Universal Controller

Universal electronic controller

UNIVERSAL
controller

Meneghetti Matteo

Introduction

The Universal Controller is a configurable solution for regulating the main physical variables (temperature, pressure, humidity) in air conditioning, refrigeration and heating units.

The configurable settings are **ON/OFF, proportional and PID**.

If the **second probe** is connected**,** it is possible to perform a differential type regulation or activate a second independent regulation with dedicated set point, differential and outputs.

If the **third probe** is connected, it is possible to activate a summer, winter or summer+winter compensation action.

Hardware

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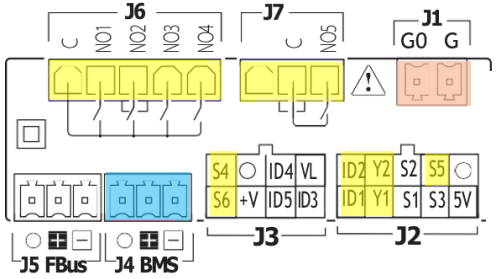
controller

Models and Features

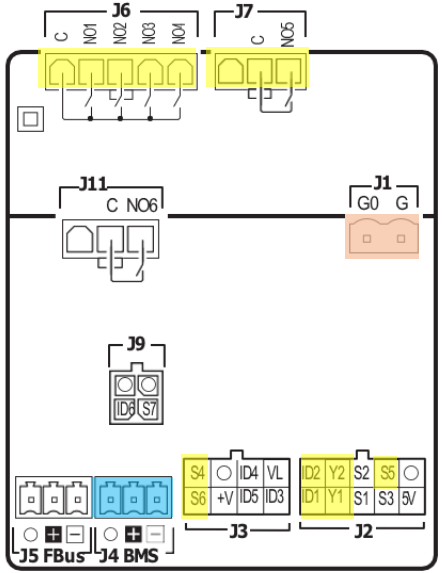
	U20R00UC00250 (DIN)	U20R00UC00200 (PANEL)
Image		
Analog Inputs	2x 0-5V/4-20mA/NTC (S4, S5) 1x 0-10V/NTC/0-5V/4-20mA/PT1000 (S6)	2x 0-5V/4-20mA/NTC (S4, S5) 1x 0-10V/NTC/0-5V/4-20mA/PT1000 (S6)
Digital Inputs	2x DI free voltage	2x DI free voltage
Analog Outputs	2x 0-10V (no PWM, no VCC)	2x 0-10V (no PWM, no VCC)
Digital Outputs	5x SPST 5A	5x SPST 5A
Power Input	24 VAC/VDC	24 VAC/VDC
Apply Connectivity	Bluetooth (BLE)	Bluetooth (BLE)
Serial ports	2x RS485 (BMS, Fieldbus) not opto-isolated	2xRS485 (BMS, Fieldbus) not opto-isolated
RTC backup	Supercap (72h)	Supercap (72h)

Terminal block

PANEL



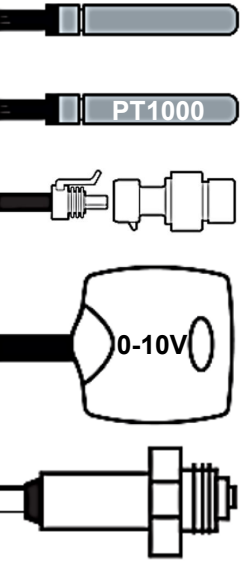
DIN RAIL



Ref.		Description
J1	G	24 VAC/VDC power supply
	G0	Neutral
J2	5V	Ratiometric probe power supply
	S3	Analogue input 3 (not used)
	S1	Analogue input 1 (not used)
	Y1	Analogue output 1
	ID1	Digital input 1
	O	Common GND
	S5	Analogue input 5 (probe 3)
	S2	Analogue input 2 (not used)
	Y2	Analogue output 2
	ID2	Digital input 2
J3	ID3	Digital input 3 (not used)
	ID5	Digital input 5 (not used)
	+V	Power supply to 4-20 mA active probes
	S6	Analogue input 6 (probe 1)
	VL	N/A
	ID4	Digital input 4 (not used)
	O	Common GND
	S4	Analogue input 4 (probe 2)
J4	-	BMS port (RS485) Rx/Tx-
	+	BMS port (RS485) Rx/Tx+
	O	BMS port (RS485) GND

Ref.		Description
J5	-	Fieldbus port (RS485) Rx/Tx-
	+	Fieldbus port (RS485) Rx/Tx+
	O	Fieldbus port (RS485) GND
J6	C	Common for relays 1, 2, 3, 4
	NO1	Digital output 1
	NO2	Digital output 2
	NO3	Digital output 3
	NO4	Digital output 4
J7	C	Common for relay 5
	NO5	Digital output 5 (alarm)
J9	S7	Analogue input 7 (not used)
	ID6	Digital input 6 (not used)
	O	Common GND
J11		N/A
	C	Common for relay 6
	CN6	Digital output 6 (not used)

Connectable sensors



Probe 1 (input S6):

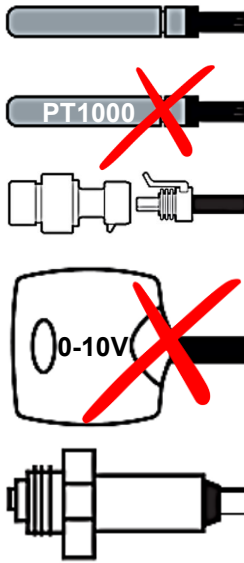
- NTC
- NTC HT
- PT1000
- 0-10 VDC
- Ratiometric 0-5 VDC
- 0..20 mA
- 4..20 mA

Configurable by parameter

Probe 2 (input S4) and Probe 3 (input S5):

- NTC
- NTC HT
- Ratiometric 0-5 VDC
- 0..20 mA
- 4..20 mA

Configurable by respective parameters



With a single hardware it is possible to manage multiple types of sensors.

IR33/DN33 code comparison

IR33-DN33 UNIVERSALE

TYPE	CODE				CHARACTERISTICS
	panel installation		DIN rail assembly		
	Temperature inputs (*)	Universal inputs (*)	Temperature inputs (*)	Universal inputs (*)	
1 relay	IR33V7HR20	IR33V9HR20	DN33V7HR20	DN33V9HR20	2AI, 2DI, 1DO, BUZ, IR, 115 to 230 V
	IR33V7HB20	IR33V9HB20	DN33V7HB20	DN33V9HB20	2AI, 2DI, 1DO, BUZ, IR, RTC, 115 to 230 V
	IR33V7LR20	IR33V9MR20 ●	DN33V7LR20	DN33V9MR20 ●	2AI, 2DI, 1DO, BUZ, IR, 12 to 24Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)
2 relays	IR33W7HR20	IR33W9HR20	DN33W7HR20	DN33W9HR20	2AI, 2DI, 2DO, BUZ, IR, 115 to 230 V
	IR33W7HB20	IR33W9HB20	DN33W7HB20	DN33W9HB20	2AI, 2DI, 2DO, BUZ, IR, RTC, 115 to 230 V
	IR33W7LR20	IR33W9MR20 ●	DN33W7LR20	DN33W9MR20 ●	2AI, 2DI, 2DO, BUZ, IR, 12 to 24 Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)
4 relays	IR33Z7HR20	IR33Z9HR20	DN33Z7HR20	DN33Z9HR20	2AI, 2DI, 4DO, BUZ, IR, 115 to 230V
	IR33Z7HB20	IR33Z9HB20	DN33Z7HB20	DN33Z9HB20	2AI, 2DI, 4DO, BUZ, IR, RTC, 115 to 230 V
	IR33Z7LR20	IR33Z9MR20 ●	DN33Z7LR20	DN33Z9MR20 ●	2AI, 2DI, 4DO, BUZ, IR, 12 to 24 Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)
4 SSR	IR33A7HR20	IR33A9HR20	DN33A7HR20	DN33A9HR20	2AI, 2DI, 4SSR, BUZ, IR, 115 to 230V
	IR33A7HB20	IR33A9HB20	DN33A7HB20	DN33A9HB20	2AI, 2DI, 4SSR, BUZ, IR, RTC, 115 to 230V
	IR33A7LR20	IR33A9MR20 ●	DN33A7LR20	DN33A9MR20 ●	2AI, 2DI, 4SSR, BUZ, IR, 12 to 24 Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)
1 relay +1 0 to 10 Vdc	IR33B7HR20	IR33B9HR20	DN33B7HR20	DN33B9HR20	2AI, 2DI, 1DO+1AO, BUZ, IR, 115 to 230 V
	IR33B7HB20	IR33B9HB20	DN33B7HB20	DN33B9HB20	2AI, 2DI, 1DO+1AO, BUZ, IR, RTC, 115 to 230 V
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	IR33E7HB20	IR33E9HB20	DN33E7HB20	DN33E9HB20	2AI, 2DI, 2DO+2AO, BUZ, IR, RTC, 115 to 230 V
	IR33E7LR20	IR33E9MR20 ●	DN33E7LR20	DN33E9MR20 ●	22AI, 2DI, 2DO+2AO, BUZ, IR, 12 to 24 Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)

OK!

IR33/DN33 code comparison

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	IR33A7HB20	IR33A9HB20	DN33A7HB20	DN33A9HB20	2AI, 2DI, 4SSR, BUZ, IR, RTC, 115 to 230V
	IR33A7LR20	IR33A9MR20 ●	DN33A7LR20	DN33A9MR20 ●	2AI, 2DI, 4SSR, BUZ, IR, 12 to 24 Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)
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	IR33E7HB20	IR33E9HB20	DN33E7HB20	DN33E9HB20	2AI, 2DI, 2DO+2AO, BUZ, IR, RTC, 115 to 230 V
	IR33E7LR20	IR33E9MR20 ●	DN33E7LR20	DN33E9MR20 ●	22AI, 2DI, 2DO+2AO, BUZ, IR, 12 to 24 Vac, 12 to 30 Vdc (● = 24 Vac/Vdc)

NO power supply 230V

NO power supply 230V

NO power supply 230V

NO outputs SSR

NO power supply 230V

NO power supply 230V

Programming

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Programming

Built-in keypad

Pressure > 3 sec

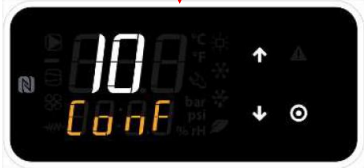
Single press

Active alarms
and
Alarm history

Password User, Service, Manufacturer

Reading probes and statuses

Setting:
- On/Off from keyboard
- Setpoint 1
- Setpoint 2 …



Main menu:
- Input/Output
- Regulation
- Alarms
- Settings
- Clock
- Time slots
- Alarm history
- Logout

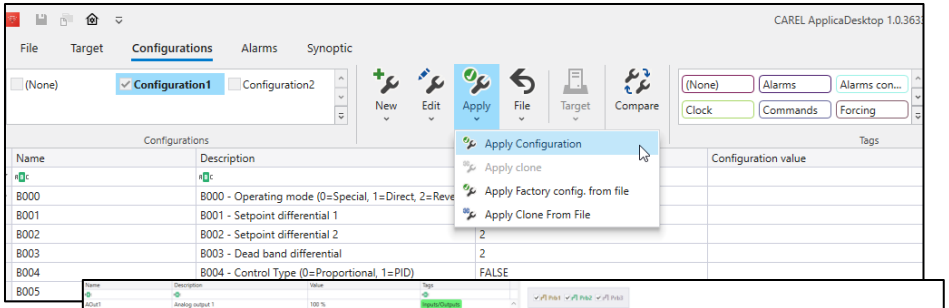
...

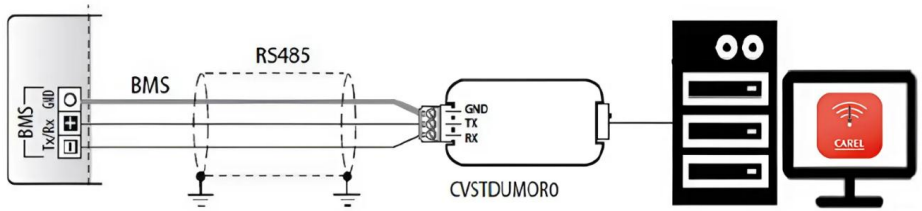
Programming

Applica Desktop

With *Applica Desktop* is possible to:

- Create, copy and load configurations
- Writie parameters and read states
- Default parameter settings
- Live trend for testing
- Application update





Programming

Applica Mobile

Available for free at:

Google Play

App Store

With *Applica Mobile*(via Bluetooth) is possible to:

- Create, copy and load configurations
- Write parameters and read states
- Default parameter settings
- Application update

Functionality

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controller

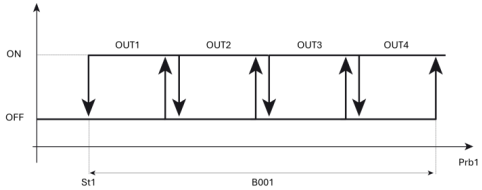
Main regulation

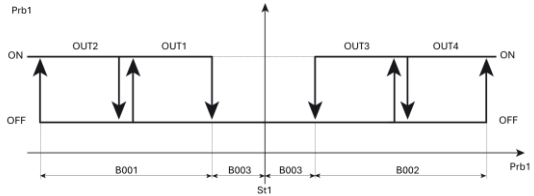
Probe 1

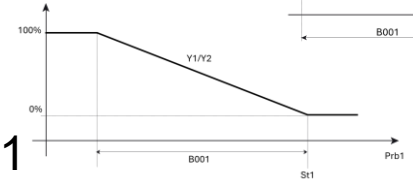
Main control loop type ON/OFF, proportional, PID type based on Probe 1.

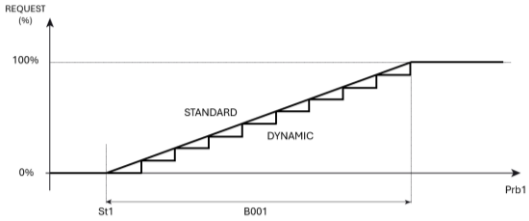
Regulation choice between:

- Direct
- Reverse
- Neutral zone
- Direct/reverse switching from DI1
- Direct: Setpoint and differential from DI1
- Reverse: Setpoint and differential from DI1
- Direct/Reverse with two distinct setpoints
- 3-point valve









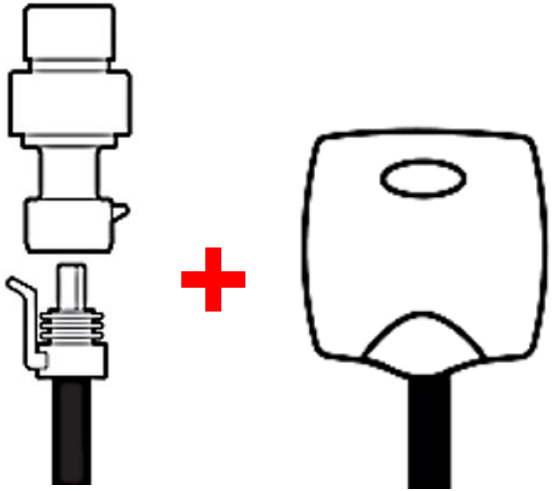
Auxiliary regulation

Probe 2

Loop for additional logic or addition of a second independent circuit on Probe 2.

Adjustment of your choice tra:

- Differential operation (Probe 1-Probe 2)
- Enable control based on the absolute setpoint
- Enable control based on the setpoint differential
- Independent operation (Circ.1 + Circ.2)
- Control on higher probe value
- Control on lower proble value
- Control setpoint from Probe 2
- Automatic summer/winter from Probe 2



Probe 1 Probe 2

Compensation logics

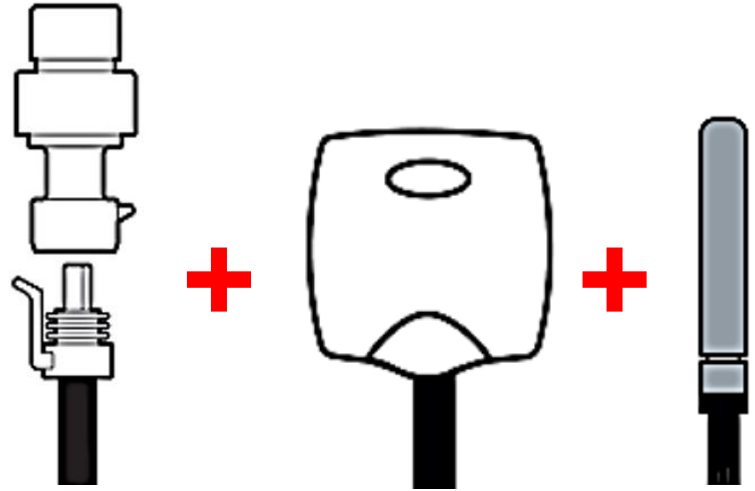
Probe 3

Loop for compensation logics of the setpoint based on Probe 3.

Regulation choice between:

- Summer compensation
- Winter compensation
- Summer/winter compensation
- Read only

This allows the management of up to 3 Loops (main regulation + auxuliary regulation+ compensation) using 3 probes connected to the same controller.



Probe 1 Probe 2 Probe 3

Custom operation

Special Logic

It is possible to create a customized operating logic that allows to configure the regulation of each individual output using additional parameters, referred to as special parameters:

- **Regulation type**
  - Regulation on thresholds
  - Regulation on St1 and B001
  - Regulation on St2 and B002
  - Alarm Status
  - Unit status ON/OFF
  - Regulation status ON/OFF
- **Regulation probe**
  - Probe 1
  - Probe 2
  - Probe 1/Probe 2 from DI1
  - Probe 1 - Probe 2
  - Probe 2 - Probe 1
- **Thresholds**
  - Activation/request at 100%
  - Deactivation/request at 0%
- **Alarm dependency (On-Off outputs only)**
  - Global alarm
  - Alarm on Probe 1/Circuit 1
  - Alarm on Probe 2/Circuit 2
  - Alarm on Probe 3
  - High alarm on Probe 1
  - Low alarm on Probe 1
  - High alarm on Probe 2
  - Low alarm on Probe 2
  - High alarm on Probe 3
  - Low alarm on Probe 3
- **Regulation type (for On-Off output only)**
  - On-Off
  - 3-point valve opening
  - 3-point valve closure
- **Output mode**
  - Direct
  - Reverse
  - Direct/Reverse from Summer/Winter

LEGEND

Special regulation logic

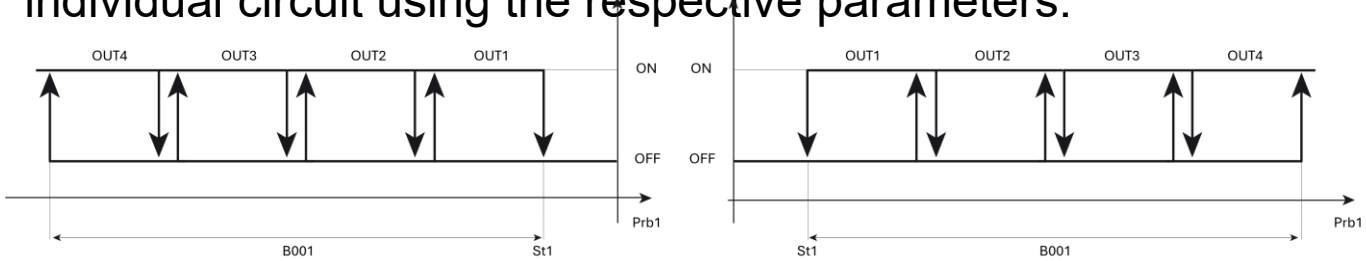
Special alarm logic

Special state logic

Summer/Winter

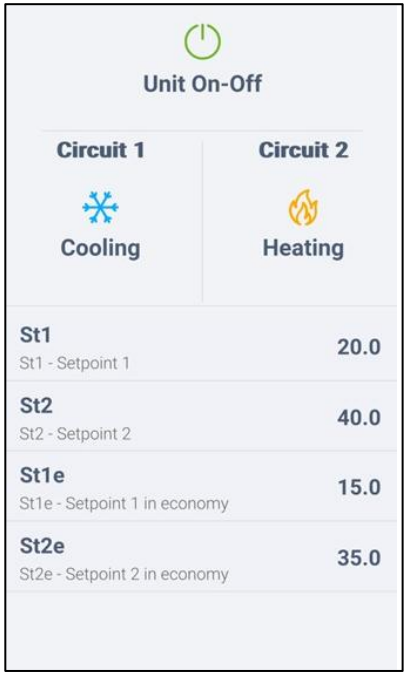
The transition from one season to another allows the current regulation setting to be reversed according to an external signal(configurable between DI1 only, DI2 only or both),without having to change the operating mode from the parameter.

It is also possible to further reverse the regulation for each individual circuit using the respective parameters.



WINTER
REVERSE
HEATING

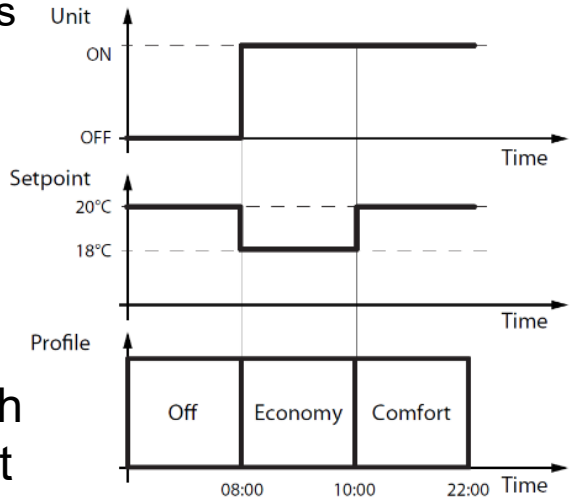
SUMMER
DIRECT COOLING



Time Bands

Scheduler with 3 different programmable profiles:

- COMFORT ➔ Specific setpoints and compensation thresholds
- ECONOMY ➔ Specific setpoints and compensation thresholds
- OFF ➔ Unit switched off

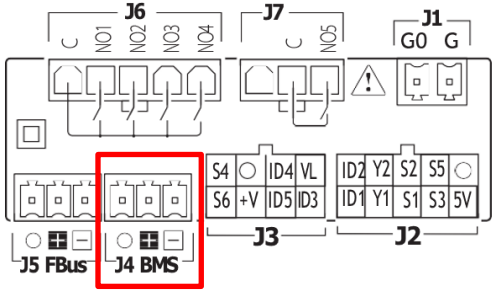


Possibility to set up to 3 programs(P1, P2, P3), each with a maximum of 4 daily time bands.

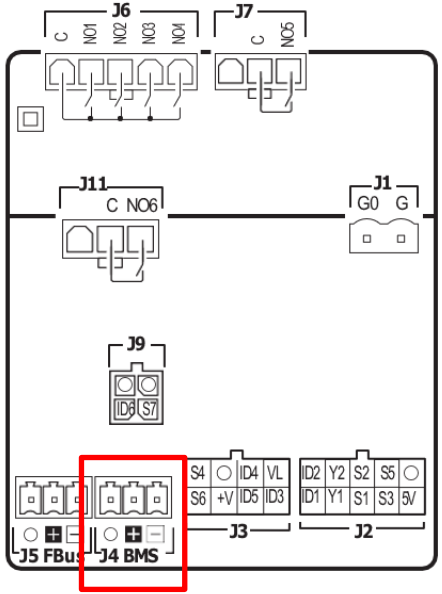
Vacation period management, specifying the day and month the vacation period starts/ends and the operating mode that will be applied during this period.

Supervision

PANEL



DIN RAIL



- Modbus RTU Server protocol via RS485 port (J4-BMS). Configurable communication parameters
- Boss model available
- tERA model available
- Parameters list and variables exposed to supervision available
- Main variables and parameters backwards compatible with existing supervisions

New features

Compared to IR33 Universal

- Management of **Summer/Winter unit** from digital input (DI1, DI2, DI1+DI2)
- Management **Independent Summer/Winter** for Circuit 1 and Circuit 2 (from parameters)
- New main feature: **3-point valve management**
- New Probe 2 feature: **Second 3-point valve (Circuit 2)**
- Compensation function revised and moved to **Probe 3**
- Management up to **3 regulation loops** (main + auxiliary + compensation)
- **Time bands management:** 3 programs, 4 daily bands and Off/Comfort/Eco profiles
- Parameterization via **Applica Mobile** And **Applica Desktop**

Documentation

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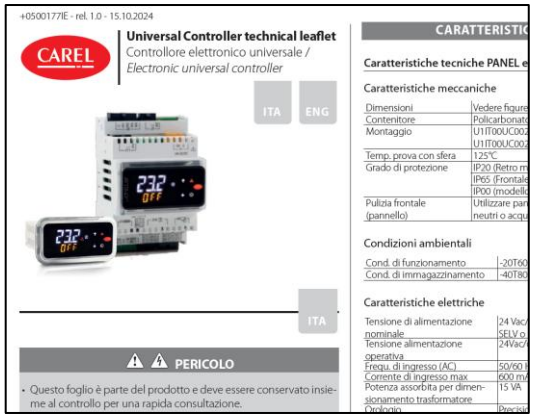
controller

Documentation

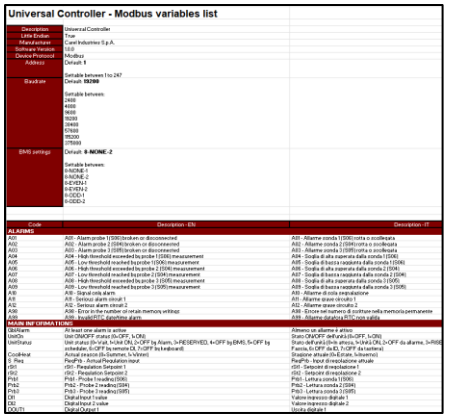
Downloadable from KSA

User Manual (ENG)

Technical Leaflet* (ITA/ENG)



Supervision List (ITA/ENG)

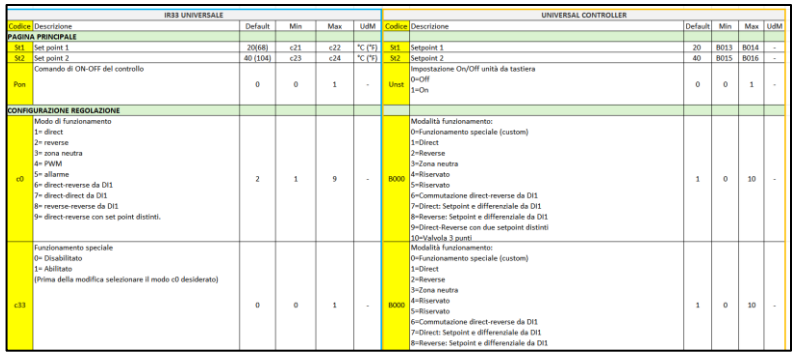


**Also available in product packaging*

Documentation

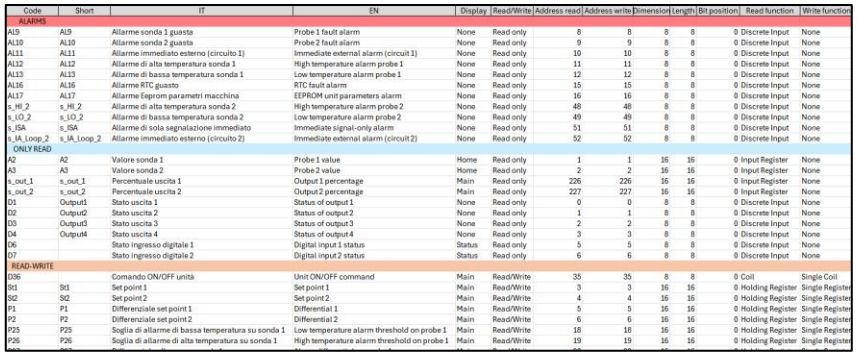
Downloadable from KSA

Parameter comparison list with universal IR33* (ITA)



IR33 UNIVERSALE						UNIVERSAL CONTROLLER					
Codice	Descrizione	Default	Min	Max	UdM	Codice	Descrizione	Default	Min	Max	UdM
PAGINA PRINCIPALE											
St1	Set point 1	20(68)	c21	c22	°C (°F)	St1	Setpoint 1	20	B013	B014	-
St2	Set point 2	40 (104)	c23	c24	°C (°F)	St2	Setpoint 2	40	B015	B016	-
Pon	Comando di ON-OFF del controllo	0	0	1	-	Unst	Impostazione On/Off unità da tastiera 0=Off 1=On	0	0	1	-
CONFIGURAZIONE REGOLAZIONE											
c0	Modo di funzionamento 1= direct 2= reverse 3= zona neutra 4= PWM 5= allarme 6= direct-reverse da DI1 7= direct-direct da DI1 8= reverse-reverse da DI1 9= direct-reverse con set point distinti.	2	1	9	-	B006	Modalità funzionamento: 0=Funzionamento speciale (custom) 1=Direct 2=Reverse 3=Zona neutra 4=Riservato 5=Riservato 6=Commutazione direct-reverse da DI1 7=Direct: Setpoint e differenziale da DI1 8=Reverse: Setpoint e differenziale da DI1 9=Direct-Reverse con due setpoint distinti 10=Valvola 3 punti	1	0	10	-
c33	Funzionamento speciale 0= Disabilitato 1= Abilitato (Prima della modifica selezionare il modo c0 desiderato)	0	0	1	-	B008	Modalità funzionamento: 0=Funzionamento speciale (custom) 1=Direct 2=Reverse 3=Zona neutra 4=Riservato 5=Riservato 6=Commutazione direct-reverse da DI1 7=Direct: Setpoint e differenziale da DI1 8=Reverse: Setpoint e differenziale da DI1	1	0	10	-

List of variables in Supervision shared with universal IR33** (ITA/ENG)



Code	Short	IT	EN	Display	Read/Write	Address read	Address write	Dimension	Length	Bit position	Read function	Write function
ALARMS												
AL9	AL9	Allarme sonda 1 guasta	Probe 1 fault alarm	None	Read only	8	8	8	8	0	Discrete Input	None
AL10	AL10	Allarme sonda 2 guasta	Probe 2 fault alarm	None	Read only	9	9	8	8	0	Discrete Input	None
AL11	AL11	Allarme immediato esterno (circuito 1)	Immediate external alarm (circuit 1)	None	Read only	10	10	8	8	0	Discrete Input	None
AL12	AL12	Allarme di alta temperatura sonda 1	High temperature alarm probe 1	None	Read only	11	11	8	8	0	Discrete Input	None
AL13	AL13	Allarme di bassa temperatura sonda 1	Low temperature alarm probe 1	None	Read only	12	12	8	8	0	Discrete Input	None
AL16	AL16	Allarme RTC guasto	RTC fault alarm	None	Read only	15	15	8	8	0	Discrete Input	None
AL17	AL17	Allarme Eeprom parametri macchina	EEPROM unit parameters alarm	None	Read only	16	16	8	8	0	Discrete Input	None
s_HI_2	s_HI_2	Allarme di alta temperatura sonda 2	High temperature alarm probe 2	None	Read only	48	48	8	8	0	Discrete Input	None
s_LO_2	s_LO_2	Allarme di bassa temperatura sonda 2	Low temperature alarm probe 2	None	Read only	49	49	8	8	0	Discrete Input	None
s_ISA	s_ISA	Allarme di sola segnalazione immediato	Immediate signal-only alarm	None	Read only	51	51	8	8	0	Discrete Input	None
s_IA_Loop_2	s_IA_Loop_2	Allarme immediato esterno (circuito 2)	Immediate external alarm (circuit 2)	None	Read only	52	52	8	8	0	Discrete Input	None
ONLY READ												
A2	A2	Valore sonda 1	Probe 1 value	Home	Read only	1	1	16	16	0	Input Register	None
A3	A3	Valore sonda 2	Probe 2 value	Home	Read only	2	2	16	16	0	Input Register	None
s_out_1	s_out_1	Percentuale uscita 1	Output 1 percentage	Main	Read only	226	226	16	16	0	Input Register	None
s_out_2	s_out_2	Percentuale uscita 2	Output 2 percentage	Main	Read only	227	227	16	16	0	Input Register	None
D1	Output1	Stato uscita 1	Status of output 1	None	Read only	0	0	8	8	0	Discrete Input	None
D2	Output2	Stato uscita 2	Status of output 2	None	Read only	1	1	8	8	0	Discrete Input	None
D3	Output3	Stato uscita 3	Status of output 3	None	Read only	2	2	8	8	0	Discrete Input	None
D4	Output4	Stato uscita 4	Status of output 4	None	Read only	3	3	8	8	0	Discrete Input	None
D6		Stato ingresso digitale 1	Digital input 1 status	Status	Read only	5	5	8	8	0	Discrete Input	None
D7		Stato ingresso digitale 2	Digital input 2 status	Status	Read only	6	6	8	8	0	Discrete Input	None
READ-WRITE												
D36		Comando ON/OFF unità	Unit ON/OFF command	Main	Read/Write	35	35	8	8	0	Coil	Single Coil
St1	St1	Set point 1	Set point 1	Main	Read/Write	3	3	16	16	0	Holding Register	Single Register
St2	St2	Set point 2	Set point 2	Main	Read/Write	4	4	16	16	0	Holding Register	Single Register
P1	P1	Differenziale set point 1	Differential 1	Main	Read/Write	5	5	16	16	0	Holding Register	Single Register
P2	P2	Differenziale set point 2	Differential 2	Main	Read/Write	6	6	16	16	0	Holding Register	Single Register
P25	P25	Soglia di allarme di bassa temperatura su sonda 1	Low temperature alarm threshold on probe 1	Main	Read/Write	18	18	16	16	0	Holding Register	Single Register
P26	P26	Soglia di allarme di alta temperatura su sonda 1	High temperature alarm threshold on probe 1	Main	Read/Write	19	19	16	16	0	Holding Register	Single Register

**Parameters used in completely modified or revised managements are not present*

***Register types and addresses are shared only for main variables and parameters*

Code list

Code	Description
Models	
U20R00UC00200	UNIVERSAL CONTROLLER FOR EEMEA MARKET, PANEL, NFC, BLE
U20R00UC00250	UNIVERSAL CONTROLLER FOR EEMEA MARKET, DIN WITH HMI, NFC, BLE
Connector kit	
UCHCONP010	CONN. AND CABLE KIT UCHILLER PANEL MOLEX/FREE 100CM
UCHCONP030	CONN. AND CABLE KIT UCHILLER PANEL MOLEX/FREE 300CM
UCHCOND010	CONN. AND CABLE KIT UCHILLER DIN MOLEX/FREE 100CM
UCHCOND030	CONN. AND CABLE KIT UCHILLER DIN MOLEX/FREE 300CM
Accessories	
CVSTDUMOR0	USB-RS485 CONVERTER 3-WAY TERMINAL

UNIVERSAL controller