valve and a percentage value of 0% to close the same valve.
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *1.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it sends are *air conditioning valve open (100%)/closed (0%)*.

8.2.8 Fan V1 switch

This allows the device to send ON/OFF commands to the actuator that manages speed one on the fan coil. The device calculates the speed to activate on the fan coil to regulate the ambient temperature and sends a telegram with a “1” logic value to activate speed one and a “0” logic value to deactivate the same speed.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it sends are *fan coil speed one ON/OFF*.

8.2.9 Fan V2 switch

The same applies as indicated in the previous paragraph, but in relation to fan coil speed two.
For further details see ***8.2.8***.

8.2.10 Fan V3 switch

The same applies as indicated in the previous paragraph, but in relation to fan coil speed three.
For further details see ***8.2.8***.

8.2.11 Fan coil continuous command

This allows the device to send percentage values to the actuator that manages the fan coil speed. The device calculates the speed to activate on the fan coil to regulate the ambient temperature and sends a telegram whose value determines the percentage speed to be activated on the fan coil; please remember that the values sent through this communication object depend on the value entered in the ***Fan coil stages number*** option (see paragraph ***8.1.3***).
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *5.001 DPT_Scaling*, so the size of the object is *1 byte* and the commands it sends are the *fan coil speed percentage values*.

9 “Reports” menu

The ***Reports*** menu lists all the parameters needed to configure the send feedback settings that the device sends by bus telegram (see Fig. 9.1).

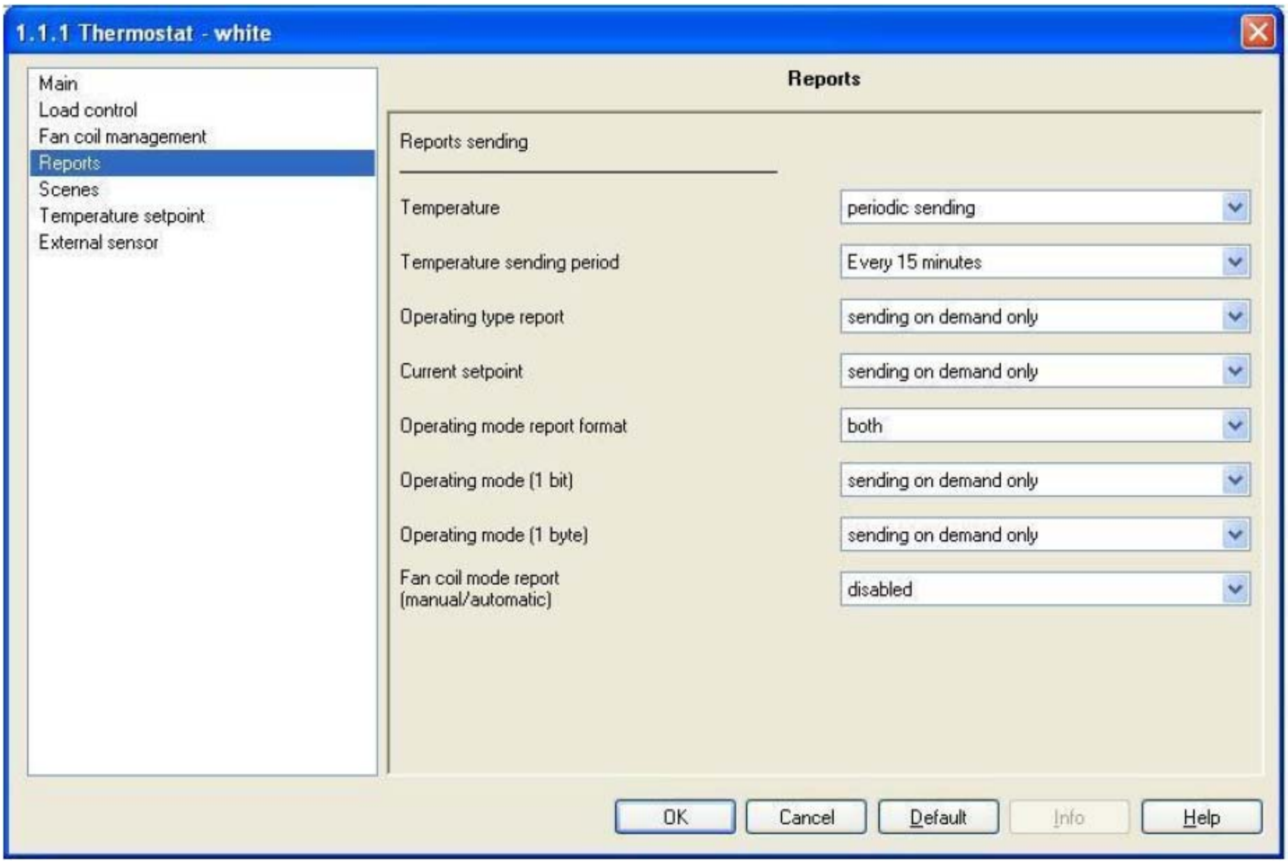


Fig. 9.1

9.1 Parameters

➢ 9.1.1 Temperature

This allows you to set the conditions for sending the measured temperature value; the settings are:

- ***sending on demand only***

The temperature value is not sent spontaneously by the device, but only upon receiving a status read request, when the device sends a response telegram to the applicant with the relative measured temperature value, which is that displayed on the screen. The ***Temperature sending period*** option is not visible.

- ***sending on variation only (1/2 °C)***

The temperature value is sent spontaneously by the device, but only if the variation in temperature compared to the last sent value is equal to at least 0.5 degrees centigrade. The ***Temperature sending period*** option is not visible.

- ***periodic sending***

The temperature value is sent periodically by the device, according to set intervals. The ***Temperature sending period*** option is also visible and is used to set the interval at which the measured temperature value should be sent.

➢ 9.1.2 Temperature sending period

Here you can set the interval at which the measured temperature telegrams are sent; the settings are provided in the drop-down menu and range from “Every minute” to “Every 255 minutes”.

➢ 9.1.3 Operating type report

Here you can configure the send conditions for the operating type feedbacks through the ***Operating type report*** communication object.
The settings are:

- ***sending on demand only***

The feedbacks of the operating type enabled on the device are not sent spontaneously by the device through the ***Operating type report*** communication object, but only upon receiving a status read request, when the device sends a response telegram to the applicant with the relative information on the operating type set for the device.

- ***sending on variation only***

The feedbacks for the operating type enabled on the device are sent spontaneously by the device through the ***Operating type report*** communication object every time there is a variation in operating mode.

➢ 9.1.4 Current setpoint

Here you can configure the send conditions for the feedbacks of the current setpoint value enabled on the device by bus telegram to the ***Current setpoint feedback*** communication object.
The settings are:

- ***sending on demand only***

The feedbacks of the current setpoint value enabled on the device are not sent spontaneously by the device through the ***Current setpoint feedback*** communication object, but only upon receiving a status read request, when the device sends a response telegram to the applicant with the relative information on the current setpoint set for the device.

- ***sending on variation only***

The feedbacks for the current setpoint enabled on the device are sent spontaneously by the device through the ***Current setpoint feedback*** communication object every time there is a variation in operating mode.
Even when the setpoint value is temporarily forced, the forced value is sent nevertheless.

➢ 9.1.5 Operating mode report format

Here you can configure the bus telegram format used by the device to report the HVAC operating mode is enabled on the device. The settings are:

- ***1 byte***

The device notifies the operating mode using one single 1 byte communication object; with this configuration the ***Operating mode (1 byte)*** and the ***Thermoregulation mode feedback*** communication object are visible.

- ***1 bit***

The device identifies the operating mode using series of communication objects with a 1 bit format; to be precise, one per mode. When a mode is actually enabled, it is notified by bus telegram to the object associated to the new mode, and a disabled mode feedback is sent to the object associated to the mode that was previously enabled. There are never circumstances where more than one HVAC mode is enabled at the same time. With this setting enabled, the ***Operating Mode (1 bit)*** option and the ***Off mode feedback, Economy mode feedback, Precomfort mode feedback,*** and ***Comfort mode feedback*** communication objects become visible.

- ***both***

The device identifies the operating mode using the communication object with a 1 byte format and the communication object with a 1 bit format. With this setting enabled, the ***Operating mode (1 byte)*** and ***Operating mode (1 bite) o***ptions and the ***Thermoregulation mode feedback, Off mode feedback,***

Economy mode feedback, Precomfort mode feedback and ***Comfort mode feedback*** communication objects become visible.

- ### *9.1.6 Operating mode (1 byte)*

Here you can configure the send conditions for the operating mode feedbacks through the ***Thermoregulation mode feedback*** 1 byte communication object.
The settings are:

- ***sending on demand only***

The feedbacks of the operating mode are not sent spontaneously by the device with a 1 byte command through the ***Thermoregulation mode feedback*** communication object, but only upon receiving a status read request, when the device sends a response telegram to the applicant with the relative information on the operating mode set for the device.

- ***sending on variation only***

The 1 byte operating mode feedbacks are sent spontaneously by the device through the ***Thermoregulation mode feedback*** communication object every time there is a variation in mode status.

- ### *9.1.7 Operating mode (1 bit)*

Here you can configure the send conditions for the operating mode feedbacks through the ***Off mode feedback, Economy mode feedback, Precomfort mode feedback*** and ***Comfort mode feedback*** 1 bit communication objects. The settings are:

- ***sending on demand only***

The feedbacks of the operating mode are not sent spontaneously by the device with a 1 bit command through the ***Off mode feedback, Economy mode feedback, Precomfort mode feedback*** and ***Comfort mode feedback*** communication objects, but only upon receiving a status read request, when the device sends a response telegram to the applicant with the relative information on the operating mode set for the object the request was sent for. This means that, when a read status request is received on one of the above listed objects, the device responds with status of that operating mode (enabled/disabled) and not with the status of the operating mode set on the device, which is on the other hand what happens with a 1 byte object.

- ***sending on variation only***

The 1 bit operating mode feedbacks are sent spontaneously by the device through the ***Off mode feedback, Economy mode feedback, Precomfort mode feedback*** and ***Comfort mode feedback*** communication objects, every time there is a variation in mode status. This means that, every time the HVAC mode changes on the device, it notifies the enabling of the new mode through the communication object associated to it, and notifies the disabling of the previous operating mode through the communication object associated to the latter.

- ### *9.1.8 Fan coil mode report (manual/automatic)*

This is used to enable the ***Fan coil mode feedback*** communication object through which the device notifies the fan coil speed control mode (manual/automatic) with a bus telegram; the settings are:

- ***disabled***

The device does not send a bus telegram with the fan coil speed control mode (automatic or manual); the ***Fan coil mode feedback*** communication object which enables the sending of this feedback is not visible.

- ***enabled***

The device does not send a bus telegram with the fan coil speed control mode (automatic or manual); with this setting the ***Fan coil mode feedback*** communication object which enables the sending of this feedback is now visible.

9.2 Communication objects

The communication objects, whose visibility depends on the settings in the items of the ***Reports*** menu, are those indicated in Fig. 9.2.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
29	Current setpoint feedback	Setpoint value	2 Byte	C	R	-	T	-	2 byte float value DPT_Value_Temp	Low
34	Fan coil mode feedback	Automatic/Manual	1 bit	C	R	-	T	-	1 bit DPT_Switch	Low
39	Measured temperature output	Value °C	2 Byte	C	R	-	T	-	2 byte float value DPT_Value_Temp	Low
40	Thermoregulation mode feedback	Auto/Eco/Precom/Comf/Off	1 Byte	C	R	-	T	-		Low
41	Operating type feedback	Heating/Air conditioning	1 bit	C	R	-	T	-		Low
42	Off mode feedback	Enabled/Disabled	1 bit	C	R	-	T	-	1 bit DPT_Enable	Low
43	Economy mode feedback	Enabled/Disabled	1 bit	C	R	-	T	-	1 bit DPT_Enable	Low
44	Precomfort mode feedback	Enabled/Disabled	1 bit	C	R	-	T	-	1 bit DPT_Enable	Low
45	Comfort mode feedback	Enabled/Disabled	1 bit	C	R	-	T	-	1 bit DPT_Enable	Low

Fig. 9.2

➢ *9.2.1 Current setpoint feedback*

The device uses this communication object to notify the setpoint value currently enabled, that is the one seen on the display which can be temporarily forced by the user where necessary.
The sending of such feedback depends on the settings entered for the ***Current setpoint*** option.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *9.001 DPT_Value_Temp*, so the size of the object is *2 byte* and the commands it sends are *current setpoint values expressed in degrees centigrade (rounded off to a tenth of a degree)*.

➢ *9.2.2 Fan coil mode feedback*

The device uses this communication object to notify the fan coil speed control mode, according to when it is switched from automatic to manual mode and vice-versa. When the fan coil speed control mode switches from MANUAL to AUTOMATIC the device send a telegram to the bus with a “1” logic value; when the fan coil speed control mode switches from AUTOMATIC to MANUAL, the device send a telegram to the bus with a “0” logic value.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *1.001 DPT_Switch*, so the size of the object is *1 bit* and the commands it sends are *fan coil speed control mode feedback: automatic/manual.*

➢ *9.2.3 Measured temperatura output*

The device uses this communication object to notify the measured temperature value, that is the one displayed on the screen that may or may not be calculated with the contribution of an external sensor.
The sending of such feedback depends on the settings entered for the ***Temperature*** option.
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *9.001 DPT_Value_Temp*, so the size of the object is *2 byte* and the commands it sends are *measured temperature values expressed in degrees centigrade (rounded off to a tenth of a degree)*.

➢ *9.2.4 Thermoregulation mode feedback*

This allows the device to notify the operating mode set by bus command.
The sending of such feedback depends on the settings entered for the ***Operating mode (1 byte)*** option.
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *20.102 DPT_HVACMode*, so the size of the object is *1 byte* and the commands it sends are *Operating mode: Economy/Precomfort/Comfort/Off.*

➢ *9.2.5 Operating type feedback*

This allows the device to notify the operating type set by bus command.
The sending of such feedback depends on the settings entered for the ***Operating type feedback*** option.
The enabled flags are C (communication), R (read by bus) and T (transmission) .
The standard format of the object is *1.100 DPT_Heat/Cool*, so the size of the object is *1 bit* and the commands it sends are *operating type: Heating/Air conditioning.*

➢ *9.2.6 Off mode feedback*

This allows the device to notify the enabling/disabling of the OFF operating mode.
The sending of such feedback depends on the settings entered for the ***Operating Mode (1 bit)*** option.
The enabled flags are C (communication), R (read by bus) and T (transmission).
The standard format of the object is *1.003 DPT_Enable*, so the size of the object is *1 bit* and the commands it sends are *operating mode OFF enabled/disable.*

➢ *9.2.7 Economy mode feedback*

The same applies as indicated in the previous paragraph, but in relation to the ECONOMY mode; please refer to ***9.2.6*** for further details.

➢ *9.2.8 Precomfort mode feedback*

The same applies as indicated in the previous paragraph, but in relation to the PRECOMFORT mode; please refer to ***9.2.6*** for further details.

➢ *9.2.9 Comfort mode feedback*

The same applies as indicated in the previous paragraph, but in relation to the COMFORT mode; please refer to ***9.2.6*** for further details.

10 *“Scene” menu*

The ***Scenes*** menu lists all the parameters needed to configure the scene operating mode (see Fig. 10.1).

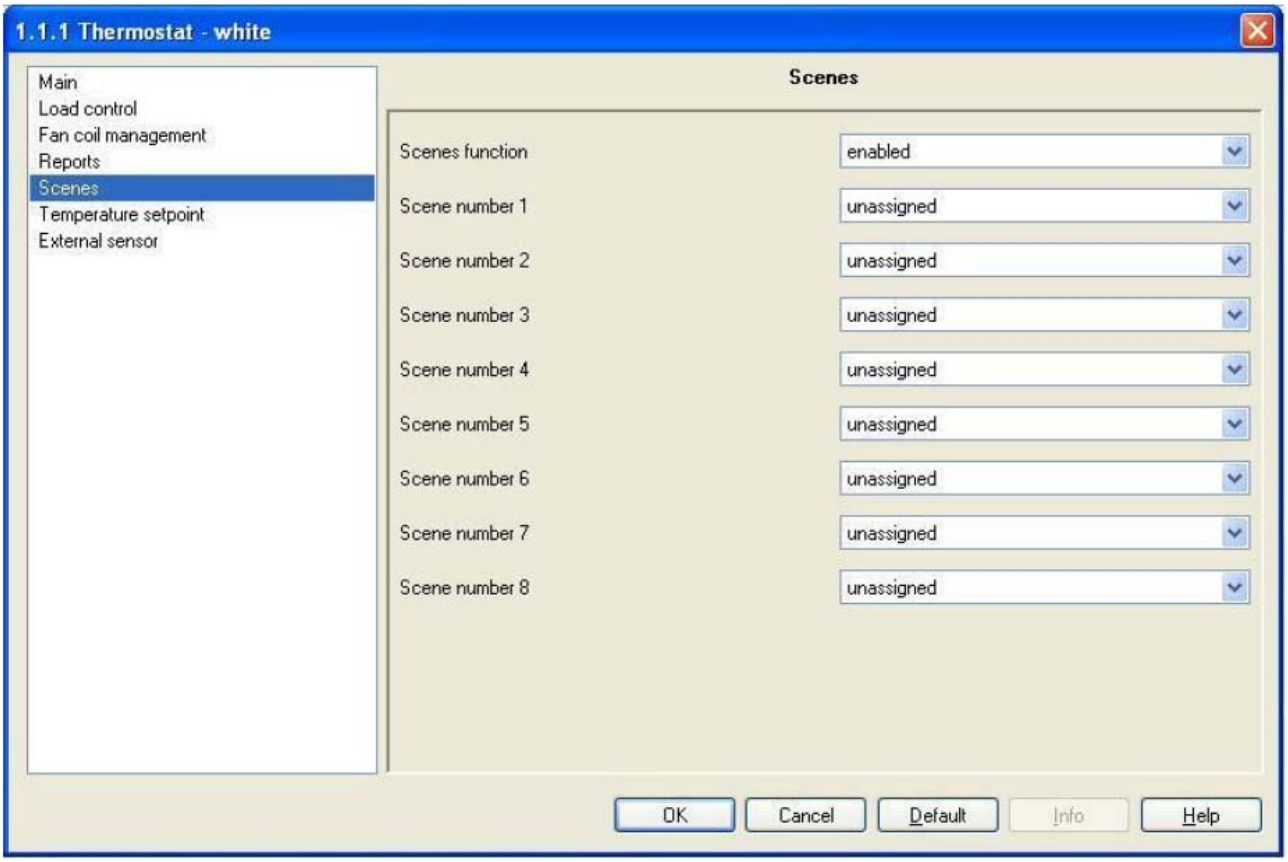


Fig. 10.1

10.1 Parameters

➢ *10.1.1 Scenes function*

This is to enable and configure the function and make the sub items (***Scene number x***) and the relative ***Scene*** communication object visible. (***x*** refers to the number associated to the scene).
The scene function sends two possible commands to the device:

− execute scene, that is a command to create a specific condition

− store scene, that is a command to memorise the current status (at the moment the command is received) of the operating mode, operating type and any indicated setpoint temporary forced positioning.

This function foresees 8 different scenes, so the device can memorise /reproduce 8 different operating modes and types. The settings are:

- ***disabled***

The scene function is not enabled and consequently the various options and communication object are not visible.

- ***enabled***

The scene function is enabled and is managed by the ***Scene*** communication object.
In this section you can also view the other settings ***(Scene number x)*** needed to configure the function.

➢ 10.1.2 Scene number x

Here you can assign a number to the scene x (where x indicates any scene, from 1 to 8, to which a common number is assigned) so that it can be recalled by a bus command.
The values that can be configured are shown in a drop down menu and can range from 0 to 63, plus the “unassigned” value if you decide not to number or use scene *x*.
There is only one rule to follow when assigning this value: it must be different from the number assigned to other scenes.

10.2 Communication objects

The ***Scenes function*** in the ***Scenes*** menu, if enabled, makes the communication object visible, as seen in Fig. 10.2.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
28	Scene	Execute/Store	1 Byte	C	-	W	-	-		Low

Fig. 10.2

➢ 10.2.1 Scene

Using this communication object, the device is able to receive the execute and store scene commands from the bus.
On receiving a store scene command, through a bus telegram to the communication object in question, please remember that the device memorises the operating mode, operating type and any temporary forced setpoint.
The enabled flags are C (communication), W (written by bus) .
The standard format of the object is *18.001 DPT_SceneControl*, so the size of the object is *1 byte* and the commands it receives are *execute/store scene*.

11 *“Temperature setpoint” menu*

The ***Temperature setpoint*** menu lists all the parameters needed to configure the setpoint values for the various HVAC modes and the two different operating types (see Fig. 11.1).

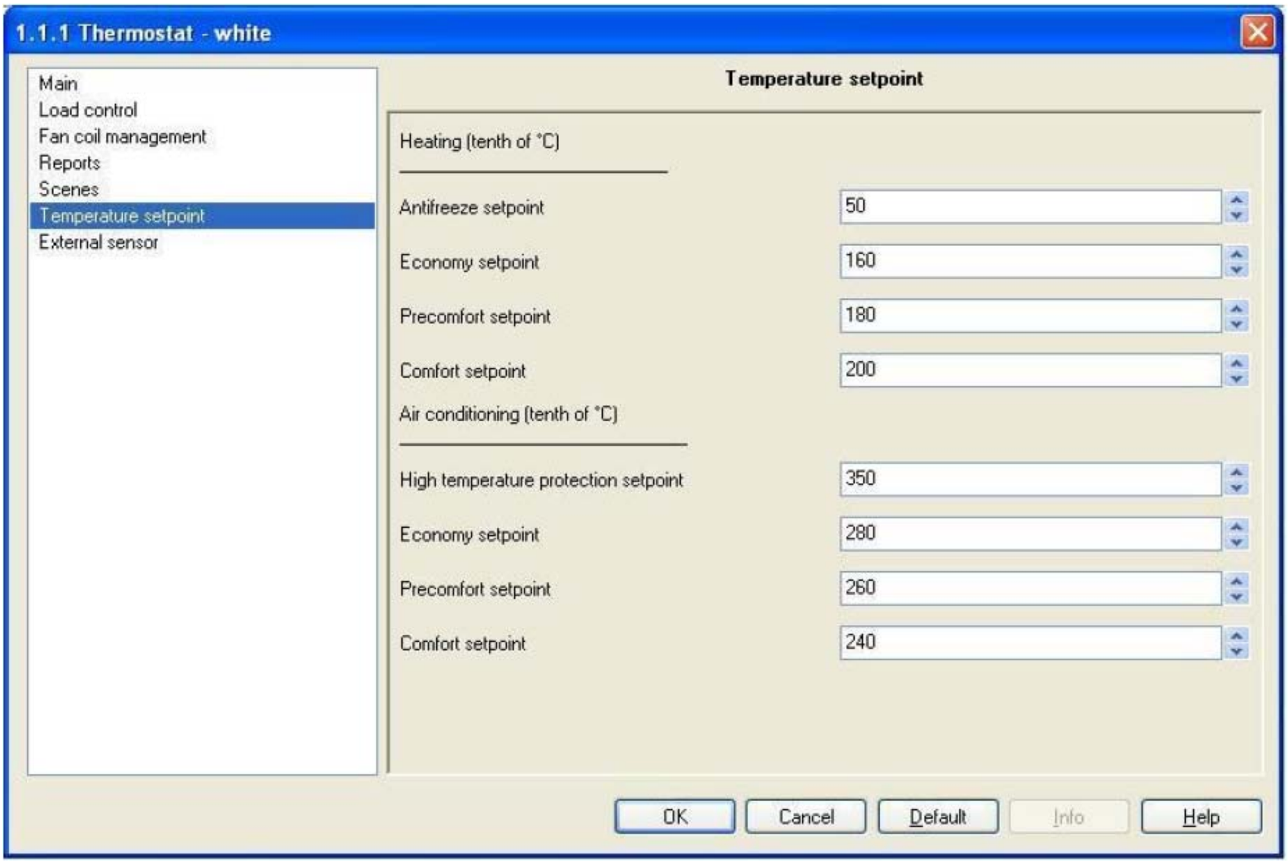


Fig. 11.1

11.1 Parameters

➢ *11.1.1 Antifreeze setpoint*

Here you can set the setpoint value for the OFF mode when it is HEATING operating mode; the values range from 20 (2 degrees centigrade) to 70 (7 degrees centigrade).
The restrictions listed in ***3.1.9*** must be complied with when setting this value.
This value can in any case be modified by the operator using the setting in the local navigation menu on the device and, where enabled, modified by a bus telegram to the relative communication object.

➢ *11.1.2 Economy setpoint*

Here you can set the setpoint value for the ECONOMY mode when it is HEATING operating mode; the values range from 50 (5 degrees centigrade) to 400 (40 degrees centigrade).
The restrictions listed in ***3.1.9*** must be complied with when setting this value.
This value can in any case be modified by the operator using the setting in the local navigation menu on the device and, where enabled, modified by a bus telegram to the relative communication object.

The features, functions and restrictions listed above also apply to the ***Precomfort setpoint***, ***Comfort setpoint*** parameters for the HEATING operating type.

➢ *11.1.3 High temperature protection setpoint*

Here you can set the setpoint value for the OFF mode when it is AIR CONDITIONING operating mode; the values range from 300 (30 degrees centigrade) to 400 (40 degrees centigrade).
The restrictions listed in ***3.1.9*** must be complied with when setting this value.
This value can in any case be modified by the operator using the setting in the local navigation menu on the device and, where enabled, modified by a bus telegram to the relative communication object.

➢ *11.1.4 Setpoint economy*

Here you can set the setpoint value for the ECONOMY mode when it is AIR CONDITIONING operating mode; the values range from 50 (5 degrees centigrade) to 400 (40 degrees centigrade).
The restrictions listed in ***3.1.9*** must be complied with when setting this value.
This value can in any case be modified by the operator using the setting in the local navigation menu on the device and, where enabled, modified by a bus telegram to the relative communication object.

The features, functions and restrictions listed above also apply to the ***Precomfort setpoint***, ***Comfort setpoint*** parameters for the AIR CONDITIONING operating type.

11.2 Communication objects

There are no communication objects enabled by the ***Temperature setpoint*** menu***.***

12 *“External sensor” menu*

The ***External sensor*** menu lists all the parameters needed to enable and configure the use of an auxiliary input for an external sensor, used to determine the temperature in the environment to be controlled in the various HVAC modes of the two different operating types (see Fig. 12.1).

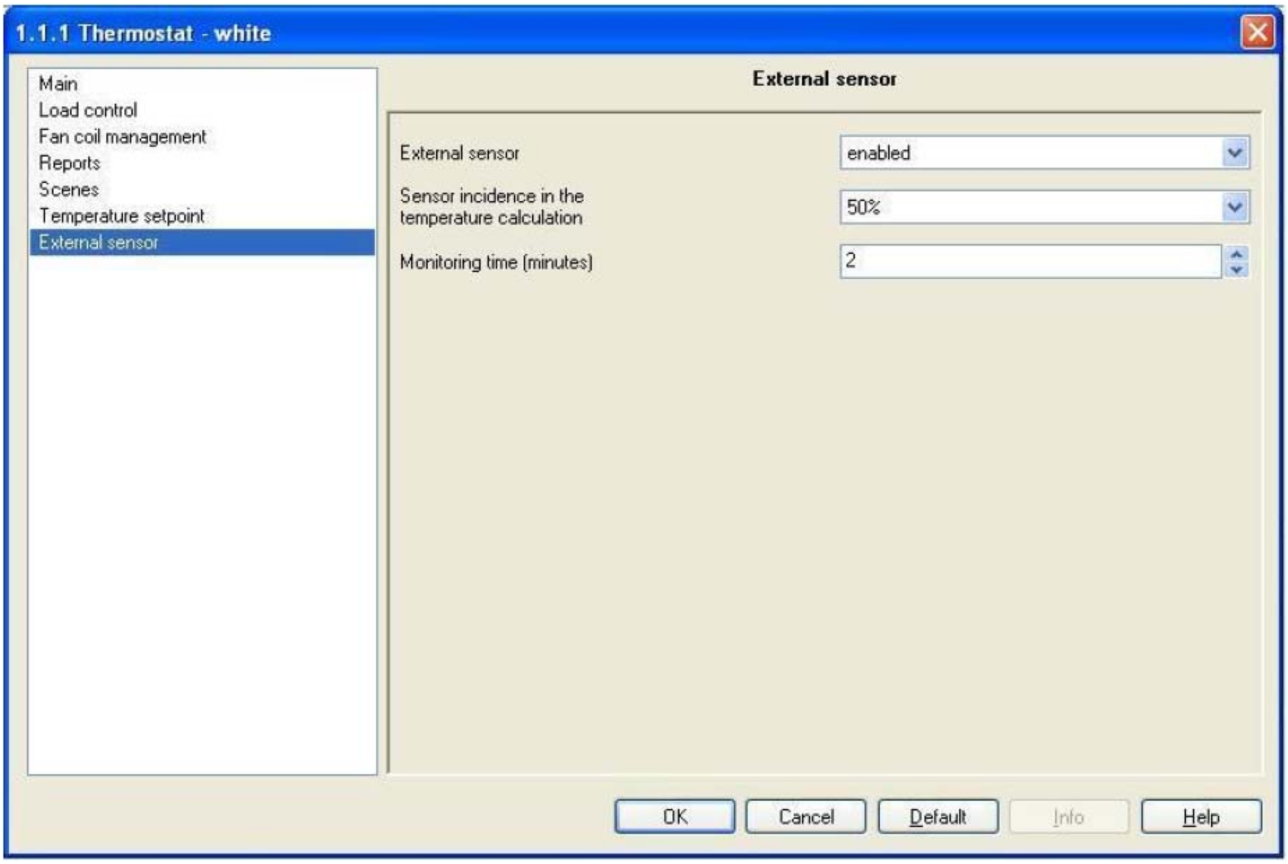


Fig. 12.1

12.1 Parameters

➢ *12.1.1 External sensor*

This is to enable the auxiliary input to measure the ambient temperature and consequently the configuration settings and the communication object which will receive the temperature value; the settings are:

- ***disabled***

The auxiliary input is not available and the measured temperature only depends on the value measured by the sensor onboard the device. With this configuration the ***Sensor incidence in the temperature calculation*** and ***Monitoring time (minutes)*** and the communication object ***External sensor input*** are not visible.

- ***enabled***

The auxiliary input is available and the measured temperature depends on the value measured by the sensor onboard the device and also by the external sensor, calculated as a weighted mean of the two values. With this configuration the ***Sensor incidence in the temperature calculation*** and ***Monitoring time (minutes)*** and the communication object ***External sensor input*** are all visible.

12.1.2 Sensor incidence in the temperature calculation

Here you can set the sensor incidence on the weighted mean used to calculate the measured temperature; the settings can be seen in the drop down menu, in an interval between 10% and 100%.
Once the auxiliary input has been enabled for the external sensor, the measured temperature will not be measured only by the sensor onboard the device, but it will be calculated as the weighted mean between the value measured by the onboard sensor and the value measured by the auxiliary external sensor.
The complete formula used to calculate temperature is:

$T_{measured} = T_{external\ sensor} \times Incidence_{external\ sensor} + T_{device\ sensor} \times (100\% - Incidence_{external\ sensor})$

12.1.3 Monitoring time [min]

Here you can set the time, expressed in minutes, after which the device assigns the value of the temperature detected by the device onboard sensor to the measured temperature value if it does not periodically receive the telegram with the value measured by the external sensor; the settings range from 2 (minutes) to 10 (minutes).
This parameter allows the calculation of the time within which the device expects to receive the temperature value measured by the external sensor in order to calculate the measured temperature; in fact, the device maintains the last value received from the external sensor as valid for a maximum period which is configured under this option; after this time, if the device does not receive another value from the sensor, the device will assign the value received from the sensor onboard the device as the measured temperature, without applying the weighted mean.
This type of configuration has been adopted to prevent any malfunctions on the external sensor from creating incorrect temperature values and consequently an incorrect management of the whole system. When the sensor sends another new value, the weighted mean will be applied again to determine the value of the measured temperature.

12.2 Communication objects

The communication object, whose visibility depends on the settings in the items of the ***External sensor*** menu, is that indicated in Fig. 12.2.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
27	External sensor input	Sensor measured temper...	2 Byte	C	-	W	-	-	2 byte float value DPT_Value_Temp	Low

Fig. 12.2

12.2.1 External sensor imput

This allows the device to receive bus telegrams with the temperature value measured by the auxiliary external sensor, in order to calculate the measured temperature value. The value received by this communication object is subject to a monitoring time; when this lapses the measured temperature is determined by the sensor onboard the device only.
The enabled flags are C (communication), W (written by bus).
The standard format of the object is *9.001 DPT_Value_Temp*, so the size of the object is *2 byte* and the commands it receives are *temperature values detected by external sensor expressed in degrees centigrade (rounded off to a tenth of a degree)*.

cod. 7.01.6.741.6

Ai sensi dell'articolo 9 comma 2 della Direttiva Europea 2004/108/CE si informa che responsabile dell'immissione del prodotto sul mercato Comunitario è:
According to article 9 paragraph 2 of the European Directive 2004/108/EC, the responsible for placing the apparatus on the Community market is:
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