EV3 MVC & EVD MVC

Controllers for mechanical ventilation units for air renewal and heat recovery

Application Manual | ENGLISH

Code 144EV3MVE104

Important

Read this manual carefully before installation and before using the devices and take all the prescribed precautions. Keep this manual with the devices for future consultation.

Only use the devices in the ways described in this manual. Do not use these devices as safety devices.

Disposal

The devices must be disposed of according to local regulations governing the collection of electrical and electronic waste.

In accordance with the Declaration of Conformity to the EU R&TTE Directive, model EVJ LCD with a built-in Bluetooth low energy sensor may be used in the following nations: Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, the Netherlands and the United Kingdom.

Index

1 INTRODUCTION

EV3 MVC and EVD MVC are controllers for the management of mechanical ventilation units for air renewal and handling, capable of complying with the most rigorous standards for air-quality and building energy certification.
Independent management of the supply and extraction fans, both EC modulating and multi-speed types, makes possible optimum flow distribution in all situations. Environmental comfort, in terms of temperature and humidity, is achieved by the ability to manage different recovery heat exchangers, with free-cooling and free-heating functions, and sources of heating/cooling.
EVCO offers the MVC solution in both the compact EV3 version (12 VAC and panel installation) and the split EVD version (115... 230 VAC and DIN rail installation). In both cases it is possible to connect the stylish EVJ LCD remote user interface, it is easy to install (wall-mounted) and it can be integrated into any environment.
With 6 capacitive keys and an optional Bluetooth BLE communication module, EVJ LCD provides end-users with easy, intuitive control of the unit using the EVcontrol APP, for Android and iOS platforms, transforming your smartphone or tablet into a state-of-the-art remote control.

1.1 Models available, purchasing codes and technical features

The table below shows the models available, the purchasing codes and the technical features of the devices.

Models available	EV3 MVC	EVD MVC	EVD EXP	EV3K11	EVJ LCD
Version					
Blind		•	•		
Built-in LED (4+4 digit)	•			•	
Built-in LCD (3+4 digit)					•
Connections					
Micro-Fit connectors	•	•	•		
Edge connectors	•				
Fixed screw terminal blocks					•
Plug-in screw terminal blocks	•	•	•	•	
Power supply					
12 VAC not insulated	•				
12 VAC/DC not insulated				•	•
115... 230 VAC insulated		•	•		
Configurable inputs					
NTC or dry contact	5	5	5		2
NTC/4-20 mA/0-10 V or dry contact	2	2	2		
Digital inputs					
dry contact/tachometric	2	2	2		
dry contact	1	1	1		
Analogue outputs					
0-10 V/PWM/phase cutting	2	2	2		
Digital outputs (electro-mechanical relays; A res. @ 250 VAC)					
Relays	4	4	4		

Digital outputs (triac; A res. @ 250 VAC)					
triac	2				
Digital outputs (open collector)					
open collector		1	1		
Communications ports					
INTRABUS	•	•	•	•	•
RS-485 MODBUS	•	•			
Other features					
Clock	•	•			
Buzzer	•			•	•

Purchasing codes

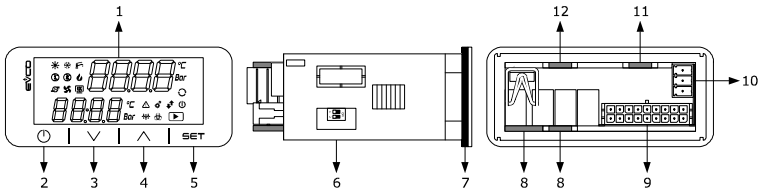
- EV3 MVC: - **EV3934LM2** (no option)
  - **EV3936LM2GF** (2 triac + RS-485 MODBUS port + clock)
- EVD MVC: **EVD934BM9MF**
- EVD EXP: **EVD094EM9**
- EVJ LCD: - **EVJD900N2VW** (no built-in sensor)
  - **EVJD900N2VWIV** (built-in Bluetooth sensor)
  - **EVJD920N2VW** (built-in temperature and humidity sensor)
  - **EVJD920N2VWIV** (Bluetooth sensor + built-in temperature and humidity sensor)
- EV3K11: **EV3K11X0CT**

2 DESCRIPTION

The following paragraphs contain a description of the various devices that can used for the management of MVC units.

2.1 Description of EV3 MVC

The diagram below shows the layout of the EV3 MVC controller for panel installation in standard 74x32mm format.



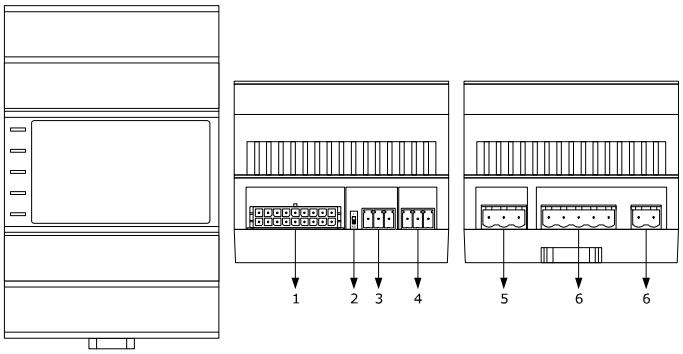
The table below describes each part of the EV3 MVC.

Part	Description
1	display
2	On/Off key, subsequently also called the On/Stand-by key
3	Decrease key, subsequently also called the Down key
4	Increase key, subsequently also called the Up key
5	Setting key, subsequently also called the Set key
6	Micro-switch for the termination resistor for the RS-485 MODBUS line
7	Seal
8	Edge connector joint for the digital output cabling with electro-mechanical relay (for future reference, the digital outputs DO1... DO4)
9	Male Micro-Fit connector for cabling for power, analogue inputs, digital inputs, analogue outputs and the INTRABUS port.
10	Plug-in screw terminal block, male only, for cabling for the RS-485 MODBUS port
11	Edge connector joint for the triac output cabling (for future reference, output TK1).
12	Edge connector joint for the triac output cabling (for future reference, output TK2).

The table gives the maximum provided.

2.2 Description of EVD MVC and EVD EXP

The diagram below shows the layout of the EVD MVC and EVD EXP controller and I/O expansion for installation in an electrical switchboard on a DIN rail in standard 4 DIN-module format.

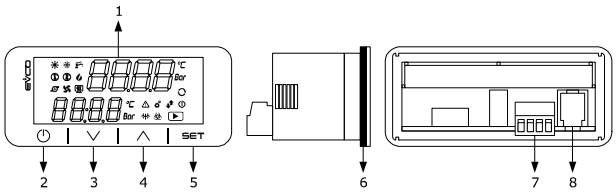


The table below describes each part of the EVD MVC.

Part	Description
1	Male Micro-Fit connector for cabling for analogue inputs, digital inputs, analogue outputs and the open collector digital output (for future reference, the digital output OC1)
2	Micro-switch for the termination resistor for the RS-485 MODBUS line (not available for EVD EXP)
3	Plug-in screw terminal block, male only, for cabling for the RS-485 MODBUS port (not available for EVD EXP)
4	Plug-in screw terminal block, male only, for cabling for the INTRABUS port
5	Plug-in screw terminal block, male only, for cabling for the digital outputs with electro-mechanical relay (for future reference, the digital outputs DO1 and DO2)
6	Plug-in screw terminal block, male only, for cabling for the power supply, electrical-mechanical relay digital outputs (for future reference, the digital outputs DO3 and DO4)

2.3 Description of EV3K11

The diagram below shows the layout of the EV3K11 remote keypad for panel installation in standard 74x32mm format.

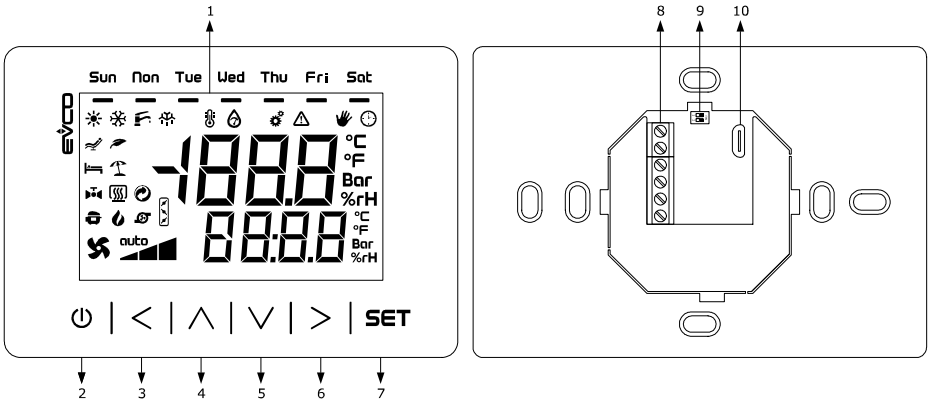


The table below describes each part of the EV3K11.

Part	Description
1	display
2	On/Off key, subsequently also called the On/Stand-by key
3	Decrease key, subsequently also called the Down key
4	Increase key, subsequently also called the Up key
5	Setting key, subsequently also called the Set key
6	Seal
7	Male + female plug-in screw terminal block for cabling for the power supply and the INTRABUS port
8	unused

2.4 Description of EVJ LCD

The diagram below shows the layout of the EVJ LCD remote keypad for wall installation in 111.4x76.4 mm format.



The table below describes each part of the EVJ LCD.

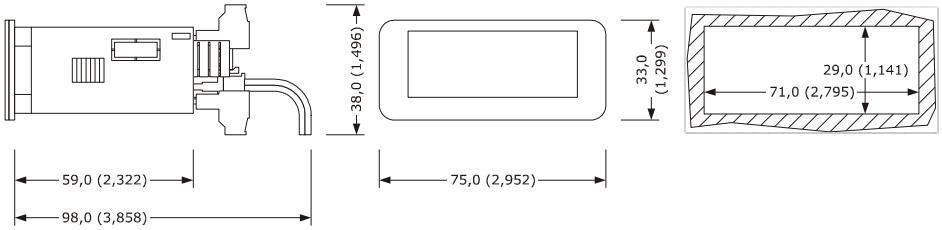
Part	Description
1	Multi-functional display
2	On/Off key, subsequently also called the On/Stand-by key
3	Left key, subsequently also called the Left key
4	Increase key, subsequently also called the Up key
5	Decrease key, subsequently also called the Down key
6	Right key, subsequently also called the Right key
7	Setting key, subsequently also called the Set key
8	Screw terminal block for cabling for the power supply and the INTRABUS port
9	unused
10	unused

The table gives the maximum provided.

3 MEASUREMENTS AND INSTALLATION

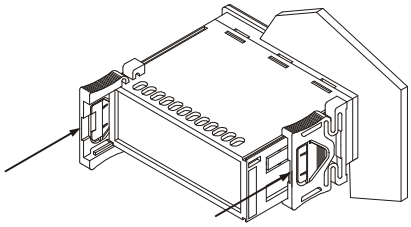
3.1 Measurements and installation of EV3 MVC

The pictures below show the measurements of EV3 MVC; measurements are expressed in mm (inches).



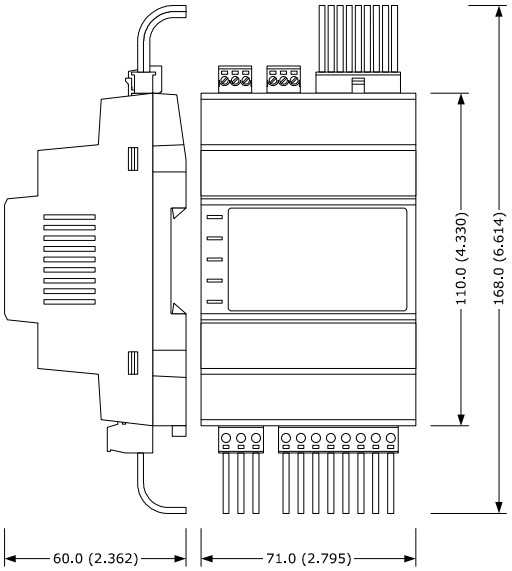
To be installed on a panel with snap-in brackets provided.

The thickness of the panel on which EV3 MVC is to be installed must be between 0.8 and 2.0mm (0.031 and 0.078 in).



3.2 Measurements and installation of EVD MVC and EVD EXP

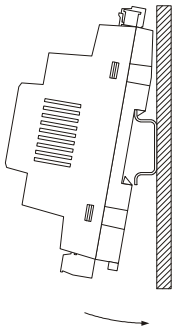
The picture below shows the measurements of EVD MVC and EVD EXP (4 DIN modules); measurements are expressed in mm (inches).



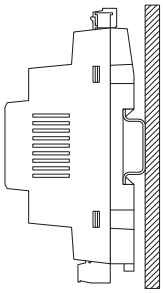
Installation is on a DIN rail 35.0 x 7.5mm (1.377 x 0.295 in) or 35.0 x 15.0mm (1.377 x 0.590 in), in a control panel.

The pictures below show how to install the EVD MVC and EVD EXP.

1

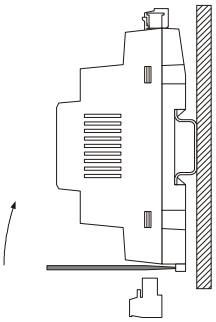


2

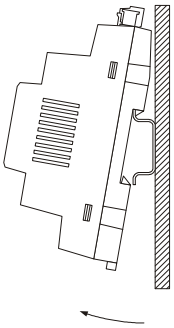


To remove the EVD MVC and EVD EXP, first remove any plug-in screw terminal blocks fitted in the lower part, then, using a screwdriver, loosen the DIN rail clip, as shown in the pictures below.

3



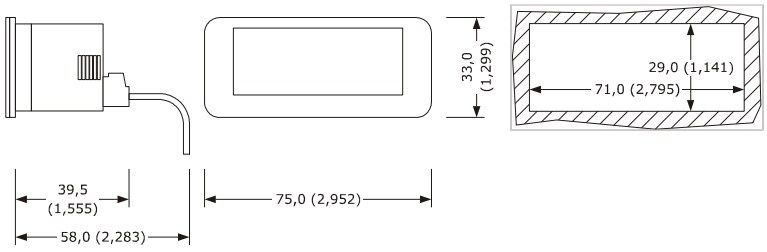
4



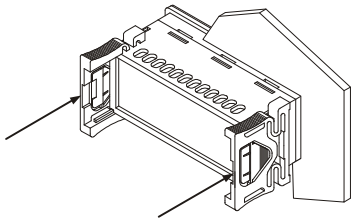
To re-install the EVD first press the DIN rail clip fully in.

3.3 Measurements and installation of EV3K11

The pictures below show the measurements of EV3K11; measurements are expressed in mm (inches).

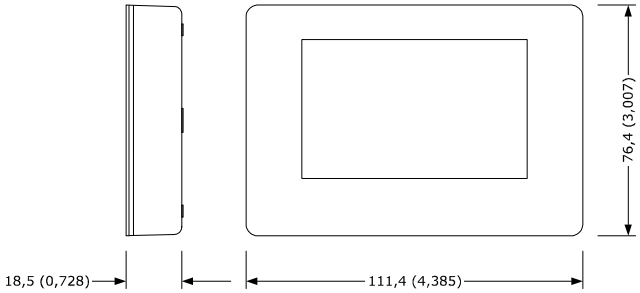


To be installed on a panel with snap-in brackets provided.
The thickness of the panel on which the EV3K11 is to be installed must be between 0.8 and 2.0mm (0.031 and 0.078 in).

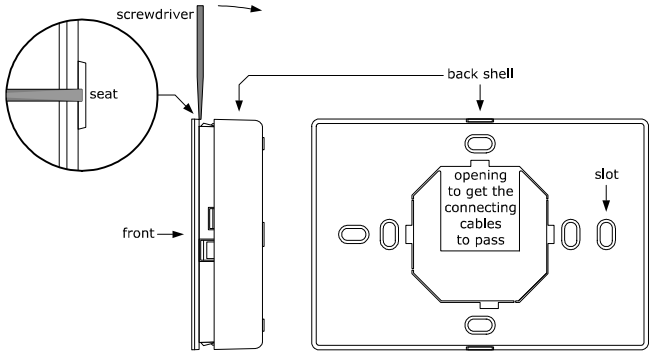


3.4 Measurements and installation of EVJ LCD

The pictures below show the measurements of EVJ LCD; measurements are expressed in mm (inches).



To be installed on a wall (with fixing screws and plugs) or in a 502E or 503E built-in box (with fixing screws).



3.5 Installation precautions

- Ensure that the working conditions for the devices (operating temperatures, humidity, etc.) are within the set limits. See the section TECHNICAL SPECIFICATIONS.
- Do not install the devices close to heat sources (heaters, hot air ducts, etc.), equipment with a strong magnetic field (large diffusers, etc.), in places subject to direct sunlight, rain, damp, excessive dust, mechanical vibrations or shocks.
- In compliance with safety regulations, the devices must be installed properly to ensure adequate protection from contact with electrical parts. All protective parts must be fixed in such a way as to need the aid of a tool to remove them.

4 USER INTERFACE

4.1 Key functions

The table below shows the functions of the keys.
In the EVJ LCD the left and right keys have no function.

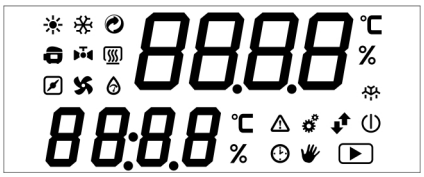
Key	Name	Function
⏻	On/stand-by	- Prolonged pressure will switch the device on or off. - Prolonged pressure will reset the manual re-arm alarms - While setting the parameters, it functions as a "Back" key. - each simple press of this key changes the operating mode of the equipment that is compatible with the enabled operating modes, according to the sequence … → cold → hot → automatic → cold → …
SET	set	- Prolonged pressure makes it possible to enter or exit the set-up menu - pressing this key makes it possible to change the parameter and setpoint values and to confirm these once they have been set - simply press the main screen to provide quick access to the setpoint setting menu - During navigation of the menu this key has the "enter" function
∧	up	- prolonged pressure on the main screen provides quick access to the machine status menu - simply press this key to move to a higher menu while navigating the menu - simply press this key to increase the value of the variable to be modified by a certain quantity if the variable is in edit mode
∨	down	- simply press this key to move to a lower menu while navigating the menu - simply press this key to decrease the value of the variable to be modified by a certain quantity if the variable is in edit mode

4.2 Display

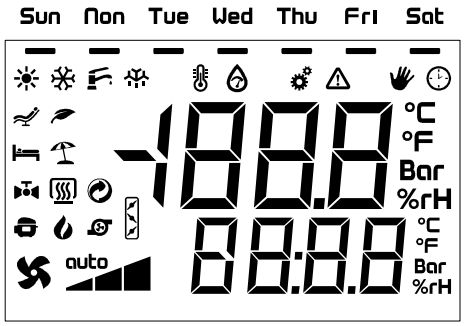
The INTRABUS serial port allows connection of an expansion and a display with choice between the EVJ LCD and EV3K11.
The upper display shows the value of the room probe if the regulation is in follow-on mode or based on the room temperature, of the supply probe if the regulation is carried out according to it or the thermostat input status if one of the digital inputs has been so configured.
The lower display shows the current alarm or a choice of the time, humidity, operating temperature setpoint, external temperature, fan speed or fan pressure capacity/differential (parameter C20).
The LEDs flash in three ways:

- Slow flash: 0.5 Hz
- Normal flash: 1 Hz
- Rapid flash: 2.5 Hz

EV3MVC and EV3K11 display



EVJ LCD display



LED EVJ LCD	LED EV3 MVC and EV3K11	Description
		Controller LED in hot/summer mode (C21) - ON if the controller is switched on in hot/summer mode (C21) - OFF if the controller is switched off or in cold/winter mode (C21) - it flashes slowly if the automatic season change function is activated
		Controller LED in cold/winter mode (C21) - ON if the controller is switched on in cold/winter mode (C21) - OFF if the controller is switched off or in hot/summer mode (C21) - it flashes slowly if the automatic season change function is activated
		Recovery heat exchanger LED - ON if the recovery heat exchanger is activated - OFF if the recovery heat exchanger is switched off - it flashes if the free heating/cooling function is activated
		Compressor LED - ON if the compressor is switched on - OFF if the compressor is switched off - it flashes if timing is in progress
		Water coil valve LED - ON if the valve is open - OFF if the valve is shut - it flashes if there is movement
		Electric coil LED - ON if the coil is switched on - OFF if the coil is switched off
		Mixing chamber damper LED - ON if the damper is open - OFF if the damper is shut - it flashes slowly (frequency 1 Hz) if CO_2 or humidity regulation is activated - it flashes (frequency 2 Hz) if the free heating/cooling function is activated - it flashes rapidly (4 Hz) if the external air limitation function is activated
		Fan LED - ON if the fans are switched on - OFF if the fans are switched off - it flashes if timing is in progress
		Fan mode LED - ON if fans are regulating CO_2, humidity - it flashes if the forced-air ventilation input is activated

		- it flashes rapidly if the external air limitation function is activated - otherwise it is OFF
		Fan speed LED It shows the speed at which the fans are operating
°C		LED for the unit of measurement of the value shown on the upper display when the probe is configured for temperature and the unit of measurement is °C (C59)
%rH	%	LED for the unit of measurement of the value shown on the upper display when the probe is configured as a humidity sensor (not used)
	%	LED for the unit of measurement of the value shown on the upper display when the unit of measurement is a percentage (not used)
Bar		LED for the unit of measurement of the value shown on the upper display when the probe is configured for pressure (not used)
°F		LED for the unit of measurement of the value shown on the upper display when the probe is configured for temperature and the unit of measurement is °F (C59)
°C		LED for the unit of measurement of the value shown on the lower display when the probe is configured for temperature and the unit of measurement is °C (C59)
%rH	%	LED for the unit of measurement of the value shown on the lower display when the probe is configured as a humidity sensor
	%	LED for the unit of measurement of the value shown on the lower display when the unit of measurement is a percentage
Bar		LED for the unit of measurement of the value shown on the lower display when the probe is configured for pressure (not used)
°F		LED for the unit of measurement of the value shown on the lower display when the probe is configured for temperature and the unit of measurement is °F (C59)
		Dehumidifier LED - ON if dehumidifying is required - it flashes slowly if the dehumidifying is required - otherwise it is OFF
		Heat regulation LED - ON if heat regulation or post-heating is required - otherwise it is OFF
		Timer setting LED - ON if timer-setting regulation is activated - OFF for manual regulation
		Manual mode LED - ON if manual mode regulation is activated - OFF if timer-setting regulation is activated
		Comfort LED - ON if comfort timer-setting regulation is used - otherwise it is OFF
		Economy mode LED - ON if economy timer-setting regulation is used - otherwise it is OFF
		Night-time LED - ON if night-time timer-setting regulation is used - otherwise it is OFF

		Holiday LED - ON if holiday timer-setting regulation is used - otherwise it is OFF
		Settings LED - ON if the device is not in primary view - OFF during normal functioning
		Alarm LED - ON if an alarm is underway - OFF if no alarm is underway
		Communication LED - it flashes if communication with the INTRABUS or RS-485 port is in progress - otherwise it is OFF
		Defrost LED - OFF if defrosting is underway - OFF if defrosting is not in progress or is completed - it flashes during dripping - it flashes slowly if timings are in progress
		On/stand-by LED - ON if the controller is switched off (stand-by) - OFF if the controller is switched on
		Play LED - always on
---		Days of the week (screen printed on the front of the EVJ LCD)
		Not used
		Not used
		Not used

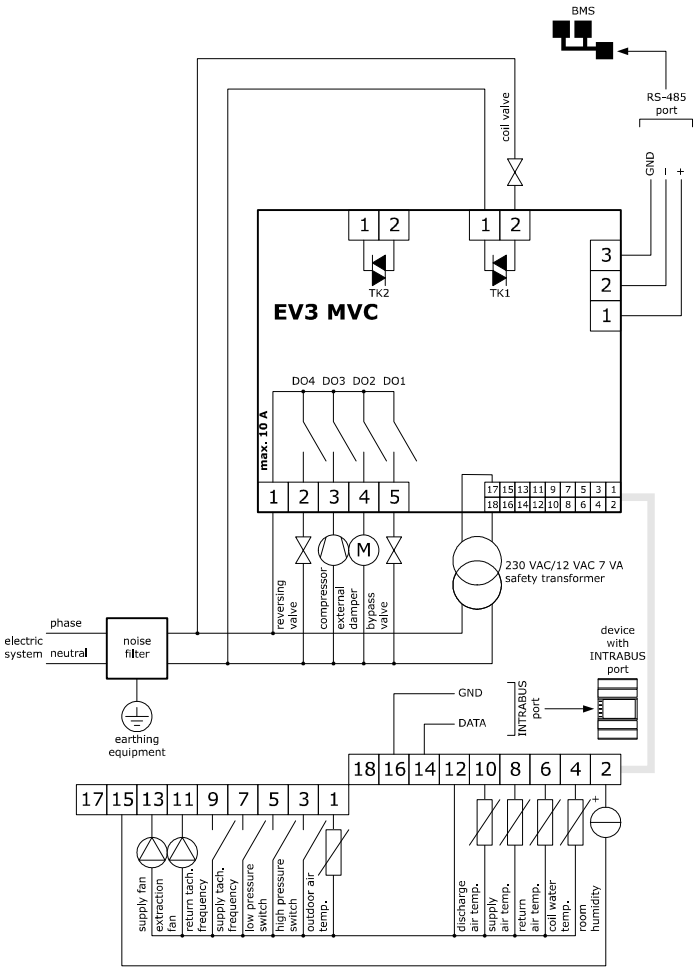
4.3 EVD MVC and EVD EXP LEDs

The table below gives a description of the EVD MVC and EVD EXP signalling LEDs.

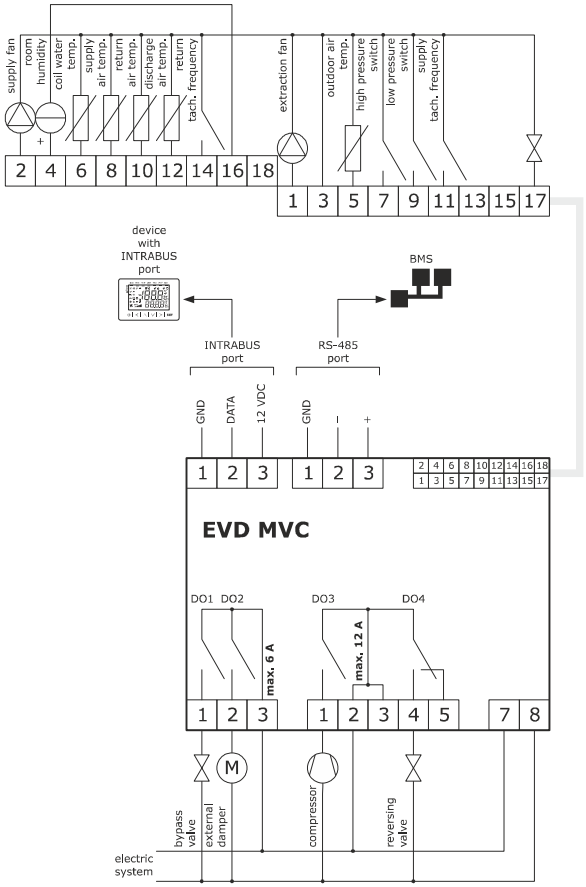
LED	Colour	Description
ON	GREEN	Hardware LED. On if the device is powered.
RUN	GREEN	RUN LED - ON if the controller is switched on - OFF if the controller is switched off (stand-by)
	RED	Alarm LED - ON if an alarm is underway - OFF if no alarm is underway
IB	AMBER	Intrabus LED - FLASHING if communication in progress - OFF if no communication in progress
RS-485	AMBER	Modbus LED - FLASHING if communication in progress - OFF if no communication in progress

5 ELECTRICAL CONNECTION

5.1 Example of EV3 MVC electrical connection



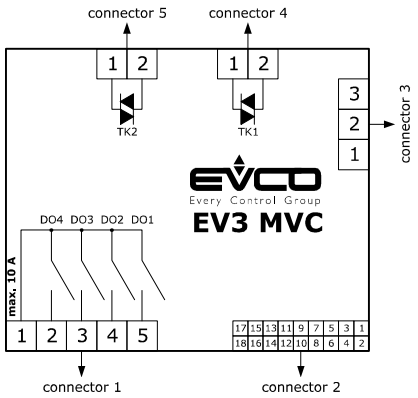
5.2 Example of EVD MVC electrical connection



5.3 Description of connectors

Description of connectors for EV3 MVC

The picture below shows the layout of the EV3 MVC connectors.



The tables below describe the EV3 MVC connectors. The tables give the maximum provided.

Connector 1

Part	Description
1	relay digital outputs DO1... DO4 (max. 10 A): common
2	relay digital output DO4 (3 A SPST): normally open
3	relay digital output DO3 (3 A SPST): normally open
4	relay digital output DO2 (3 A SPST): normally open
5	relay digital output DO1 (3 A SPST): normally open

Connector 2

Part	Description
1	Analogue input IN6
2	Analogue input IN1
3	Analogue input IN7
4	Analogue input IN2
5	Dry contact digital input/pulse input IN8
6	Analogue input IN3
7	Dry contact digital input/pulse input IN9
8	Analogue input IN4
9	Dry contact digital input IN10
10	Analogue input IN5
11	Analogue output AO1
12	reference (GND)
13	Analogue output AO2
14	INTRABUS port signal:
15	Output 12 VDC, max. 40 mA

16	reference (GND)
17	EV3 MVC power supply (12 VAC)
18	EV3 MVC power supply (12 VAC)

Connector 3

Part	Description
1	Positive signal RS-485 MODBUS port
2	Negative signal RS-485 MODBUS port
3	reference (GND)

Connector 4

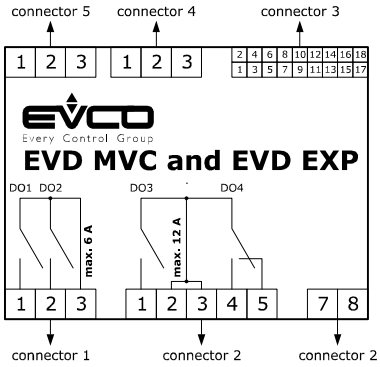
Part	Description
1	Triac TK1 output: common
2	Triac TK1 output (200 mA): normally open

Connector 5

Part	Description
1	Triac TK2 output: common
2	Triac TK2 output (2 A): normally open

Description of EVD MVC and EVD EXP connectors

The picture below shows the layout of the EVD MVC and EVD EXP connectors.



The tables below show the description of the EVD MVC and EVD EXP connectors.

Connector 1

Part	Description
1	relay digital output NO1 (3 A SPST)
2	relay digital output NO 2 (3 A SPST)
3	relay digital outputs CO1/2 (max. 6 A): common

Connector 2

Part	Description
1	relay digital output DO3 (12 A SPST): normally open
2	relay digital output DO3 and D04: common
3	relay digital output DO3 and D04: common
4	relay digital output DO4 (8 A SPDT): normally open
5	relay digital output DO4 (8 A SPST): normally closed
7	EVD MVC power supply (115... 230 VAC insulated)
8	EVD MVC power supply (115... 230 VAC insulated)

Connector 3

Part	Description
1	Analogue output AO2
2	Analogue output AO1
3	reference (GND)
4	Dry contact analogue/digital input IN1
5	Dry contact analogue/digital input IN10
6	Dry contact analogue/digital input IN2
7	Dry contact analogue/digital input IN9
8	Dry contact analogue/digital input IN3
9	Dry contact digital input/pulse input IN8

10	Dry contact analogue/digital input IN4
11	Dry contact digital input/pulse input IN7
12	Dry contact analogue/digital input IN5
13	GND
14	Dry contact digital input IN6
15	unused
16	12 VDC, max. 40 mA
17	Open collector digital output OC1 (12 V, max. 40 mA)
18	reference (GND)

Connector 4 (not present in EVD EXP)

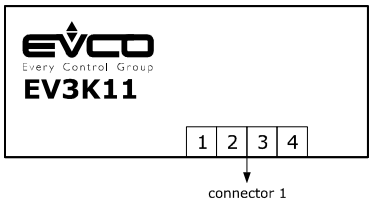
Part	Description
1	reference (GND)
2	Negative signal RS-485 MODBUS port
3	Positive signal RS-485 MODBUS port

Connector 5

Part	Description
1	INTRABUS port reference (GND)
2	INTRABUS port signal
3	12 VDC output

Description of EV3K11 connectors

The picture below shows the layout of the EV3K11 connectors.



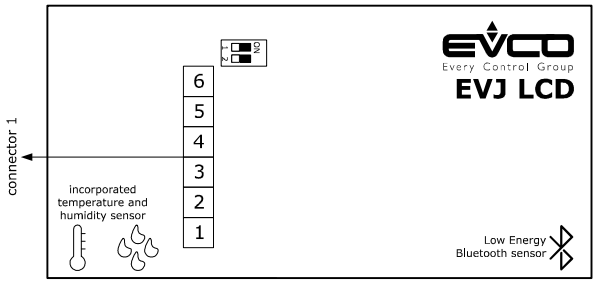
The table below describes the EV3K11 connectors.

Connector 1

Part	Description
1	EV3K11 (12 VAC/DC) power supply; if EV3K11 is fed by DC power, connect the positive pole
2	unused
3	INTRABUS port signal
4	EV3K11 power supply reference (GND) and INTRABUS port

Description of connectors for EVJ LCD

The picture below shows the layout of the EVJ LCD connectors.



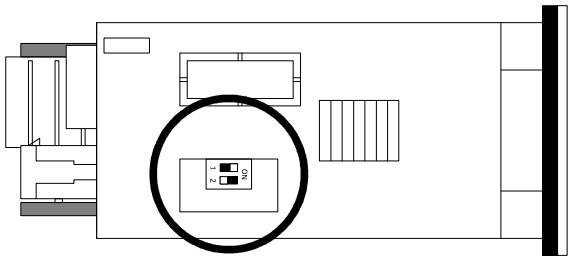
The table below describes the EVJ LCD connectors. La tabella fa riferimento alla dotazione massima.

Connector 1

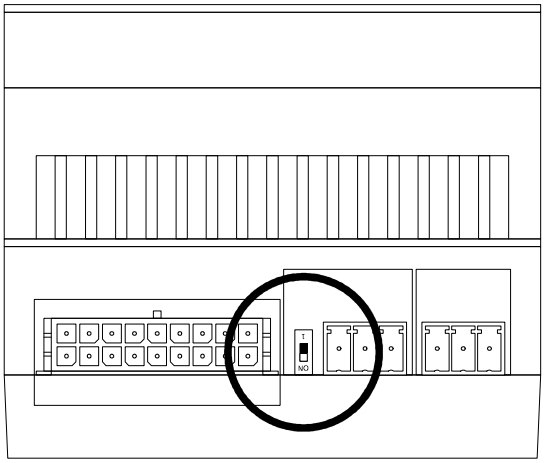
Part	Description
1	INTRABUS port reference (GND)
2	INTRABUS port signal
3	EVJ LCD (12 VAC/DC) power supply; if EVJ LCD is fed by DC power, connect the negative pole
4	EVJ LCD (12 VAC/DC) power supply; if EVJ LCD is fed by DC power, connect the positive pole
5	unused
6	unused

5.4 Termination resistor for the RS-485 MODBUS line

To terminate the RS-485 MODBUS line of the EV3 MVC, place micro-switch 1 in position ON. Do not touch micro-switch 2.



To terminate the RS-485 line of the EVD MVC, place micro-switch 1 in position ON.



5.5 Precautions for electrical connection

- Do not use electric or pneumatic screwdrivers on the terminal blocks of the devices.
- If the devices have been moved from a cold to a warm place, the humidity may cause condensation to form inside. Wait about an hour before switching on the power.
- Make sure that the supply voltage, electrical frequency and power of the devices correspond to the local power supply. See the section TECHNICAL SPECIFICATIONS.
- Disconnect the devices from the power supply before doing any type of maintenance.
- The devices must be fed by power of the same phase as that feeding any module with a phase-cutting command signal.
- If TRIAC digital outputs are used it is advisable to connect a noise filter; do not touch the heat sink because it may reach very high temperatures.
- Connect the devices to the RS-485 network using a screened cable with a twisted pair for the signal and an independent third wire for connecting the reference (GND); the shield (braid) is earthed at a single point to avoid parasitic currents; a BELDEN 3106A cable or equivalent is recommended.
- Connect the power cables as far away as possible from those for the signal.
- Do not use the devices as safety devices.
- For repairs and for further information on the devices, contact the EVCO sales network.

6 MENU

6.1 Menu list

The following menus are available:

SEt Provides access to the quick setting function of the regulation setpoints

- FAN: fan speed setpoint regulation
- dAM: open fan setpoint regulation
- tMP: temperature setpoint regulation
- tbM: operating timer settings

StA Shows machine status (see chapter 11)

AL Shows the list of alarms underway (see section 10)

PAr Shows and allows the device parameters to be altered. The parameters are grouped according to their function, identified on the display by a label. Each parameter has an alphabetic code followed by two numbers, as shown in the table below.

Group	Identification label	Parameter code
Timer settings	tb	t
Setpoint	SP	P
Configuration	CnF	C
Defrost	dEF	d
Alarm	ALM	A
Inputs/outputs	IO	I

Hr Shows the operating hours

- HCP: compressor operating hours
- HFA: fan operating hours
- HUn: unit operating hours

Press the SET key for about 3 seconds to set the operating hours to zero if at least the service level password has been entered

HiS Enables up to 20 alarm events to be saved

- ViS: the historical details are shown on the lower display in the following sequence:
- y xx year if the clock is available or alarm number
- M xx month if the clock is available
- d xx day if the clock is available
- hh:mm hours:minutes if the clock is available
- cLS: deletes historical details

rtc Enables the time to be set in devices with a clock

- YEA: set year
- Mon: set month
- dAY: set date
- UdA: set day of the week
- Hou: set hour
- Min: set minutes

inFo Enables the project data to be seen in this sequence

Project

Variation

Revision:Version

PAS Enables the password to be entered to access the desired level: parameter C18 for servicer level, C19 for manufacturer level.

7 PARAMETERS

7.1 Configuration parameters

Label	Default	Min.	Max.	U.M.	Description
t01	0	0	2		Timer setting mode 0 = OFF 1 = ON 2 = Holiday
t02	26	0	95	1/4 h	Start time setting 1 type A
t03	2	0	4		Setting 1 type A mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t04	32	0	95	1/4 h	Start time setting 2 type A
t05	3	0	4		Setting 2 type A mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t06	64	0	95	1/4 h	Start time setting 3 type A
t07	2	0	4		Setting 3 type A mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t08	84	0	95	1/4 h	Start time setting 4 type A
t09	4	0	4		Setting 4 type A mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t10	28	0	95	1/4 h	Start time setting 1 type B
t11	2	0	4		Setting 1 type B mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t12	40	0	95	1/4 h	Start time setting 2 type B

Label	Default	Min.	Max.	U.M.	Description
t13	3	0	4		Setting 2 type B mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t14	64	0	95	1/4 h	Start time setting 3 type B
t15	2	0	4		Setting 3 type B mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t16	88	0	95	1/4 h	Start time setting 4 type B
t17	4	0	4		Setting 4 type B mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t18	28	0	95	1/4 h	Start time setting 1 type C
t19	2	0	4		Setting 1 type C mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t20	40	0	95	1/4 h	Start time setting 2 type C
t21	3	0	4		Setting 2 type C mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly 4 = Night-time
t22	48	0	95	1/4 h	Start time setting 3 type C
t23	2	0	4		Setting 3 type C mode 1 = Disabled 2 = OFF 3 = Comfort 4 = Eco-friendly 5 = Night-time
t24	88	0	95	1/4 h	Start time setting 4 type C
t25	4	0	4		Setting 4 type C mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Eco-friendly

Label	Default	Min.	Max.	U.M.	Description
					4 = Night-time
t26	0	0	2		Setting type for Monday 0 = Type A 1 = Type B 2 = Type C
t27	0	0	2		Setting type for Tuesday 0 = Type A 1 = Type B 2 = Type C
t28	0	0	2		Setting type for Wednesday 0 = Type A 1 = Type B 2 = Type C
t29	0	0	2		Setting type for Thursday 0 = Type A 1 = Type B 2 = Type C
t30	0	0	2		Setting type for Friday 0 = Type A 1 = Type B 2 = Type C
t31	1	0	2		Setting type for Saturday 0 = Type A 1 = Type B 2 = Type C
t32	2	0	2		Setting type for Sunday 0 = Type A 1 = Type B 2 = Type C
t33	16	0	100		Holiday end year
t34	1	1	12		Holiday end month
t35	1	1	31		Holiday end day
t36	0	0	23		Holiday end hour
SP	Setpoint parameter menu				
P01	21,0	-50,0	90,0	°C	Temperature setpoint hot mode comfort setting
P02	25,0	-50,0	90,0	°C	Temperature setpoint cold mode comfort setting
P03	-1,0	-12,7	12,7	°C	Temperature offset hot mode economy setting
P04	1,0	-12,7	12,7	°C	Temperature offset cold mode economy setting
P05	-2,0	-12,7	12,7	°C	Temperature offset hot mode night-time setting
P06	2,0	-12,7	12,7	°C	Temperature offset cold mode night-time setting
P07	21,0	-50,0	90,0	°C	Temperature setpoint manual setting in hot mode
P08	25,0	-50,0	90,0	°C	Temperature setpoint manual setting in cold mode
P09	80	0	100	%	Fan speed setpoint comfort setting

Label	Default	Min.	Max.	U.M.	Description
P10	60	0	100	%	Fan speed setpoint economy setting
P11	40	0	100	%	Fan speed setpoint night-time setting
P12	80	0	100	%	Fan speed setpoint manual setting
P13	100	0	100	%	Fan speed setpoint from digital input
P14	40	0	100	%	Damper opening setpoint comfort setting
P15	30	0	100	%	Damper opening setpoint economy setting
P16	20	0	100	%	Damper opening setpoint night-time setting
P17	40	0	100	%	Damper opening setpoint manual setting
CNF	Configuration parameter menu				
C01	30,0	0,0	40,0	°C	Maximum temperature setpoint value in hot mode
C02	10,0	0,0	40,0	°C	Minimum temperature setpoint value in hot mode
C03	30,0	0,0	40,0	°C	Maximum temperature setpoint value in cold mode
C04	10,0	-0,0	40,0	°C	Minimum temperature setpoint value in cold mode
C05	100	0	100	%	Maximum fan setpoint value
C06	10	0	100	%	Minimum fan setpoint value
C07	100	0	100	%	Maximum damper setpoint value
C08	10	0	100	%	Minimum damper setpoint value
C09	ON	OFF	ON		Enable RTC
C10	0	0	255		Parameter reserved for supervisor use
C11	1	0	2		Change-over mode 0 = Manual 1 = Manual+Automatic 2 = Auto
C12	5	0	100	%	Fan/damper control step
C13	1	0	100	s	Increase/decrease fan/damper control time
C14	20	0	100	%	Minimum fan value with compressor ON
C15	20	0	100	%	Minimum fan value with 1 heater ON
C16	20	0	100	%	Minimum fan value with 2 heaters ON
C17	5	0	255	s	Post-ventilation from OFF
C18	-12	-127	127		Servicer password
C19	-123	-127	127		Manufacturer password
C20	3	0	5		Second display 0 = Hour 1 = Humidity 2 = Temperature setpoint 3 = External temperature 4 = Fan speed 5 = Fan pressure capacity/differential
C21	0	0	1		Sun LED meaning 0 = Heating

Label	Default	Min.	Max.	U.M.	Description
					1 = Cooling
C22	1	1	247		MODBUS serial address
C23	0	0	2		Change-over type configuration 0 = on room temperature 1 = on external temperature 2 = on water temperature
C24	30	0	255	min	Change-over mode change delay
C25	20,0	-50,0	90,0	°C	Temperature while changing in hot mode
C26	26,0	-50,0	90,0	°C	Temperature while changing in cold mode
C27	0	0	2		Type of recovery heat exchanger 0 = cross-flow 1 = rotary 2 = thermodynamic
C28	12	0	255	s*10	Minimum compressor off time
C29	36	0	255	s*10	Minimum time between compressor switch-ons
C30	2	0	2		First coil type 0 = Cold 1 = Hot 2 = Reversible
C31	20	0	255	s	Heater activation period in PWM
C32	10,0	0,0	10,0	V	Output voltage PWM active
C33	90	0	255	s	Three-point water valve running time
C34	20	0	100		Maximum number of three-point water valve closures for re-synchronisation
C35	0	-100	100	%	Speed differential supply fans/return fans
C36	20	0	100	%	Minimum recirculation damper value with compressor ON
C37	2,0	0,0	25,5	°C	Regulation band in hot mode
C38	2,0	0,0	25,5	°C	Regulation band in cold mode
C39	5	0	255	%	Heat regulation control step
C40	30	0	255	s	Heat regulation increase/decrease time
C41	2,0	0,0	25,5	°C	Room temperature delta for follow-on regulation in hot mode
C42	2,0	0,0	25,5	°C	Room temperature delta for follow-on regulation in cold mode
C43	5,0	0,0	25,5	°C	Room setpoint delta for follow-on regulation in hot mode
C44	5,0	0,0	25,5	°C	Room setpoint delta for follow-on regulation in cold mode
C45	3	0	3		Dehumidifier mode 0 = OFF 1 = Hot 2 = Cold 3 = Hot/Cold
C46	50	0	100	%	Humidity setpoint
C47	5	0	255	%	Humidity regulation band
C48	1	0	1		Dehumidifier in cold mode with priority over heat regulation

Label	Default	Min.	Max.	U.M.	Description
					0 = OFF 1 = ON
C49	25	0	255	°C	Minimum humidifier supply temperature value
C50	1000	0	5.000	ppm	CO_2 over-modulation setpoint
C51	100	0	5.000	ppm	CO_2 over-modulation band
C52	5	0	255	°C	Free-heating temperature differential setpoint
C53	5	0	255	°C	Free-cooling temperature differential setpoint
C54	1,0	0,0	25,5	°C	Free cooling/heating hysteresis
C55	5,0	0,0	25,5	°C	Off-band setpoint
C56	1000	-5000	5000	Pa m^3/h	Control setpoint in constant pressure/capacity
C57	50	0	5000	Pa m^3/h	Control band in constant pressure/capacity
C58	0	0	1000		k capacity coefficient (in the formula: $q = k\sqrt{\Delta P}$) 0 = Control in constant pressure
C59	0	0	1		Temperature measurement unit 0 = Celsius 1 = Fahrenheit
DEF	Defrost parameter menu				
d01	0	0	3		Refrigeration circuit defrost mode 0 = OFF 1 = ON 2 = with compressor off 3 = time-controlled
d02	-5,0	-50,0	80,0	°C	Refrigeration circuit defrost start setpoint
d03	20	0	255	min	Delay refrigeration circuit defrost activation
d04	15,0	-50,0	80,0	°C	Refrigeration circuit defrost end setpoint
d05	5	0	255	min	Maximum refrigeration circuit defrost time
d06	60	0	255	s	Refrigeration circuit compressor/reversing valve waiting time
d07	6	0	255	sx10	Refrigeration circuit drip time
d08	-20,0	-50,0	90,0	°C	Refrigeration circuit forced defrost start setpoint
d09	5,0	-50,0	80,0	°C	Recovery heat exchanger defrost start setpoint
d10	2,0	0,0	25,5	°C	Recovery heat exchanger defrost regulation band
d11	10,0	-50,0	80,0	°C	Recovery heat exchanger stop setpoint in defrost
d12	20	0	255	%	Maximum difference between supply and suction recovery heat exchanger defrost
d13	0	0	255		Rotary recovery heat exchanger turn time
ALM	Alarm parameter menu				
A01	10.000	0	65.535	h	Maximum fan hour limit 0 = Disabled

Label	Default	Min.	Max.	U.M.	Description
A02	10.000	0	65.535	h	Maximum compressor hour limit 0 = Disabled
A03	0	0	255	s	Fan alarm bypass time
A04	120	0	255	s	Low pressure alarm bypass time
A05	3	0	255		Number of low pressure alarm signals per hour
A06	30	0	255	s	Flow switch alarm bypass time
A07	10	0	255	s	Flow switch alarm delay from flow switch input activation
A08	10	0	255	s	Flow switch alarm delay from flow switch input deactivation
A09	3	0	255		Number of flow switch actions per hour
A10	60	0	255	s	External air damper running time
A11	105	0	255	°C	High discharge temperature setpoint
A12	15,0	0,0	25,5	°C	High discharge temperature alarm hysteresis
A13	60	0	255	s	Correct temperature bypass time from valve activation
A14	60	0	255	s	Antifreeze alarm bypass time
A15	5	-127	127	°C	Antifreeze alarm setpoint
A16	2,0	0,0	25,5	°C	Antifreeze alarm hysteresis
I-O					IO parameter menu
I01	110	-17	110		IN1 input function configuration -17 = Filter pressure switch (NC) -16 = Forced ventilation (NC) -15 = External air damper closed limit switch (NC) -14 = External air damper open limit switch (NC) -13 = Dehumidifier request (NC) -12 = Thermostat request (NC) -11 = Heater thermal switch (NC) -10 = Coil water antifreeze (NC) -9 = Season change (NC) -8 = remote ON-OFF (NC) -7 = Compressor thermal switch (NC) -6 = Low pressure (NC) -5 = High pressure (NC) -4 = Return flow switch (NC) -3 = Supply flow switch (NC) -2 = Return fan flow switch (NC) -1 = Supply fan flow switch (NC) 0 = Disabled 1 = Supply fan flow switch (NO) 2 = Return fan flow switch (NO) 3 = Supply flow switch (NO) 4 = Return flow switch (NO) 5 = High pressure (NO) 6 = Low pressure (NO) 7 = Compressor thermal switch (NO) 8 = remote ON-OFF (NO) 9 = Season change (NO) 10 = Coil water antifreeze (NO)

Label	Default	Min.	Max.	U.M.	Description
					11 = Heater thermal switch (NO) 12 = Thermostat request (NO) 13 = Dehumidifier request (NO) 14 = External air damper open limit switch (NO) 15 = External air damper closed limit switch (NO) 16 = Forced ventilation (NO) 17 = Filter pressure switch (NO) 100 = Room probe 101 = Supply probe 102 = External probe 103 = Discharge probe 104 = Water probe 105 = Compressor defrost probe 106 = Compressor discharge temperature probe 107 = Humidity probe 108 = CO_2 probe 109 = Remote control probe 110 = Differential pressure transducer
I02	101	-17	110		IN2 input function configuration; see parameter I01
I03	102	-17	106		IN3 input function configuration -17 = Filter pressure switch (NC) -16 = Forced ventilation (NC) -15 = External air damper closed limit switch (NC) -14 = External air damper open limit switch (NC) -13 = Dehumidifier request (NC) -12 = Thermostat request (NC) -11 = Heater thermal switch (NC) -10 = Coil water antifreeze (NC) -9 = Season change (NC) -8 = remote ON-OFF (NC) -7 = Compressor thermal switch (NC) -6 = Low pressure (NC) -5 = High pressure (NC) -4 = Return flow switch (NC) -3 = Supply flow switch (NC) -2 = Return fan flow switch (NC) -1 = Supply fan flow switch (NC) 0 = Disabled 1 = Supply fan flow switch (NO) 2 = Return fan flow switch (NO) 3 = Supply flow switch (NO) 4 = Return flow switch (NO) 5 = High pressure (NO) 6 = Low pressure (NO) 7 = Compressor thermal switch (NO) 8 = remote ON-OFF (NO) 9 = Season change (NO) 10 = Coil water antifreeze (NO) 11 = Heater thermal switch (NO) 12 = Thermostat request (NO) 13 = Dehumidifier request (NO) 14 = External air damper open limit switch (NO) 15 = External air damper closed limit switch (NO)

Label	Default	Min.	Max.	U.M.	Description
					16 = Forced ventilation (NO) 17 = Filter pressure switch (NO) 100 = Room probe 101 = Supply probe 102 = External probe 103 = Discharge probe 104 = Water probe 105 = Compressor defrost probe 106 = Compressor discharge temperature probe
I04	103	-17	106		IN4 input function configuration; see parameter I03
I05	104	-17	106		IN5 input function configuration; see parameter I03
I06	16	-17	106		IN6 (EV3)/IN10 (EVD) input function configuration; see parameter I03
I07	9	-17	106		IN7 (EV3)/IN9 (EVD) input function configuration; see parameter I03
I08	18	-17	19		IN8 input function configuration -17 = Filter pressure switch (NC) -16 = Forced ventilation (NC) -15 = External air damper closed limit switch (NC) -14 = External air damper open limit switch (NC) -13 = Dehumidifier request (NC) -12 = Thermostat request (NC) -11 = Heater thermal switch (NC) -10 = Coil water antifreeze (NC) -9 = Season change (NC) -8 = remote ON-OFF (NC) -7 = Compressor thermal switch (NC) -6 = Low pressure (NC) -5 = High pressure (NC) -4 = Return flow switch (NC) -3 = Supply flow switch (NC) -2 = Return fan flow switch (NC) -1 = Supply fan flow switch (NC) 0 = Disabled 1 = Supply fan flow switch (NO) 2 = Return fan flow switch (NO) 3 = Supply flow switch (NO) 4 = Return flow switch (NO) 5 = High pressure (NO) 6 = Low pressure (NO) 7 = Compressor thermal switch (NO) 8 = remote ON-OFF (NO) 9 = Season change (NO) 10 = Coil water antifreeze (NO) 11 = Heater thermal switch (NO) 12 = Thermostat request (NO) 13 = Dehumidifier request (NO) 14 = External air damper open limit switch (NO) 15 = External air damper closed limit switch (NO) 16 = Forced ventilation (NO) 17 = Filter pressure switch (NO) 18 = Supply tachometer (NO) 19 = Return tachometer (NO)

Label	Default	Min.	Max.	U.M.	Description
I09	19	-17	19		IN9 (EV3)/IN7 (EVD) input function configuration; see parameter I08
I10	8	-17	17		IN10 (EV3)/IN6 (EVD) input function configuration -17 = Filter pressure switch (NC) -16 = Forced ventilation (NC) -15 = External air damper closed limit switch (NC) -14 = External air damper open limit switch (NC) -13 = Dehumidifier request (NC) -12 = Thermostat request (NC) -11 = Heater thermal switch (NC) -10 = Coil water antifreeze (NC) -9 = Season change (NC) -8 = remote ON-OFF (NC) -7 = Compressor thermal switch (NC) -6 = Low pressure (NC) -5 = High pressure (NC) -4 = Return flow switch (NC) -3 = Supply flow switch (NC) -2 = Return fan flow switch (NC) -1 = Supply fan flow switch (NC) 0 = Disabled 1 = Supply fan flow switch (NO) 2 = Return fan flow switch (NO) 3 = Supply flow switch (NO) 4 = Return flow switch (NO) 5 = High pressure (NO) 6 = Low pressure (NO) 7 = Compressor thermal switch (NO) 8 = remote ON-OFF (NO) 9 = Season change (NO) 10 = Coil water antifreeze (NO) 11 = Heater thermal switch (NO) 12 = Thermostat request (NO) 13 = Dehumidifier request (NO) 14 = External air damper open limit switch (NO) 15 = External air damper closed limit switch (NO) 16 = Forced ventilation (NO) 17 = Filter pressure switch (NO)
I11	0	-17	110		IN1 expansion input function configuration; see parameter I01
I12	0	-17	110		IN2 expansion input function configuration; see parameter I01
I13	0	-17	106		IN3 expansion input function configuration; see parameter I03
I14	0	-17	106		IN4 expansion input function configuration; see parameter I03
I15	0	-17	106		IN5 expansion input function configuration; see parameter I03
I16	0	-17	106		IN10 expansion input function configuration; see parameter I03
I17	0	-17	106		IN9 expansion input function configuration; see parameter I03
I18	0	-17	19		IN8 expansion input function configuration; see parameter I08
I19	0	-17	19		IN7 expansion input function configuration; see parameter I08
I20	0	-17	17		IN6 expansion input function configuration; see parameter I10
I21	0	0	1		Humidity probe on display

Label	Default	Min.	Max.	U.M.	Description
					0 = OFF 1 = ON
I22	0	0	1		Room temperature probe on display 1 = ON
I23	0	0	2		IN1 input type configuration 0 = NTC/Digital input 1 = 4-20 mA 2 = 0-10 V
I24	0	0	2		IN2 input type configuration; see parameter I23
I26	0	0	2		IN1 expansion input type configuration; see parameter I23
I27	0	0	2		IN2 expansion input type configuration; see parameter I23
I29	0	0	100	%	Start of humidity probe/remote control scale [@4mA/0 V]
I30	100	0	100	%	End of humidity probe/remote control scale [@20mA/10 V]
I31	0	0	5.000	ppm Pa	Start of CO_2 probe/differential pressure scale [@4mA/0 V]
I32	2.000	0	5.000	ppm Pa	End of CO_2 probe/differential pressure scale [@20mA/10 V]
I33	0,0	-12,7	12,7	°C-%- ppm Pa	IN1 analogue input offset
I34	0,0	-12,7	12,7	°C-%- ppm Pa	IN2 analogue input offset
I35	0,0	-12,7	12,7	°C	IN3 analogue input offset
I36	0,0	-12,7	12,7	°C	IN4 analogue input offset
I37	0,0	-12,7	12,7	°C	IN5 analogue input offset
I38	0,0	-12,7	12,7	°C	IN6 (EV3)/IN10 (EVD) analogue input offset
I39	0,0	-12,7	12,7	°C	IN7 (EV3)/IN9 (EVD) analogue input offset
I40	0,0	-12,7	12,7	°C-%- ppm Pa	IN1 expansion analogue input offset
I41	0,0	-12,7	12,7	°C-%- ppm Pa	IN2 expansion analogue input offset
I42	0,0	-12,7	12,7	°C	IN3 expansion analogue input offset
I43	0,0	-12,7	12,7	°C	IN4 expansion analogue input offset
I44	0,0	-12,7	12,7	°C	IN5 expansion analogue input offset
I45	0,0	-12,7	12,7	°C	IN10 expansion analogue input offset
I46	0,0	-12,7	12,7	°C	IN9 expansion analogue input offset
I47	5	-12	12		DO1 digital output function configuration -12 = Alarm (NC) -11 = Humidifier (NC)

Label	Default	Min.	Max.	U.M.	Description
					-10 = Step 2 heater (NC) -9 = Step 1 heater (NC) -8 = Close water valve (NC) -7 = Open water valve (NC) -6 = External air damper (NC) -5 = recovery heat exchanger /bypass damper (NC) -4 = Reversing valve (NC) -3 = Compressor (NC) -2 = Return fan (NC) -1 = Supply fan (NC) 0 = Disabled 1 = Supply fan (NO) 2 = Return fan (NO) 3 = Compressor (NO) 4 = Reversing valve (NO) 5 = recovery heat exchanger/bypass damper (NO) 6 = External air damper (NO) 7 = Open water valve (NO) 8 = Close water valve (NO) 9 = Step 1 heater (NO) 10 = Step 2 heater (NO) 11 = Humidifier (NO) 12 = Alarm (NO)
I48	6	-12	12		DO2 digital output function configuration; see parameter I47
I49	7	-12	12		DO3 digital output function configuration; see parameter I47
I50	12	-12	12		DO4 digital output function configuration; see parameter I47
I51	0	-12	12		TK1 (EV3)/OC (EVD) digital output function configuration; see parameter I47
I52	0	-12	12		TK2 digital output function configuration; see parameter I47
I53	0	-12	12		AO1 digital output function configuration; see parameter I47
I54	0	-12	12		AO2 digital output function configuration; see parameter I47
I55	0	-12	12		DO1 expansion digital output function configuration; see parameter I47
I56	0	-12	12		DO2 expansion digital output function configuration; see parameter I47
I57	0	-12	12		DO3 expansion digital output function configuration; see parameter I47
I58	0	-12	12		DO4 expansion digital output function configuration; see parameter I47
I59	0	-12	12		AO1 expansion digital output function configuration; see parameter I47
I60	0	-12	12		AO2 expansion digital output function configuration; see parameter I47
I61	0	-12	12		OC expansion digital output function configuration; see parameter I47
I63	1	0	5		AO1 analogue output function configuration 0 = Disabled 1 = Water valve 2 = Heater 3 = Supply fan 4 = Return fan 5 = Mixing chamber damper
I64	1	0	5		AO2 analogue output function configuration; see parameter I63
I65	0	0	5		AO1 expansion analogue output function configuration; see parameter I63

Label	Default	Min.	Max.	U.M.	Description
I66	0	0	5		AO2 expansion analogue output function configuration; see parameter I63
I67	0	0	1		TK1 (EV3)/OC (EVD) analogue output function configuration 0 = Disabled (or DO) 1 = Heaters
I68	0	0	1		TK2 analogue output function configuration 0 = Disabled (or DO) 1 = Heaters
I69	0	0	1		OC expansion analogue output function configuration 0 = Disabled (or DO) 1 = Heaters
I71	2	0	4		AO1 analogue output type configuration 0 = Disabled (or DO) 1= Phase cutting 2 = 0-10 V 3 = PWM 4 = Frequency
I72	2	0	4		AO2 analogue output type configuration; see parameter I71
I73	100	1	200	Hz*10	PWM output frequency
I74	0	0	4		AO1 expansion analogue output type configuration; see parameter I71
I75	0	0	4		AO2 expansion analogue output type configuration; see parameter I71
I76	100	1	200	Hz*10	Expansion PWM output frequency

8 INPUT/OUTPUT CONFIGURATION

8.1 Inputs

All ten inputs can be used as digital inputs but only some (IN1, IN2, IN3, IN4, IN5, IN6 and IN7 on EV3 MVC; IN1, IN2, IN3, IN4, IN5, IN9 and IN10 on EVD MVC) can be configured as analogue.
Inputs IN1 and IN2 can be configured using parameters I23, I24 (controller), I26 and I27 (expansion), as shown in the table below, whereas the other analogue inputs are of the temperature type.

Type AI universal

Parameter value I23 - I24 - I26 - I27	Description
0	NTC / Digital input
1	4-20 mA
2	0-10 V

Important: in EV3 MVC, if one of the inputs IN1/IN2 has been set to power, the other one must also be. If this does not happen the reading of the input set to power will be affected by the offset.
The type of probe chosen affects the unit in which measurements are taken: probes measuring temperature are in °C or °F according to the parameter C59 setting, while probes measuring power or voltage use the units Pa or % (%rh in EVJ LCD) according to the conversion scales set by parameters I29-I32 that determine the values at both ends of the scale for sensors configured as humidity, CO_2, pressure or remote control probes.

AI/DI configuration

Parameter value (absolute value) I01 - I20	Description
0	Disabled
1	Supply fan thermal switch
2	Return fan thermal switch
3	Supply flow switch
4	Return flow switch
5	High pressure
6	Low pressure
7	Compressor thermal switch
8	Remote ON-OFF
9	Season change
10	Coil water antifreeze
11	Heater thermal switch
12	Thermostat request
13	Dehumidifier request
14	External air damper open limit switch
15	External air damper closed limit switch
16	Forced ventilation
17	Filter pressure switch

18	Supply tachometer (only for fast digital inputs)
19	Return tachometer (only for fast digital inputs)
100	Room probe
101	Supply probe
102	External probe
103	Discharge probe
104	Water probe
105	Compressor defrost probe
106	Compressor discharge temperature probe
107	Humidity probe (only for universal inputs IN1 and IN2)
108	CO_2 probe (only for universal inputs IN1 and IN2)
109	Remote control probe (only for universal inputs IN1 and IN2)
110	Differential pressure probe (only for universal inputs IN1 and IN2)

8.2 Analogue outputs

There are 2 analogue outputs, AO1 and AO2. The parameters I71, I72, I74 and I75 determine output type: 0-10 V, phase cutting, PWM, frequency or disabled.

AO type

I71 - I72 - I74 - I75 parameter values	Description
0	Disabled (or DO)
1	Phase cutting
2	0-10 V
3	PWM
4	Frequency

The choice of output type affects the unit of measurement. Frequency outputs are measured in Hz whereas phase cutting, power and PWM outputs are measured in %.
If the heaters are driven by a solid-state relay, low-frequency PWM and live voltage can also be regulated and can be configured (between 0 and 10 V) by parameter.
The timing of the resulting square wave (from 0 to 255 seconds) can be configured by parameter C31, while the amplitude of the output signal is configured by parameter C32. In order to use this regulation, the output must be configured as 0-10 V. If a heater is driven by a modulating signal of 0-10 V, parameter C31 is to be set at a 0.

Disabled (or DO)

If it is decided to disable the analogue output it can be used as DO digital output.

Phase cutting

In output a pulse of 500 us is generated, synchronised by the network 0. The delay of the pulse with respect to the zero-cross is calculated so the value set is that of the effective load voltage: under 20% the output is always off, above 90% it is always on.
A fixed start-up time is applied of 1s when the output shifts from 0% to a different value: for this time the output is forced at 100%.
The shift value is fixed at 2.5 ms.

0-10 V

The output voltage varies according to the value set: 0% output always off, 100% output at 10 V.

PWM

A signal with constant frequency and variable duty cycle is generated at the output.
The frequency of the output configured as PWM is determined by the I73 and I76 parameters.
The duty cycle varies according to the value set: 0% output always off, 100% output always on.

Frequency

A signal with variable frequency and fixed duty cycle is generated at the output.
The output frequency varies according to the value set: below 10 Hz the output is always off. Maximum frequency value is 255 Hz. The duty cycle is always 50%.
It is not possible to configure one output at 0-10 V and the other as PWM or frequency. The table below outlines permitted (**O**) and prohibited configurations (**X**).

I71/I72 I74/I75	0	1	2	3	4
0	O	O	O	O	O
1	O	O	O	O	O
2	O	O	O	X	X
3	O	O	X	O	X
4	O	O	X	X	X

Parameters I63, I64, I65 and I66 determine the function of the analogue outputs.

AO configuration

I63 - I64 - I65 - I66 parameter values	Description
0	Disabled
1	Water valve
2	Heater
3	Supply fan
4	Return fan
5	Mixing chamber damper

8.3 Triac and open collector outputs

Model EV3 MVC has 2 triac outputs (with an optional board), while model EVD MVC has an open collector output, which can be configured by parameters I67 and I68 (controller) and I69 (expansion).
If the triac/OC output has been disabled it is possible to use it as a digital output (DO) using parameters I51/I52 and I61 to configure the function.
Triac/OC outputs have % as the unit of measurement.

TK/OC configuration

I67 - I69 parameter value	Description
0	Disabled (or DO)
1	Heaters

In model EVD the TK1 triac output has been replaced with an open collector output.

8.4 Digital outputs

The parameters between I47 and I62 configure the function associated with the digital outputs.

Both analogue and triac outputs can be configured as digital outputs if disabled as analogue outputs as previously explained (parameters I63-I69).

DO configuration

As with the digital inputs, the parameters configuring the function assigned to each digital output consist of an absolute value indicating the function and by a sign showing its polarity.

Negative = Normally closed (NC)

Positive = Normally open (NO)

The value 0 indicates that no function is associated with the digital output.

Absolute value parameters I47 - I61	Description
0	Disabled
1	Supply fan
2	Return fan
3	Compressor
4	Reversing valve
5	Recovery heat exchanger/bypass damper
6	External air damper
7	Open water valve
8	Close water valve
9	Step 1 heater
10	Step 2 heater
11	Humidifier
12	Alarm

8.5 Serial ports

Controllers EV3 MVC and EVD MVC have the following serial ports:

- INTRABUS baud rate 19,200, even, 1 stop bit
  proprietary communications protocol INTRABUS node 1 (MASTER)
- RS-485 baud rate 9,600, even, 1 stop bit
  MODBUS communications protocol node as parameter C22 (default=1).

The EVD EXP expansion has the following serial port.

- INTRABUS baud rate 19,200, even, 1 stop bit
  communications protocol INTRABUS node 5.

The RS-485 serial ports can be used to communicate with a supervision system or a personal computer.

The document "MODBUS/JBUS IMPLEMENTATION TABLE" (document code 1463DMVC104) describes the resources of the devices accessible with the RS-485 serial port. The document is available on the website www.evco.it.

The INTRABUS serial ports enable connection of a remote keypad (EVK3K11 or EVJ LCD) and an I/O expansion (EVD EXP) to the controllers.

9 REGULATIONS

9.1 Regulation in the incremental neutral zone

The working parameters for regulation in the neutral zone consist of a setpoint, a regulation band, a reaction time and an incremental step. Almost all the available functions use these regulating mechanisms.

Because this system is extremely easy and intuitive to operate it provides excellent results, allowing precise regulation.

The neutral zone is between the setpoint:

1) When the regulation variable is in the neutral zone, it is regulated according to the controlled output value, maintaining the same value

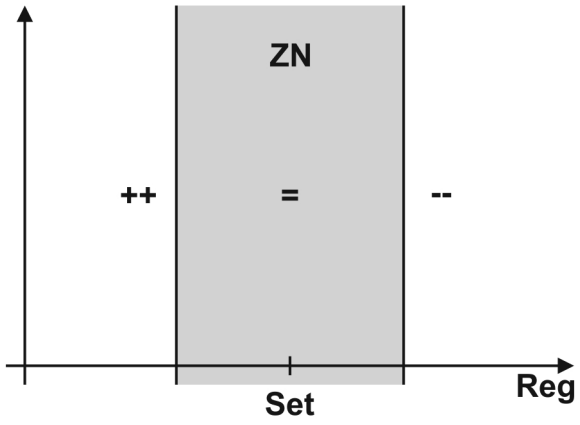
2a) When the regulation variable falls below the neutral zone, the regulation immediately increases the controlled output value by a percentage equal to the value expressed by the relevant parameter (incremental/decremental step)

2b) If the regulation variable is not within the neutral zone by the time set by the relevant parameter (reaction time) point 2a above is repeated until the maximum possible value of the output value is reached

3a) When the regulation variable rises above the neutral zone, the regulation immediately decreases the controlled output value by a percentage equal to the value expressed by the relevant parameter (incremental/decremental step)

3b) If the regulation variable is not within the neutral zone by the time set by the relevant parameter (reaction time) point 3a above is repeated until the minimum possible value of the output value is reached

The diagram below is a graphic representation of the operating mode.



9.2 Selecting the operating modes

The controller always makes it possible to manage heating and cooling and use either manual operation or timer settings to meet the user's needs in the best way.

Selecting hot/cold mode

There are three season change modes in descending order of priority:

- By digital input
- By probe (automatic)
- By keypad/supervisor.

If a digital input is configured as *season change* the status of this input determines the operating mode.

If a digital input is not configured but the automatic change-over function (C11=2) is activated, the machine heats up if the probe temperature configured by parameter C23 is lower than C25, while it cools down if the regulation temperature is above C26. Parameter C24 sets the time necessary for the mode to change.

If the changer-over probe (C23) is not configured by the relative parameters (I01-I20) the configuration alarm is activated, if however, the probe is in alarm mode the relative probe alarm is activated. In both cases this inhibits the automatic season change and the machine stays in "current" operating mode.

If a specific digital input is not configured and the automatic change-over function (C11=0) is not activated, the operating mode is set by the keypad and each time the ESC key is pressed this will change the operating mode...-> COOL -> HEAT.

In this situation the supervisor is able to force the operating mode (Status S16).

If C11=1 (Manual + Auto) is set by the keypad and supervisor, it is possible to decide whether machine is to operate in hot, cold or automatic mode, in which case every time the ESC key is pressed the operating mode will be changed ...-> COOL -> HEAT → AUTO.

Selecting the timer setting mode

The setpoints for temperature, for opening the mixing chamber damper and for the fans are set by parameter *t01* and according to the current time. It is possible to change the temperature, fan speed and mixing chamber damper regulation (if present) setpoints from the keypad or by the supervisor in the following way:

- From the keypad by pressing the SET key and changing the values tMP, FAn, dMP
- By the supervisor by changing the status of S05 (fan speed), S09 (open damper) and S18 (temperature).

In manual mode any change to these values is also reflected in the parameters for which they become final.
If the timer settings are activated, when a new timer setting starts up or if the mode is changed from manual to timer setting or vice versa, the setpoints are altered according to the parameters set.

Manual mode (t01 = 0)

Listed below are the setpoints used:

P07 manual temperature setpoint heating mode
P08 manual temperature setpoint cooling mode
P12 manual fan setpoint
P17 Manual mixing chamber damper setpoint.

Timer setting mode (t01 = 1)

If there is a clock error, the manual mode is activated.
The active timer setting is based on the current time scrolling back in time until no valid value is found in the parameters set for the timer settings. If no valid mode is found (e.g. if the timer setting parameters t02-t32 have not been correctly set) the machine operates in manual mode.
Each day of the week can be associated with a different type of day (t26-t32).
Three "day types" (A, B, C) are available each of which can have up to 4 different timer settings (t02-t25).
Each timer setting depends on the mode activated, the start time and the required comfort level.
The following comfort levels are available:

- Comfort (COM) for this mode the settings used are provided by the following parameters:
  - P01 comfort temperature setpoint heating mode (winter)
  - P02 comfort temperature setpoint cold mode (summer)
  - P09 comfort fan speed setpoint
  - P14 comfort mixing chamber damper setpoint
- Economy (ECO) for this level the temperature setpoints are taken from the comfort mode settings adding an offset; the fan speed and damper open setpoints are controlled by the following specific parameters:
  - P01+P03 economy temperature setpoint heating mode
  - P02+P04 economy temperature setpoint cold mode
  - P10 economy fan speed setpoint
  - P15 economy mixing chamber damper setpoint
- Night-time (NIGHT) for this level the temperature setpoints are also taken from the comfort mode settings adding a specific offset; the fan speed and damper open setpoints are controlled by the following specific parameters:
  - P01+P05 temperature setpoint night-time heating mode
  - P02+P06 temperature setpoint night-time cold mode
  - P11 night-time fan speed setpoint
  - P16 night-time mixing chamber damper setpoint

Holiday mode (t01 = 2)

If a temporary suspension of the timer setting operating mode is required (clock enabled and not incorrect) the Holiday mode can be activated consisting of a set period starting when this is activated and ending at a particular date and time. The holiday mode can be activated for some hours or for several months as required, with the holiday ending date and time correctly set (parameters t33-t36), after which there will be a return to the situation prior to the holiday mode setting. The holiday begins when parameter t01 is set at 2, in which case the setpoints of the manual mode are used:

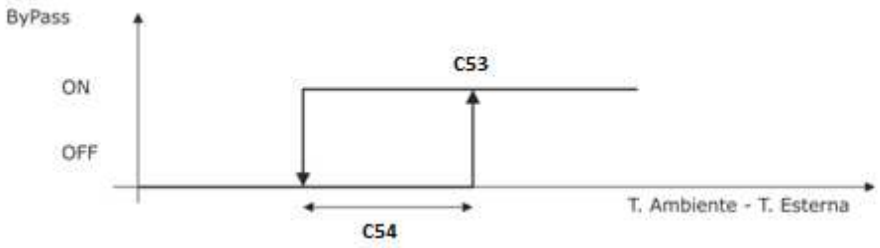
P07 manual temperature setpoint heating mode
P08 manual temperature setpoint cooling mode
P12 manual fan setpoint
P17 Manual mixing chamber damper setpoint.

9.3 Activating free heating/cooling

This mode is activated if the room probe and external probe are activated and not in alarm.
If the external temperature is favourable this inhibits the recovery heat exchanger (bypass or deactivation) so as to use the external air to improve the room comfort.
If the controller detects favourable conditions with a differential between the external and internal temperatures capable of cooling or heating the environment, the recovery heat exchanger bypass is activated (bypass damper activated, rotation of the rotary exchanger deactivated, compressor switched off) and the mixing chamber damper is opened 100%.
Activation of these functions naturally leads to the room temperature coming close to the relevant setpoint thus requiring no further forced regulating action. The two functions are therefore completely independent.

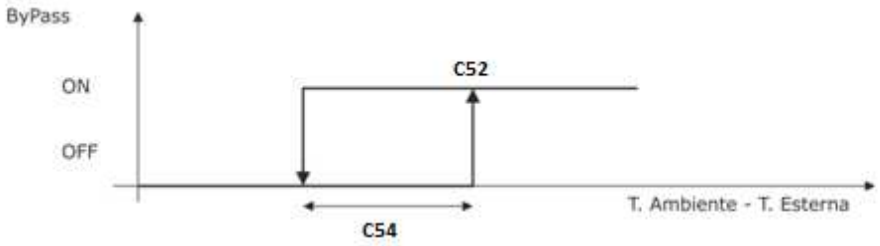
Summer mode (free-cooling)

When the temperature rises above the regulation setpoint, thus requiring cooling, and when the conditions shown in the diagram below apply, the recovery heat exchanger bypass is activated (bypass damper activated, rotation of the rotary exchanger deactivated, compressor switched off).



Winter mode (free-heating)

When the temperature falls below the regulation setpoint, thus requiring heating, and when the conditions shown in the diagram below apply, the recovery heat exchanger bypass is activated (bypass damper activated, rotation of the rotary exchanger deactivated, compressor switched off).



9.4 Regulating the ventilation

The controller manages two fans: the supply fan and the return fan. The regulation of both fans is driven by an analogue output that can be single (the same speed for both fans) or independent. It is also possible to configure an enabling digital output, either single or independent. The enabling digital output is activated when the relevant analogue output is set to a value other than 0.
Both fans are regulated in the same way and the point of reference is the supply fan. It is however possible to differentiate the supply and return fan speeds in order to balance the different losses of load in the tubes or to keep the environment at low/high pressure by configuring parameter C35 that sets the differential between the speed of the two fans.
The return fan is switched off if the supply fan is off.
Post-ventilation can be set at a duration of C17 from when the unit is switched off to ensure the disposal and recovery of the residual heat from the coils.

Regulation of the supply fans follows this order of priority:

- If a defrost of the recovery heat exchanger is in progress the fans follow the algorithm described in the relevant paragraph, while if a defrost of the refrigeration unit is active the fans are switched off unless this happens because the compressor is switched off (in which case ventilation operates normally).
- If the digital input *forced ventilation* is configured and active, the supply fan speed is determined by parameter P13.
- If a probe such as *remote control probe* is configured and not in alarm mode, the fan speed is the same as that of the probe as set by parameters I29 and I30 that set the value of the output in relation respectively to the minimum and maximum value of the input.
- If the CO_2 or differential pressure sensor is configured and not in alarm mode regulation is based on this sensor as described in the relevant paragraphs.
- If the humidifier in heating (C45) is enabled and the humidity sensor is configured and not in alarm mode or if the digital input dehumidifier request is configured and activated, regulation is based on the value of the aforesaid inputs as described in the relevant paragraph.
- If none of these situations exist, the fan speed is determined by the current setpoint (manual or timer settings).

All ventilation regulations with the exception of remote control, use a fixed incremental step set by parameter C12, its intervals defined by parameter C13.

The fan speed is always limited by the minimum (C05) and maximum (C06) values, also taking into account any forced ventilation supporting the refrigeration circuit (C14) and the electric coils (C15, C16) that are able to increase the minimum fan speed when such functions are activated.

During the active defrost phases of the refrigeration unit, the fans are switched off to maintain any localised heat on the coil that does the defrosting and avoid an inflow of cold air and pressure imbalances in the room.

If the mixing chamber damper is completely closed, the return fan is switched off to avoid possible imbalances.

External air damper

When the digital output *External air damper* is configured, the fans will only switch on if this damper is open. Once the damper is open the opening time set by A10 elapses before the fans are switched on.

If the digital input *External air damper open limit switch* is configured, the fans remain off until the damper halts contact.

When the fans are switched off the external air damper is also closed.

9.5 Regulating the recovery heat exchanger

The controller can manage 3 different types of recovery heat exchanger, configured using parameter C27:

- Cross-flow
- Rotary
- Thermodynamic (compressor).

In order to use this function, the recovery heat exchanger/bypass damper or Compressor (if the recovery heat exchanger is thermodynamic) relays must be configured.

Cross-flow recovery heat exchanger is a passive system, meaning that when activated the corresponding relay is in rest position. When the recovery heat exchanger is inactive the corresponding relay opens the bypass damper.

Rotary and thermodynamic recovery heat exchangers are active systems meaning that the corresponding relay must be active for the exchanger to operate.

Irrespective of the type, the recovery heat exchanger is always operating other than in the following situations when it is deactivated:

- If the fans are in alarm mode or the machine in standby mode (only in the case of active recovery heat exchanger since the energy exchange would be nil while there would be energy consumption required to keep the exchanger active)
- If the mixing chamber damper is completely closed for the same reason as above (in this case the return fan is switched off)
- If the free heating or free cooling functions are activated.

Defrosting cross-flow or rotary recovery heat exchanger

During the winter cycle, the recovery heat exchanger exchanges heat between the flow of expelled air (hot and humid) and the input air (cold and dry). If the external air is particularly cold, the expelled air flow temperature can fall to freezing point, risking obstruction of the exchanger and impeding normal air flow.

To prevent this happening it is necessary to prevent excessive lowering of the expelled air flow temperature by constantly monitoring this temperature (expelled air temperature) and, when needed, first slowing down just the supply fan and then both fans.

Regulation happens in the neutral zone with setting d09, band d10, step C12 and time C13 according to the temperature of the *Expulsion probe*: if the temperature is too low (<d09 - d10/2) the supply fan speed is lowered compared to that of the return fan speed up to a maximum differential (d12) always taking into account any balancing of the C35 speeds that remains valid at all times; if

the need for defrosting remains the speed of both fans will be reduced in parallel down to the minimum permitted speed (C06). If the expulsion temperature falls below the critical value d11, the rotary recovery heat exchanger stops or the bypass damper opens for the cross-flow recovery heat exchanger.

The fan speeds gradually return to their normal value when the expelled air temperature rises to above the value of d09+d10/2.

Regardless of the fan speed regulation settings these are suspended while defrosting in in progress. When defrosting is finished, the fan speed regulation returns to the normal settings.

In the event of manual regulation, it is possible to set a different value for the fan speeds, but this value will only be valid when defrosting is finished.

9.6 Regulating the mixing chamber damper

When present, the mixing chamber damper regulates the quantity of recirculated air and external air emitted into the environment (damper completely closed = all recirculated; damper completely open = all external air).

The percentage of damper opening therefore influences the following factors:

- Temperature (free cooling/heating and off band)
- Humidity (winter dehumidifier)
- CO2.

The controller regulates the opening of the mixing chamber damper using the modulating 0-10 V output, to activate the function the analogue output *Mixing chamber damper* should be configured.

This regulation works with that of the fans both in terms of the percentage increase/decrease (C12) and the relative timing (C13).

In normal conditions the damper is open by at least the minimum opening percentage (C08) to guarantee the minimum air exchange in the environment. It is possible to set the minimum opening higher when the compressor is active (if present) to provide a greater air flow by changing parameter C36.

There are some conditions in which the minimum opening setting is not applied (damper completely closed):

- If the machine is in stand-by
- If the regulation temperature is "off-band"
- If the fans are in alarm mode.

If the free cooling or free heating functions are activated, the mixing chamber damper is completely open.

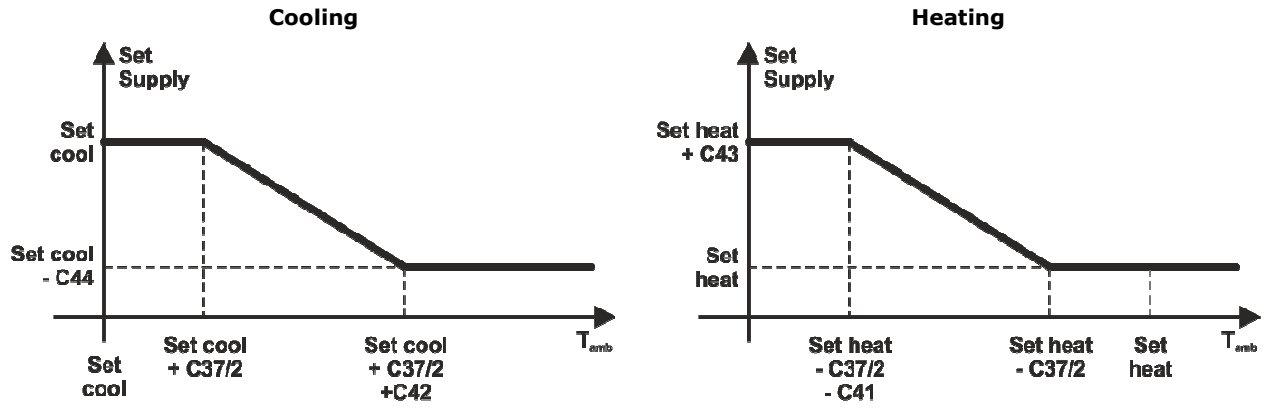
In all other situations the damper opening depends on the configuration of the machine in the following order of priority:

- If the CO2 sensor is configured and not in alarm mode, the damper opening depends on the value detected by this probe as described in the relevant paragraph.
- If the humidity sensor is configured and not in alarm mode, the "heating" function activated and the winter dehumidifier enabled, the damper opening depends on the value detected by this probe as described in the relevant paragraph.
- If none of the above situations apply, the damper opening is determined by the regulating settings (P14…P17) associated with the timer setting in progress.

9.7 Temperature regulation

The temperature regulation algorithm is of the "incremental neutral zone" type previously described. The temperature used for regulation can be the room temperature or the supply temperature if only one of these probes is configured. If neither of the probes is configured or if they are in error, temperature regulation is inhibited.

If both the probes (room and supply) are configured, the regulation probe is the supply temperature but the setpoint is adjusted to the room temperature (follow-on regulation) as shown in the diagram below.



Treatment coils

The controller is able to manage one or two coils for heating and cooling of the air emitted into the environment. The purpose of these coils, together with the recovery heat exchanger, is to guarantee that the ideal temperature is maintained in the air-conditioned environment.

The first coil can be hot, cold or reversible according to parameter C30. The second coil can only be hot and can be used as:

- The single heating source (in the winter cycle) if the first coil is cold only and as post-heating in the summer cycle
- The second heating level (in the winter cycle) if the first coil is hot or reversible, always as post-heating in the summer cycle if the first coil is reversible (if the first coil is hot dehumidifying is not possible and therefore post-heating does not apply).

The coils are allocated according to the resources used.

The types of coils managed are as follows:

- Direct expansion coil: can be hot, cold or reversible according to parameter C30. It uses the Compressor relay
- Three-point water coil: can be hot, cold or reversible according to parameter C30. It uses the Open water valve and Close water valve relays. The duration of the valve action is determined by parameter C33
- ON-OFF water coil: can be hot, cold or reversible according to parameter C30. It uses the Open water valve relay
- Modulating water coil: can be hot, cold or reversible according to parameter C30. It uses the water valve analogue output configured as analogue output 0-10 V and the Open water valve relay to enable (optional)
- One or two step electric coil: can only be hot. It uses the Step 1 heater and the Step 2 heater relays
- Modulating electric coil: can only be hot. It uses the heater analogue output configured as analogue output 0-10 V or a triac/OC output configured as heater. The Step 1 heater is used to enable. If parameter C31 (heater activation period) is greater than 0, the analogue output is controlled in PWM with this period (in seconds) and with the maximum output signal amplitude determined by parameter C32. For example, if C31=10 seconds, C32=8 V and regulation with 50% regulation, the output signal takes on the value 8 V for 5 seconds and the value 0 V for another 5 seconds. If however, C31=0 the output is modulating (where the output voltage corresponds to the percentage of heat regulation required).
  N.B. the electric coils are only switched on when the time A06 (flow alarm bypass) has elapsed from when the fans are switched on to guarantee airflow and avoid any possible overheating problems.

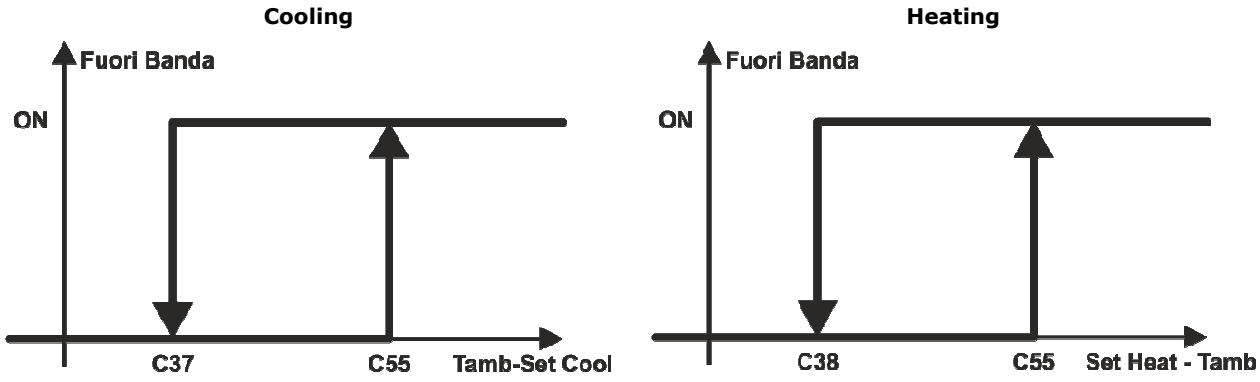
Off-band mode activation

This mode is activated if the room probe is configured and not in alarm mode and if the mixing chamber damper is configured.

The room temperature is considered off-band if this is outside the comfort zone (<Hot setting – Comfort band (C55) in heating; > Cold setting + Comfort band (C55) in cooling).

The effect of off-band mode is to close the mixing chamber damper so as to speed up the return to the temperature regulation band.

The mode is deactivated if the room temperature comes close to the active regulation setting returning within the normal active regulation band (C37 in heating, C38 in cooling) as shown in the diagrams.



9.8 Regulating the compressor

The controller can manage an ON-OFF compressor that can be used as either a first hot/cold/reversible regulation coil teamed with a cross-flow or rotary recovery heat exchanger or a thermodynamic recovery heat exchanger as an alternative to the other types of heat exchangers. As compared to the other types of coils and recovery heat exchangers, the safety features listed below should be taken into consideration for managing the compressor:

- Minimum time between switch-on (C29) and switch-off (C28)
- Safety inputs (high and low pressure, compressor thermal switch, discharge temperature, etc.).

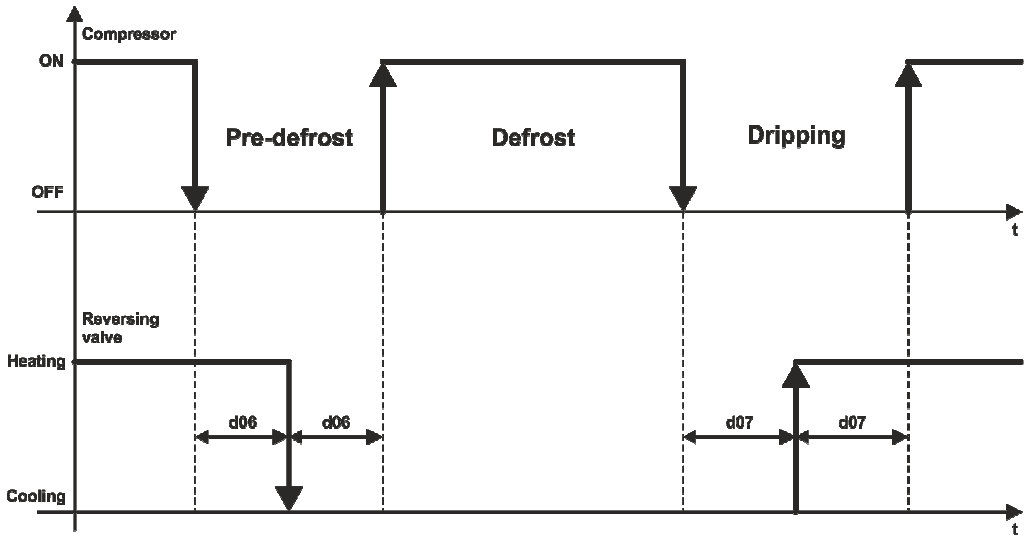
In order for the compressor to function as a thermodynamic recovery heat exchanger (active in both heating and cooling mode) or as a reversible coil, an *inversion valve* digital output must be configured to allow the refrigeration circuit to function in both modes.

When the mode is changed (from hot to cold or vice versa) the compressor, if activated, is switched off and the valve inverted.
Another feature of the compressor is the need for defrosting that may be managed in such a way as to remove ice that has formed in the coil as described in the paragraph below.
During the active defrost phases the refrigeration circuit function is inverted. To retain the heat localised on the coil that needs defrosting and to avoid both pressure imbalances and emitting freezing air into the environment, both fans are switched off.
N.B. the compressor is only switched on when the time A06 (flow alarm bypass) has elapsed from when the fans are switched on to guarantee airflow and avoid any possible imbalances.

Defrosting the refrigeration circuit

In order to determine both when it is necessary to perform a defrosting cycle and to end this, the probe located on the coil (*Compressor defrost probe)* is used according to the parameters governing this function, d01-d08.
According to the parameter d01 value, defrost can be:
d01 = 0 Defrost not enabled
d01 = 1 Defrost by temperature, described below
When the compressor is active and value detected by the probe located on the coil falls below d02, a counter begins and when this reaches a value of d03 the defrost cycle is activated. If during counting the temperature returns to above d02 or if the compressor is switched off, the count is suspended. If during counting the temperature detected by the probe falls below the value d08 defrost is activated with a wait reduced to 10 seconds.
When the defrost cycle starts up the compressor is switched off for the d06 time, at the end of which this switches the reversing valve. After a further d06 period the compressor is reactivated for the active defrost cycle phase. The purpose of the waiting time 2xd06 is to balance the pressures in the circuit. This could also be zeroed if a running defrost is required.

The compressor remains on until the temperature detected by the probe on the coil rises above d04, in which case the active phase comes to an end. If this situation is not achieved within the d05 time the active defrost phase is still concluded but the compressor is switched off. After this the drip phase begins, after d07 the reversing valve switches to heating status and after a further d07, the compressor is reactivated in heating mode.
The diagram below shows the way in which the defrost by temperature happens.



d01 = 2 Defrost by compressor off, described below
To defrost the coil the compressor is switched off, in which case the fans remain on and the warm expelled air removes the ice. Compared to the last process, this one avoids the active phase of the defrost cycle (compressor on with reversing valve in cooling position).
d01 = 3 Time defrost, described below
In this situation everything works as for d01=1 apart from the exit from the defrost active phase that is always determined by the maximum time (d05).

9.9 Constant capacity/pressure regulation

The controller can regulate the fan speed to maintain constant pressure or air capacity if the differential pressure sensor is configured and not in alarm mode.

On the basis of the parameter C58 (capacity coefficient) value the regulation will be by pressure (C58 = 0) or capacity (C58 > 0). In the first situation the value detected by the differential pressure probe will be the setting value (C56), while in the second situation it is the value of the capacity calculated using the formula:

$$Q = k\sqrt{\Delta P}$$

In the incremental neutral zone regulation is based on the values of the parameters C56 (setpoint) and C57 (neutral zone) with an increase in the C12 speed when the value of the pressure/capacity falls below C56 - C57/2 and a reduction in the C12 speed when the pressure/capacity value rises above C56 + C57/2. In this situation too, the action may be repeated if the condition remains above C13.

9.10 CO_2 regulation

The controller is able to keep the CO_2 value in the environment under control to guarantee maximum comfort. Regulation acts first on the mixing chamber damper (if present) and then on the fan speed if the *CO_2 probe* is configured and not in alarm mode.

CO_2 control uses incremental neutral zone regulation with parameters C50, C51, C12 and C13. If the CO_2 concentration is too high (above C50 setting plus half the neutral zone C51) the mixing chamber damper is gradually opened wider starting from the normal open position (defined by its setting and the active timer setting) up to its maximum aperture (C07). If the situation does not return to normal when the damper is open to its maximum degree (or if the damper is not present) the fan speed gradually increases, starting from normal speed (as for its setting and the active timer setting) until it reaches maximum speed (C05). When the CO_2 concentration falls below the setting minus half band the process is reversed and the fan speed gradually reduces down to normal speed, then the damper returns to its normal aperture.

9.11 Humidity regulation

The controller is able to control the room humidity to guarantee maximum comfort both when the humidity needs to be reduced (dehumidifying) and when it needs to be increased (humidifying). The dehumidifying processes in the summer and winter cycles are different.

Winter dehumidifier

For environments that are also humid in winter (swimming pools for example) it is possible to use the extremely low humidity of the external air to reduce the interior humidity. In this situation regulation happens by action on the mixing chamber damper and on the fan speed if the dehumifier in hot mode *(C45) is enabled and the Humidity probe is configured and not in alarm mode or the digitial input Dehumidifier request is configured and active.*

The humidity is regulated in the incremental neutral zone by parameters C46, C47, C12 and C13. If the humidity is too high (>C46+C47/2) the mixing chamber damper is gradually opened wider, starting from normal then up to maximum aperture. If the situation does not return to normal when the damper is open to its maximum degree, the fan speed gradually increases, starting from normal speed until it reaches maximum speed. When the humidity falls below the setting minus half band (C46-C47/2) the process is reversed and the fan speed gradually reduces down to normal speed, then the damper returns to its normal aperture.

Summer dehumidifier

In the summer cycle the external air cannot cause an effective reduction in the environmental humidity, making it necessary to use a cold coil possibly with post-heating of the air.

Regulation acts on the cooling resources if the dehumidifier in cold mode (C45) is enabled and the Humidity probe is configured and not in alarm mode or the digital input Dehumidifier request is configured and active.

If required, the summer dehumidifier is activated when the humidity is greater than C46+C47 or the dehumidifier request digital input is active. The process stops when the humidity falls below C46 or the digital input is deactivated.

The humidity is regulated in the incremental neutral zone by parameters C46, C47, C39 and C40 that activate the cooling resources according to the heat regulation timings and methods.

Following dehumidification the environmental temperature is liable to fall below the active regulation setting (which is the cooling setting for the time setting in progress, possibly in follow-on if the return/room probe and the supply probe are present). If this happens and the second coil is present the post-heating function is activated with regulation in the incremental neutral zone. In this form of regulation the hot coil power is increased (according to parameters C39/C40) when the temperature falls by C37/2 (regulation band in hot mode) below the setting; the coil power is decreased if the temperature rises above the setting (without waiting for it to rise by C37/2 above that value).

If parameter C48 is set to 0 temperature regulation takes priority over dehumidifying, in this situation if the regulation temperature falls below the setting - band/2 the dehumidifier request is inhibited. This parameter can be used to limit excessive cooling caused by dehumidification, for example if a post-heating coil is not present.

Humidification

If the winter cycle is activated the relative humidity in the environment is likely to be quite low. To guarantee comfort in the these conditions too, the regulator is able to manage an ON-OFF humidifier if the digital output *Humidifier* is configured and the *Humidity probe* is configured and not in alarm mode, if the humidity percentage falls below the setting - band (C46 - C47). The humidifier is switched off when the humidity rises above the setting C46.

If the *Supply probe* is also configured, the humidifier is switched off, to avoid condensation, if the supply temperature falls below the C49 limit.

9.12 External air limitation

In both summer and winter cycles, if the external temperature is particularly extreme (very high in summer and very low in winter) it is possible for the regulation setting not to be reached even with the resources at maximum potential.

In this situation external air limitation comes into play and, by reducing the quantity of external air, it limits this problem. This function helps to maintain the room temperature even in very difficult environmental conditions.

When the regulation temperature is outside the neutral zone with heating/cooling resources at 100%, the external air limitation function first acts by closing the mixing chamber damper down to its minimum aperture (C07) and then by reducing the fan speed down to the minimum speed (C06) using regulation in the incremental neutral zone with the usual parameters for the temperature regulation (C39/C40) in progress (heating or cooling).

The "go backwards" regulation first gradually resets the fan speed to normal and then opens the mixing chamber damper to its normal aperture if the temperature returns to below the regulated setting.

Note: for this function, all the resources of the unit will be used. For example, in the units without damper, at the beginning the cooling/heating power will be driven to the maximum value (according to the active function) and then the fans speed will be reduced. In the units without damper and handling coil, it will directly act on the fans speed.

10 ALARMS

The alarm signals can be of the following types.

- Automatic: the alarm is reset automatically once the cause of the alarm has disappeared
- Manual: must be reset manually (before resetting the alarms to manual reset check that the cause of the alarm has been rectified and then switch the device off and on)
- With a number of signals per hour (resetting is automatic provided the signal counter has not exceeded the parameter specified in the description of each alarm, then they must be reset manually; the hourly signal counter is increased once every 225 seconds).

10.1 List of alarms

The table below shows the meaning of the device's various alarm codes.

Code	Display code	Description
AL01	oFFd	Check switch-on by digital input Indicates that the controller is switched off with remote commands Automatic alarm Main results - The loads are switched off with the set timings
AL02	oFFt	Check switch-on by timer setting Indicates that controller is switched off by timer setting regulation Automatic alarm Main results - The loads are switched off with the set timings
AL03	EA	Cumulative probe alarm Indicates that one or more of the probes is in alarm mode. Non-

		configured analogue inputs do not cause alarms. Automatic alarm Main results - the functions linked to the probes in alarm mode are inhibited
AL04	ACoM	Communication alarm The alarm signal is activated when communication with the expansion is missing for longer than 10 seconds Manual alarm - All loads are switched off
AL05	AFro	Antifreeze alarm The alarm signal is activated when the value of the water probe is lower than the A15 value; it deactivates when the value is above A15+A16 The alarm is delayed for a period equal to A14 from reaching the threshold temperature Automatic alarm Main results - the water valve is opened to the maximum aperture
AL06	Atr	Electric coil heater thermal switch alarm The alarm is activated if the input configured as a heater thermal switch input is active. It deactivates if the input is inactive. Manual alarm Main results - The electric coil is switched off
AL07	AHP	High circuit pressure alarm The alarm is activated if the input configured as a high pressure input is active. It deactivates if the input is inactive. Manual alarm Main results - The compressor is switched off.
AL08	ALP	Low circuit pressure alarm The alarm is activated if the input configured as a low pressure input is active. It deactivates if the input is inactive. The alarm is activated after a delay of A04 from compressor switch-on. It reverts to manual reset if the number of alarm events in an hour exceeds A05. Main results - The compressor is switched off.
AL09 AL10	AFnS AFnr	Supply or return fan alarm The alarm is activated if the input configured as fan thermal switch is active. It deactivates if the input is inactive. The alarm signal is activated if the input configured as a tachometric input detects a different speed for the one set; it is deactivated if the speed detected is the same as expected (only control other than 0). The alarm is activated after a period equal to A03 after the event happens Manual alarm Main results - All loads are switched off
AL11	AtC	Compressor thermal switch alarm The alarm is activated if the input configured as compressor thermal

		switch is active. It deactivates if the input is inactive. Manual alarm Main results - The compressor is switched off.
AL12	AdS	Compressor discharge alarm The alarm signal is activated if the value of the probe configured as compressor discharge rises above the A11 parameter value, and it is deactivated when this measurement falls below A11-A12 Automatic alarm Main results - The compressor is switched off.
AL13	AFnH	Fan hour alarm The alarm signal is activated if the fan hour value is above the limit set by parameter A01 The alarm switches off when the fan hours are reset on the menu. Automatic alarm Main results - signal only
AL14	ACPH	Compressor hour alarm The alarm signal is activated if the compressor hour value is above the limit set by parameter A02 The alarm switches off when the compressor hours are reset on the menu. Automatic alarm Main results - signal only
AL15	AOdM	External air damper alarm The alarm signal is activated when the limit switch sensors for the external air damper do not react quickly enough (A10) when movement is ordered. Manual alarm Main results - All loads are switched off
AL16	Artc	Clock alarm The alarm signal is activated when the clock shows an invalid date, is broken or disabled (C09) and timer setting regulation is activated (t01) Automatic alarm Main results - regulating using the clock is not permitted
AL17 AL18	AFLS AFLr	Supply or return flow alarm The alarm signal is activated when the input configured as a flow switch is active for a time period equal to A07, with an A06 delay from fan switch-on; it is deactivated when the input is not active for a time period equal to A08 It reverts to manual reset if the number of alarm events in an hour exceeds A09. Main results - when the alarm is in automatic mode the electric coils and the compressor are switched off - when the alarm is in manual mode all the loads are switched off
AL19	ACnf	Change-over probe not configured alarm

		The alarm signal is activated if the probe selected as a change-over probe is in alarm mode or has been improperly configured Automatic alarm Main results - inhibits the automatic change-over operations
AL20	AH2O	Water temperature alarm The alarm signal is activated in hot mode if the water probe temperature is below the setpoint value, after a period equal to A13 from when the water valve is opened. It is deactivated when the temperature rises above the setpoint + C37* 1/2 The alarm signal is activated in cold mode if the water probe temperature is above the setpoint value, after a period equal to A13 from when the water valve is opened. It is deactivated when the temperature falls below the setpoint + -C38* 1/2 Main results - The water coil is switched off
AL21	ASF	Filter pressure switch alarm The alarm is activated if the input configured as filter pressure switch is active. It deactivates if the input is inactive. Automatic alarm Main results - signal only
	EA01 EA02 EA03 EA04 EA05 EA06 EA07 EA08 EA09 EA10 EA11 EA12 EA13 EA14 EA15 EA16	Probe alarms The alarm is activated in the following situations: - when a probe short circuits or is interrupted - if the upper or lower limits set for a probe are exceeded Non-configured analogue inputs do not cause alarms. Automatic alarm Main results - Regulation concerning faulty probes are interrupted

11 Machine status

It is possible to access the machine operating status from both the user interface and the serial port. Most of the status readings are in read only (RO) format, some of them can also be written (a useful function especially for access from a personal computer).

Label	Min.	Max.	U.M.	Description	Access
S01	0	1		Unit status 0 = ON 1 = Stand-by 2 = Stand-by from timer setting 3 = Stand-by from digital input	RW
S02				Timer settings 0 = OFF 1 = ON	RO
S03				Device in alarm mode 0 = OFF 1 = ON	RO
S04				Function mode 0 = Disabled 1 = OFF 2 = Comfort 3 = Economy 4 = Night-time 5 = Holiday 6 = Manual 255 = None	RO
S05	0	100	%	Fan regulation setting	RW
S06				Fan function mode 0= Normal 1 = Remote 2 = CO_2 3 = Humidity 4 = Forced by DI 5 = OFF Await external air damper 6 = Alarm 7 = Stand-By 8 = Stand-by from digital input 9 = Stand-by from timer settings 10 = External air limitation 11 = Constant pressure 12 = Constant capacity 13 = Fans Off for defrost 14 = Fans ON in defrost 15 = Post-ventilation	RO
S07			%	Supply fan speed	RO
S08			%	Return fan speed	RO
S09	0	100	%	Damper regulation setpoint	RW
S10				Damper function mode 0 = Disabled 1= Normal 2 = CO_2	RO

				3 = Humidity 4 = Free cooling/heating 5 = OFF 6 = External air limitation	
S11			%	Mixing chamber damper aperture	RO
S12				Recovery heat exchanger function mode 0 = Disabled 1 = OFF 2 = ON	RO
S13				Recovery heat exchanger defrost phase 0 = Not in defrost 3 = Defrosting 5 = Dripping	RO
S14	0	100	%rH	Humidity regulation setpoint	RW
S15				Function mode 0 = Cooling 1 = Heating 2 = Auto+Cooling 3 = Auto+Heating	RO
S16	0	2		Set function mode 0 = Cooling 1 = Heating 2 = Auto	RW
S17				Change-over probe value	RO
S18	-50,0	90,0	°C	Temperature regulation setting	RW
S19				Temperature regulation mode 0 = Disabled 1 = Follow-on regulation 2 = Room temperature setpoint 3 = Supply setpoint 4 = Digital input	RO
S20			°C	Regulation probe value -3276.8 = ERR	RO
S21			°C	Temperature regulation setpoint	RO
S22				1st coil type 0 = Not available 1 = Thermodynamic 2 = 3-point, water 3 = Modulating, water 4 = ON-OFF, water 5 = 2-step, electric 6 = Modulating, electric 7 = ON-OFF, electric 8 = Not configured	RO
S23				2nd coil type 0 = Not available 2 = 3-point, water 3 = Modulating, water 4 = ON-OFF, water	RO

				5 = 2-step, electric 6 = Modulating, electric 7 = ON-OFF, electric 8 = Not configured	
S24				Thermodynamic coil function mode 0 = OFF 1 = ON	RO
S25				Water coil function mode 0 = OFF 1 = ON	RO
S26			%	Valve opening	RO
S27				Electric coil function mode 0 = OFF 1 = Step 1 2 = Step 2	RO
S28				Electric coil percentage	RO
S29				Steps in operation	RO
S30				Defrost phase 0 = Not in defrost 1 = Awaiting defrost 1 input 2 = Awaiting defrost 2 input 3 = Defrosting 4 = Awaiting defrost input 5 = Pre-drip 6 = Dripping	RO
S31			S	Defrost time	RO
S32			M	Delay between defrosts	RO
S33			10S	Safety time	RO
S34				Compressor in alarm mode 0 = OFF 1 = ON	RO
S35	0	0	H	Compressor operating hours	RW
S36	0	0	H	Fan operating hours	RW
S37	0	0	H	Unit operating hours	RW
S38				Expansion resources used	RO
S39				E2 write request status	RO
S40			°C	Room probe value -3276.4 = Disabled -3276.8 = ERR	RO
S41			°C	Supply probe value -3276.4 = Disabled -3276.8 = ERR	RO
S42			°C	External probe value -3276.4 = Disabled -3276.8 = ERR	RO
S43			°C	Expulsion probe value	RO

				-3276.4 = Disabled -3276.8 = ERR	
S44			°C	Water probe value -3276.4 = Disabled -3276.8 = ERR	RO
S45			°C	Compressor defrost probe value -3276.4 = Disabled -3276.8 = ERR	RO
S46			°C	Compressor discharge temperature probe value -3276.4 = Disabled -3276.8 = ERR	RO
S47			%rH	Return air humidity probe value -3276.4 = Disabled -3276.8 = ERR	RO
S48			PPM	CO_2 probe value -3276.4 = Disabled -3276.8 = ERR	RO
S49			%	Remote control probe value -3276.4 = Disabled -3276.8 = ERR	RO
S50				Pressure differential control probe value -3276.4 = Disabled -3276.8 = ERR	RO
S51			Hz	Tachometric supply digital input value -1 = Disabled	RO
S52			Hz	Tachometric return digital input value -1 = Disabled	RO
S53				Supply fan thermal switch digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S54				Return fan thermal switch digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S55				Supply flow switch digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S56				Return flow switch digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S57				High pressure digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S58				Low pressure digital input value	RO

				-1 = Disabled 0 = OFF 1 = ON	
S59				Compressor thermal switch digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S60				Remote ON-OFF digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S61				Change mode digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S62				Coil water antifreeze digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S63				Heater thermal switch digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S64				Thermostat request digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S65				Dehumidifier request digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S66				External air damper limit switch open digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S67				External air damper limit switch closed digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S68				Forced ventilation digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S69				Dirty filter digital input value -1 = Disabled 0 = OFF 1 = ON	RO
S70			%	Supply fan analogue output value -1 = Disabled	RO

S71			%	Return fan analogue output value -1 = Disabled	RO
S72			%	Water valve analogue output value -1 = Disabled	RO
S73			%	Mixing chamber damper analogue output value -1 = Disabled	RO
S74			%	Heater analogue output value -1 = Disabled	RO
S75			%	Heater TK/OC output value -1 = Disabled	RO
S76				Supply fan digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S77				Return fan digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S78				Compressor digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S79				Reversing valve digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S80				Rotary recovery heat exchanger/bypass damper digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S81				External air damper digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S82				Open water valve digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S83				Close water valve digital output value Disabled =-1 OFF = 0 ON =1	RO
S84				Step 1 heater digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S85				Step 2 heater digital output value -1 = Disabled 0 = OFF	RO

				1 = ON	
S86				Humidifier digital output value -1 = Disabled 0 = OFF 1 = ON	RO
S87				Alarm digital output value -1 = Disabled 0 = OFF 1 = ON	RO
PSW				Password	
S88				Current level 0 = Hidden 1 = User 2 = Installer 3 = Manufacturer	RO
S89	-127	127		Password	WO

12 ACCESSORIES

12.1 EVIF20SUXI non-optoisolated RS-485/USB serial interface

This interface makes it possible to connect EV3 MVC and EVD MVC to the Parameters Manager set-up software system.

12.2 0025100010 drip protector

This drip protector shields EV3 MVC and EV3K11 from damp.

12.3 CJAV connection kit

These kits make it possible to cable EV3 MVC, EVD MVC and EVD EXP.

Device	Connection kit (purchasing code)
EV3 MVC	CJAV39
EVD MVC and EVD EXP	CJAV38

13 TECHNICAL SPECIFICATIONS

Purpose of the control device	EV3 MVC	Function controller
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	
Construction of the control device	EV3 MVC	Built-in electronic device
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	
Container	EV3 MVC	Black, self-extinguishing
	EVD MVC EVD EXP	Grey, self-extinguishing
	EV3K11	Black, self-extinguishing
	EVJ LCD	White, self-extinguishing
Category of heat and fire resistance	EV3 MVC	D
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	
Measurements	EV3 MVC	750 x 33.0 x 59.0 mm (2.952 x 1.299 x 2.322 in)
	EVD MVC EVD EXP	71.0 x 110.0 x 60.0 mm (2.795 x 4.330 x 2.362 in); 4 DIN modules
	EV3K11	75.0 x 33.0 x 39.5 mm (2.952 x 1.299 x 1.555 in)
	EVJ LCD	111.4 x 76.4 x 18.5 mm (4.384 x 3.007 x 0.727 in)
Mounting methods for the control device	EV3 MVC	To be fitted to a panel, snap-in brackets provided
	EVD MVC EVD EXP	On a DIN rail 35.0 x 7.5 mm (1.377 x 0.295 in) or 35.0 x 15.0 mm (1.377 x 0.590 in), in a control panel.
	EV3K11	To be fitted to a panel, snap-in brackets provided
	EVJ LCD	Wall-mounted (with fixing screws and plugs) or in a built-in 502E or 503E box (with fixing screws)
Degree of front protection	EV3 MVC	IP65
	EVD MVC EVD EXP	IP40
	EV3K11	IP65
	EVJ LCD	IP30
Connections	EV3 MVC	- Micro-Fit connector (power supply, analogue inputs, digital inputs, analogue outputs and INTRABUS port) - Edge connectors (digital outputs)

		- Plug-in screw terminal block (RS-485 MODBUS port).
	EVD MVC EVD EXP	- Micro-Fit connector (analogue inputs, digital inputs, open collector output) - Plug-in screw terminal blocks (power supply, electro-mechanical relays, INTRABUS port and RS-485 MODBUS port).
	EV3K11	Plug-in screw terminal block (power supply and INTRABUS port).
	EVJ LCD	Fixed screw terminal block (power supply and INTRABUS port).
	The maximum length of the connection cables are as follows: - Power supply: 10 m (32.8 ft) - Analogue inputs: 10 m (32.8 ft) - Power supply for transducer analogue inputs 4-20mA: 10 m (32.8 ft) - Digital inputs: 10 m (32.8 ft) - Analogue outputs 0-10 V: 10 m (32.8 ft) - Phase cutting analogue outputs: 10 m (32.8 ft) - PWM analogue outputs: 1 m (3.28 ft) - Digital outputs: 10 m (32.8 ft) - INTRABUS ports: 10 m (32.8 ft) - RS-485 MODBUS ports: 1,000 m (3,280 ft); see also the *MODBUS manual "specifications and implementation guides"* available on *http://www.MODBUS.org/specs.php*. - USB port, 1 m (3.28 ft) Use cables of an adequate section for the current running through them. For EV3 MVC cabling we recommend using the CJAV39 connection kit (to be ordered separately). For EVD MVC and EVD EXP cabling we recommend using the CJAV38 connection kit (to be ordered separately).	
Operating temperature	EV3 MVC	from -10 to 55 °C (from 14 to 131 °F)
	EVD MVC EVD EXP	from -10 to 55 °C (from 14 to 131 °F)
	EV3K11	from 0 to 55 °C (from 32 to 131 °F)
	EVJ LCD	from 0 to 40 °C (from 32 to 104 °F)
Storage temperature	EV3 MVC	from -20 to 70 °C (from -4 to 158 °F)
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	
Operating humidity	EV3 MVC	Relative humidity without condensate from 10 to 90%
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	Relative humidity without condensate from 5 to 95%
Pollution status of the control device	EV3 MVC	2
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	
Compliance:	EV3 MVC	- RoHS 2011/65/EC - WEEE 2012/19/EU
	EVD MVC	

	EVD EXP EV3K11 EVJ LCD	- REACH (EC) Regulation no. 1907/2006 - EN 60730-1 - IEC 60730-1 - R&TTE 1999/5/EC (only applicable for EVJ LCD)
Power supply	EV3 MVC	12 VAC (+10 -15 %), 50/60 Hz (±3 Hz), max. 7 VA not insulated Protect the power supply with a 1 A-T 250 V fuse.
	EVD MVC EVD EXP	115... 230 VAC (+10% -15%), 50/60 Hz (±3 Hz), max. 6 VA insulated Protect the power supply with a 2 A-T 250 V fuse.
	EV3K11	- 12 VAC (±15 %), 50/60 Hz (±3 Hz), max. 5 VA not insulated - 12 VDC (±15%), max. 5 W not insulated Protect the power supply with a 1 A-T 250 V fuse
	EVJ LCD	- 12 VAC (±15 %), 50/60 Hz (±3 Hz), max. 10 VA not insulated - 12 VDC (±15%), max. 10 W not insulated
Rated impulse-withstand voltage	EV3 MVC EVD MVC EVD EXP EV3K11 EVJ LCD	4 KV
Over-voltage category	EV3 MVC	III
	EVD MVC EVD EXP	II
	EV3K11	Not applicable
	EVJ LCD	III

Software class and structure	EV3 MVC	A
	EVD MVC EVD EXP	
	EV3K11	
	EVJ LCD	
Clock	EV3 MVC	On request (with secondary lithium battery) Battery autonomy in the absence of a power supply: > 6 months at 25 °C (77 °F) Battery charging time: 24h (the battery is charged by the power supply of the device) Drift: ≤ 60 s/month at 25 °C (77 °F)
	EVD MVC EVD EXP	
	EV3K11	not available
	EVJ LCD	not available
Analogue inputs	EV3 MVC	7 inputs: - 5 for NTC or dry contact probe - 2 for NTC/4-20 mA/0-10 V or dry contact probe
	EVD MVC EVD EXP	
	EV3K11	None
	EVJ LCD	None
	<u>NTC analogue inputs (10 KΩ @ 25 °C, 77 °F)</u> Sensor type: ß3435 Measurement field: from -50 to 150 °C (from -58 to 248 °F) Precision: ±0.5°C from -20 to 40°C, ±1°C from -40 to 120°C, ±2°C from -50 to 150°C Resolution: 0.1 °C Protection: none	
	<u>Analogue inputs 4-20 mA</u> Input resistance: ≤ 200 <u>Ω</u> Resolution: 0.02 mA Protection: none; the maximum current permitted on each input is 25mA	
	<u>Analogue inputs 0-10 V</u> Input resistance:> 10 K<u>Ω</u>. Measurement field: from 0.00 to 12.00 V Precision: 0.1 V Resolution: 0.02 V Protection: none; the maximum current permitted on each input is 12.5 V	
Digital inputs	EV3 MVC	3 inputs: - 2 dry contact/tachometric - 1 dry contact
	EVD MVC EVD EXP	
	EV3K11	None
	EVJ LCD	None
	<u>Dry contact digital inputs (5 VDC, 1.5 mA)</u> Power supply: none Protection: none Minimum ON time for fast inputs to detect the pulse: 2.5 ms	
Analogue outputs	EV3 MVC	2 for 0-10 V/PWM/phase cutting
	EVD MVC EVD EXP	

	EV3K11	none
	EVJ LCD	none
	Analogue outputs 0-10 V (max. 10 mA) Minimum load impedence: 1 KΩ Resolution: 0.01 V Protection: none	
	Phase cutting analogue outputs Output: 10 VDC, max. 10 mA Frequency: synchronised with that of the power supply Pulse duration: 500 µs Shift: 20... 90 % Protection: none	
	PWM analogue outputs Output: 10 VDC, max. 10 mA Frequency: 10... 2 KHz Duty: 5... 95 % Protection: none	
	Frequency analogue outputs Output: 10 VDC, max. 10 mA Frequency: 10Hz ... 255 Hz Duty: 50% Protection: none	
Digital outputs	EV3 MVC	Up to 6 outputs: - 4 SPST relays, 3 A res. @ 250 VAC - 1 200 mA triac res. @ 250 VAC at 25°C (77°F) - 1 2 A triac res. @ 250 VAC at 25°C (77°F)
	EVD MVC EVD EXP	Up to 5 outputs: - 2 SPST relays, 3 A res. @ 250 VAC - 1 SPST relay, 8 A res. @ 250 VAC - 1 SPST relay, 12 A res. @ 250 VAC - 1 open collector, 12 VDC, max. 40 mA
	EV3K11	none
	EVJ LCD	none
Type 1 or Type 2 Actions	EV3 MVC EVD MVC EVD EXP	Type 1
	EV3K11	Not applicable
	EVJ LCD	Not applicable
Additional features of Type 1 or Type 2 actions	EV3 MVC EVD MVC EVD EXP	C
	EV3K11	Not applicable
	EVJ LCD	Not applicable
Displays	EV3 MVC	4+4 digit LED display
	EVD MVC EVD EXP	Signalling LED

	EV3K11	4+4 digit LED display
	EVJ LCD	3+4 digit LCD display
Communications ports	EV3 MVC	Up to 2 ports: - 1 INTRABUS port - 1 RS-485 MODBUS port (optional)
	EVD MVC EVD EXP	Up to 2 ports: - 1 INTRABUS port - 1 RS-485 MODBUS port (optional)
	EV3K11	1 INTRABUS port
	EVJ LCD	1 INTRABUS port
Alarm buzzer	EV3 MVC	Built-in
	EVD MVC EVD EXP	not available
	EV3K11	Built-in
	EVJ LCD	Built-in
Built-in sensors	EV3 MVC	None
	EVD MVC EVD EXP	None
	EV3K11	None
	EVJ LCD	- Bluetooth Low Energy (optional) - temperature and humidity (optional)
Built-in temperature and humidity sensor measurement field	EV3 MVC	not available
	EVD MVC EVD EXP	not available
	EV3K11	not available
	EVJ LCD	- 0... 40 °C (32... 104 °F) - 10... 90% relative humidity

EV3 MVC & EVD MVC

Controllers for mechanical ventilation units for air renewal and heat recovery

Application manual ver. 1.0

PT - 23/17

Code 1443DMVCE104

EVCO S.p.A.
Via Feltre 81, 32036 Sedico Belluno ITALIA
Tel. 0437/8422 | Fax 0437/83648
info@evco.it | www.evco.it