

MAXinBOX FANCOIL 4CH2P

Two-Pipe Fan Coil Controller

ZCL-4XFC2P

Application program version: [1.0]

User manual edition: [1.0]_a

www.zennio.com

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1 INTRODUCTION

1.1 MAXINBOX FANCOIL 4CH2P

MAXinBOX FANCOIL 4CH2P from Zennio is a KNX actuator aimed at covering the climate control needs in KNX environments with **two-pipe fan coil units** where both the fan speed and the opening of the water pipe valves are controlled by relays.

This actuator provides 16 relay outputs, which makes it possible to control **up to four two-tube fan coil units**: three relays for the fan speed selection, and a fourth one for the valve control.

At a glance, the most outstanding features of MAXinBOX FANCOIL 4CH2P are:

- **16 relay outputs** to control **up to four two-pipe fan coil units**.
- 20 customisable, multi-operation **logic functions**.
- **Scene-triggered action control**, with an optional delay in the execution.
- **Manual operation / supervision** of the relay outputs through the on-board pushbuttons and LEDs.

1.2 INSTALLATION

MAXinBOX FANCOIL 4CH2P connects to the KNX bus through the on-board KNX connector. Once the device is provided with power from the KNX bus, both the individual address and the associated application program may be downloaded.

This device does not need any additional external power since it is entirely powered through the KNX bus.

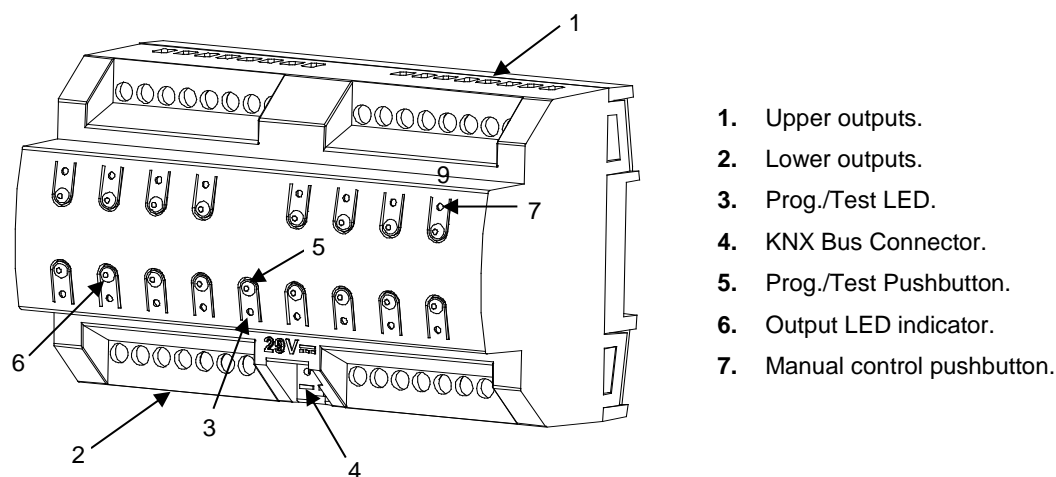


Figure 1 MAXinBOX FANCOIL 4CH2P Elements

The main elements of the device are described next.

- **Prog./Test Pushbutton (5):** a short press on this button sets the device into the programming mode, making the associated LED (3) light in red.

Note: if this button is held while plugging the device into the KNX bus, the device will enter into **safe mode**. In such case, the LED will blink in red every 0.5 seconds.

- **Outputs (1 and 2):** output ports for the insertion of the stripped cables of the systems being controlled by the actuator (see section 2.2). Please secure the connection by means of the on-board screws.
- **Manual control pushbuttons (6):** pushbuttons for a direct control of the relays during the set-up process. See section 2.5.

For detailed information about the technical features of the device and for safety instructions or about the installation process, please refer to the corresponding **Datasheet**, bundled with the original package of the device and also available at www.zennio.com.

1.3 START-UP AND POWER LOSS

During the device start-up, the Prog./Test LED will blink **in blue colour** for a few seconds before MAXinBOX FANCOIL 4CH2P is ready. External orders will not be executed during this time, but afterwards.

Depending on the configuration, the device may **send certain status objects** to the bus after the power recovery. In addition, it is possible to configure whether the fan coil units should remain off after the device start-up, or switch to their previous state. Please consult the next sections of this document for further details.

On the other hand, when **a bus power failure** takes place, MAXinBOX FANCOIL 4CH2P will interrupt any pending actions, and will save its state so it can be recovered once the power supply is restored.

2 CONFIGURATION

2.1 GENERAL

After importing the corresponding database in ETS and adding the device into the topology of the desired project, the configuration process begins by right-clicking into the device and selecting *Edit Parameters*.

ETS PARAMETERISATION

From the “General” screen it is possible to mark/unmark the appropriate checkboxes to enable the required functionality. The only one active by default is “**Manual Control**” (see section 2.5), thus the corresponding tab will also be available from the beginning in the tab tree on the left.

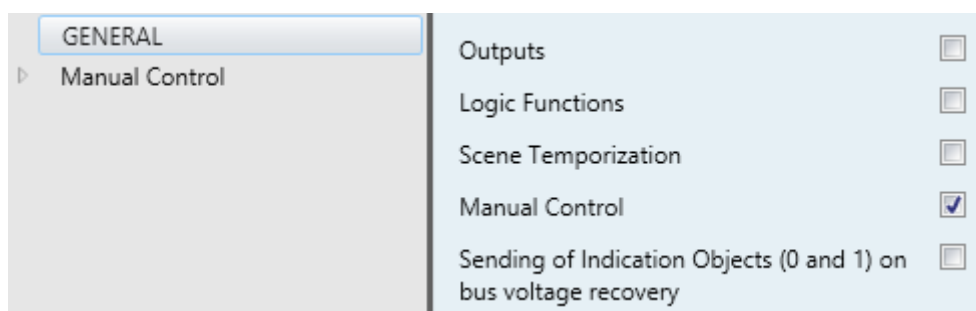


Figure 2 General screen

- Once activated, **Outputs**, **Logic Functions**, **Scene Temporization** and **Manual Control** (enabled by default) bring additional tabs to the menu on the left. These functions and their parameters will be explained in later sections of this document.
- **Sending of Indication Objects (0 and 1) on Bus Voltage Recovery**: this parameter lets the integrator activate two new communication objects (“**Reset 0**” and “**Reset 1**”), which will be sent to the KNX bus with values “0” and “1” respectively whenever the device begins operation (for example, after a bus power failure). It is possible to parameterise a certain **delay** to this sending (0 to 255 seconds).

2.2 FAN COIL

MAXinBOX FANCOIL 4CH2P incorporates four **fan coil control modules**, which will be responsible for operating the relays that open and close the water pipe valves, and the relays that set the fan speed level. The latter can be achieved **relay accumulation** (more relays closed means a higher fan speed) or through **relay commutation** (one specific relay will be available per level).

For a detailed description of these functions and on their configuration, please refer to the specific manual “**Relays’ Fan Coil in MAXinBOX FANCOIL 4CH2P**”, available at www.zennio.com.

Note: *as stated before, this device can only control **two-pipe fan coil systems**, therefore any indications related to four-pipe fan coils that the aforementioned document may contain do not apply to this actuator.*

2.3 LOGIC FUNCTIONS

This module makes it possible to perform numeric and binary operations to incoming values received from the KNX bus, and to send the results through other communication objects specifically enabled for this purpose.

MAXinBOX FANCOIL 4CH2P can implement **up to 20 different and independent functions**, each of them entirely customisable and consisting in **up to 4 consecutive operations each one**.

The execution of each function can depend on a configurable **condition**, which will be evaluated every time the function is **triggered** through specific, parameterisable communication objects. The result after executing the operations of the function can also be evaluated according to certain **conditions** and afterwards sent (or not) to the KNX bus, which can be done every time the function is executed, periodically or only when the result differs from the last one.

Please refer to the specific manual “**Logic Functions in MAXinBOX FANCOIL 4CH2P**”, available at the www.zennio.com website, for detailed information about the functionality and the configuration of the related parameters.

2.4 SCENE TEMPORISATION

The scene temporisation allows **imposing delays over the scenes** of the fan coil channels. These delays, defined in parameters, are applied on the execution of one or more scenes that may have been configured.

Please bear in mind that, as multiple delayed scenes can be configured for each fan coil channel, in case of receiving an order to execute one of them **when a previous temporisation is still pending in that channel**, the channel will interrupt such temporisation and will only execute the delay and the action of the new scene.

ETS PARAMETERISATION

Prior to setting the **scene temporisation**, it is necessary to have one or more scenes configured in some of the channels. When entering the Configuration window under Scene TempORIZATION, all configured scenes will be listed, together with a few checkboxes to select which of them need to be temporised, as shown in the figure.

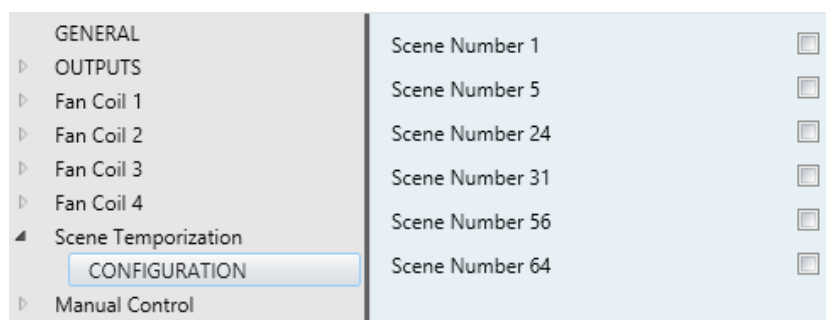


Figure 3. Scene Temporisation

Enabling a certain scene number n brings a new tab with such name to the menu on the left, from which it is possible to configure the temporisation of that scene for each of the channels where it has been configured.

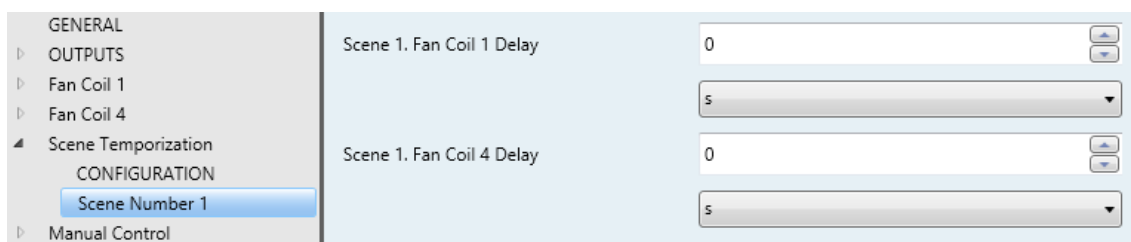


Figure 4. Configuration of Scene TempORIZATION

Therefore, parameter “**Scene m. Channel z Delay**” defines the delay that will be applied to the action defined in channel z for the execution of scene m. The range of this delay is 0 to 3600 seconds, 0 to 1440 minutes or 0 to 24 hours.

2.5 MANUAL CONTROL

MAXinBOX FANCOIL 4CH2P allows manually switching the state of its output relays through the respective pushbuttons on the top of the device. A specific pushbutton is therefore available per output.

Manual operation can be done in two different ways, named as **Test On Mode** (for testing purposes during the configuration of the device) and **Test Off Mode** (for a normal use, anytime). Whether both, only one, or none of these modes should be accessible needs to be parameterised in ETS. Moreover, it is possible to enable a specific binary object **for locking and unlocking the manual control** in runtime.

Note:

- *The **Test Off mode** will be active (unless it has been disabled by parameter) after a download or a reset with no need of a specific activation – the pushbuttons will respond to user presses from the start.*
- *On the contrary, switching to the **Test On mode** (unless disabled by parameter) needs to be done by long-pressing the Prog./Test button (for at least three seconds), until the LED is no longer red and turns yellow. From that moment, once the button is released, the LED light will remain green to confirm that the device has switched from the Test Off mode to the Test On mode. After that, an additional press will turn the LED yellow and then off, once the button is released. This way, the device leaves the Test On mode. Note that it will also leave this mode if a bus power failure takes place.*

Important: *this device is delivered from factory with the Test On and Test Off modes already enabled in parameters.*

Test Off Mode

Under the Test Off Mode, the outputs can be controlled through both their communication objects and the actual pushbuttons located on the top of the device.

When one of these buttons is pressed, the output will behave **as if the order had been received through the corresponding communication object**. The status objects of the different functions will still be sent in the usual way.

The action performed depends on the output type.

- **Fan:** pressing on any of the three fan speed control pushbuttons will operate the relays to set the corresponding speed. If the target speed matches the current one, the fan will stop (the three fan speed relays will open). The LEDs next to these pushbuttons show the state of the fan speed control relays.

The behaviour is equivalent to receiving the orders through the bus, i.e.:

- If the control is **fan-oriented**, pressing a button to set a fan speed makes the valve open.
- If the control is **valve-oriented**, the valve must be open before activating a fan speed. However, if the valve is not open, the selected speed is saved for later application.

Note: *this control is subject to the **number of fan speeds** and the **delay between fan speed switchovers** that may have been parameterised. Analogously, the speed will be switched through relay commutation or relay accumulation, according to the parameters.*

- **Valve:** pressing the valve control pushbutton makes the valve switch the open / closed state, provided that the fan coil has been enabled in parameters. This may also imply:
 - **A switch-on of the fan**, if the currently active fan speed is other than zero but the fan is found to be stopped when the valve opens. This does not apply under the Cooling mode in a fan-oriented control (in such case, the fan will remain as is).
 - **A switch-off of the fan**, if it is found to be in motion when the valve closes,

except under the Cooling mode in a fan-oriented control (in such case, the fan will remain as is).

Button presses during this mode are entirely analogous to the reception of the corresponding orders from the KNX bus.

Test On Mode

After entering the Test On mode, it will only be possible to control the outputs through the on-board pushbuttons. Orders received through communication objects and addressed to any of the outputs will be ignored.

On the other hand, to prevent interference with the normal operation and since the Test On mode is intended for testing, once the device leaves the Test On mode the device will **set the outputs back to their previous state**.

Depending on the parameterisation of the output, the reactions to the button presses will differ.

- **Fan:** the behaviour is analogous to that of the Test Off mode, although the parameterised configuration is ignored (the fan coil is always considered as a three-speed system). Nevertheless, the device does perform the speed switchovers through relay commutation or through relay accumulation, according to the parameterisation.

Note: *in case a particular fan coil channel has been left disabled in parameters, its behaviour during the Test On mode will be the same as above, although in this case the speed switchovers will be always through relay commutation.*

- **Valve:** pressing the valve control pushbutton makes the valve switch the open / closed state unconditionally (in this case, it does not matter whether the fan coil channel has been enabled in parameters or not).

Any order sent from the KNX bus to the actuator will not affect the outputs while the Test On mode is active. No status objects will be sent, either.

ETS PARAMETERISATION

The **Manual Control** is configured from a specific tab which can be enabled from the “General” screen (see section 2.1).

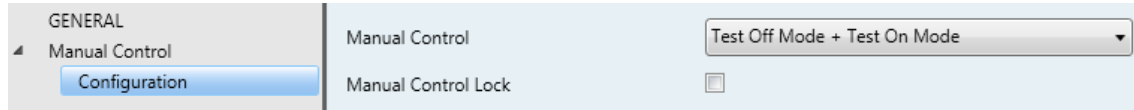


Figure 5 Manual Control

- **Manual Control:** options are “Disabled”, “Only Test Mode Off”, “Only Test Mode On” and “Test Mode Off + Test Mode On” (default).

Depending on the selection, the device will permit using the manual control under the Test Off, the Test On, or both modes. Note that, as stated before, using the Test Off mode does not require any special action, while switching to the Test On mode does require long-pressing the Prog./Test button.

- **Lock Manual Control:** unless the above parameter has been set to “Disabled”, enabling this checkbox brings object “**Manual Control Lock**”, as well as two more parameters:
 - **Value:** defines whether the lock/unlock of the manual control should take place respectively upon the reception (through the aforementioned object) of values “0” and “1”, or the opposite.
 - **Initialization:** sets how the manual control should remain after the device start-up (after an ETS download or a bus power failure): “Unlocked”, “Locked” or by default, “Last Value” (unlocked after the first start-up).

ANNEX I. COMMUNICATION OBJECTS

- “**Functional range**” shows the values that, with independence of any other values permitted by the bus according to the object size, may be of any use or have a particular meaning because of the specifications or restrictions from both the KNX standard or the application program itself.

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
1	1 Bit		C T - - -	DPT_Trigger	0/1	Reset 0	Voltage Recovery -> Sending of 0
2	1 Bit		C T - - -	DPT_Trigger	0/1	Reset 1	Voltage Recovery -> Sending of 1
3	1 Bit	I	C - - W -	DPT_Switch	0/1	Lock Manual Control	0 = Lock; 1 = Unlock
	1 Bit	I	C - - W -	DPT_Switch	0/1	Lock Manual Control	0 = Unlock; 1 = Lock
4-35	1 Bit	I	C - - W -	DPT_Bool	0/1	[LF] (1 bit) Data Entry X	Binary Data Entry (0/1)
36-51	1 Byte	I	C - - W -	DPT_Value_1_Ucount	0 - 255	[LF] (1 byte) Data Entry X	1 byte Data Entry (0-255)
52-67	2 Bytes	I	C - - W -	DPT_Value_2_Ucount	0 - 65535 -32768 - 32767 -273,00 - 670760,00	[LF] (2 bytes) Data Entry X	2 bytes Data Entry
				DPT_Value_2_Count			
				DPT_Value_Temp			
68-75	4 Bytes	I	C - - W -	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] (4 bytes) DataEntry X	4 bytes Data Entry
76-95	1 Bit	O	C T R - -	DPT_Bool	0/1	[LF] Function X - Result	(1 bit) Boolean
	1 Byte	O	C T R - -	DPT_Value_1_Ucount	0 - 255	[LF] Function X - Result	(1 byte) Unsigned
	2 Bytes	O	C T R - -	DPT_Value_2_Ucount	0 - 65535	[LF] Function X - Result	(2 bytes) Unsigned
	4 Bytes	O	C T R - -	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] Function X - Result	(4 bytes) Signed
	1 Byte	O	C T R - -	DPT_Scaling	0% - 100%	[LF] Function X - Result	(1 byte) Percentage
	2 Bytes	O	C T R - -	DPT_Value_2_Count	-32768 - 32767	[LF] Function X - Result	(2 bytes) Signed
	2 Bytes	O	C T R - -	DPT_Value_Temp	-273,00 - 670760,00	[LF] Function X - Result	(2 bytes) Float
96	1 Byte	I	C - - W U	DPT_SceneControl	0-63; 128-191	[FC] Scenes	0 - 63 (Execute 1 - 64)
97, 130, 163, 196	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] On/Off	0 = Off; 1 = On
98, 131, 164, 197	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] On/Off (Status)	0 = Off; 1 = On
99, 132, 165, 198	1 Bit	I	C - - W U	DPT_Heat_Cool	0/1	[FCx] Mode	0 = Cool; 1 = Heat
100, 133, 166, 199	1 Bit	O	C T R - -	DPT_Heat_Cool	0/1	[FCx] Mode (Status)	0 = Cool; 1 = Heat
101, 134, 167, 200	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Fan: Manual/Automatic	0 = Automatic; 1 = Manual

	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Fan: Manual/Automatic	0 = Manual; 1 = Automatic
102, 135, 168, 201	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Fan: Manual/Automatic (Status)	0 = Automatic; 1 = Manual
	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Fan: Manual/Automatic (Status)	0 = Manual; 1 = Automatic
103, 136, 169, 202	1 Bit	I	C - - W U	DPT_Step	0/1	[FCx] Manual Fan: Step Control	0 = Down; 1 = Up
104, 137, 170, 203	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Manual Fan: Speed 0	0 = Off; 1 = On
105, 138, 171, 204	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Manual Fan: Speed 1	0 = Off; 1 = On
106, 139, 172, 205	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Manual Fan: Speed 2	0 = Off; 1 = On
107, 140, 173, 206	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Manual Fan: Speed 3	0 = Off; 1 = On
108, 141, 174, 207	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Fan: Speed 0 (Status)	0 = Off; 1 = On
109, 142, 175, 208	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Fan: Speed 1 (Status)	0 = Off; 1 = On
110, 143, 176, 209	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Fan: Speed 2 (Status)	0 = Off; 1 = On
111, 144, 177, 210	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Fan: Speed 3 (Status)	0 = Off; 1 = On
112, 145, 178, 211	1 Byte	I	C - - W U	DPT_Value_1_Ucount	0 - 255	[FCx] Manual Fan: Enumeration Control	0 = S0; 1 = S1; 2 = S2; 3 = S3
	1 Byte	I	C - - W U	DPT_Value_1_Ucount	0 - 255	[FCx] Manual Fan: Enumeration Control	0 = S0; 1 = S1; 2 = S2
	1 Byte	I	C - - W U	DPT_Value_1_Ucount	0 - 255	[FCx] Manual Fan: Enumeration Control	0 = S0; 1 = S1
113, 146, 179, 212	1 Byte	O	C T R - -	DPT_Value_1_Ucount	0 - 255	[FCx] Fan: Enumeration Speed (Status)	S0 = 0; S1 = 1; S2 = 2; S3 = 3
	1 Byte	O	C T R - -	DPT_Value_1_Ucount	0 - 255	[FCx] Fan: Enumeration Speed (Status)	S0 = 0; S1 = 1; S2 = 2
	1 Byte	O	C T R - -	DPT_Value_1_Ucount	0 - 255	[FCx] Fan: Enumeration Speed (Status)	S0 = 0; S1 = 1
114, 147, 180, 213	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Manual Fan: Percentage Control	0% = S0; 1-33% = S1; 34-66% = S2; 67-100% = S3
	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Manual Fan: Percentage Control	0% = S0; 1-50% = S1; 51-100% = S2
	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Manual Fan: Percentage Control	0% = S0; 1-100% = S1
115, 148, 181, 214	1 Byte	O	C T R - -	DPT_Scaling	0% - 100%	[FCx] Fan: Percentage Speed (Status)	S0 = 0%; S1 = 33,3%; S2 = 66,6%; S3 = 100%
	1 Byte	O	C T R - -	DPT_Scaling	0% - 100%	[FCx] Fan: Percentage Speed (Status)	S0 = 0%; S1 = 50,2%; S2 = 100%
	1 Byte	O	C T R - -	DPT_Scaling	0% - 100%	[FCx] Fan: Percentage Speed (Status)	S0 = 0%; S1 = 100%
116, 149, 182, 215	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Cooling Fan: Continuous Control	0 - 100 %
	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Cooling Valve: PI Control (Continuous)	0 - 100 %
117, 150, 183, 216	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Heating Fan: Continuous Control	0 - 100 %
	1 Byte	I	C - - W U	DPT_Scaling	0% - 100%	[FCx] Heating Valve: PI Control (Continuous)	0 - 100 %
118, 151, 184, 217	1 Bit	I	C - - W U	DPT_OpenClose	0/1	[FCx] Cooling Valve: PWM Control (1 bit)	0 = Open Valve; 1 = Close Valve
	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Cooling Valve: PWM Control (1 bit)	0 = Close Valve; 1 = Open Valve
119, 152, 185, 218	1 Bit	I	C - - W U	DPT_OpenClose	0/1	[FCx] Heating Valve: PWM Control (1 bit)	0 = Open Valve; 1 = Close Valve
	1 Bit	I	C - - W U	DPT_Switch	0/1	[FCx] Heating Valve: PWM Control (1 bit)	0 = Close Valve; 1 = Open Valve
120, 153, 186, 219	1 Bit	O	C T R - -	DPT_OpenClose	0/1	[FCx] Cooling Valve (Status)	0 = Open; 1 = Closed
	1 Bit	O	C T R - -	DPT_Switch	0/1	[FCx] Cooling Valve (Status)	0 = Closed; 1 = Open

	1 Bit	O	CTR--	DPT_OpenClose	0/1	[FCx] Valve (Status)	0 = Open; 1 = Closed
	1 Bit	O	CTR--	DPT_Switch	0/1	[FCx] Valve (Status)	0 = Closed; 1 = Open
121, 154, 187, 220	1 Bit	O	CTR--	DPT_OpenClose	0/1	[FCx] Heating Valve (Status)	0 = Open; 1 = Closed
	1 Bit	O	CTR--	DPT_Switch	0/1	[FCx] Heating Valve (Status)	0 = Closed; 1 = Open
122, 155, 188, 221	1 Bit	I	C--WU	DPT_Start	0/1	[FCx] Cooling Valve: Trigger Purge	0 = Stop; 1 = Start
	1 Bit	I	C--WU	DPT_Start	0/1	[FCx] Valve: Trigger Purge	0 = Stop; 1 = Start
123, 156, 189, 222	1 Bit	I	C--WU	DPT_Start	0/1	[FCx] Heating Valve: Trigger Purge	0 = Stop; 1 = Start
124, 157, 190, 223	1 Bit	O	CTR--	DPT_Switch	0/1	[FCx] Cooling Valve: Purge (Status)	0 = Not Active; 1 = Active
	1 Bit	O	CTR--	DPT_Switch	0/1	[FCx] Valve: Purge (Status)	0 = Not Active; 1 = Active
125, 158, 191, 224	1 Bit	O	CTR--	DPT_Switch	0/1	[FCx] Heating Valve: Purge (Status)	0 = Not Active; 1 = Active
126, 159, 192, 225	1 Bit	O	CTR--	DPT_Bool	0/1	[FCx] Control Input Failure	0 = No Error; 1 = Error
127, 160, 193, 226	2 Bytes	I	C--WU	DPT_Value_Temp	-273,00 - 670760,00	[FCx] Ambient Temperature	Ambient Temperature
128, 161, 194, 227	2 Bytes	I	C--WU	DPT_Value_Temp	-273,00 - 670760,00	[FCx] Setpoint Temperature	Setpoint Temperature
129, 162, 195, 228	2 Bytes	I/O	CTR WU	DPT_TimePeriodMin	1 - 1440	[FCx] Duration of Manual Override of Fan	0: Forever; 1 - 1440 min; >1440: 1440 min
	2 Bytes	I/O	CTR WU	DPT_TimePeriodHrs	1 - 1440	[FCx] Duration of Manual Override of Fan	0: Forever; 1 - 24 h; >24: 24 h

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Zennio Avance y Tecnología S.L.
C/ Río Jarama, 132. Nave P-8.11
45007 Toledo (Spain).

Tel. +34 925 232 002.

Fax. +34 925 337 310.

www.zennio.com

info@zennio.com



RoHS