

e-drofan FTU

electronic controller

CAREL



GB User manual

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1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately;
2. the public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment.
3. the equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment;
4. the symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately;
5. in the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.

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1. INTRODUCTION

Features of the e-drofan FTU:

- Remote terminal with elegant appearance and diversified access to the various functions (set point modification on front buttons, change operating mode etc. on side buttons). Built-in NTC sensor;
- Flush mounted LCD terminal with built-in sensor;
- Remote control with LCD on board;
- Dipswitches for simple configuration by the installer;
- Control board with high number of I/Os (5 digital inputs, 3 probes, 3 relay outputs);
- Creation of local broadcast networks (max 5 slaves, max 30 m);
- Possibility to create extended networks (up to 1 km) using optional CANbus® serial card. Flexible space management;
- Implementation of hydronic systems with synergy between the CCU and the e-drofan FTU controller using optional serial card;
- Customisable supervisory system thanks to the numerous protocols supported (Modbus®, CANbus®, PlantVisor);
- Parameter programming key;
- Options for managing a 3-point output, a modulating 0 to 10 V analogue output and an ON/OFF output (via relay).

e-drofan FTU is an electronic controller for terminal units, in flexible spaces, installed mainly in raised floors (fan tile units); it optimises the performance of the cooling/heating system in order to achieve maximum comfort and greater customisation possibilities concerning different zones in the same environment. It is easy to install and use, and allows the rapid re-configuration of the unit in the event where there are changes to the spaces being air-conditioned.

The network connection simplifies the operations if the installation has a high number of fan tile units, as well as offering advanced supervision and automation functions (time bands, energy savings etc.), thanks to the integration with the CCU (pCO)/heat pump or boiler controller.

The information provided below has been divided based on the area of interest: user, installation, and advanced settings (typically reserved for the manufacturer of the air-conditioning system).

2. USER

The user interface is represented by the acqua remote terminal or flush mount terminal, or by the remote control; all the devices are fitted with a liquid crystal display that ensures simple and user-friendly operation.

2.1 e-droset terminal

In summary:

NTC sensor on board to control the room temperature;
LCD with clear symbols;
selection of the value displayed (temperature, set point, offset from common set point);
selective keypad lock (limited functions for offices, hotels.);
manual or automatic operation;
sleep and occupancy function;
wall mounting using the most commonly available 3 gang switch boxes.

Below is the description of the terminal and the symbols on the liquid crystal display:

butt.	meaning
	Fan tile unit On/Off. If the remote ON/OFF digital input or the hydronic network is present, the function of the button may be disabled.
M	Used to select the desired mode: cooling, heating, dehumidify, fan, automatic operation. If the remote cooling/heating digital input or hydronic network is present, the function of the button may be disabled.
	Used to select the default device to be controlled (fan or damper).
	Pressing this once activates the sleep function, pressing it again selects the number of hours the sleep function lasts (if more than three seconds have passed since the button was last pressed the function is deactivated). After pressing 9 consecutive times the function is deactivated. WITH THE OCCUPANCY FUNCTION ACTIVE: Pressing this button switches the e-drofan FTU to occupancy mode, that is, it controls the temperature according to the set point rather than based on energy savings.
	Increases the currently selected value. Used to set the temperature set point.
	Decreases the currently selected value. Used to set the temperature set point.

Tab. 2.a

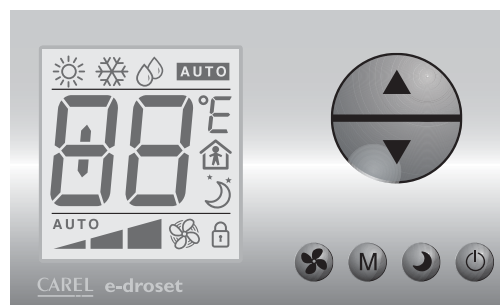


Fig. 2.a

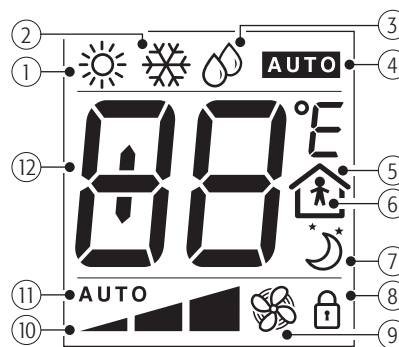


Fig. 2.b

Key

- 1 heating
- 2 cooling
- 3 dehumidification
- 4 automatic operation
- 5 occupancy function = enabled
- 6 on steady = occupied
flashing = temporarily occupied
- 7 sleep function
- 8 limited keypad function
- 9 fan & operating mode
- 10 fan speed set (min/med/max)
- 11 fan speed in automatic mode
- 12 display temperature sensor or set point or active alarm code

The following section shows all the default functions available on the e-drofan FTU; the device can in any case be reconfigured by the manufacturer of the cooling/heating system or by the installer (according to the features of the installation), and therefore some functions may not be available; in particular, if a series of e-drofan FTU units are connected in a hydronic network, some settings are fixed by the manager of the installation and cannot be modified.

Manual operation: Cooling

Once the device has been switched on using the ON/OFF button, proceed by:

- pressing the MODE button repeatedly until the cooling symbol comes on;
- setting the set point (desired temperature) using the UP and DOWN buttons;
- pressing the FAN button repeatedly to select the desired fan speed; if AUTO mode is selected the speed is decided by the electronic controller based on the deviation from the set point (the greater the deviation, the higher the speed).

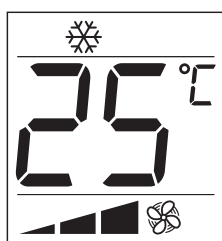


Fig. 2.c

Manual operation: Heating with or without heater

Once the device has been switched on using the ON/OFF button, proceed by:

- pressing the MODE button repeatedly until the heating symbol comes on. If the heater is installed it is always used;
- setting the set point (desired temperature) using the UP and DOWN buttons;
- pressing the FAN button repeatedly to select the desired fan speed; if AUTO mode is selected the speed is decided by the electronic controller based on the deviation from the set point (the greater the deviation, the higher the speed).

If the electric heater is installed the fan continues operating for a time equal to P48 (post-ventilation with heater) even after it has been stopped. This time must also elapse even if the unit is switched off using the ON/OFF button or after shutdown due to alarm or when changing mode.

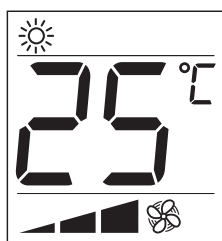


Fig. 2.d

Manual operation: 0 to 10 V fan speed management

Once the device has been switched on using the ON/OFF button, proceed by:

- press the FAN button, the FAN symbol flashes and the display shows the current speed;
- using the UP and DOWN buttons select the speed, between 0 and 10 (0 = AUTOFAN), the display will show FA (autofan), F1, F2...F9, FH (maximum speed);
- after 2 seconds from when the button was last pressed, the display returns to the set point (or the temperature) and the value is acquired;
- to view the set speed, press the FAN button once, after 2 seconds from when the button was last pressed the display returns to the set point (or the temperature);
- when changing mode, the terminal resets the speed to the same value when that mode was last used.

Manual 3-speed fan management:

- press FAN button, the FAN symbol flashes;
- using the UP and DOWN buttons select the speed, between AUTOFAN, MIN, MED, MAX;
- after 2 seconds from when the button was last pressed the FAN symbol stops flashing and the set value is acquired

Manual operation: modulating damper management

Once the device has been switched on using the ON/OFF button, proceed by:

- in automatic operation (the P+I algorithm controls the damper), press the FAN button twice, the display shows "dA" flashing (AUTO damper);
- using the UP and DOWN buttons, select the position of the damper between 0 and 10, (the terminal will show dA,d0,d1...d9,domestic hot water, which stands for damper High);
- setting "d0" closes the damper;
- four seconds after the button was last pressed, the display returns to the set point (or the temperature) and the value is acquired, e-drofan FTU positions the damper at the set value;
- to view the current position, press the FAN button twice (pressing it once access the fan management, see above), "dX" is displayed flashing, where X is the current position, to change this use the UP and DOWN buttons;
- when changing mode, the manual position of the damper remains the same;
- pressing the FAN button twice and setting "dA" releases the damper, after which the position is controlled by the P+I algorithm.

Automatic operation

Once the device has been switched on using the ON/OFF button, proceed by:

- pressing the MODE button repeatedly until the automatic symbol comes on;
- setting the set point (desired temperature) using the UP and DOWN buttons;
- pressing the FAN button repeatedly to select the desired fan speed; if AUTO mode is selected the speed is decided by the electronic controller based on the deviation from the set point (the greater the deviation, the higher the speed).

The mode (heating or cooling) is decided by the electronic controller based on the deviation from the set point; if the room temperature is higher than the set point the control performs the cooling function while if it is lower it performs the heating function.

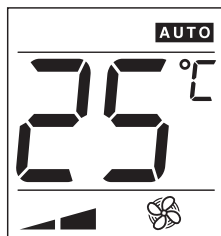


Fig. 2.e

Comfort control

In some installations the set point is decided by the manager of the installation; in these cases the user can increase or decrease the set point up to 3°C to compensate for the different perception of the room temperature.

The value is modified by pressing the UP and DOWN buttons and is displayed for 2 seconds, after which the display returns to the previous situation.



Fig. 2.f

Set comfort in automatic

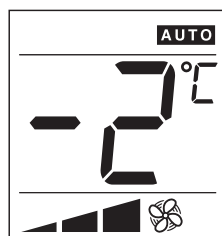


Fig. 2.g

Sleep function

The sleep function is especially useful during the night-time, when the decrease in body temperature (due to sleep) changes the perception of the room temperature.

In cooling mode the set point is increased by P18 for the number of hours set, after which the e-drofan FTU returns to the previous situation (the sleep function is cancelled). SLEEP display active (Fig. 2.m.h).

In heating mode the set point is decreased by P19. To set the sleep function, proceed as follows:

switch the device on using the ON/OFF button and select the operating mode;

press the SLEEP button repeatedly until setting the required number of hours for the function (exceeding the maximum number of 9 hours disables the function).

To see the remaining time for the sleep function, press the sleep button once (after having waited 3 seconds since last pressed), and press it again to leave the function. The sleep function is always cancelled after a power failure or when the device is switched off.

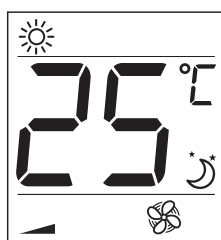


Fig. 2.h

Temperature management in degrees Fahrenheit

The e-droset terminal can display the temperature read by the probes in degrees Fahrenheit, however only up to a maximum value of 99 °F (corresponding to 37 °C).

Alarms

The e-droset terminal displays any alarms relating to the malfunctions of the device, shown in the summary table below. In the event of alarms, contact the relevant personnel (manager of the installation or installer/maintenance engineer) and make note of the signal to assist the response..

signal	alarm
A01	EEPROM fault
A02	serial option fault
A03	room probe fault
A04	probe St2 or St3 fault
A05	open window alarm
A06	generic alarm from digital input
A07	local stop

Tab. 2.b

Occupancy function

The system will air-condition the room to the set temperature only when this is occupied; to activate the system, simply press any button, or wait for the sensor (if installed) to detect occupancy (this is shown by the symbol of the man coming on or flashing on the terminal). If the room is not occupied, air-conditioning is activated with a set point aimed at saving energy (in this case, the terminal only shows the house symbol). Room empty, press any button to set occupancy (Fig. 2.m.l); Room temporarily occupied (Fig. 2.m.m)

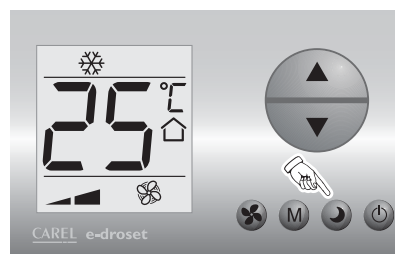


Fig. 2.i

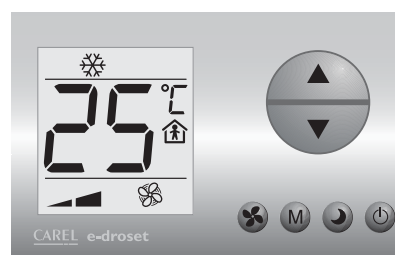


Fig. 2.j



Note: When using the e-droset terminal, the user cannot modify the system parameters.

2.3 Remote control & IR receiver board

i In summary:

- remote control of the unit (7 m);
- lock keypad (limited user functions: offices, hotels ..);
- LCD on board;
- IR receiver board with 3 LEDs, 1 buzzer for the signals and 1 button (in the event of flat batteries);
- manual or automatic operation;
- ON, OFF timer functions;
- sleep function.

Below is the description of the remote control and the symbols shown on the liquid crystal display:



Fig. 2.k

button	meaning
	ON/OFF: fan tile unit on/off. If the ON/OFF digital input or hydronic network is present the function of the button may be disabled.
	MODE: used to select the desired mode: cooling, dehumidify, fan, heating, automatic operation. . If the cooling/heating digital input or hydronic network is present the function of the button may be disabled
	UP set point: used to increase the desired temperature value
	DOWN set point: used to decrease the desired temperature value
	FAN: press this more than once to set the fan speed (min, med, max, auto).
	SLEEP: press once to activate the sleep function, press again to select the number of hours for the sleep function. After pressing 9 times the function is cancelled
	TIMER ON: used to set the fan coil on time
	TIMER OFF: used to set the fan coil off time
	UP timer: increases the setting of the timer
	DOWN timer: decreases the setting of the timer
	SET: confirms the modifications made to the timer settings.
	CLEAR: pressed after the timer ON or timer OFF buttons cancels the action of the selected timer. If pressed for 5 seconds activates the keypad lock, the only function enabled is On/Off.
	pressed for 5 seconds sets the time.
	DAMPER: used to select the opening of the damper

Tab. 2.c

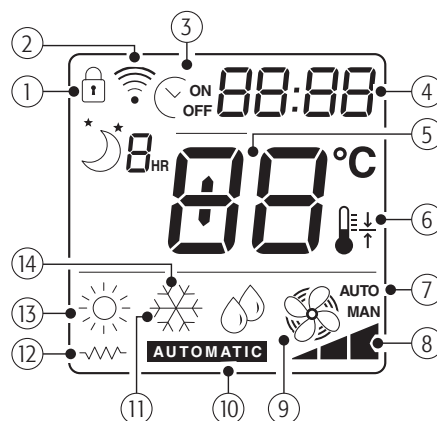


Fig. 2.l

Key:

- 1 lock keypad function
- 2 data transmission in progress
- 3 ON/OFF timer
- 4 timer/clock
- 5 display temperature sensor or set point or active alarm
- 6 hydronic network connection indicator
- 7 fan speed in automatic mode
- 8 fan speed set (min/med/max)
- 9 fan & operating mode
- 10 automatic operation
- 11 cooling
- 12 heating with electric heater
- 13 heating
- 14 dehumidification

The following section shows all the default functions available on the e-drofan FTU; the device can in any case be reconfigured by the manufacturer of the cooling/heating system or by the installer (according to the features of the installation), and therefore some functions may not be available; in particular, if a series of e-drofan FTU are connected in a hydronic network (highlighted by the special symbol on the display), some settings are fixed by the manager of the installation and cannot be modified.

The correct reception of the functions is signalled by the sounding of the buzzer.

Manual operation: cooling

Once the device has been switched on using the ON/OFF button, proceed by:

- pressing the MODE button repeatedly until the cooling symbol comes on;
- setting the set point (desired temperature) using the UP set point and DOWN set point buttons.

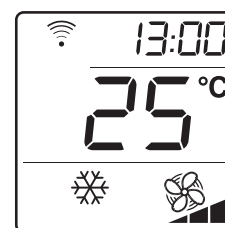


Fig. 2.m

Manual operation: heating

Once the device has been switched on using the ON/OFF button, proceed by:

- pressing the MODE button repeatedly until the heating symbol only or heating with heater symbol (if installed) comes on. In the latter case the electric heater is also used as a source of heat;
- setting the set point (desired temperature) using the UP set point and DOWN set point buttons;
- pressing the FAN button repeatedly to select the desired fan speed; If the electric heater is installed the fan continues operating for a time equal to P48 (post-ventilation with heater) even after it has been stopped. This time must also elapse even if the unit is switched off using the ON/OFF button, in the event of alarms or when changing mode.

Heating with electric heater

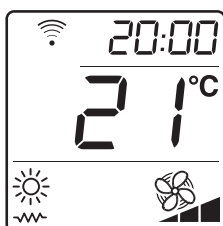


Fig. 2.n

Heating without electric heater

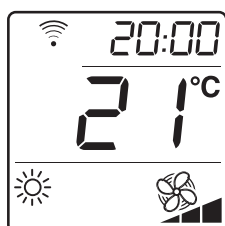


Fig. 2.o

Automatic operation

Once the device has been switched on using the ON/OFF button, proceed by:

- pressing the MODE button repeatedly until the automatic symbol comes on;
- setting the offset (from -2 to +2°C) from the set point in automatic mode (P01 = 22 °C by default), using the UP set point and DOWN set point buttons;
- pressing the FAN button repeatedly to select the desired fan speed; if AUTO mode is selected the fan is managed at fixed speed.

The mode (heating or cooling) is decided by the electronic controller based on the deviation from the set point; if the room temperature is higher than the set point the control performs the cooling function while if it is lower it performs the heating function.

If the network connection is present, the set point is decided by the manager of the installation; in these cases, the user can only increase or decrease the set point by 2 °C to compensate for the different perception of the room temperature.

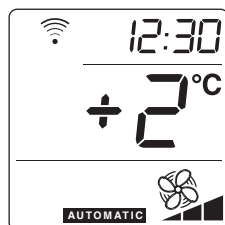


Fig. 2.p

Setting the clock & on/off timer

e-drofan FTU offers the possibility to perform programmed starts and stops if the room only needs to be air-conditioned at certain times of the day. To be able to use these functions, the internal clock needs to be set with the correct time, as shown below:

- press the TIMER UP and DOWN buttons at the same time for 5 seconds (Fig. 2.26);
- set the time using the TIMER UP and DOWN buttons (Fig. 2.27);
- confirm by pressing the SET button (see Fig. 2.28).



Important:

In the event of power failures, the clock setting will be lost and needs to be reset (the time is displayed correctly on the remote control), as does the On/Off timer. To reset the clock, clock send any command to the e-drofan FTU.



Fig. 2.q



Fig. 2.r



Fig. 2.s

The ON timer (start, Fig. 2.29) is set by:

- pressing the TIMER ON button once;
- setting the required start time with the TIMER UP and DOWN buttons;
- confirming the time with the SET button (the symbol is on steady and the current time is displayed).

The OFF timer (stop, Fig. 2.30) is set as for the timer ON, with the difference that the TIMER OFF button must be pressed.

The ON/OFF timer functions remain active even after the corresponding On/Off event has occurred; to disable these functions proceed as follows:

- press the TIMER ON/OFF button;
- press the clear button (the special symbol disappears).

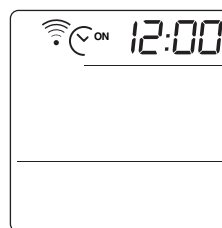


Fig. 2.t

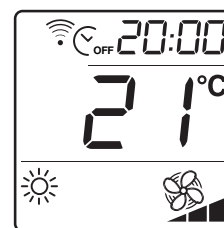


Fig. 2.u

Damper management

The remote control can be used to manually manage the three-point damper on the fan tile unit.

To manage the position of the damper, press the "damper" button (); six positions are available (closed, open and four intermediate) plus automatic.

Sleep function

The sleep function is especially useful during the night-time, when the decrease in body temperature (due to sleep) changes the perception of the room temperature.

In cooling mode the set point is increased by P18 for the number of hours set, after which the e-drofan FTU returns to the previous situation (the sleep function is cancelled).

In heating mode the set point is decreased by P19. To set the sleep function, proceed as follows:

- switch the device on using the ON/OFF button and select the operating mode;
- press the SLEEP button repeatedly until setting the required number of hours for the function. to cancel the function, proceed by pressing the SLEEP button again, after having waited 3 s since the button was last pressed, or pressing the button more than once until exceeding the maximum number of hours, that is, 9.

The sleep function can be combined with the timer OFF (see Fig. 2.31).

When the sleep function is active the brightness of the LED on the IR receiver board decreases.

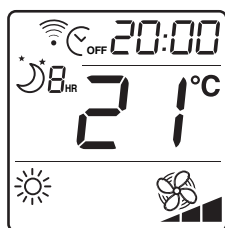


Fig. 2.v

Lock keypad

When the keypad lock symbol is present, only the On/Off function is enabled. To activate the lock, press the CLEAR button for 5 seconds, and to deactivate the function repeat the operation.

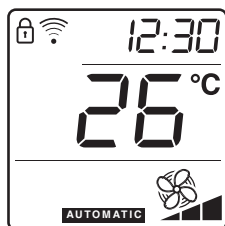


Fig. 2.w

Button and signal LEDs

The IR receiver board features a button for setting the operation if the remote control is not available (e.g. flat batteries); pressing the button repeatedly changes the mode, in the following sequence: automatic, cooling, dehumidify, fan, heating, off. When setting the mode using the button the fan operates at minimum speed and the set point is equal to the value of parameter P01 (automatic mode set point, default= 22°C).

Below is a list of the signals on the IR board:

Mode	green LED	yellow LED	red LED
OFF	OFF	OFF	OFF
COOL	ON	ON	OFF
HEAT	OFF	ON	OFF
AUTOMATIC OFF	ON	OFF	OFF
EXTRA FLUSH	ON	OFF	OFF

Tab. 2.d

Initial setup and replacing the batteries

When the batteries are discharged or removed, all the settings are lost, and consequently the remote control needs to be reset according to the type of installation (heater fitted, hydronic networks, damper fitted, etc.).

In this case, proceed as follows:

- with the unit OFF, press the "Mode" and "clear" buttons at the same time for 5 seconds;
- a number of messages are displayed that correspond to the questions on the installation. respond YES or NO by pressing the UP or DOWN button and confirming with the set button.

The settings are saved once the sequence of messages has been completed; if the procedure is not completed, all the modifications made are ignored. If the information is not available, contact the relevant personnel (manager of the installation, installer..).

message	meaning
	e-drofan FTU mod.: for e-drofan FTU HYFT**** answer NO.
	Heater: Yes: Available No: Not available
	Flap: Yes: Available No: Not available
	Valve: Answer NO
	Hydronic network: Yes: Available No: Not available
	The option "Ft" sets the following configuration: Heaters: Yes Flap: Yes Valve: No The previous settings of these parameters will be ignored; the parameter "H" remains selectable. If "Ft" is set to Yes: - mode fix on automatic+heater - fan selectable as min->med->max (no autofan) - damper positioned fixed in "Auto", the symbol  remains OFF and the relevant key is in OFF.

Tab. 2.e

Alarms

The IR receiver board uses the LED to signal the internal status, including any alarms (see the table below). Notify the maintenance personnel of the signal shown.

alarm	green LED	yellow LED	red LED	priority
none	OFF	OFF	OFF	
EEPROM fault	BLINK	BLINK	BLINK	1
slave offline in CAN network	ON	OFF	ON	2
fault room probe	BLINK	OFF	ON	3
probe St2 or St3 fault	OFF	BLINK	ON	4
open window alarm	BLINK	ON	ON	5
stop from digital input	ON	BLINK	ON	6
local stop	OFF	ON	ON	7

Tab. 2.f

2.4 Troubleshooting

problem	solution
The fan on one slave doesn't start	The room temperature has already reached the set point. Wait; if the fan remains off for an extended period contact the relevant personnel.
The fan does not work at the set speed	The initial fan cycle at minimum speed may be in progress, or alternatively the fan is operating so as to ensure a uniform temperature in the room.

Tab. 2.g

3. INSTALLATION

installer

i In summary:

- easy configuration by dipswitch;
- creation of local networks (up to 5 slaves) without setting parameters or addresses (max 30 m);
- possibility of control using the sensor on board or the sensor on the acqua terminal;
- creation of extended networks (up to 1 km) with simple re-configuration if the layout of the spaces is changed.

3.1 Introduction: e-drofan FTU & accessories

The following section lists the family of devices made up of the e-drofan FTU and its accessories:

e-drofan FTU control board HYFT00000*

Manages the fan on the fan tile unit and controls the temperature. Allows the connection of digital inputs for the remote control of functions such as ON/OFF, cooling/heating, economy etc. Fitted with a serial port for the network connection of a series of units.

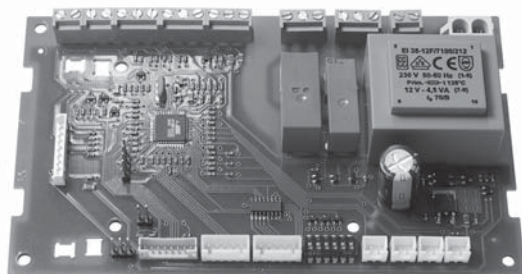


Fig. 3.a

e-drofan FTU expansion board, HYVC000U0*

Allows the e-drofan FTU to control additional loads to the fan, such as other fans, modulating dampers and heaters, using a 0 to 10 Vdc output, 2 TRIAC outputs and a relay.

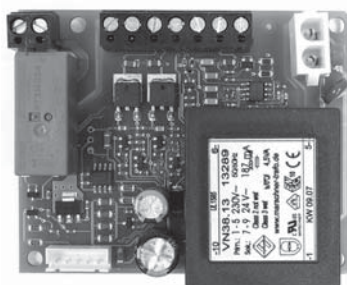


Fig. 3.b

IR receiver board for e-drofan FTU HYIR00000*

Allows the e-drofan FTU to receive the settings from the remote control, and displays, using 3 LEDs, the status of the unit and any alarms. Fitted with a button for setting operation if the batteries are discharged.

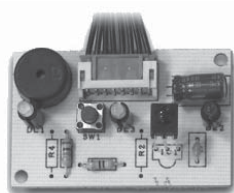


Fig. 3.c

Remote control for e-drofan FTU HYHS00100*

Allows the user to control the operation of the e-drofan FTU, including any slaves connected in the network. The LCD ensures straightforward and user-friendly operation.



Fig. 3.d

RS485 serial card HYSC00F0P0

Used to create customised (PlantVisor) or open (Modbus®) supervisory systems.

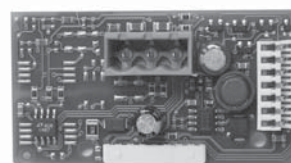


Fig. 3.e

CANbus serial card for e-drofan FTU HYSC00F0C0

Fitted on the e-drofan FTU, this is used to create CANbus networks for centralised management and the application of advanced comfort and energy saving algorithms (integration with the CCU).

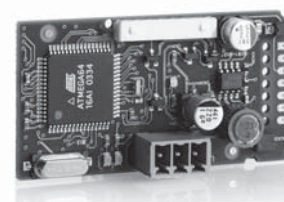


Fig. 3.f

"Acqua" LCD terminal for e-drofan FTU HYPA00100*

This allows the user to set the values of the parameters on the e-drofan FTU controller.



Fig. 3.g

user

service

"e-droset" flush mounted LCD terminal for controlling e-drofan FTU, HYPA00300*

Ideal for wall mounting in the more commonly-used 3 gang switch boxes (Biticino, AVE, Vimar ... see the list in the corresponding paragraph). This allows the user to set the operation of the e-drofan (and any slaves connected in the network), display the alarms and air-condition the environment only if occupied (occupancy function). The LCD ensures simple and user-friendly operation. The terminal also includes a sensor that can be used to control the room temperature.



Fig. 3.h

Programming key PSOPZKEY00

Used to simply export the configuration of the parameters from one e-drofan FTU to another. Useful in systems with a large number of fan tile units.

Programming key PSOPZKEYA0.

Version with power supply.



Fig. 3.i

Adapter for e-drofan FTU programming key HYKA00000*

To be used together with the programming key PSOPZKEY*.



Fig. 3.j

3.2 Type of fan tile unit & system

The e-drofan FTU electronic controller can control units with 3-speed or single-speed fans (using 2 relays).

The expansion board can be used to manage additional loads, such as: modulating damper (2 triacs on the board for managing a servomotor with 3 point control), heater (one relay on the expansion board) and a variable-speed fan (using a 0 to 10 V output on the expansion board).

For the thermodynamic features and the installation/maintenance of the fan tile unit, see the manual provided by the manufacturer.

3.3 Installation & basic settings

Assembly

The controller is mounted to the fan tile unit using 4 plastic turrets (manufactured by RICHCO, code SP1-12-01) that slot into the holes on the four corners of the board, or alternatively using the special plastic supports on the specially prepared fan tile units: dimensions (Fig. 7.a).

Dimensions of the e-drofan FTU (Fig. 3.k)

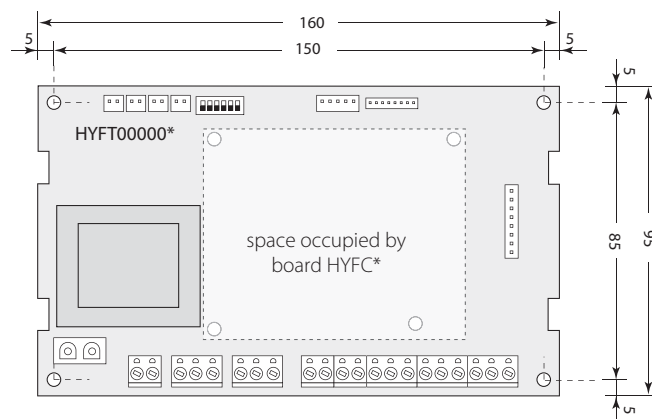


Fig. 3.k

Height of e-drofan FTU with accessories (Fig. 3.l).

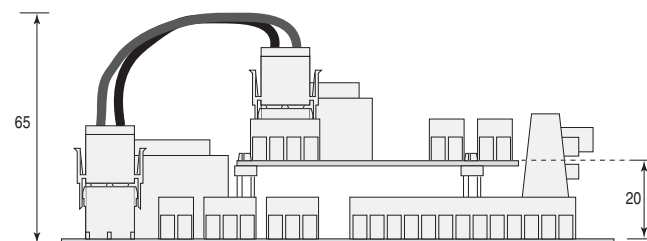


Fig. 3.l

Connections

In summary:

- 5 digital inputs (3 can be configured);
- voltage outputs for the fan;
- optional outputs: one 0 to 10V output, 2 triac outputs and one voltage-free contact (relay). Operation can be configured (heater, variable speed fan, damper);
- 3 NTC probes;
- tLAN serial connection (max 5 slave, max 30 m);
- optional CANbus serial connection (max 1 km);
- tLAN connection for remote acqua terminal (max 30 m, power supplied by e-drofan).

The user interface is represented by the remote control or the terminal (both cannot be used), in particular the latter contains a sensor that can be used to control the room temperature; see the notes provided below the table of connections for the positioning of the terminal.

Some especially useful functions in certain installations (e.g. remote ON/OFF inside hotels etc.) are also available by digital inputs or via serial communication, as well as from the terminal or remote control.

Below is a diagram of the connections:

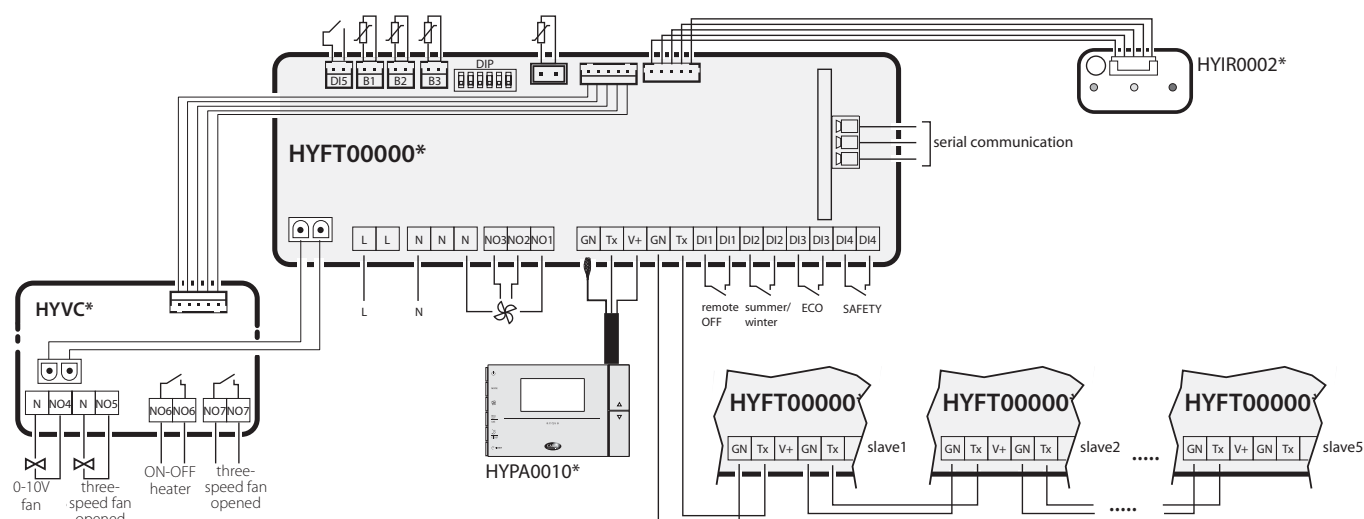


Fig.m

terminal	meaning	notes for e-drofan FTU
L	Phase	Power supply to e-drofan FTU and all the loads connected to the voltage outputs. Max length: 5 m. Size: 14 to 22 AWG
N	Neutral	Power supply to e-drofan FTU and all the loads connected to the voltage outputs. Max length: 5 m. Size: 14 to 22 AWG
NO1	Minimum fan speed (normally open).	Max length: 5 m. Voltage output (L) Size: 14 to 22 AWG
NO2	Medium fan speed (normally open).	Max length: 5 m. Voltage output (L) Size: 14 to 22 AWG
NO3	Maximum fan speed (normally open).	Max length: 5 m. Voltage output (L) Size: 14 to 22 AWG
GN, Tx, V+	tLAN: Connection to LCD terminal	Shielded cable: 3 wires + shield. Max length 30 m. Size: 14 to 22 AWG
GN, Tx	tLAN: Terminals for local network serial connection (master + 5 slaves).	Shielded cable: 3 wires + shield. Max length of the entire tLAN network: 30 m. Size: 14 to 22 AWG
DI1, DI2, DI3, DI4, DI5	Digital inputs (voltage-free contacts). 1= remote ON/OFF 2= remote cooling/heating; closed = cool, open = heat 3= multifunction: to be configured 4= multifunction: to be configured 5= multifunction: to be configured	Max length 30 m. Inputs DI3, DI4, DI5 configurable using parameters P43, P44, P45 (see the "manufacturer" section). Polarity of DI2 configurable by parameter P56. Size: 14 to 22 AWG
St1	Intake air temp. probe (room)	Max length 10 m. Control probe (without terminal or network connection, see dipswitches).
St2	Underfloor air probe	Max length 10 m
St3	Outlet air temp. probe	Max length 10 m
DIP	Configuration dipswitches: see the paragraph "basic settings & functions available".	
EXP	Expansion board connector (5-wire cable)	
FLAP	Damper power supply connector (where available).	Maximum length of damper power supply cables: 50 cm.
SUPPLY EXP	e-drofan FTU expansion power supply connector (connect using the 2-wire cable).	
IR	Infrared receiver interface connector (using a 5-wire cable). Required when using the remote control.	
JS3	Optional power supply connector for compatibility with pCO serial cards	Future uses
SERIAL	Serial card connector (connection to supervisory systems or local networks).	

Tab. 3.a

e-drofan FTU expansion

terminal	meaning	notes for e-drofan FTU expansion
SUPPLY EXP	e-drofan FTU expansion power supply connector (connect using the 2-wire cable)	
EXP	e-drofan FTU expansion connector (using the 5-wire cable).	
N	Neutral	Size: 14 to 22 AWG
No4	0 to 10 V output.	Voltage output (L). Max length 3 m. Size: 14 to 22 AWG
No5	Triac output.	Voltage output (L). Max length 3 m. Size: 14 to 22 AWG
No6	Triac output.	Max length 3 m. Size: 14.. 22 AWG
No7	Voltage-free contact (relay)	Max length 3 m. Size: 14.. 22 AWG
SF	SAFETY LOOP external safety device for heater	

Tab. 3.b

Size the power cables and connection cables to the loads based on the current input (the maximum current input of the network must not exceed 6 A).

Maximum serial card communication cable length: see the "technical specifications" or the corresponding instruction sheet.

If a local network (tLAN) is created and the remote control is used (the LCD terminal must not be present) the master must be fitted (between terminals GN and V+) with the 1.3 kOhm resistor supplied. This operation assigns the e-drofan the role of master, and the receivers present on the other e-drofans connected to the master tLAN will automatically be deactivated.



Warning:

All installation and maintenance operations must be carried out with the unit off; serial connections: do not make star connections (use chain connections, see the paragraph "tLAN and Broadcast Network").

- Connect the shield to terminal GN;
- avoid short-circuits between pins GN and V+ (LCD terminal power supply);
- adopt precautions against electrostatic discharges when handling the boards;
- do not earth terminal GN, as this may damage the instruments in the event of network connection.

Basic settings & functions available (dipswitches)

The dipswitches on the fan tile unit board can be used to select the predefined settings relating to the type of fan tile unit and installation. Each input/output can nonetheless be reconfigured so as to guarantee greater flexibility; in this case (as for the advanced functions) the terminal needs to be used to modify the parameters. To perform this operation, enter the special password (see the "manufacturer" section).

Functions of the dipswitches:

DIP1	if ON, variable temperature control & constant flow-rate; if OFF, constant temperature control & variable flow-rate;
DIP2	if ON, cooling/heating digital input (DI2) enabled
DIP3	if ON, 3-speed fan; if OFF, variable-speed fan
DIP4	if ON, cold air only from CCU; if OFF cold and hot air from CCU
DIP5	If ON electric heater available; if OFF electric heater not available
DIP6	room probe: if ON fitted on e-droset terminal; if OFF fitted on e-drofan FTU controller.

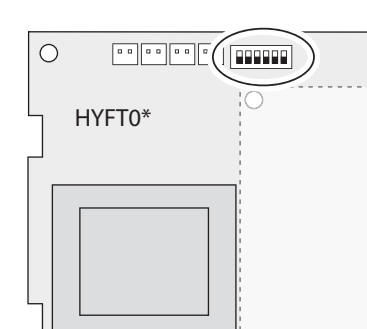


Fig. 3.q

Programming key (copy configuration)

Once having set the parameters, the configuration can be quickly copied to other e-drofan FTU controllers using the programming key. Proceed as follows:

1. Switch off the previously programmed e-drofan FTU (source);
2. Set the dipswitches inside the programming key (underneath the battery cover) to reading mode (dip 1= OFF, dip2= OFF);
3. Insert the key in the special 4 pin connector on the adapter, and connect the 8-wire cable supplied (see Fig. 3.d);
4. Disconnect the 8-wire cable on the IR receiver board (if present) from the e-drofan FTU;
5. Insert the 8-wire cable from the programming key adapter to the IR connector on the e-drofan FTU board (source), see Fig. 3.e;
6. Press the button. The red LED and then the green LED come on in succession, if the operation has been completed with success. Other signals indicate problems (refer to the corresponding instruction sheet);
7. Remove the key and the adapter; set the dipswitch to write mode (dip 1= OFF, dip2= ON) and repeat steps 3, 4, 5, 6 to write the data to the target e-drofan FTU;
8. Once having completed the sequence reconnect the IR receiver board on the source and target e-drofan FTU.



Important:

to avoid of excessively draining the batteries in the programming key, disconnect the normally closed digital inputs on the e-drofan FTU. If this is not possible, use the key with the power supply. The parameters can be copied from e-drofan FTU units (sources) with the same or lower software version (compared to the destination unit).

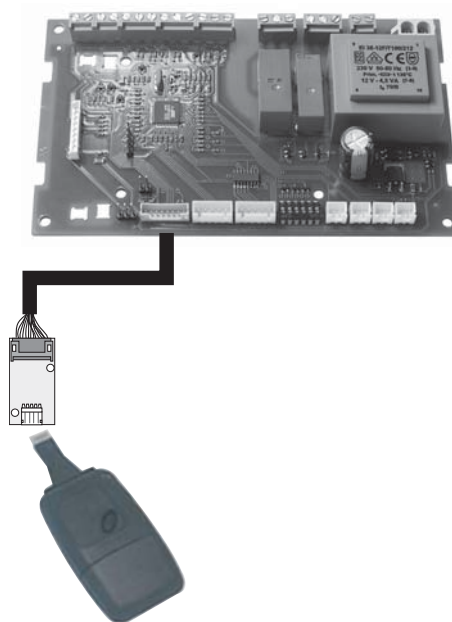


Fig. 3.r

e-droset

Avoid placing the terminal in places where the room temperature measurement may be altered: outside walls, near doors leading outside, exposed to the sun, near the fan coil etc. The terminal is located inside the plastic case and is accessible using a screwdriver.

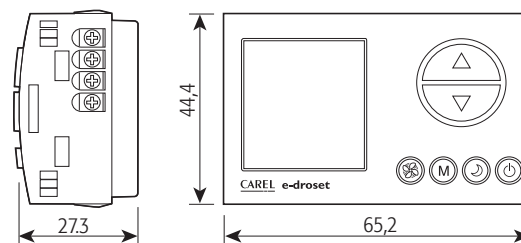


Fig. 3.s

Below is the sequence of operations for wall mounting:

- fasten the 3 gang support to the box for built-in installation using two screws;
- make the connections between the terminal and the wires in the shielded cable from the e-drofan.

terminal	meaning
GN (3)	use for connection to terminal GN on e-drofan FTU and the shield of the shielded cable
Tx (2)	use for connection to terminal Tx on e-drofan FTU
V+ (1)	use for connection to terminal V+ on e-drofan FTU

Tab. 3.c

Maximum length of the shielded connection cable: 30 m from the e-drofan FTU:

- insert the terminal in the plastic support;
- insert the fastening "shoulders";
- position the wallplate on the support.

The following wallplates can be used: BTicino Living International; Light; Light Tech; Matix VIMAR Idea; Idea Rondò; Plana.

The Living International - Light Tech - Matrix brands are the property of BTicino SpA. The Idea - Idea Rondò - Plana brands are the property of VIMAR SpA.

If the local network (tLAN) is used, the terminal assigns the role of master to the fan tile unit connected.

Warnings:

- all installation and maintenance operations must be carried out with the unit off;
- adopt precautions against electrostatic discharges when handling the board.

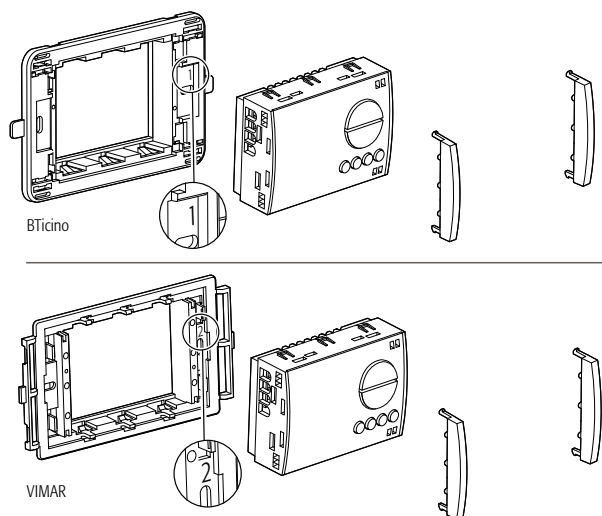


Fig. 3.t

The diagram in Fig. 3.t describes the connections to be made to the e-drofan board.

If the temperature measured by the internal probe needs to be corrected (e.g. due to installation in a less than optimum position), a set number of degrees centigrade can be added or subtracted. For these settings see the "manufacturer" section, under the paragraph on "probes".

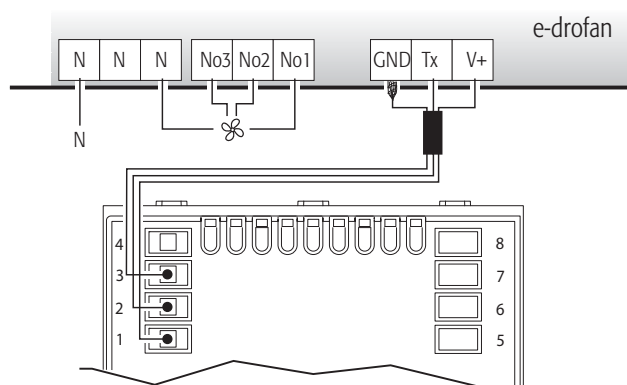


Fig. 3.u

Protection against electric shock and maintenance warnings

Important:

The system made up of the control board (HYFT0*****) and the other optional boards and cards (HYVC000R0*, HYPA*****, HYIR*****, HYSC00F0C*, pCO serial cards ecc.) represents a control device to be incorporated in class 1 or 2 appliances.

The class of protection against electric shock depends on how the control device is integrated into the unit built by the manufacturer.

Disconnect the power supply before working on the board during assembly, maintenance, replacement and configuration. The protection against short-circuits must be guaranteed by the manufacturer of the appliance that the control device is integrated into or by the final installer.

Broadcast networks

In summary:

- basic broadcast networks (max 5 slaves, max 30 m);
- extended broadcast networks (up to 1 km, max 100 units) using the CANbus card;
- simple reconfiguration from extended broadcast to hydronic system.

The network connection is used to simplify the operation of installations with multiple fan tile units. For smaller environments, the tLAN can be used to create a small local network (basic broadcast) made up of a master and a maximum of 5 slaves (maximum total length: 30 m). In this case, the information is sent in one direction only: from the master to the slaves; all the settings on the master (the only unit fitted with the terminal) are applied to the slaves. By setting dipswitch 6 on the master to ON, all the fan tile units perform the control functions using the sensor on the terminal, while if set to OFF, each fan tile unit performs the control functions using its own internal sensor St1.

tLAN networks can also be created using the remote control as the user interface; in this case, the e-drofan FTU master must be fitted with the IR receiver board and the resistor supplied must be connected between pins GN and V+.

Notes:

- a slave unit, disconnected from the network for at least 8 seconds, is automatically switched off;
- the panel only displays the status of the master;
- the slave alarms are managed locally and independently;
- if using the remote control, each fan tile unit performs the control functions using its own sensor;
- the settings of the dipswitches present on the slaves are ignored;
- the digital inputs on the slaves are disabled, with the exception of the ON/OFF and window alarm input;
- the parameters on a slave can be modified by disconnecting the network and connecting the terminal. Once the network is restored, the slave maintains the modifications (unless these concern the settings overwritten by the network);
- the following settings are sent by the master to the slaves: ON/OFF, mode (e.g. heating, etc.), fan speed, sleep function, On/Off timer, set point, control probe (if DIP 6 on the master is ON).

Example of a basic broadcast network

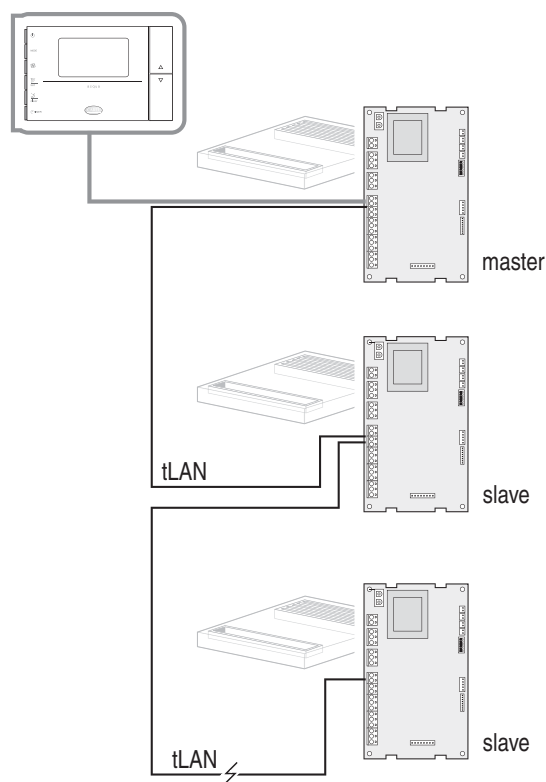


Fig. 3.v

To cover distances greater than the 30 m (up to 1 km in total) or connect more slaves, CANbus communication is required, using the serial card HYSC00F0C* (on each controller).

The following figure shows an example of an extended/multizone broadcast connection.

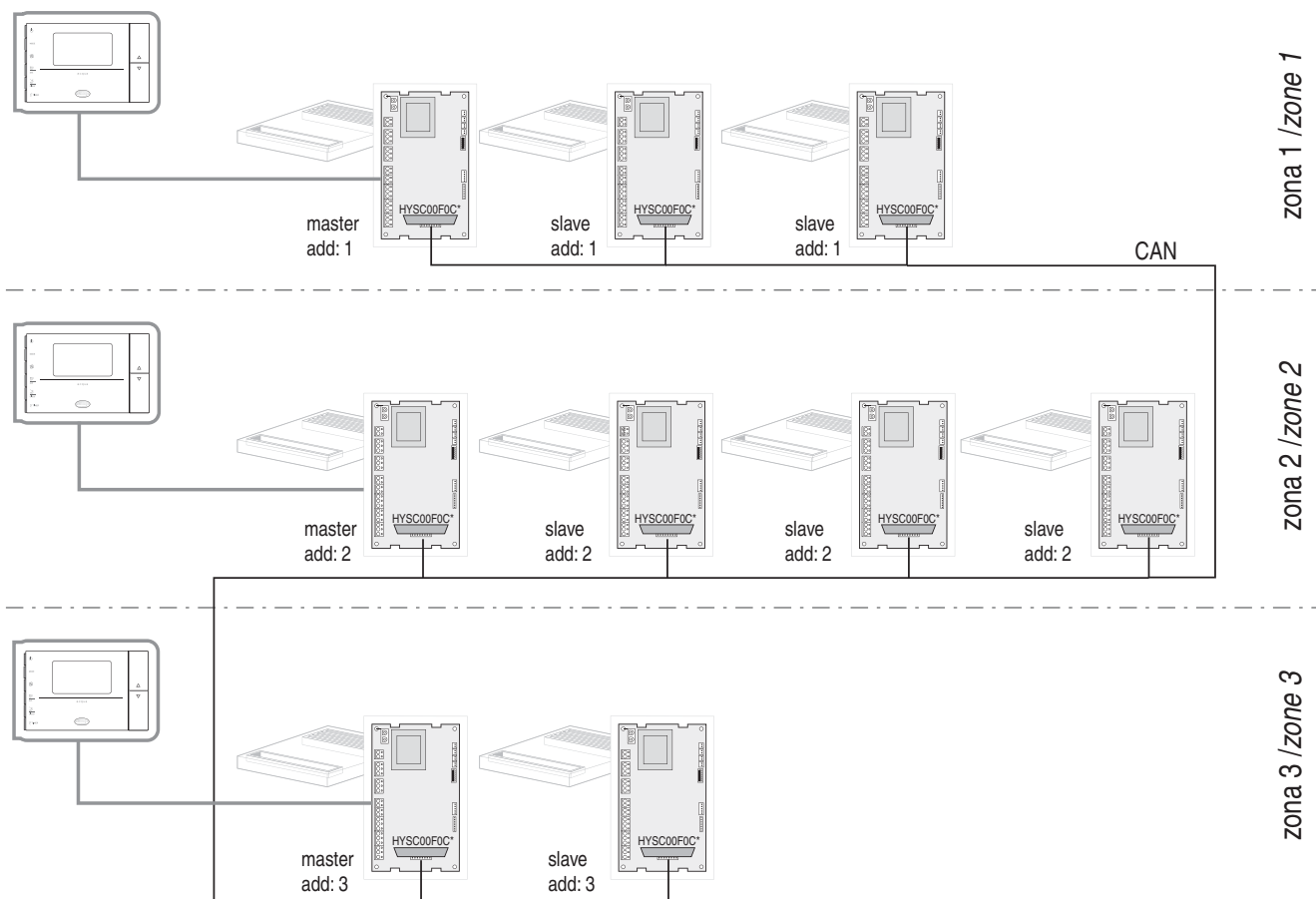


Fig. 3.w

The CANbus connection has the following specifications:

- maximum number of units connected: 100;
- maximum number of masters: 15;
- maximum number of slaves: 100 minus the number of masters;
- maximum number of slaves for each master: all slaves available;
- maximum length of the CANbus network (total): 1 km with low communication speed (65 kbit); 500 m with high communication speed (125 kbit);
- connection cable: shielded cable, 2 wires + shield;
- connect two 120 ohm resistors to the ends of the CANbus (between terminals H+ & H-).

The behaviour is the same as in the case of the tLAN. The master has the control panel and sends all the slaves the status to be repeated. Each controller must be fitted with a serial board and each slave must have the same address as the master it serves.

The serial address is set on the group of 10 dipswitches located on the serial card (dips 1 to 7) (Fig. 3.n).

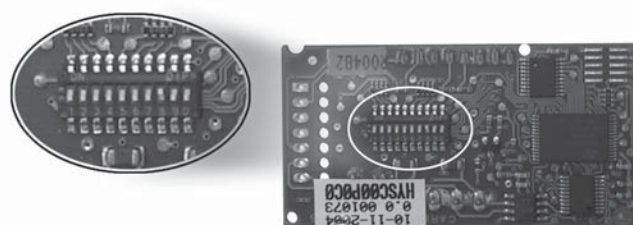
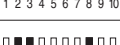
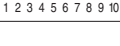


Fig. 3.x

In the extended broadcast, the available addresses range from 1 to 15; setting 0 allows the address to be entered from the acqua terminal (see the section on "advanced settings"), in this way the system can be reconfigured by simply connecting the terminal.

An extended broadcast installation can be easily converted to a hydronic system by modifying the serial addresses and setting a few parameters (see the section on "advanced settings" and "hydronic systems").

The following table shows the settings required to configure the corresponding addresses (binary notation):

dipswitch setting	associated address
ON 	Default=1 (serial address settable on acqua terminal)
ON 	1
ON 	2
ON 	3
ON 	4
ON 	5
ON 	6
ON 	7
ON 	8
ON 	9
ON 	10
ON 	11
ON 	12
ON 	13
ON 	14
ON 	15

Tab. 3.d

Dipswitches 9 and 10 are used to set the communication speed on the CANbus and must be both set in the same position.

dip 9 & 10: ON= 125 kbit/s

dip 9 & 10: OFF= 62.5 kbit/s

dip 8: dust always remain ON for the use of the serial card on the e-drofan FTU.

After each variation made to the position of the dipswitches, the e-drofan FTU must be switched off and on again to make the changes operational.

The serial card is fitted with three LEDs to display the operating status. The green LED indicates that the serial card is on (power from the e-drofan) while the yellow and red LEDs indicate the serial communication status. When starting, the two LEDs (red and yellow) come on together, in normal communication first the red LED goes off, then the yellow LED, and finally the yellow LED (data reception in progress) or red LED (data transmission in progress) starts flashing. If both the LEDs are off steady communication is interrupted (the red LED continues flashing on the master).

yellow LED	red LED	meaning
ON	ON	starting sequence in progress
OFF	OFF	communication interrupted
flashing	OFF	data reception in progress (slave)
OFF	flashing	data transmission in progress (master)

Tab. 3.e

Procedure for testing the installation and alarms

Once the installation has been completed, the test procedure supplied with the e-drofan FTU can be run to check the devices. The terminal is required for these functions. To enter test mode press the UP and DOWN buttons for 10 seconds with the unit connected to the power supply and in off status; the event is signalled by the buzzer, which emits a beep.

The test proceeds in steps, indicated on the terminal by the message "L" followed by an incremental number; pressing the UP button proceeds to the next step (signalled by the BEEPING of the buzzer). After the last step, the procedure ends and the controller returns to normal operation.

step	part in question	message flashing	message not flashing
"L01"	probe St1	probe error	probe Ok
"L02"	probe St2	probe error	probe Ok
"L03"	probe St3	probe error	probe Ok
"L04"	digital input 1	input open	input closed
"L05"	digital input 2	input open	input closed
"L06"	digital input 3	input open	input closed
"L07"	digital input 4	input open	input closed
"L08"	digital input 5	input open	input closed
"L09"	fan	inside fan at minimum speed	
"L10"	fan	inside fan at medium speed	
"L11"	fan	inside fan at maximum speed	
"L12"	output NO4 expansion	0 to 10 V output	
"L13"	output NO5 expansion	damper output (open)	
"L14"	output NO6 expansion	heater	
"L15"	output NO7 expansion	damper output (close)	

Tab. 3.f

During operation (as well as during the test procedure), the device may generate alarm signals displayed on both the IR receiver board and on the terminal.

The alarms are shown in the "Advanced setting" section.

4. ADVANCED SETTINGS

i In summary:

- **general functions:** inlet water temperature control;
- algorithm to overcome the phenomenon of air stratification;
- **manual operation:** cooling, heating (optional heater management);
- automatic operation (optional heater management);
- **occupancy:** possibilità di usare un secondo set point nel caso l'room non sia occupata (risparmio energetico).

e-drofan FTU provides a number of additional functions compared to traditional controllers: 5 digital inputs that can be configured, 3 probes, 1 dipswitch for rapid customisation on site, possibility of tLAN network connection and advanced control algorithms.

The e-drofan FTU comes with a family of accessories (see the description in the "installer" section) including: the e-droset terminal (with NTC sensor on board) or the remote control with corresponding receiver board, the expansion board (with one relay output, 2 triacs and a 1 to 10V analogue output) and the CANbus® serial card for creating hydronic systems; as an alternative to the latter accessory, the 485 serial card can be installed to create customised (PlantVisor) or open (Modbus®) connectivity solutions.

The following section shows, in sequence, the description of the parameters, from the configuration of the I/Os to the setting of the control

algorithms. The list of parameters is shown at the end of the section.



Important: avoid parameter settings that create situations of conflict (for example, do not configure 2 digital inputs on the same e-drofan FTU for economy operation).

4.1 I/O configuration & custom installer settings

The inputs and the outputs can be configured by parameter, thus giving the manufacturer complete freedom in choosing the available functions, while at the same time the installer can simply make the custom settings relating to the installation in progress (fixed 3-speed fan or variable speed fans, heater available or not, etc.) using the dipswitches (see the "installer" section).

I parametri possono essere impostati tramite: il acqua terminal, la programming key e la serial connection.

The following section shows some examples that help describe the controllable loads (fan, dampers, heater etc.) and the corresponding configuration of the parameters.

Example of fan tile unit installation in a system with electric heater:

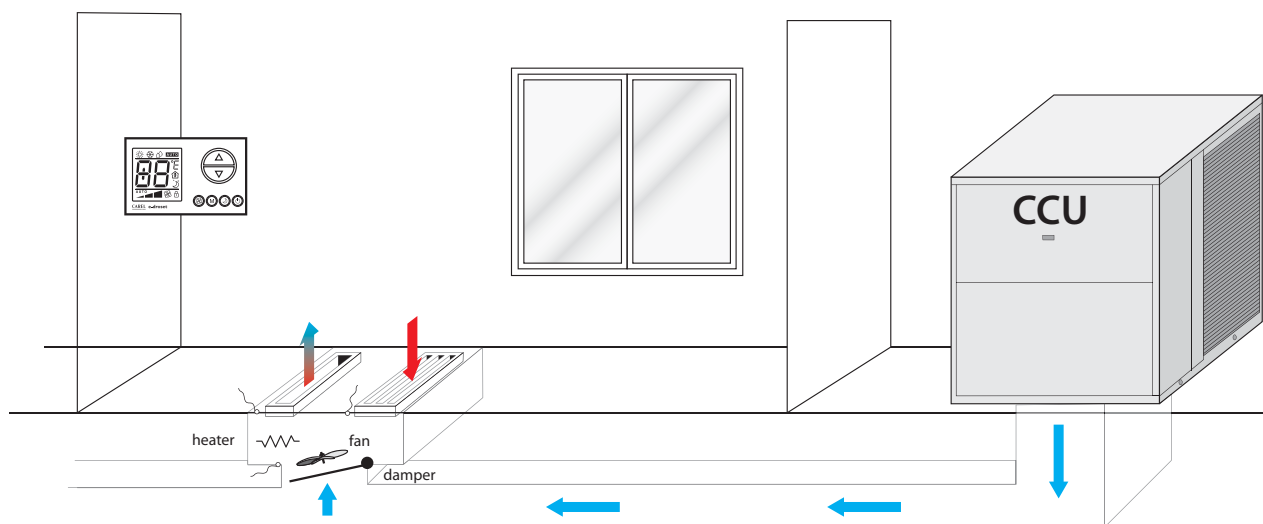


Fig. 4.a

Setting the parameters

To display and modify the default parameters, enter parameter setting mode by pressing, with the device OFF, the mode and clear buttons for 5 seconds (password 22) and then entering the second password for parameter P92 (password 66). To restore the default values, set parameter P91 to the value 44 (with the device OFF)

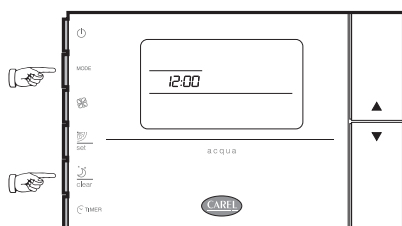


Fig. 4.b.a

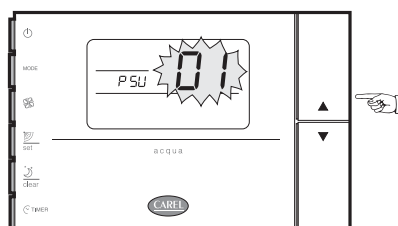


Fig. 4.b.b

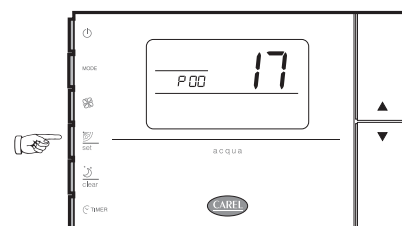


Fig. 4.b.c

Probes

The probe readings are affected by the position of the fan tile unit (on the wall or the floor), due to the phenomenon of air stratification. To overcome this problem, different offsets can be specified, depending on the operating mode (heating or cooling). Faults with one of the three probes (room, underfloor and outlet) causes the forced shutdown of the loads on the unit (fan, heater, etc.). By default the operation of the probes must be set by dipswitch, nonetheless to use modulating dampers and the P+I function, operation can be set directly by parameter (the parameters must be set for all the probes).

probe	description	associated parameters	note
St1	Room probe	P58, P59, P60, P61	When DIP6 is OFF & P22=0: room control probe.
St2	Underfloor air temp. probe	P62, P63	
St3	Outlet air temp. probe	P64, P65	
BT	Sensor inside the terminal		When DIP6 is ON = Room control probe.

Tab. 4.a

par.	setting	min	max	def	UOM	type	index	R/W	notes
P15	Use of probe St1 0= disabled 1= control 2= underfloor 3= outlet	0	7	0					
P16	Use of probe St2 (See P15)	0	7	0					
P17	Use of probe St3 (See P15)	0	7	0					
P22	NOT USED	0	2	0					
P58	probe St1 offset in cooling	-99	127	0	°C/10				
P59	probe St1 offset in heating	-99	127	0	°C/10				
P60	probe St1 offset in automatic	-99	127	0	°C/10				
P61	probe BT offset as room control probe	-99	127	-30	°C/10				
P62	probe St2 offset in cooling	-99	127	0	°C/10				
P63	probe St2 offset in heating	-99	127	0	°C/10				
P64	probe St3 offset in heating	-99	127	0	°C/10				
P65	probe St3 offset in cooling	-99	127	0	°C/10				

Tab. 4.b

Digital inputs

Digital inputs DI1 and DI2 have a fixed configuration, while the remaining inputs can be configured by parameter. The OFF status of the digital input has priority over the signals received via the serial communication, so as to allow the user (directly affected by the flow of cold or hot air) to switch the fan tile units off.

input	description	associated parameters	notes
DI1	ON/OFF input		When the input is closed the unit is OFF (even in the event of network connection). In the transition from OFF->ON the e-drofan FTU is started, but may subsequently be switched off from the terminal or via serial connection. In the Off status, the fan is stopped (after any post-ventilation phase required for the heater)
DI2	cooling/heating		Enabled when DIP2= ON
DI3	multifunction	P43	
DI4	multifunction	P44	
DI5	multifunction	P45	

Tab. 4.c

par	description	function	min	max	def	UOM	SV type	SV no.	Modbus®	access
P43	0= input disabled	varies the set point (cool= increase, heat= decrease) stop fan & close damper switch system to "occupied" status stop fan & close damper stop fan & close damper			0					
	1= economy (norm. open)									
	2= open window alarm (norm. open)									
	3= occupancy (norm. open)									
	4= local stop (norm. open)									
	5= economy (norm. closed)									
	6= open window alarm (norm. closed)									
	7= occupancy (norm. closed)									
	8= local stop (norm. closed)									
P44	see P43	-			0					
P45	see P43	-			0					

Tab. 4.d

The management of the occupancy input is described in the paragraph on the occupancy function.

The Economy function is the same as the sleep function, with the difference that it is activated/deactivated by digital input.

Outputs

output	description	associated parameters	notes
No1	Voltage output (L) for minimum fan speed winding.	-	-
No2	Voltage output (L) for medium fan speed winding.	-	-
No3	Voltage output (L) for maximum fan speed winding.	-	-
No4	0 to 10 Vdc voltage output, multifunction (see DIP4)	P39	e-drofan FTU expansion
No5	Multifunction triac output	P40	e-drofan FTU expansion
No6	Multifunction triac output	P41	e-drofan FTU expansion
No7	Voltage-free contact (relay)	P42	e-drofan FTU expansion

Tab. 4.e

par.	description	min	max	def.	UOM	SV type	SV no.	Modbus®	access
P39	25= 0-10 V fan.			25					
P40	19= 3-speed fan open			19					
P41	18= ON/OFF heater See P39			18					
P42	20= 3-speed fan closed See P39			20					

Tab. 4.f

4.2 Control algorithms

In summary:

- general functions: Flush, Extra flush, autofan, continuous ventilation;
- manual operation: cooling, heating (optional heater management), ventilation;
- automatic operation (optional heater management);
- on/off timer and sleep function;
- P+I control algorithm for modulating fans and dampers.

Below is a description of the operation of the e-drofan FTU, divided into general functions, manual and automatic functions.

General functions: Flush (fan on/off cycles)

To overcome the phenomenon of air stratification, the e-drofan FTU operates fan on/off cycles at minimum speed, even when the room temperature has reached the set point and the "continuous ventilation" function is not enabled. This helps ensure the correct measurement of the room temperature if the sensor on the acqua terminal is not used (control probe St1).

par.	description	min.	max.	def.	UOM	SV type	SV no.	Modbus®	access
P34	0= Function disabled; 1= Flush function active in cooling & automatic OFF. 2= Flush function active in heating & automatic OFF. 3= Flush function active in heating, cooling & automatic OFF.	0	3	0					
P32	0= Flush disabled >0: Fan off time (due to control or flush function)	0	255	2	min				
P33	0= Flush disabled >0: Fan on time	0	255	90	s				

Tab. 4.g

General functions: Extra Flush

This function ensures correct operation when the terminal is not fitted (control probe St1), overcoming the phenomenon of air stratification. Whenever switching from OFF->ON or changing operating mode, the e-drofan FTU runs a fan cycle at minimum speed (for the time P35) to make sure the room temperature is uniform. At the end of this interval, normal operation resumes in automatic mode.

General functions: 3-speed autofan (fan speed selection based on the room temperature)

The Autofan function establishes the fan speed when this is not set manually by the user.

In cooling and heating mode the speed is higher the more the room temperature deviated from the set point (including automatic cooling, automatic heating). In fan mode the speed is fixed at the average value for the range set by parameters P30, P31, P06 (see the corresponding paragraph).

par.	setting	min.	max.	def.	UOM	SV type	SV no.	Modbus®	access
P07	Deviation of medium speed in autofan	0	255	7	°C/10				
P08	Deviation of maximum speed in autofan	0	255	7	°C/10				
P09	Fan speed hysteresis in autofan	0	255	5	°C/10				

Tab. 4.h

If control is performed by probe BT, the flush function is disabled.

The behaviour can be modified depending on the operating mode: heating, cooling, or automatic. The fan is started after a period of inactivity (due to the set point having been reached or the heat enable or cool enable functions), equal to the value of parameter P32.

Setting parameters P32 & P33 to 0 disables the flush function.

The valve should be installed to use the flush function.

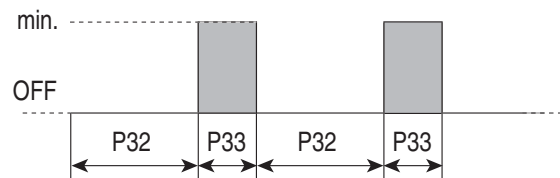


Fig. 4.c

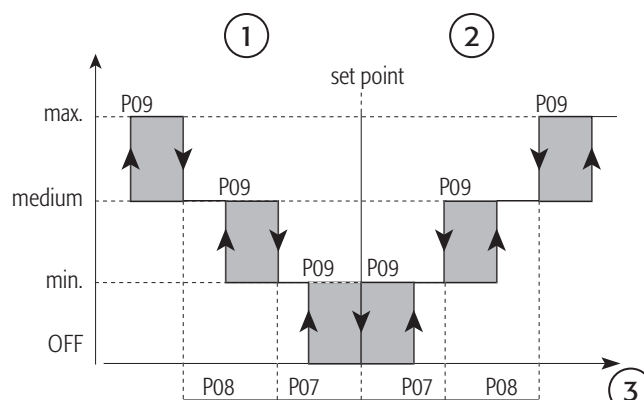


Fig. 4.d

Key:

1. heating;
2. cooling;
3. room temperature.

General functions: Variable speed fan (Dip 3= OFF)

If a variable-speed fan is used, managed by the 0 to 10 V dc output, the speed is set linearly in reference to the set point, following a proportional band defined by parameter P115 in cooling mode, and P116 in heating mode, with a minimum speed set using parameter P119 (this means that the fan is activated only if at least the minimum activation speed is requested). Once operating, the fan stops when the set point is reached, unless the "continuous fan operation" function is selected.

General functions: Comfort

This function, if activated by P36 (P36=1), disables the modification of the set point, allowing only an offset of +/- 3°C from the set value (in all modes except fan). On the e-drofan FTU master, the set point can be set via a serial connection (see the corresponding paragraph), while the slaves receive the set point from the related master and apply any offset (set from the terminal). The master automatically loads the set point saved for parameter P01 when starting; this is subsequently modifiable via a serial connection. The logic and dependence parameters should be set accordingly. Whenever changing operating mode, any modifications made to the set point are reset.

Example 1: In a hydronic system, the set point can be set on the e-drofan FTU master and the slaves only allow modifications of ± 3 C.

Example 2: In a centralised system (hotel), the room set point can be set via serial, allowing the guest the possibility to change it by ± 3 C.

General functions: Occupancy

This function is used to set a second set point applied if the room is not occupied, allowing the air-conditioning system to consume less energy and thus achieve cost savings (the economy set point will be "warmer" in cooling mode and "cooler" in heating mode, so as to require less energy to be reached). In addition, using occupancy sensors near the various fan tile units (both master and slaves) and time bands (set via supervisor), the three typical situations identified (office, meeting rooms, corridor) and controlled by parameter P93 (P93=1 - meeting rooms, P93=2 - corridor, P93=3 - office; P93=0 - occupancy function disabled) can be optimised. The set point is increased or decreased, depending on the operating mode, by the value set for two specific parameters (parameter P18 for "cooling/dehumidification" mode, and P19 for "heating" mode).

The device can have the following status:

- OFF: the device is off;
- ON+ECO: the device is on and is working with the "economy" set point;
- ON: the device is operating to reach the main set point (not the "economy" set point).

system status	type of occupancy	room status	e-drofan FTU operation	event activating control at set point	symbol on master terminal
OFF (command only sent once by supervisor)	0	Empty/occupied	OFF		
	1= meeting room				
	2= corridor				
	3= office				
ON+ECO (command only sent once by supervisor)	0	Empty/occupied	set point= economy		☾
	1= meeting room	Empty/occupied	set point= economy		☾ + 🏠
		Occupied	set point=value set. When the occupancy timer expires, e-drofan FTU returns to set point = economy.	Setting the occupancy timer, in sequence: 1. Pressing any button (except ON/OFF button); 2. Pressing the sleep button or upon activation of the occupancy digital input.	🛌
	2= corridor	Empty/occupied	set point= economy		☾
	3= office	Empty	set point= economy		☾ + 🏠
		Occupied	set point= value set. When the occupancy timer expires, e-drofan returns to set point = economy	Setting the occupancy timer, in sequence: 1. Pressing any button (except ON/OFF button) or upon activation of the occupancy digital input; 2. Resetting the occupancy timer by pressing the sleep button or upon activation of the occupancy digital input.	🛌
ON (command only sent once by supervisor)	0	Empty/occupied	ON		
	1= meeting room	Empty	set point= economy		☾ + 🏠
		Occupied	set point= value set. When the occupancy timer expires, e-drofan FTU returns to set point = economy.		🛌
	2= corridor	Empty	set point= economy		🏠
		Occupied	set point= value set. When the occupancy timer expires, e-drofan returns to set point = economy	Setting the occupancy timer, upon activation of the occupancy digital input.	🛌
	3= office	Empty/occupied	set point= value set	• No digital input: set point always = value set. Pressing the sleep button for 5 seconds switches on the symbol and set point= economy. • With digital input: 1. Pressing any button (except ON/OFF button) or upon activation of the occupancy digital input; 2. Resetting the occupancy timer by pressing the sleep button upon activation of the occupancy digital input.	🛌

Tab. 4.i

- In all modes the change ON+ECO->ON or OFF->ON sets the "occupancy timer", that is, on power-up the e-drofan FTU starts with set point equal to the set value.
- In all modes (except corridor), holding the sleep button for 5 seconds the e-drofan FTU takes set point= set value without time limits until receiving the OFF command; the set point may return to economy by pressing the sleep button again or switching the unit OFF or alternatively by disconnecting and reconnecting power to the e-drofan FTU. In a hydronic network the occupancy function shares the same variables as the economy/sleep functions, meaning the slaves can be forced to follow the status of the master (simply set the function on the master). In any case, the occupancy on a slave can be managed locally (obviously this must be fitted with a terminal) by activating the function using the corresponding parameter; in this case the activation request (following the detection of occupancy on the master) is ignored.

 **Note:** do not use the ECONOMY digital input with the occupancy function enabled.

With the remote lock function active (dipswitch 3= ON) pressing the sleep button for 5 seconds does not switch to occupied mode without time limits.

 **Note:** the occupancy function must only be set on the master unit.

Below is an example of occupancy management in a centralised system for offices:

time band	system status	description	rooms
00.00 06.00	System OFF	The system remains off and ignores the requests from the fan tile unit	All types
06.00 08.00	ON+ECO	The system starts air-conditioning the rooms, preparing them for the arrival of the personnel. The fan tile units start from unoccupied (set point= economy, e.g. 16°C in heating) and if necessary switch to occupied according to the types shown above	• office • meeting room
08.00 12.00	System ON	The system controls the temperature of the rooms to ensure the comfort of the personnel. At 8:00 all fan tile units are activated at the set point= set value (e.g. 20°C in heating) for a time equal to the occupancy timer; upon expiry of the timer, the fan tile units return to the management depending on the type	All types
12.00 14.00	ON+ECO	The system returns to unoccupied during the lunch break (set point= economy, e.g. 16°C in heating), maintaining comfort only where required	• office • meeting room
14.00 18.00	System ON	The system starts air-conditioning the rooms again to ensure the comfort of the personnel (e.g. 20°C in heating). At 14:00 all the fan tile units are activated at set point =set value (e.g. 20°C in heating) for a time equal to the occupancy timer; upon expiry of the timer, the fan tile units return to the management depending on the type.	All types
18.00 20.00	ON+ECO	The system returns to unoccupied due to the absence of personnel (set point= economy, e.g. 16°C in heating), maintaining comfort only where required	• office • meeting room
20.00 24.00	System OFF	The system remains off and ignores the requests from the fan tile unit	All types

Tab. 4.j

General functions: proportional control

e-drofan FTU can control the damper proportionally; the system can operate in both heating and cooling mode, as described in the following diagrams.

Proportional control (heating mode)

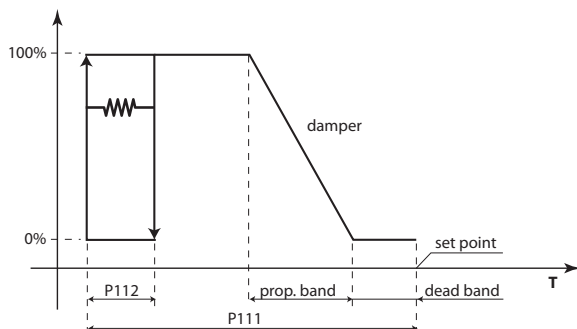


Fig. 4.f.a

Proportional control (cooling mode)

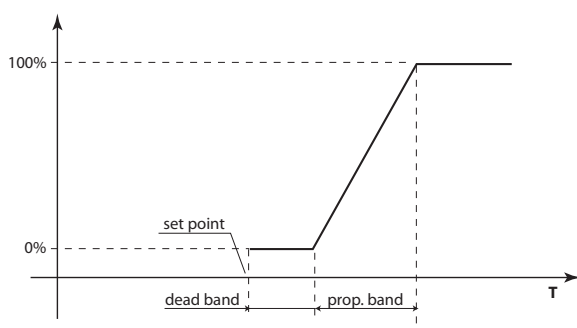


Fig. 4.f.b

General functions: P+I algorithm (cooling/heating/automatic)

e-drofan FTU features a P+I algorithm that is used to control the damper on the fan tile unit and the 0 to 10 V fan, completing the proportional action, "P", described above, with an "integral" action, denominated "I". Control can be performed on probe BT on the terminal (room temperature, enabled by dipswitch 6) or on one of the three probes on the e-drofan FTU (e.g. air intake temperature), by setting the corresponding parameter. The P+I algorithm is activated by enabling one of the modulating valve outputs and setting the proportional band and integral time, and the three probe parameters (P15, P16 and P17).

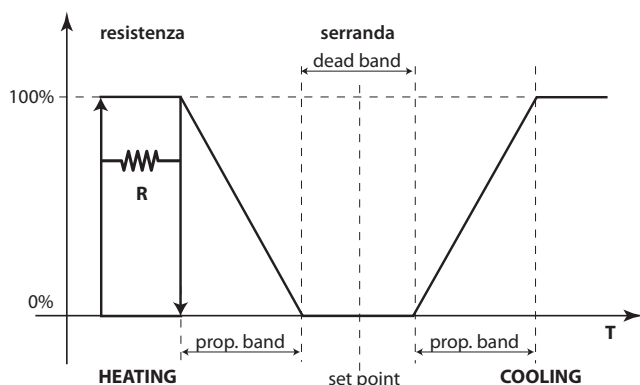


Fig. 4.e

Key:

- 1 P+I output
- 2 control probe (°C)
- 3 activate heater
- 4 open damper
- 5 close damper
- 6 P109 dead zone
- 7 P112 ON/OFF heater hysteresis
- 8 P115 damper proportional band
- 9 P111 heater set point deviation
- 10 set point

The opening of the damper depends on the proportional and integral factors; the proportional factor opens the damper further the more temperature is below the set point, while the integral factor increases the opening of the damper if the device takes a long time to reach the set point (with the temperature above the set point the behaviour is symmetrical, that is, the valve is closed). Low values of the proportional band cause a fast and intense response but cause system instability (swings between opening and closing of the damper); setting low values for the integral factor offers a fast response but, in this case too, the risk of the system becoming instable remains. The integral factor compensates for any misalignments between the theoretical position and the actual position of the damper.

To correctly set the proportional band and the integral time, run some tests on the fan tile unit system in the room being air-conditioned, simulating high load and low load conditions and the typical variations in load.

A parameter is featured that limits the movements of the damper so as to reduce wear and adapt the P+I output to the effective resolution in the position of the actuator; in fact, a minimum variation in the P+I output can be established before effectively switching the output (parameter P99).

Parameter P109 is the dead band (to the sides of the set point); within this zone the algorithm accepts minimum variations of the control temperature without performing any action, the purpose is to avoid instability and limit the number of operations of the actuator in steady operation (the integral factor remains constant, while the proportional factor is equal to 0).



Note: In cooling mode, the behaviour is symmetrical.

For the effective use of the actuators, the fan is activated when the P+I output is other than zero, the fan speed can be set manually or determined by the autofan function (in this case, at least the minimum speed is guaranteed).

The position of the damper can be displayed on the e-droset terminal in the place of the set point (see parameter P37).

The "bumpless transfer" parameter is featured that, in response to modifications of the P+I algorithm control parameters during the normal operation of the unit, is used to dampen any swings or over-corrections of the system, especially if the algorithm interacts with a series of devices or actuators.

The P+I parameters are shown in the following table (for the settings corresponding to the various types of valves, see the following paragraphs).

par.	description	min	max	def	UOM	SV type	SV no.	Modbus®	access
P99	Minimum P+I output variation for damper movement (0 to 10 V and 3 point) and heater increase. Expressed as a % of the total P+I output..	0	100	5%	%				
P107	Bumpless transfer 0= no management of the transients for a change in actuator, variation in P+I parameters and variation in the set point. 1= gradual activation when changing actuator 2= gradual activation when changing actuator and gradual response to variations in P+I parameters 3= gradual activation when changing actuator, gradual response to variations in P+I parameters and set point	1	3	0					
P108	Integral time 0= Integral factor disabled	0	255	0	s *10				
P109	Dead zone	0	255	2	°C/10				
P111	Heater control set point, expressed as an offset from the set point (ON/OFF management with hysteresis)	0	255	30	°C/10				
P112	Heating set point hysteresis for ON/OFF heater control	0	255	5	°C/10				
P114	Damper proportional band	0	255	20	°C/10				
P115	Fan proportional band in cooling mode 0=actuator disabled	0	255	20	°C/10				
P116	Fan proportional band in heating mode	0	255	20	°C/10				

Tab. 4.k

Automatic operation

In automatic mode, the e-drofan FTU measures the room temperature and decides which mode to activate (cooling or heating), based on the set point set by the user; the criterion is described in the graph to the side. The fan and damper are managed as in heating/cooling mode (the flush function is not active). The heater is also managed as in heating mode. If when entering automatic mode the room temperature falls within the hysteresis, priority is given to heating mode. When cooling mode is activated, the control set point is equal to the set point + P02, while in heating mode, the control set point is equal to the set point - P03.

P+I ALGORITHM:

Heating or cooling mode is determined according to the graph shown on the side, subsequently the P+I algorithm is activated to manage the outputs. The mode is changed only after the deactivation of all the actuators, as a consequence the internal parameters are reset each time. It should be noted that P02, P03, P04 and P05 ensure a further activation hysteresis (in addition to the P+I dead band) and consequently the parameters need to be set appropriately. The values of parameters P04

and P05 should be set lower than the dead zone.

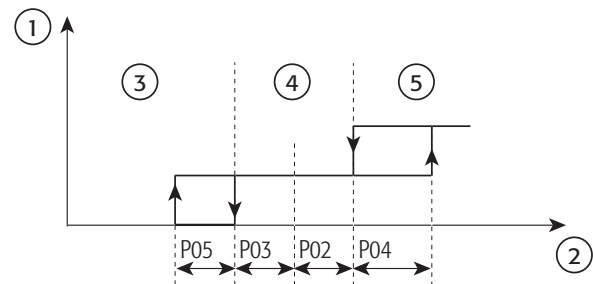


Fig. 4.f

Key:

- | | | | |
|---|-------------------|---|----------|
| 1 | mode | 4 | OFF; |
| 2 | room temperature; | 5 | cooling. |
| 3 | heating; | | |

4.3 Notes on settings from serial connection

A serial connection (PlantVisor or Modbus) can be used to check all the e-drofan FTU parameters and set those that are not write protected. Below is a short description of the most significant variables (for the settings see the parameter summary table).

variable	description	type	SV ind	Modbus®	R/W
Control probe	This variable contains the reading of the probe used to control the e-drofan (B1 or BT). The value considers any offsets, hysteresis values, control algorithms, etc.	A	74	74	Read only
Set point set	Used to read and where required overwrite the value of the set point that has been set on the panel. Especially useful if the e-drofan is operating with the comfort function active (e.g. centralised systems, such as hotels, offices, etc).	I	83	211	Read/write
Control set point	This variable is used to read the value of the set point used to control the e-drofan. The value considers the hysteresis settings, compensation factors, offsets (e.g. sleep function), algorithms, etc.	A	76	76	Read only
Digital inputs and heat/cool request	Heat/cool request: the bits are set when the unit is in ON and the set point has not been reached. Especially useful for energy saving functions.	I	81	209	Read only
Lock keypad from panel	Used to disable the buttons on the terminal to prevent accidental settings. Useful for centralised systems (hotels, offices etc.).	I	78	206	Read/write

Tab. 4.l

4.4 User interface (remote terminal)

Certain parameters can be set to determine which information is displayed on the remote terminal

par.	description	min.	max.	def.	UOM	SV type	SV no.	Modbus®	access
P36	Comfort: 0= Comfort function disabled 1= Enable Comfort	0	1	0					
P37	Display: 0= Display set point; 1= Display control probe St1; 2= Display probe St2; 3= Display probe St3 4= Display modulating valve position (only use in test phase or for service and only with acqua terminal)	0	5	0					
P38	Disable functions. Used to reduce the number of functions available on the panel (using the keypad). The settings are obtained by adding the values shown below: 1= automatic; 2= cooling; 4= dehumidification; 8= ventilation; 16= heating; 32= autofan; 64= sleep; 128= ON/OFF timer & display clock. e.g.= Activate automatic mode only: 2+4+8+16=30	140	255	140					
P55	Enable cooling & heating symbols in automatic: 0= symbols off 1= symbols on when operation requested	0	1	0					

Tab. 4.m

The hydronic network, if suitably configured, can disable some buttons on the terminal (see the section on "hydronic systems").
Enabling the TIMER ON and TIMER OFF functions (on parameter P38) also enables the clock and the corresponding display (otherwise this is not visible).

Event programming: ON, OFF timer and sleep

See the information in the "user" section and the corresponding settings for parameter P38. When the sleep function is active, in cooling mode, the set point is increased by the value set for parameter P18; in heating mode, the set point is decreased by the value of P19.

If any alarms are active the display of the mode is replaced by the alarm signal. If more than one alarm is active, the alarm with the highest priority is shown.

alarm	DL1 (grn.)	DL2 (yell.)	DL3 (red)	priority
None	OFF	OFF	OFF	
EEPROM fault	BLINK	BLINK	BLINK	1
Slave offline in CAN network	ON	OFF	ON	2
Room probe fault	BLINK	OFF	ON	3
Probe St2 or St3 fault	OFF	BLINK	ON	4
Window alarm	BLINK	ON	ON	5
Generic alarm from DI	ON	BLINK	ON	6
Local stop from digital in.	OFF	ON	ON	7

Tab. 4.o

4.5 User interface (remote control & IR receiver)

The IR receiver board displays the status of the unit when the remote control is used. It also features a button for setting operation if the remote control is not available (e.g. flat batteries); pressing the button repeatedly changes the mode, in the following sequence: automatic, cooling, heating, off. When setting the mode on the button the fan operates at minimum speed and the set point is equal to the value of parameter P01 (automatic mode set point).

Below is a list of the signals on the IR board:

mode	green LED	yellow LED	red LED
OFF	OFF	OFF	OFF
COOL	ON	ON	OFF
HEAT	OFF	ON	OFF
AUTOMATIC OFF	ON	OFF	OFF
OFF EXTRA FLUSH	ON	OFF	OFF

Tab. 4.n

The IR receiver board also features a buzzer that signals the correct reception of the commands sent from the remote control, as well as signalling special situations; the signals are made up of a sequence of intervals lasting 100 m/s in which the buzzer is on or off:

signal	sequence	sound					
Power ON (power supply)	ON	ON	ON	ON	OFF	OFF	OFF
Command received correctly	ON	OFF	OFF	OFF	OFF	OFF	OFF
On	ON	OFF	ON	OFF	OFF	OFF	OFF
Off	ON	ON	OFF	OFF	ON	ON	ON
Load default values	ON	OFF	ON	ON	ON	ON	OFF

Tab. 4.p

4.6 Alarms

If alarms occur, the e-drofan FTU performs certain actions to limit any possible problems; when more than one alarm is active at the same time, only the one with the highest priority is displayed:

alarm	signal (terminal)	effect	notes	priority
EEPROM fault at power on	A01	unit shutdown	load the default values or reset from key	1
Offline in CAN network	A02		communication lost between e-drofan & CAN board	2
Room probe fault	A03			3
Probe St2 or St3 fault	A04		switch off heater	4
Window alarm	A05		switch off heater & close damper	5
Circulating pump alarm	A06		switch off heater & close damper	6
Local stop	A07			7

Tab. 4.q

4.7 List of parameters (values in degrees Fahrenheit in brackets)

	parameter	min.	max.	def.	unit	SV type	SV #	Modbus®	access	notes
00	Firmware version	-	-	-	-	I	1	129	U	e.g. v1.4 = 14
01	Set point in automatic mode	0	255	22 (72)	°C	A	1	1	U	
02	Differential in automatic OFF-cooling zone	0	255	5 (9)	°C/10	A	2	2	U	
03	Differential in automatic OFF-heating zone	0	255	5 (9)	°C/10	A	3	3	U	
04	Differential for cooling in automatic	0	255	10 (180)	°C/10	A	4	4	U	
05	Differential for heating in automatic	0	255	3 (5)	°C/10	A	5	5	U	
06	Thermostat hysteresis (not automatic mode)	0	255	5 (9)	°C/10	A	6	6	U	
07	Medium speed delta in Auto Fan	0	255	255 (255)	°C/10	A	7	7	U	
08	Maximum speed delta in Auto Fan	0	255	255 (255)	°C/10	A	8	8	U	
09	Fan speed hysteresis in Auto Fan	0	255	1 (1)	°C/10	A	9	9	U	
10	Minimum speed set in HOT START	0	255	29 (84)	°C	A	10	10	U	NOT USED
11	Medium speed set in HOT START	0	255	33 (91)	°C	A	11	11	U	NOT USED
12	Maximum speed set in HOT START	0	255	37 (99)	°C	A	12	12	U	NOT USED
13	HEAT ENABLE/COOL ENABLE hysteresis	0	255	10 (18)	°C/10	A	13	13	U	NOT USED
14	Enable fan set point in cooling	0	255	21 (70)	°C	A	14	14	U	NOT USED
15	Use of probe St1	0	3	1	-	I	105	233	U	
16	Use of probe St2	0	3	2	-	I	106	234	U	
17	Use of probe St3	0	3	0 (0)	-	I	107	235	U	
18	Increase COOL/DRY set in sleep	0	255	10 (18)	°C/10	A	18	18	U	
19	Decrease HEAT set in sleep	0	255	10 (18)	°C/10	A	19	19	U	
20	Limit ADC coefficient	0	15	6	-	I	2	130	U	
21	Average ADC coefficient	0	15	6	-	I	3	131	U	
22	Select outside compensation probe	0	2	0	-	I	4	132	U	NOT USED
23	Set point delta for compensation in cooling	-99	127	0 (0)	°C/10	A	20	20	U	NOT USED
24	Compensation factor in cooling	-20	20	0	-	A	21	21	U	NOT USED
25	Set point delta for compensation in heating	-99	127	0 (0)	°C/10	A	22	22	U	NOT USED
26	Compensation coefficient in heating	-20	20	0	-	A	23	23	U	NOT USED
27	Not used	0	2	0	-	I	5	133	U	NOT USED
28	Visibility of output values	0	3	3 (3)	s	I	6	134	U	
29	Enable continuous ventilation	0	1	1 (1)	-	I	7	135	U	NOT USED
30	Ventilation set point in fan mode (local & AUTO)	0	255	15 (59)	°C	A	24	24	U	NOT USED
31	Ventilation diff. in fan mode (local & automatic)	0	255	20 (36)	°C	A	25	25	U	NOT USED
32	Flush fan off time	0	255	2	min	I	8	136	U	
33	Flush fan on time	0	255	90	s	I	9	137	U	
34	Flush mode	0	3	0	-	I	10	138	U	
35	Flush time on change mode	0	255	0 (0)	s	I	11	139	U	
36	Select Automatic with set point or comfort	0	1	0	-	I	12	140	U	
37	Select terminal display	0	5	0	-	I	13	141	U	
38	Disable functions on terminal	172	255	140	-	I	14	142	U	
39	Set output 1	0	25	25	-	I	15	143	U	NOT DISPLAYED
40	Set output 2	0	25	19	-	I	16	144	U	NOT DISPLAYED
41	Set output 3	0	25	18	-	I	17	145	U	NOT DISPLAYED
42	Set output 4	0	25	20	-	I	18	146	U	NOT DISPLAYED
43	Select multifunction input DI3	0	8	0 (0)	-	I	19	147	U	
44	Select multifunction input DI4	0	8	0	-	I	20	148	U	
45	Select multifunction input DI5	0	8	0	-	I	21	149	U	
46	Band hysteresis for std. heaters	0	255	30 (54)	°C/10	A	26	26	U	NOT USED

	parameter	min.	max.	def.	unit	SV type	SV #	Modbus®	access	notes
47	Max. temperature of St2 to switch off std. heaters	0	255	40 (104)	°C	A	27	27	U	NOT USED
48	Extraflush time with heaters	0	255	20	s	I	22	150	U	
49	Fan ON time in DRY	0	255	3	min	I	23	151	U	NOT USED
50	Fan OFF time in DRY	0	255	15	min	I	24	152	U	NOT USED
51	Valve On time in uni cycle	0	255	0	min	I	25	153	U	NOT USED
52	Max valve Off time in uni cycle	0	255	0	min	I	26	154	U	NOT USED
53	Minimum local valve Off time	0	255	0	min	I	27	155	U	NOT USED
54	UART as RS485 (0) or ModBus (1)	0	1	1 (1)	-	I	28	156	F	
55	Enable cool & heat symbols in AUTOMATIC	0	1	0	-	I	29	157	F	
56	Polarity of cooling/heating digital input	0	1	1	-	I	30	158	U	
57	Mains frequency (0= 50Hz; 1= 60Hz)	0	1	1	-	I	31	159	U	
58	Offset for probe St1 in COOL	-99	127	0 (0)	°C/10	A	28	28	U	
59	Offset for probe St1 in HEAT	-99	127	0 (0)	°C/10	A	29	29	U	
60	Offset for probe St1 in AUTOMATIC	-99	127	0 (0)	°C/10	A	30	30	U	
61	Offset for probe St1 Probe In	-99	127	-30 (-54)	°C/10	A	31	31	U	
62	Offset for probe St2 in COOL	-99	127	0 (0)	°C/10	A	32	32	U	
63	Offset for probe St2 in HEAT	-99	127	0 (0)	°C/10	A	33	33	U	
64	Offset for probe St3 in COOL	-99	127	0 (0)	°C/10	A	34	34	U	
65	Offset for probe St3 in HEAT	-99	127	0 (0)	°C/10	A	35	35	U	
66	Master (1), Slave (0) in single node	0	1	0	-	I	32	160 *	F	
67	CANbus serial address	1	125	1	-	I	33	161 *	F	
68	Hydronic algorithm logic	0	7	0	-	I	34	162 *	F	
69	Local network address	0	207	1	-	I	35	163	F	
70	Dependency of hydronic algorithms (on Slaves)	0	7	0	-	I	36	164 *	F	
71	Serial address of Slave 1	0	207	0	-	I	37	165 *	F	
72	Serial address of Slave 2	0	207	0	-	I	38	166 *	F	
73	Serial address of Slave 3	0	207	0	-	I	39	167 *	F	
74	Serial address of Slave 4	0	207	0	-	I	40	168 *	F	
75	Serial address of Slave 5	0	207	0	-	I	41	169 *	F	
76	Serial address of Slave 6	0	207	0	-	I	42	170 *	F	
77	Serial address of Slave 7	0	207	0	-	I	43	171 *	F	
78	Serial address of Slave 8	0	207	0	-	I	44	172 *	F	
79	Serial address of Slave 9	0	207	0	-	I	45	173 *	F	
80	Serial address of Slave 10	0	207	0	-	I	46	174 *	F	
81	Dependency of hydronic algorithms on Slave 1	0	7	0	-	I	47	175 *	F	
82	Dependency of hydronic algorithms on Slave 2	0	7	0	-	I	48	176 *	F	
83	Dependency of hydronic algorithms on Slave 3	0	7	0	-	I	49	177 *	F	
84	Dependency of hydronic algorithms on Slave 4	0	7	0	-	I	50	178 *	F	
85	Dependency of hydronic algorithms on Slave 5	0	7	0	-	I	51	179 *	F	
86	Dependency of hydronic algorithms on Slave 6	0	7	0	-	I	52	180 *	F	
87	Dependency of hydronic algorithms on Slave 7	0	7	0	-	I	53	181 *	F	
88	Dependency of hydronic algorithms on Slave 8	0	7	0	-	I	54	182 *	F	
89	Dependency of hydronic algorithms on Slave 9	0	7	0	-	I	55	183 *	F	
90	Dependency of hydronic algorithms on Slave 10	0	7	0	-	I	56	184 *	F	
91	Load defaults	0	255	0	-	I	57	185	F	value= 44
92	Factory password	0	255	0	-	I	58	186	U	value= 66
93	Occupancy mode	0	3	0	-	I	59	187	U	
94	Occupancy time	1	255	15	min	I	60	188	U	
95	Select °C/°F (0= °C, 1= °F)	0	1	0	-	I	61	189	U	
96	Not used	-	-	-	-	-	-	-	-	NOT USED
97	Maximum valve travel time (2 windings)	0	255	120	s	I	63	191	U	NOT USED
98	Not used					I	61	192	U	NOT USED
99	Minimum movement in PI	0	100	5	%	I	65	193	U	
100	Maximum valve inactivity time (for unblocking)	0	255	4	hours	I	66	194	U	
101	Forced movement for antistick function	0	100	0	% max trav.	I	67	195	U	NOT USED
102	Inactivity hysteresis	0	100	0	%	I	68	196	U	NOT USED
103	Damper travel time	0	255	18	s	I	69	197	U	
104	Freecooling activation delta	0	255	0 (20)	°C/10	A	36	36	U	NOT USED
105	Freeheating activation delta	0	255	0 (20)	°C/10	A	37	37	U	NOT USED
106	Minimum outlet temperature	-28 (-18)	127	15 (27)	°C (°F)	A	38	38	U	
107	Bumpless transfer mode	0	3	1	-	I	104	232	U	
108	Integral time	0	255	0	s *10	I	99	227	U	
109	PI dead zone	0	255	10 (18)	°C/10	A	43	43	U	
110	Fan/damper activation delta in HEAT	0	255	0 (0)	°C/10	A	44	44	U	
111	Heater activation delta	0	255	25 (45)	°C/10	A	45	45	U	
112	Heating set point hysteresis for heater control	0	255	10 (18)	°C/10	A	46	46	U	
113	Fan/damper activation delta in COOL	0	255	0 (0)	°C/10	A	47	47	U	
114	Damper proportional band	0	255	10 (186)	°C/10	A	39	39	U	
115	Fan proportional band in COOL	0	255	20 (36)	°C/10	A	40	40	U	
116	Fan proportional band in HEAT	0	255	20 (36)	°C/10	A	41	41	U	

	parameter	min.	max.	def.	unit	SV type	SV #	Modbus®	access	notes
117	Heater proportional band	0	255	20 (36)	°C/10	A	42	42	U	NOT USED
118	Fan mode	0	2	0	-	I	100	228	U	NOT USED
119	Minimum 0 to 10 V fan speed	0	100	20	%	I	101	229	U	
120	Damper activation delay	0	255	1 (1)	s*10	I	102	230	U	
121	Maximum damper step	5	100	10	%	A	48	48	U	
122	End antifreeze threshold	-28	50	7 (7)	°C	A	49	49	U	NOT USED
123	Antifreeze time	1	255	2	min	I	103	231	U	NOT USED
124	Unit model	0	1	0	-	I	108	236	U	NOT USED
125	Max. outlet temperature	0 (32)	50 (122)	40 (104)	°C (°F)	A	50	50	U	
126	Outlet limit differential	10 (18)	255 (255)	20 (36)	°C/10	A	51	51	U	NOT USED
127	Time to disable heater from fan	0	255	1 (1)	min	I	109	237	U	

* Only for CAN bus hydronic systems. Do not use with Modbus or PlantVisor systems

Tab. 4.r

	variables only accessible via serial connection	def.	min.	max.	unit	SV type	SV #	Modbus®	notes
	probe St1	0	-	-	°C/10	A	70	70	read only
	probe BT	0	-	-	°C/10	A	71	71	read only
	probe St2	0	-	-	°C/10	A	72	72	read only
	probe B3	0	-	-	°C/10	A	73	73	read only
	control probe	0	-	-	°C/10	A	74	74	read only
	virtual probe (probe set by CANbus/supervisor)	0	-	-	°C/10	A	75	75	do not use with PlantVisor & Modbus®
	control set point	-	-	-	°C/10	A	76	76	read only
	damper	0	-	-	%	A	77	77	read only
	valve	0	-	-	%	A	78	78	read only
	heater	0	-	-	%	A	79	79	read only
	mode (see Tab. 4.z)	0	0	6	-	I	70	198	see tab. below
	fan (see Tab. 4.z)	0	0	3	-	I	71	199	see tab. below
	manual fan, 0 to 10 V	-	-	-	-	I	72	200	
	ON/OFF	0	0	1	-	I	73	201	
	control probe enabled (1=B1; 0= BT)	0	0	1	-	I	74	202	internal use do not modify from supervisor
	alarms	0	-	-	-	I	76	204	read only
	lock keypad	0	-	-	-	I	78	206	for hydronic systems only CANbus, do not use with Modbus® systems & PlantVisor
	general flags 1 (see Tab. 4.z)	-	-	-	-	I	79	207	see tab. below
	general flags 2 (see Tab. 4.z)	-	-	-	-	I	80	208	see tab. below, read only
	digital inputs (see Tab. 4.z) and requests	-	-	-	-	I	81	209	see tab. below, read only
	sleep/eco	0	0	1	-	I	82	210	
	set point set	22	8	32	°C	I	83	211	
	comfort control	0	-2	+2	°C	I	84	212	
	general flags 3 (see Tab. 4.z)	-	-	-	-	I	85	213	see tab. below, read only
	manual damper	-	-	-	-	I	86	214	
	enable virtual control probe when=1	0	0	1	-	I	87	215	for hydronic systems only CANbus, do not use with Modbus® systems & PlantVisor. Internal use
	NOT USED	0	0	1	-	I	88	216	

Tab. 4.s

mode	
0	automatic
1	automatic + heater
2	cooling
3	dehumidification
4	ventilation
5	heating
6	heating + heater

Tab 4.t.a

fan	
0	auto
1	minimum
2	medium
3	maximum

Tab 4.t.b

general flags 1	
1	heater available
2	not used
4	reserved
8	remote control
16	broadcasting active
32	sleep/eco
64	lock functions
128	reserved

Tab 4.t.c

general flags 2	
1	cooling active
2	heating active
4	comfort active
8	economy
16	reserved
32	reserved
64	reserved
128	not used

Tab 4.t.d

general flags 3	
1	cooling symbol
2	heating symbol
4	reserved
8	display set/probe
16	not used
32	not used
64	not used
128	not used

Tab 4.t.e

digital inputs	
1	input (remote ON/OFF)
2	input (cooling/heating)
4	input (multifunction)
8	input (multifunction)
16	input (multifunction)
32	heating request
64	cooling request
128	not used

Tab 4.t.f

manual damper	
0	Automatic
1	0% (close)
2	10%
3	20%
4	30%
5	40%
6	50%
7	60%
8	70%
9	80%
10	90%
11	100%

Tab 4.t.g

0 to 10 V fan	
0	AUTOFAN
1	10%
2	20%
3	30%
4	40%
5	50%
6	60%
7	70%
8	80%
9	90%
10	100%

Tab 4.t.h

5. HYDRONIC SUPERVISORY SYSTEMS

installer

user

service

i In summary:

- Synergy between chiller controller (pCO) and e-drofan FTU;
- Algorithms focused on energy savings;
- Algorithms focused on comfort;
- Building automation functions;
- Flexible space management;
- Reduced times for the propagation of the commands;
- Type of networks: hydro bus (dedicated area controller or integrated into the chiller controller), integrated hybrid (area controller integrated into the chiller controller);
- Possibility to install the terminal on the slaves;
- Feedback on the alarms relating to the slaves (on chiller controller/area controller and e-drofan FTU master);
- Control of all units by the supervisory system or area controller.

The use of the CAN serial card on the e-drofan FTU allows the creation of hydronic systems with the purpose of creating synergy between the chiller controller (pCO) and the fan tile unit. This interaction gives the opportunity to apply advanced energy savings and comfort algorithms (resident on the chiller controller), as well as implement useful building automation functions.

The CAN card has been designed to minimise the activation of the operators in the event of variations in the spaces to be air-conditioned (quite common in some installations, e.g. offices); in this case, simply redefine the roles of the master and slave on the acqua terminal or pCO controller (if available).

5.1 Structure

The single node structure is used in the hydronic systems, in which the flow of data is bi-directional (unlike the broadcast structure, in which it is mono-directional); there are many consequent advantages: display the slave alarms on the master, acquire useful values for the management of the system, fit the acqua terminal on the slaves... etc.

	single node
Maximum number of units connected	100
Maximum number of masters	64
Maximum number of slaves	100-no. of masters
Maximum number of slaves for each master	10
Maximum length of CANbus (total)	1 km (62.5 kbit); 500 m (125 kbit)

Tab. 5.a

The address set using the group of 10 dipswitches on the CAN card defines the operating mode:

address (binary), dip 1-7	mode	notes
0	Configurable: Broadcast or Single node	The address can be set on the acqua terminal, parameter P67 (switch off and on again to make the new setting operational); consequently, the mode can be configured. Without these settings P67=1 and the e-drofan FTU fitted with the terminal becomes the master.
1-15	Broadcast	Master and slave must have the same address
16	Reserved	
21-125	Single node	Each unit (master or slave) must have different addresses
126-128	Reserved	

Tab. 5.b

Dipswitches 9 and 10 are used to set the CANbus communication speed and must be set both in the same position.

dip 9 & 10 ON= 125 kbit/s dip 9 & 10 OFF= 62.5 kbit/s

dip 8= must be set to ON to use the serial card on the e-drofan FTU.

After each change made to the position of the dipswitches, the e-drofan FTU must be switched off and on again for the changes to become operational.

Single node

In this mode, the information that the master must send to all the slaves (LOGIC parameter) can be set, as well as the information accepted by each individual slave (DEPENDENCE). The set of a master and its slaves is a "zone". All the settings are performed on the master from the panel.

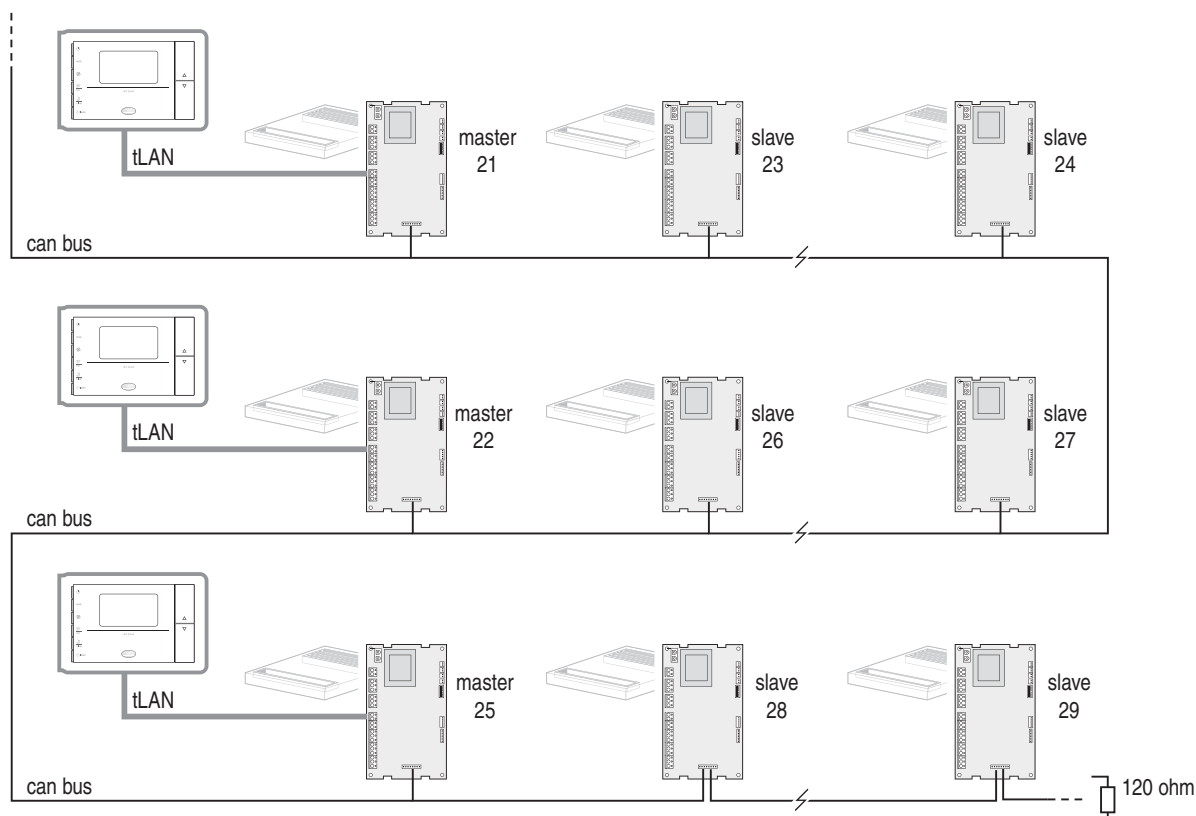


Fig. 5.a

par.	description	min.	max.	def.
P66	e-drofan FTU master or slave: 0= slave; 1= master.	0	1	0
P67	Serial address on CANbus. Settable from acqua terminal if the serial address specified by dipswitch on CAN board is 0	1	125	1
P68	Master LOGIC (see the table below)	0	7	0
P69	485 network serial address (used only with 485 serial card), with CANbus must always be= 1	1	207	1
P70	DEPENDENCY of the controller on its master (e-drofan o pCO): 0= the controller ignores all data from its master; 1= the controller accepts: ON/OFF, ECONOMY/ SLEEP; 2= the controller accepts: ON/OFF, ECONOMY/ SLEEP, mode; 3= the controller accepts: ON/OFF, ECONOMY/ SLEEP, mode, set point; 4= the controller accepts: ON/OFF, ECONOMY/ SLEEP, mode, comfort, set point; 5= the controller accepts: mode, comfort, set point; 6= the controller accepts: mode, comfort, set point, fan speed; 7= the controller accepts: all data from its master.	0	7	0
P71-P80	CANbus addresses of the slaves	0	207	0
P81-P90	Dependency of the slaves: 0= the slave ignores all data from the master; 1= the slave accepts: ON/OFF, ECONOMY/ SLEEP; 2= the slave accepts: ON/OFF, ECONOMY/ SLEEP, mode; 3= the slave accepts: ON/OFF, ECONOMY/ SLEEP, mode, set point; 4= the slave accepts: ON/OFF, ECONOMY/ SLEEP, mode, comfort, set point; 5= the slave accepts: mode, comfort, set point; 6= the slave accepts: mode, comfort, set point, fan speed; 7= the slave accepts: all data from the master.	0	7	0

Tab. 5.c

The occupancy function uses the economy/sleep variables to manage the network.

Data propagated according to the LOGIC parameter	LOG.=1	LOG.=2	LOG.=3	LOG.=4	LOG.=5	LOG.=6	LOG.=7 **
ON/OFF	√	√	√	√	√	√	√
ECONOMY/SLEEP	√	√	√	√	√	√	√
Mute ALARM (future use)	√	√	√	√	√	√	√
Control with probe value sent from the zone master (if DIP 6= ON, on the master)	√						
Control performed with probe value sent from the chiller controller (PCO)		√					
Set point propagated by zone master	√	√		√		√*	√
Operating mode and comfort function propagated by zone master	√	√		√	√		
Fan speed propagated by zone master	√	√		√	√	√	
Flap position propagated by zone master (future use)							
Mode, comfort, set point, fan speed and flap position at switch OFF->ON only propagated by zone master (only once).			√				
Use by zone master and slaves of the control probe value calculated as average of all the control probes in the zone (including slaves)				√			
Different set points propagated for the various slaves in the zone. The set points are specified for the related dependence parameters (the dependence is set to 7 for all the slaves in the zone) (e.g. P81= e-drofan slave1 set point etc.)					√		
Different offsets (from zone master set point) propagated for the various slaves in the zone. The offsets are specified in the related dependence parameters (the dependence is set to 7 for all the slaves in the zone) (e.g. P81= e-drofan slave1 offset; e-drofan slave1 set point = e-drofan master set point + P81 etc.)						√	

Tab. 5.d

* the master sends the final set point to the slave, performing the sum with the offset internally.

** Logic 7 reserved for future uses.

If logic= 0 no data is propagated

Important: Before modifying a parameter on the master (related to the configuration of the network), the e-drofan FTU must be set as a slave (P66= 0); once the operation has been completed, the e-drofan FTU can be configured as the master.

The pCO chiller controller can deactivate some buttons on the e-drofan FTU terminals via the hydronic network.

These restrictions are required to avoid conflicts between the operation set by the master and any settings made by the user on the e-drofan FTU slaves (using the terminal).

Buttons locked on the terminal by the KEYLEVEL parameter	key level=1	key level=2	key level=3	key level=4	key level=5	key level=6	key level=7	key level=8	key level=9
ON/OFF button		√	√	√	√				√
MODE button				√	√		√	√	√
Fan speed button									√
SET button	√	√	√	√	√	√	√	√	√
CLEAR/SLEEP button (ECON. from digital in.)			√		√				√
TIMER button	√	√	√	√	√	√	√	√	√
UP button					√			√	√
DOWN button					√			√	√

Tab. 5.e

* reserved for future uses.

Description of the LOGIC parameter:

- LOGIC 1: The same as the broadcast, with the addition of displaying the alarms relating to the slaves on the master terminal.
- LOGIC 2: Operation as per broadcast, as well as displaying the alarms relating to the slaves on the master terminal; all the e-drofan FTUs in the zone are controlled based on the probe value sent by the chiller controller (pCO). Useful for algorithms resident on the pCO.
- LOGIC 3: Operation as per broadcast (with slave alarms displayed on the master terminal) but data sent only at power-up of the master. Modifications can be made to operation by the user controlling the slave (e.g. change fan speed to reduce noise). Useful for aligning the status of the slaves in a zone with the corresponding master (e.g. Start-up in the morning).
- LOGIC 4: The master propagates ON/OFF, ECONOMY/SLEEP and control probe; all the remaining functions can be modified on the slaves. The control probe reading is the average of the probes (B1 or BT) on all the slaves in the zone. Useful for giving priority to control of the average temperature in a room rather than single point control (see Fig. 5.b).
- LOGIC 5: Operation as per broadcast (with slave alarms displayed on the master terminal). The master propagates different set points for each slave (these can be set on the master terminal). Useful in zones featuring slaves without terminals.
- LOGIC 6: Operation as per broadcast (with slave alarms displayed on

the master terminal). The master propagates different set points for each slave (these can be set on the master terminal as offsets from the set point). Useful in zones featuring slaves without terminals.

- LOGIC 7: Reserved for future uses.

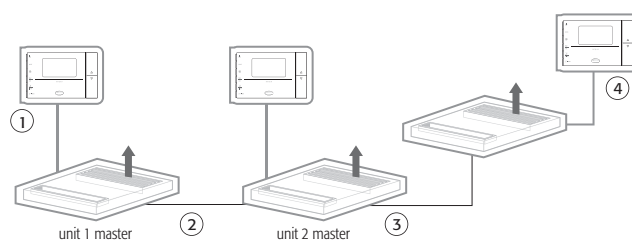


Fig. 5.b

Key:

- | | | | |
|---|---|---|-------------------------|
| 1 | Average of BT on unit 1, BT unit 2, BT unit 3; Bcontrol= (21+22+23)/3= 22 °C; | 3 | Set: 23 °C - BT: 22 °C |
| 2 | Set: 23 °C - BT: 21 °C; | 4 | Set: 23 °C - BT: 23 °C. |

The OFF status, determined by ON/OFF digital input, has priority over the command sent by the master; this operation is required to allow the user to turn off the fan tile unit.

The area controller/chiller controller can nonetheless force the settings on the e-drofan FTU irrespective of the dependence setting (useful in some extreme situations) and can acquire some useful information (status of digital inputs, heating/cooling request... etc.); for this information and for the further algorithms (comfort, energy savings... that reside on the chiller controller (PCO)), refer to the corresponding user manual.

Important: If communication is interrupted between a slave e-drofan FTU and its master (e.g. disconnection ...etc.) the slave stops automatically, nonetheless, it can be re-activated if fitted with the acqua terminal or remote control (in this case, the device has full control over all the functions).

Below is an example of the possible reconfiguration of the e-drofan FTUs if the spaces are reorganised.

Initial configuration of a zone:

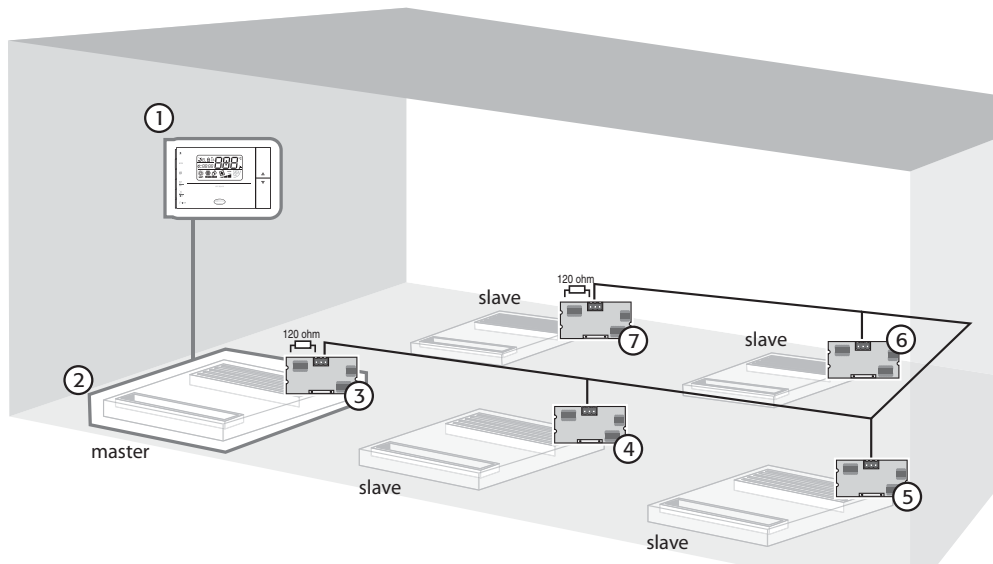


Fig. 5.c

Key:

1. acqua terminal;
2. P66= 1;
P71= 22;
P72= 23
P73= 24
P74= 25;
3. serial card, ID= 21
4. serial card, ID= 22;
5. serial card, ID= 23;
6. serial card, ID= 24;
7. serial card, ID= 25

Configuration after the division of the zone into two parts:

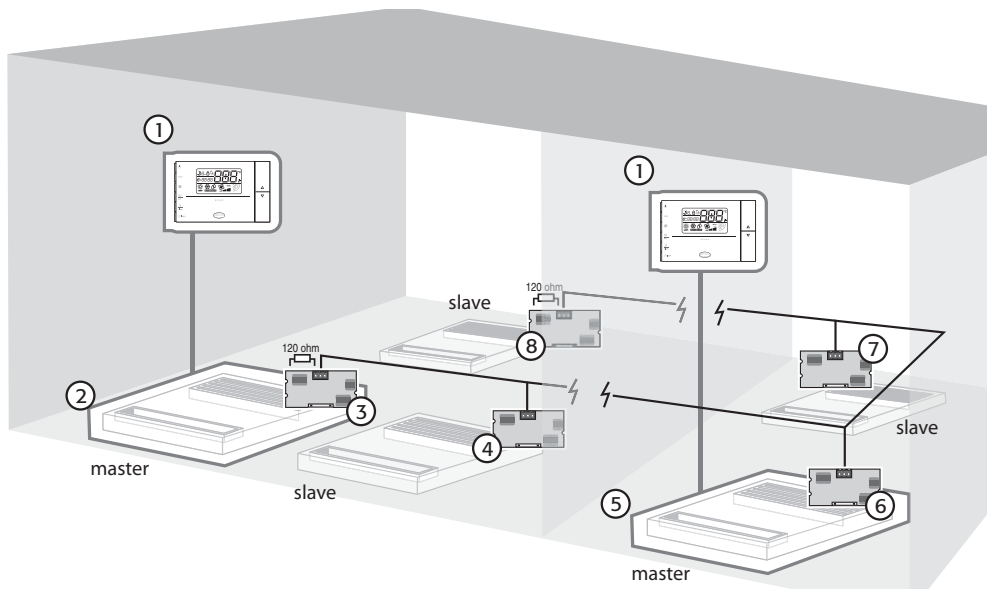


Fig. 5.d

Key:

1. acqua terminal;
2. P66= 1;
P71= 22;
P72= 25;
3. serial card, ID= 21
4. serial card, ID= 22;
5. P66= 1
P71= 24
6. ID= 23;
7. serial card, ID= 24;
8. serial card, ID= 25

Integrated hybrid systems

Integrated hybrid networks can be created, i.e. single node structures with the chiller controller and only the e-drofan FTU master (where the slaves are connected in the tLAN and without the acqua terminal).

In these applications (typical in single homes) the chiller controller (pCO) carries out the functions of both chiller and area controller (that is, sends the commands required for the management of the units connected in the network and monitors the status). A maximum of 16 e-drofan FTU masters can be managed by the chiller controller.

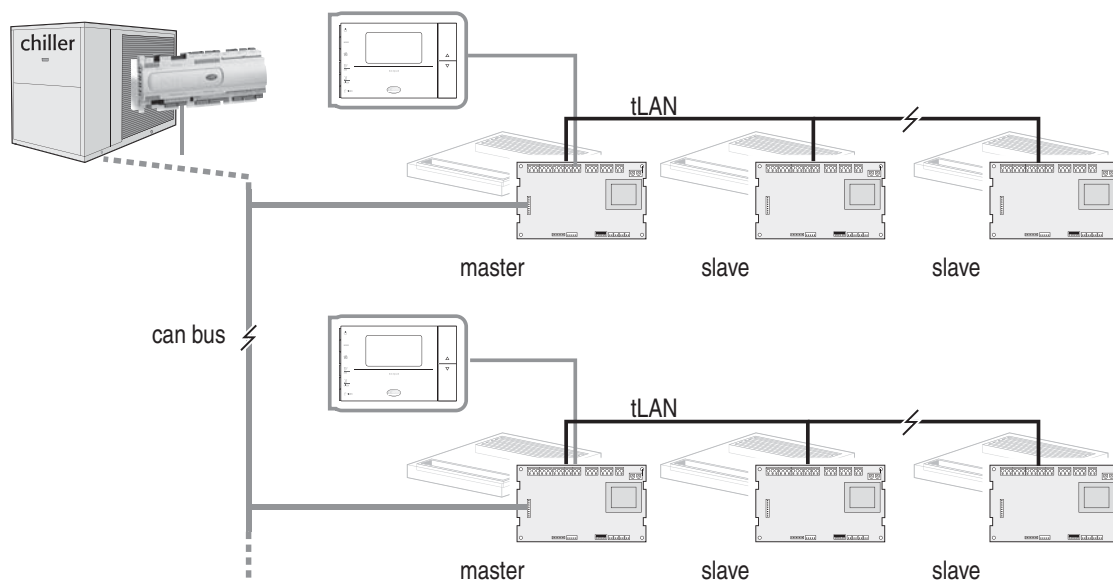


Fig. 5.e

e-drobus

If only the CANbus connection is used, there is still the possibility to create networks in which the pCO acts as both chiller controller and area controller (that is, manages the 16 masters connected in the network). To exceed the limit of 16 master units (necessary for multi-storey buildings), systems must be adopted in which one pCO only acts as area controller, while the chiller is controlled by a dedicated device (connected to the

area controller, e.g.: pCO, μ CH2).

In this case, a maximum of 64 e-drofan FTU masters can be connected to the area controller, and the remaining units (up to a maximum of 100) can be assigned as slaves to the e-drofan FTU masters. The area controller has complete control over the masters directly connected, while as regards the slaves assigned to the master, it can only act on the related logic and dependence parameters (resident on the masters).

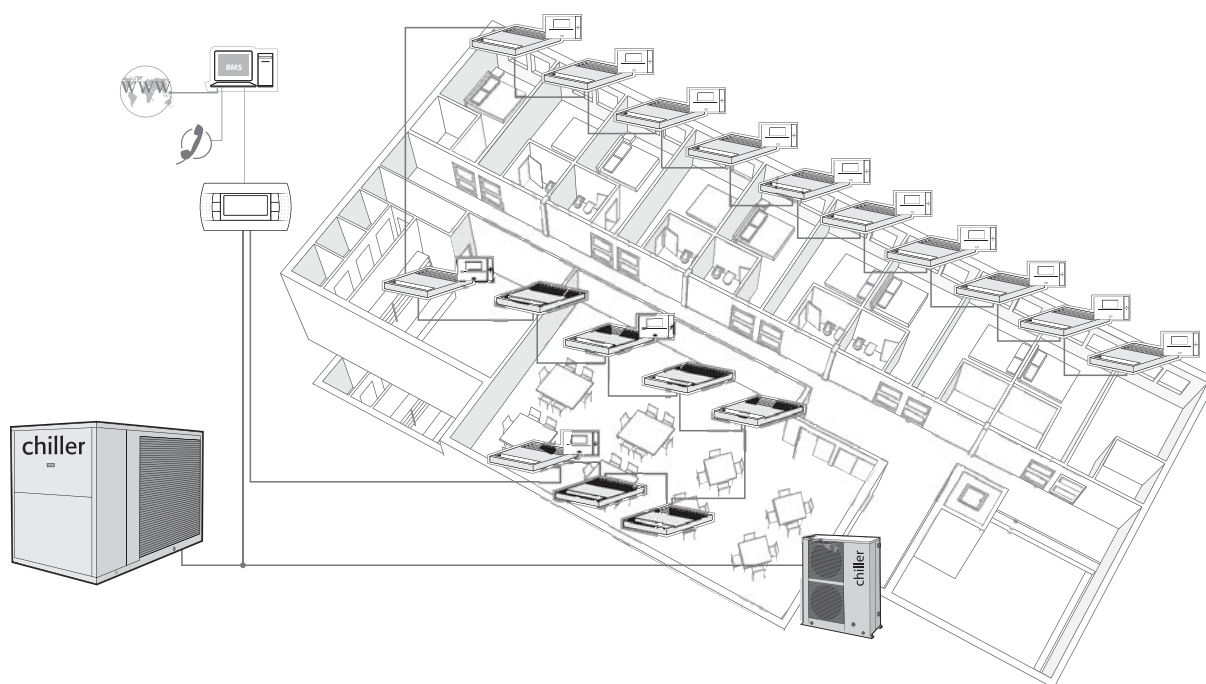


Fig. 5.f

5.2 Signals & diagnostics

The CANbus serial card has three LEDs to display the serial communication status relating to the device it is installed on.
When the card is powered up or after the configuration of the network

parameters, the following signals are shown (the green LED is always on when power is connected)

single node

green LED	yellow LED	red LED	meaning	actions
ON	ON steady	OFF	ON line (master or slave)	OK
ON	OFF	ON steady	OFF line (slave only)	- check configuration of master - check address P67 - check wiring
ON	ON steady	flashing	Communication problems between e-drofan and CANbus serial card	- check P69=1 - check that the board is inserted correctly
ON	ON steady	ON steady	Serious error	Contact CAREL S.p.A.
ON	OFF	OFF	Serious error	Contact CAREL S.p.A.
OFF	any	any	No power supply	- check power supply - check it is plugged in correctly

Tab. 5.f

Alarms

The acqua terminal displays the alarms on the e-drofan FTU it is connected to, as well as those on the corresponding slaves. When it displays the alarms on its own e-drofan FTU, the signal starts with "A" (e.g. A04), while when displaying those relating to the slaves in the zone, the signal starts with "S" (the second number indicates which slave it refers to (from 0 to 9), while the third number indicates the alarm code). The codes for the slave alarms (third number) are the same as described in the "manufacturer" section. The alarms on the master have priority over the slaves (see the "manufacturer" section), the alarms on the different slaves are displayed in sequence (for each slave, the alarm with the highest priority is displayed). Code SX0 display shows the loss of communication between Master and Slave. The e-droset terminal only displays the index of the slave with the alarm.

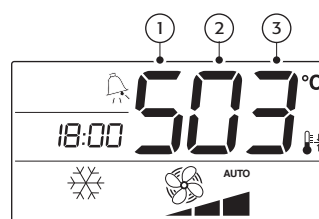


Fig. 5.g

Key:

1. slave alarm;
2. slave;
3. room probe fault.

Notes on configuring hydronic networks

During the configuration of the hydronic networks, the following instructions should be observed:



Important: Avoid settings that create situations of conflict.

note	description	related events
1	If configuring a series of e-drofan FTU, first configure the slaves and then the corresponding master, or alternatively perform the settings with the CANbus disconnected.	If this sequence is not observed, some buttons on the terminal connected to the slave may be locked due to the dependence set on the master, thus preventing the correct configuration of the slave/slaves.
2	With logic 5 and 6 do not connect the acqua terminals on the slaves.	The information propagated via the CANbus may be lost.
3	The logic must be set on the master before the dependence on the slaves.	The related parameters (dependence P81-P90) may have different meanings (see logic 5 and 6) when the logic changes. When logic is 5 (different set points) the limits are 7 to 35°C, when logic is 6 (offset from the set point on the master) the limits are -5 to +5.
4	Some functions can be activated both locally (digital inputs) and remotely (via serial connection). To avoid conflicts, install the ON/OFF, ECONOMY and OCCUPANCY digital inputs only on the e-drofan FTU master. The slaves can only be connected to the inputs relating to the alarms (window alarm, circulating pump alarm and local stop).	The status of an e-drofan FTU slave is continuously controlled by its master. The master is set by the area controller/chiller controller just once, which allows the subsequent modification of its status (e.g. from the presence or ON/OFF inputs etc.). The continuous or periodical control of the master must be included in the area controller/chiller controller application.
5	So as to avoid conflicts, the cooling/heating function (to be installed on the master only) must be set only by digital input or via serial communication. The same must be applied to the remote off (settable by dipswitch). In this regard, the dependence is set to 0 when DIP 2 or 3 is ON (only when starting), while there is still the possibility to change the dependence from the area controller/chiller controller.	In the event of conflicts between the digital input and the area controller/chiller controller, operation is not affected, however there will be intense traffic in the serial communication, causing a decline in performance.
6	The specifications provided for the acqua terminal are also valid when using the remote control, with the exception of the keypad lock. In fact, if a function is locked, the remote control still sends the data, which are however ignored by the e-drofan; consequently, there may be discrepancies between the information shown on the display of the remote control and the operation of the device.	
7	The slaves should be fitted ON/OFF digital inputs (without acqua terminal or remote control, or if ON/OFF is disabled). In this way, the user can switch the unit off to stop the flow of hot/cold air.	

Tab. 5.g

6. NON-HYDRONIC SUPERVISORY SYSTEMS

The 485 serial card can be used to create customised supervisory systems, for example PlantVisor. The same accessory can be used to integrate the e-drofan FTU into Modbus® systems (enable Modbus® by setting parameter P54= 1).

7. TECHNICAL SPECIFICATIONS & PRODUCT CODES

7.1 e-drofan FTU

Assembly and installation instructions.

Terminal	Meaning
L	Phase
N	Neutral
No1	Minimum fan speed (normally open). Voltage output (L)
No2	Medium fan speed (normally open). Voltage output (L)
No3	Maximum fan speed (normally open). Voltage output (L)
GN, Tx, V+	LCD panel connection
GN, Tx	Terminals for local network serial connection (master + 5 slaves)
DI1, DI2, DI3, DI4, DI5	Digital inputs: 1=remote ON/OFF 2= remote cooling/heating 3= multifunction (P43) 4= multifunction (P44) 5= multifunction (P45)
St1	Room probe (intake)
St2	Underfloor air probe
St3	Outlet air temp. probe
DIP	Configuration dipswitches: 1 ON= Variable temperature control & constant flow-rate 2 ON= Cooling/heating enabled by DI2 3 ON= 3-speed fan, fixed speeds (OFF= variable speed) 4 ON= Cold air only from CCU 5 ON= Heater available 6 ON = Control on panel sensor (OFF= probe on FTU)
EXP	Expansion board connector (5-wire cable)
FLAP	Not used
SUPPLY EXP	Expansion board power supply connector (2-wire cable)
IR	Infrared receiver interface connector (8-wire cable).
JS3	Optional power supply connector for compatibility with pCO serial cards (future uses)
SERIAL	Optional serial card connector

Tab. 7.a

Power supply	230 Vac, range -15 to 10%; 50/60 Hz; Maximum power input (excluding relay loads): 4 VA
Screw terminals (external unit power supply)	Max voltage: 230 V Cable size: 14-22 AWG The current input of the network (sum of the current input of the loads plus the external module) must not exceed 6 A.
Relay outputs No1, No2, No3	Maximum current: VDE0631: 6 (2) A, 250 Vac Minimum interval between switching cycles (each relay): 12 s (the manufacturer of the unit the device is integrated into must guarantee the correct configuration to respond to this specification) Type of relay action/microswitching: 1C Insulation between low (relay outputs) and very low voltage parts: Reinforced
Digital inputs	Electrical standard: voltage-free contact Closing current referred to earth: 5 mA Maximum closing resistance: 50 Ω
Analogue inputs	B1, B2, B3: CAREL NTC temperature probes (10 kΩ at 25 °C).
Index of protection	IP00
Storage conditions	-20T80 °C, humidity 80% rH non-condensing
Operating conditions	0T60 °C, humidity <90% rH non-condensing
Pollution	Normal
Cat. of resistance to heat and fire	D
PTI of insulating materials	for all materials PTI≥250
Software class and structure	A
Period of stress across the insulating parts	long

Tab. 7.b

Max. cable lengths:

probes:	10 m
digital inputs:	30 m (AWG 14-22)
LCD/tLAN communication:	30 m (AWG 14-22)
serial card communication :	see instruction sheet
boiler control signal:	30 m (AWG 14-22)
power supply:	5 m (AWG 14-22)
power outputs (relays):	30 m (AWG 14-22)

Tab. 7.c

Warnings:

- All installation and maintenance operations must be carried out with the unit off;
- Use shielded cables for the serial connections: 3-wire + shield for tLAN, 2-wire + shield for networks made with optional serial cards. Do not make star connections (use chain connections). Connect the shield to terminal GN;
- Avoid short-circuits between pins GN and V+ (LCD panel power supply);
- Adopt precautions against electrostatic discharges when handling the board;
- Do not earth terminal GN.

Protection against electric shock and maintenance warnings

The system made up of the control board (HYFT0*) and the other optional cards (HYVC000U0*, HYPA*, HYIR*, HYSC00F0C*, pCO serial cards etc.) represents a control device to be incorporated in class 1 or 2 appliances. The class of protection against electric shock depends on how the control device is integrated into the unit built by the manufacturer.

Disconnect power before working on the board during assembly, maintenance and replacement.

The protection against short circuits must be guaranteed by the manufacturer of the appliance that the controller will be fitted on, or by the installer.

Technical specifications

Functional characteristics

Resolution of analogue inputs:	Temperature probes: interval -40 to 80 °C, 0.1 °C
Temperature measurement error:	Interval -20 to 25 °C, ± 0.5 °C (excluding sensor)
	Interval 25 to 30 °C, ± 1 °C (excluding sensor)
	Interval 30 to 90 °C, ± 1.5 °C (excluding sensor)

Tab. 7.d

Connections

See Fig. 3.c.

7.2 e-drofan FTU expansion board HYVC000U0*

Assembly and installation instructions.

Terminal	Meaning
SUPPLY EXP	e-drofan FTU expansion power supply connector (connect using 2-wire cable)
EXP	e-drofan FTU expansion connector using 5-wire cable
N	Neutral
No4	0 to 10 V output.
No5	Triac output
No6	Triac output
No7	Voltage-free contact (relay)
SF	SAFETY LOOP external safety device for heater

Tab. 7.e

Maximum cable length, voltage outputs No4 & No5: 5 m

Maximum cable length, outputs No6 & No7: 30 m (voltage-free contact), 5 m (power supply to any load).



Warnings:

- All installation and maintenance operations must be carried out with the unit off;
- Keep the power cable (relay outputs) separate from the probe cables, digital inputs, flap power supply, IR receiver board, flat connection cable to expansion and serial connections (LCD panel, tLAN networks, hydronic networks etc.);
- Adopt precautions against electrostatic discharges when handling the board (e.g. antistatic bracelet);
- If using serial communication boards, the use of output No7 may be limited to very low voltage only.

Protection against electric shock and maintenance warnings

The system made up of the control board (HYFT0*) and the other optional cards (HYVC000U0*, HYPA*, HYIR*, HYSC00F0C*, pCO serial cards etc.) represents a control device to be incorporated in class 1 or 2 appliances. The class of protection against electric shock depends on how the control device is integrated into the unit built by the manufacturer.

Disconnect power before working on the board during assembly, maintenance and replacement.

The protection against short circuits must be guaranteed by the manufacturer of the appliance that the controller will be fitted on, or by the installer.

Technical specifications

Power supply	230 Vac, range -15 to 10 %; 50/60 Hz
Maximum power input:	5 VA
Screw terminals, max voltage:	250 V cable size: 14-22 AWG max current: see outputs No4-7
0 to 10V output No4	minimum impedance of the 0 to 10 Vdc actuator input stage = 10 kOhm
Triac outputs No5, No6	max current a 24 Vac (for each voltage output): 0.09 A Type of action of the triac: electronic disconnection
Relay output No7	maximum current at 250 Vac: - EN60730: Resistive 10 A 100,000 cycles type of relay action/microswitching: 1C
Insulation between low and very low voltage parts:	reinforced
Insulation between triac voltage outputs (24 Vac) No5, No6:	reinforced
Insulation between triac voltage outputs No5, No6 & relay output No7:	reinforced
Insulation between 0-10 Vdc output & relay output No7: reinforced	
Index of protection	IP00
Storage conditions	-20T80 °C, humidity 80% rH non-condensing
Operating conditions	0T60 °C, humidity <90% rH non-condensing
Pollution	normal
Category of resistance to heat and fire	D
PTI of insulating materials, for all materials	250
Period of stress across the insulating parts	long

Tab. 7.f

7.3 Acqua remote terminal

Assembly and installation instructions

To access the connection terminal remove the rear cover by levering the tab.

terminal	meaning
GN	use for connection to terminal GN on the fan coil and the shield of the shielded cable
Tx	use for connection to terminal Tx on the fan coil
V+	use for connection to terminal V+ on the fan coil

Tab. 7.g

Maximum length of shielded connection cable: 30 m from fan coil.

If the local network (tLAN) is used, assign the role of master to the fan tile unit connected. Avoid installing the terminal in places where the ambient temperature measurement may be altered: outside walls, near doors leading to the outside, exposed to the sun, etc.

Fasten the terminal as shown in the figure (the terminal should be fastened to the wall in a horizontal position so as to allow the recirculation of air through the slits on the rear cover).



Warnings:

- All installation and maintenance operations must be carried out with the unit off;
- Keep the power cables (relay outputs, live cables, etc.) separate from the shielded connection cable to the fan tile unit;
- Adopt precautions against electrostatic discharges when handling the board.

Technical specifications

Power supply	8 to 25 Vdc (supplied by the e-drofan board)
Insulation	Insulation between low (relay outputs) and very low voltage parts: reinforced (guaranteed by the fan coil board and the shielded connection cable).
Index of protection	IP30
Storage conditions	-20T80 °C, humidity 80% rH non-condensing
Operating conditions	0T60 °C, humidity <90% rH non-condensing
Pollution	Normal
Category of resistance to heat and fire	D
PTI of insulating materials	for all materials PTI≥250
Period of stress across the insulating parts	long

Tab. 7.h

7.4 e-droset remote terminal

Assembly and installation instructions

Below is the sequence of operations for wall mounting:

- Fasten the 3 gang support to the box for built-in installation using two screws;
- Make the connections between the terminal and the wires in the shielded cable from the e-drofan.

terminal	meaning
GN	Use for connection to terminal GN on the e-drofan and the shield of the shielded cable.
Tx	Use for connection to terminal Tx on the e-drofan.
V+	Use for connection to terminal V+ on the e-drofan.

Tab. 7.i

Maximum length of shielded connection cable: 30 m from e-drofan;

- insert the terminal in the plastic support;
- insert the fastening "shoulders";
- position the wallplate on the support.

The following wallplates can be used:

Biticino	Living International; Light; Light Tech; Matix
Vimar	Idea; Idea Rondò; Plana

The Living International - Light Tech - Matrix brands are the property of BTicino SpA. The Idea - Idea Rondò - Plana brands are the property of VIMAR SpA.

If the local network (tLAN) is used, the terminal assigns the role of master to the fan coil connected. Avoid placing the terminal in places where the room temperature measurement may be altered: outside walls, near doors leading outside, exposed to the sun, near the fan tile units etc.



Warnings

- All installation and maintenance operations must be carried out with the unit off;
- Keep the power cables (relay outputs, live cables, etc.) separate from the shielded connection cable to the e-drofan FTU;
- Adopt precautions against electrostatic discharges when handling the board.

Technical specifications

Power supply	8 to 25 Vdc (supplied by the fan coil board)
Insulation	Insulation between low (e-drofan relay outputs) and very low voltage parts: reinforced (guaranteed by the e-drofan board and the shielded connection cable).
Index of protection of front panel	IP30
Storage conditions	-20T80 °C, humidity 80% rH non-condensing
Operating conditions	0T60 °C, humidity <90% rH non-condensing
Pollution	Normal
Category of resistance to heat and fire:	D

Tab. 7.j

7.5 CANbus serial card

Assembly and installation instructions

terminal	meaning
GND, H+, H-	CANbus connection
8-pin connector	Power and communication with electronic controller, to be inserted in the CANbus (fan tile unit, pCO ...).
7-pin connector (where available)	Power and communication with electronic controller, to be inserted in the CANbus (fan tile unit, pCO ...).
Set of 10 dipswitches	Used to make the following settings (refer to the corresponding user manual): DIP 1-7: Serial address of the unit that hosts the CAN board (binary notation). From 1 to 15 for broadcast networks and the remaining for the single node mode. DIP8: ON= For use on pCO (OFF= For use on fan coil); DIP9: CANbus speed (ON= 125 Kbit/s OFF= 62.5 Kbit/s); DIP10: ON= Enable maximum CANbus distance (1 km). In this case the speed used must be 62.5 Kbit/s.

Tab. 7.k

Maximum cable length: 1 km at 62.5 Kbit/s, 500 m at 125 Kbit/s.



Warnings:

All installation and maintenance operations must be carried out with the unit off.

- Use shielded cables for the serial connections: 2 wire + shield, typical impedance 120 Ohm, parasitic capacitance 40 pF/m and signal propagation time 5 ns/m;
- Adopt precautions against electrostatic discharges when handling the board;
- The serial card is not optically isolated, do not earth.

Below is a table showing the recommended shielded cables, depending on the various installations. The codes specified satisfy all the required specifications; cables supplied by other manufacturers can be used, as long as the above specifications are complied with.

example	wire resistance (Ohm/Km)	max cable length (km)	Belden code
AWG 16	13.7	1.173	9860
AWG 18	22.6	0.711	3074F
AWG 22	48.2	0.333	3105A
AWG 24	78.7	0.204	9841
AWG 24	78.7	0.204	8103

Tab. 7.l

Depending on the assumed length of the network, cables with a smaller cross-section may be used. For example, if expecting a maximum length of 300 m, AWG22 cable is sufficient.

Protection against electric shock and maintenance warnings

The system made up of the control board (including any optional cards) and the CAN serial card represents a control device to be incorporated in class 1 or 2 appliances. The class of protection against electric shock depends on how the control device is integrated into the unit built by the manufacturer.

Disconnect power before working on the board during assembly,

maintenance and replacement.

The protection against short circuits must be guaranteed by the manufacturer of the appliance that the controller will be fitted on, or by the installer.

Technical specifications

Power supply	8 to 38 Vdc Maximum power input: 900 mW
Screw terminals	Cable size: 28-16 AWG
Insulation	Board not optically isolated. See the user manual for the controller it is installed on
Index of protection	IP00
Storage conditions	-20T80 °C, humidity 80% rH non-condensing
Operating conditions	0T60 °C, humidity <90% rH non-condensing
Pollution	Normal
Cat. of resistance to heat and fire:	D
PTI of insulating materials:	for all materials PTI≥250
Software class and structure:	A
Period of stress across the insulating parts:	long

Tab. 7.m

7.6 Remote control

Assembly and installation instructions

If using this with a master fan tile unit, make sure that the resistor has been inserted between terminals GN and V+ (on the fan tile unit) and that the receiver board HYIR***** has been connected.



Warnings: Disconnect the power supply before performing installation and maintenance operations on the fan tile unit.

Adopt precautions against electrostatic discharges when handling the fan tile unit board.

Technical specifications

Power supply	Two 1.5 V "AAA" batteries.
Storage conditions	-20T80 °C, humidity 80% rH non-condensing
Operating conditions	0T60 °C, humidity <90% rH non-condensing
Pollution	Normal. The batteries should be disposed of according to the standards in force
Type of communication	Infrared

Tab. 7.n

7.7 Dimensions

Also see Figs. 3.b.a, 3.b.b and 3.e.

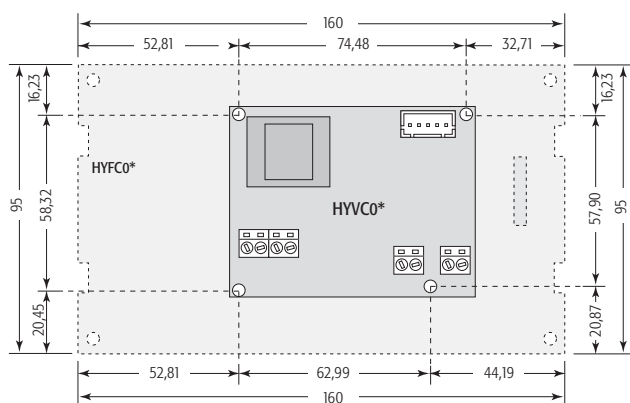


Fig. 7.a

7.8 Codes

For the description of all the e-drofan FTU products, see the "installer" section.

description	quantity	code
Main board		
e-drofan FTU: Electronic controller for fan tile units, single package	1 pc	HYFT000000
e-drofan FTU: Electronic controller for fan tile units, multiple package	25 pcs	HYFT000001
Terminal		
Acqua remote terminal for e-drofan FTU, single package	1 pc	HYPA001000
Acqua remote terminal for e-drofan FTU, multiple package	25 pcs	HYPA001001
e-droset flush mount terminal for e-drofan FTU, single package	1 pc	HYPA003000
Accessories		
Programming key	1 pc	PSOPZKEY00
Programming key with power supply	1 pc	PSOPZKEYA0
Adapter for e-drofan FTU programming key	1pz	HYKA000000
e-drofan FTU TRIAC/relay expansion board, multiple package	50 pcs	HYVC000M01
Serial options		
CANbus serial card for e-drofan FTU, single package	1 pc	HYSC00F0C0
RS485 serial card for e-drofan FTU, single package	1 pc	HYSC00F0P0
Remote control options		
IR receiver board cable, 24 cm, multiple package of 25 pcs	25 pcs	HYCB000201
IR receiver board cable, 50 cm, multiple package of 25 pcs	25 pcs	HYCB000501
IR receiver board, multiple package	50 pcs	HYIR000001
IR receiver board + 50 cm cable, multiple package	50 pcs	HYIR000501
Remote control, single package	1 pc	HYHS001000
Remote control, multiple package	50 pcs	HYHS001001
Probes		
HP NTC probes 40 cm	50 pcs	NTC004HP0R
HP NTC probes 60 cm	50 pcs	NTC006HP0R
HP NTC probes 100 cm	50 pcs	NTC010HP0R
HP NTC probes 160 cm	50 pcs	NTC016HP0R

Tab. 7.o

Notes

CAREL

CAREL S.p.A.

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