RDT 921 F901

Configurable controllers

Hardware manual | ENGLISH

Code 114RDT921E104SAU

Important

Read this document thoroughly before installation and before use of the device and follow all recommendations; keep this document with the device for future consultation.

Only use the device in the way described in this document; do not use the same as a safety device.

Disposal

The device must be disposed of in compliance with local standards regarding the collection of electric and electronic equipment.

Index

1 INTRODUCTION

1.1 Introduction

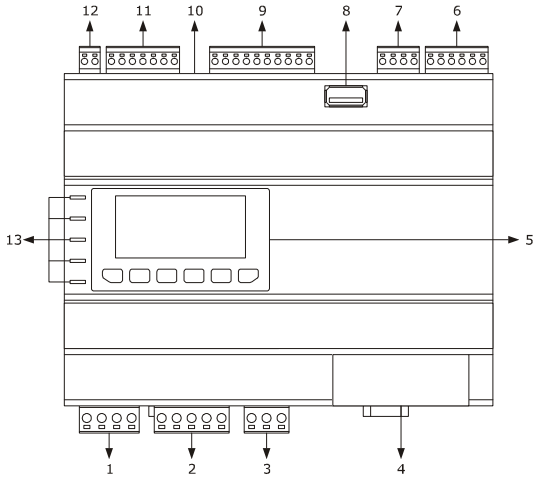
RDT900 is a range of configurable controllers for cooling and air conditioning applications.
The controllers are equipped with a significant number of input and output arrangements which make it possible to create a flexible, modular and expandable network of control devices.
The range of available communication ports (RS-485, CAN, USB and Ethernet) and of supported communication protocols promote the integration of the devices into larger systems.

For information on the use of the BACnet communication protocol please consult the PICS.
The actual version implements a BACnet® standardized device profile B-ASC, which doesn't require the managing of Scheduler and Calendar objects, instead required for the B-AAC profile.

2 DESCRIPTION

2.1 Description

The following drawing shows the appearance of the devices.



The following table shows the meaning of the parts of the devices.

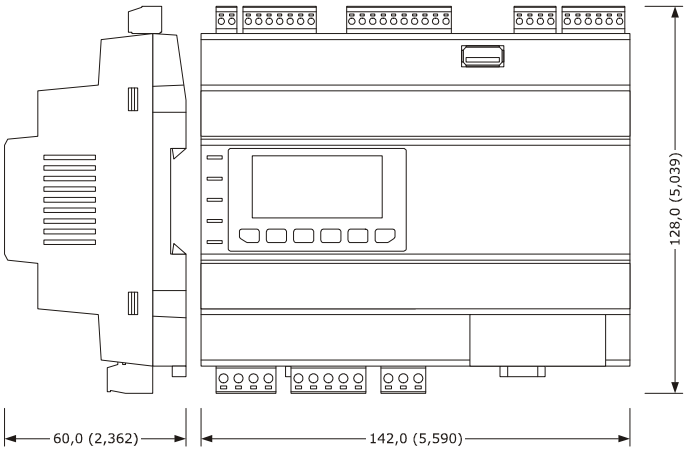
PART	MEANING
1	K1 and K2 digital outputs
2	K3, K4, K5 and K6 digital outputs
3	K7 digital outputs
4	Ethernet MODBUS TCP, Web Server, BACnet IP port
5	display and keypad (not available for the blind versions)
6	digital inputs
7	analog outputs
8	USB port
9	analog inputs
10	micro switch activating the Can Canbus terminal port, the RS-485 MODBUS master/slave port and the RS-485 MODBUS slave port
11	RS-485 MODBUS slave, RS-485 MODBUS master/slave and CAN CANBUS ports
12	power supply
13	signalling LED

For additional information, please refer to the following chapters.

3 DIMENSIONS AND INSTALLATION

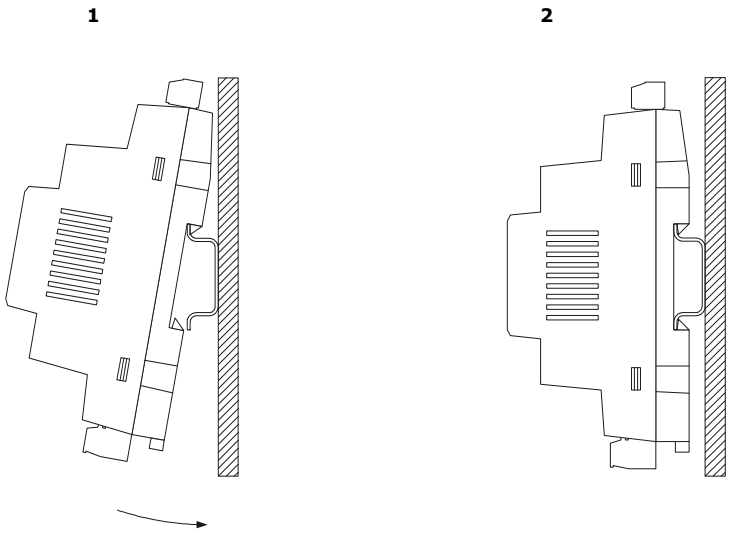
3.1 Dimensions:

The following drawing shows the measurements of the devices (8 DIN modules), in mm (in).



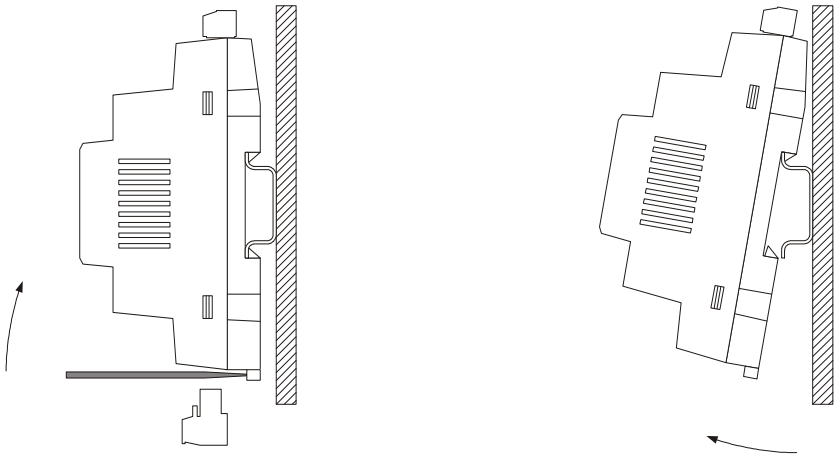
3.2 Installation

The device is installed on a DIN 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), track in a control panel.
To install the devices, please follow the instructions in the drawing below.



To remove the devices, first remove any screw-in removable terminal boards mounted in the lower part, then trigger the DIN track clip with a screwdriver as show in the following picture:

3 **4**



To install the devices again, first press the clip of the DIN track.

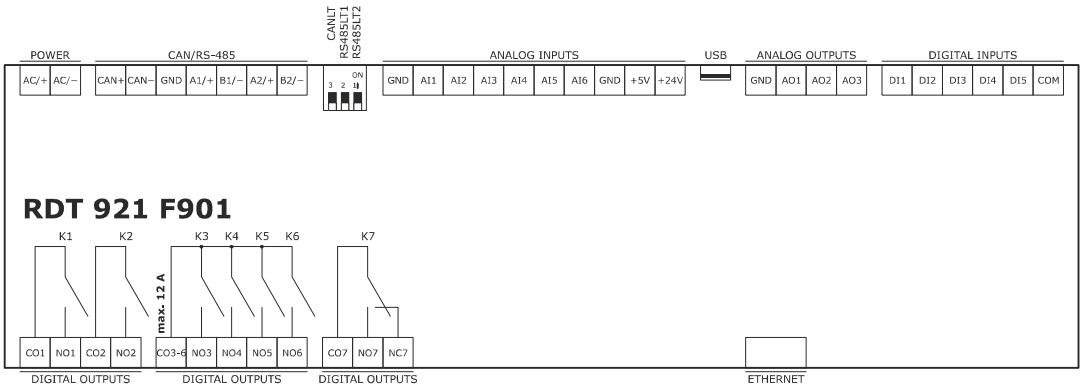
3.3 Installation warnings

- make sure that the device work conditions (temperature of use, humidity, etc.) lie within the limits indicated; see chapter 7 "TECHNICAL DATA"
- do not install the device near to any heat sources (heating elements, hot air ducts etc.), equipment containing powerful magnets (large diffusers, etc.), areas affected by direct sunlight, rain, humidity, excessive dust, mechanical vibrations or shocks
- in compliance with Safety Standards, the device must be installed correctly and in a way to protect against any contact with electric parts; all parts that ensure protection must be fixed in a way that they cannot be removed without the use of tools.

4 ELECTRIC CONNECTION

4.1 Connectors

The following drawing shows the connectors of the devices.



4.2 Meaning of connectors

The following tables show the meaning of the various device connectors.

For additional information, please read chapter 7 "TECHNICAL DATA",

POWER

Device power supply (24 VAC/DC not insulated)

If the device runs on direct current, it shall be necessary to pay attention to the polarity of the supply voltage.

If the device is connected to a network of devices, it shall be necessary to:

- check that the power supply of the devices included in the network are galvanically isolated.
- the phase powering the device is the same as that of all the devices included in the network.

PART	MEANING
AC/+	device power supply: - if the device is run by alternating current, connect the phase - if the device is run by direct current, connect the positive pole
AC/-	device power supply: - if the device is run by alternating current, connect the neuter - if the device is run by direct current, connect the negative pole

ANALOG INPUTS

Analog inputs

Please see paragraph 6 "CONFIGURATION" for the settings of the analog inputs.

PART	MEANING
GND	analog inputs ground
AI1	analog input 1 settable by way of the PTC, NTC, Pt 1000, Ni 1000 probes configuration parameter, transducers 0-20 mA, 4-20 mA, 0-5 V ratiometric or 0-10 V
AI2	analog input 2 settable by way of the PTC, NTC, Pt 1000, Ni 1000 probes configuration parameter, transducers 0-20 mA, 4-20 mA, 0-5 V ratiometric o 0-10 V

AI3	analog input 3 settable by way of the PTC, NTC, Pt 1000, Ni 1000 probes configuration parameter, transducers 0-20 mA, 4-20 mA, 0-5 V ratiometric o 0-10 V
AI4	analog input 4, settable by way of the PTC, NTC, Pt 1000, Ni 1000 probes configuration parameter
AI5	analog input 5, settable by way of the PTC, NTC, Pt 1000, Ni 1000 probes configuration parameter
AI6	analog input 6, settable by way of the PTC, NTC, Pt 1000, Ni 1000 probes configuration parameter
GND	analog inputs ground
+5V	0-5 V (5VDC) ratiometric transducers power supply
+24V	0-20 mA, 4-20 mA and 0-10 V (24 VAC) transducers power supply

DIGITAL INPUTS

Digital inputs.

PART	MEANING
DI1	digital input 1 (24 VAC/DC, 50/60 Hz or 2 KHz opto-isolated);
DI2	digital input 2 (24 VAC/DC, 50/60 Hz o 2 KHz opto-isolated);
DI3	digital input 3 (24 VAC/DC, 50/60 Hz opto-isolated)
DI4	digital input 4 (24 VAC/DC, 50/60 Hz opto-isolated)
DI5	digital input 5 (24 VAC/DC, 50/60 Hz opto-isolated)
COM	common digital inputs

ANALOG OUTPUTS

Analog outputs.

Please see paragraph 6 "CONFIGURATION" for the settings of the analog outputs.

PART	MEANING
GND	analog outputs ground
AO1	analog output 1, settable by way of the configuration parameter for PWM or 0-10V.
AO2	analog output 2, settable by way of the configuration parameter for PWM or 0-10 V
AO3	analog output 3, settable by way of the configuration parameter for 0-20 mA, 4-20 mA or 0-10 V

DIGITAL OUTPUTS

Digital outputs.

PART	MEANING
CO1	common digital output 1
NO1	usually open contact for digital output 1 according to model: - electromechanical relay with 3 A res. @ 250 VAC - control for 24 VAC/DC, 600 mA max. solid state relays
CO2	common digital output 1
NO2	usually open contact for digital output 2 according to model: - electromechanical relay with 3 A res. @ 250 VAC - control for 24 VAC/DC, 600 mA max. solid state relays
CO3-6	common digital output 3... 6
NO3	usually open contact for digital output 3 (electromechanical relay with 3 A res. @ 250 VAC)
NO4	usually open contact for digital output 4 (electromechanical relay with 3 A res. @ 250 VAC)
NO5	usually open contact for digital output 5 (electromechanical relay with 3 A res. @ 250 VAC)
NO6	usually open contact for digital output 6 (electromechanical relay with 3 A res. @ 250 VAC)
CO7	common digital output 7
NO7	usually open contact for digital output 7 (electromechanical relay with 3 A res. @ 250 VAC)
NC7	usually open contact for digital output 7

CAN/RS-485

RS-485 MODBUS slave, RS-485 MODBUS master/slave and CAN CANBUS ports

The communication protocol for the RS-485 MODBUS master/slave port can be set with the development environment.

For the settings for the RS-485 MODBUS slave, RS-485 MODBUS master/slave and CAN CANBUS ports, please refer to chapter 6 "CONFIGURATION".

PART	MEANING
CAN+	CAN CANBUS port positive pole
CAN-	CAN CANBUS port negative pole
GND	RS-485 MODBUS slave, RS-485 MODBUS master/slave and CAN CANBUS ports ground
A1/+	RS-485 MODBUS master/slave port positive pole

B1/-	RS-485 MODBUS master/slave port negative pole
A2/+	RS-485 MODBUS slave port positive pole
B2/-	RS-485 MODBUS slave port negative pole

The following table shows the Function codes supported by the device, provided that it works in commander mode with a MODBUS communication protocol.

FUNCT. CODE	MEANING
FC 01	read coils
FC 02	read discrete inputs
FC 03	read multiple registers
FC 04	read input registers
FC 05	write single coil
FC 06	write single register
FC 08	diagnostic
FC 15	write multiple coils
FC 16	write multiple registers
FC 23	read write multiple registers (maximum 10 registers)

The RS-485 MODBUS slave and RS-485 MODBUS master/slave ports can be used for one of the following operations:
- device configuration (through the Parameters Manager set-up software system)
- device supervision (through the Sauter Vision Center system monitoring and supervision (via Web) system)
- MODBUS master function use with regard to other slave devices.

The CAN CANBUS port can be used to connect the device to the remote user interfaces of the ***RDB900*** range
The maximum number of devices that can be comprised in the CAN network (32) depends on the BUS load; the BUS load, in turn, depends on the baud rate of the CANBUS communication and on the type of device (for instance, a CAN network can comprise 1 controller and 4 remote user interfaces with a baud rate of 500,000 baud).

USB

USB port

Through the USB port it is possible to carry out one of the following actions:
- upload and download of application software (through the development environment or USB flash drive)
- application software debug (through development environment)
- device configuration (through the Parameters Manager set-up software system or a USB flash drive)
- file transfer (through the development environment)
- data logging (through a USB flash drive).

Please see paragraph 6 "CONFIGURATION" for the settings of the USB port.

ETHERNET

Ethernet MODBUS TCP, Web Server, BACnet IP port

Please see paragraph 6 "CONFIGURATION" for the settings of the Ethernet MODBUS TCP, Web Server, BACnet IP port.

4.3 Insertion of the termination resistor of the CAN CANBUS port

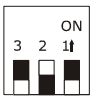
To reduce reflections on the signal transmitted through the cables connecting the devices to a CAN network it is necessary to insert the termination resistor of the first and last elements of the network.

To insert the termination resistor, place the micro-switch 3 in the ON position.

4.4 Insertion of the RS-485 MODBUS master/slave port termination resistor

To reduce reflections on the signal transmitted through the cables connecting the devices to a RS-485 network it is necessary to insert the termination resistor of the first and last elements of the network.

To insert the termination resistor, place the micro-switch 2 in the ON position.



4.5 Insertion of the RS-485 MODBUS slave port termination resistor

To reduce reflections on the signal transmitted through the cables connecting the devices to a RS-485 network it is necessary to insert the termination resistor of the first and last elements of the network.

To insert the termination resistor, place the micro-switch 1 in the ON position.

4.6 RS-485 MODBUS master/slave port polarisation

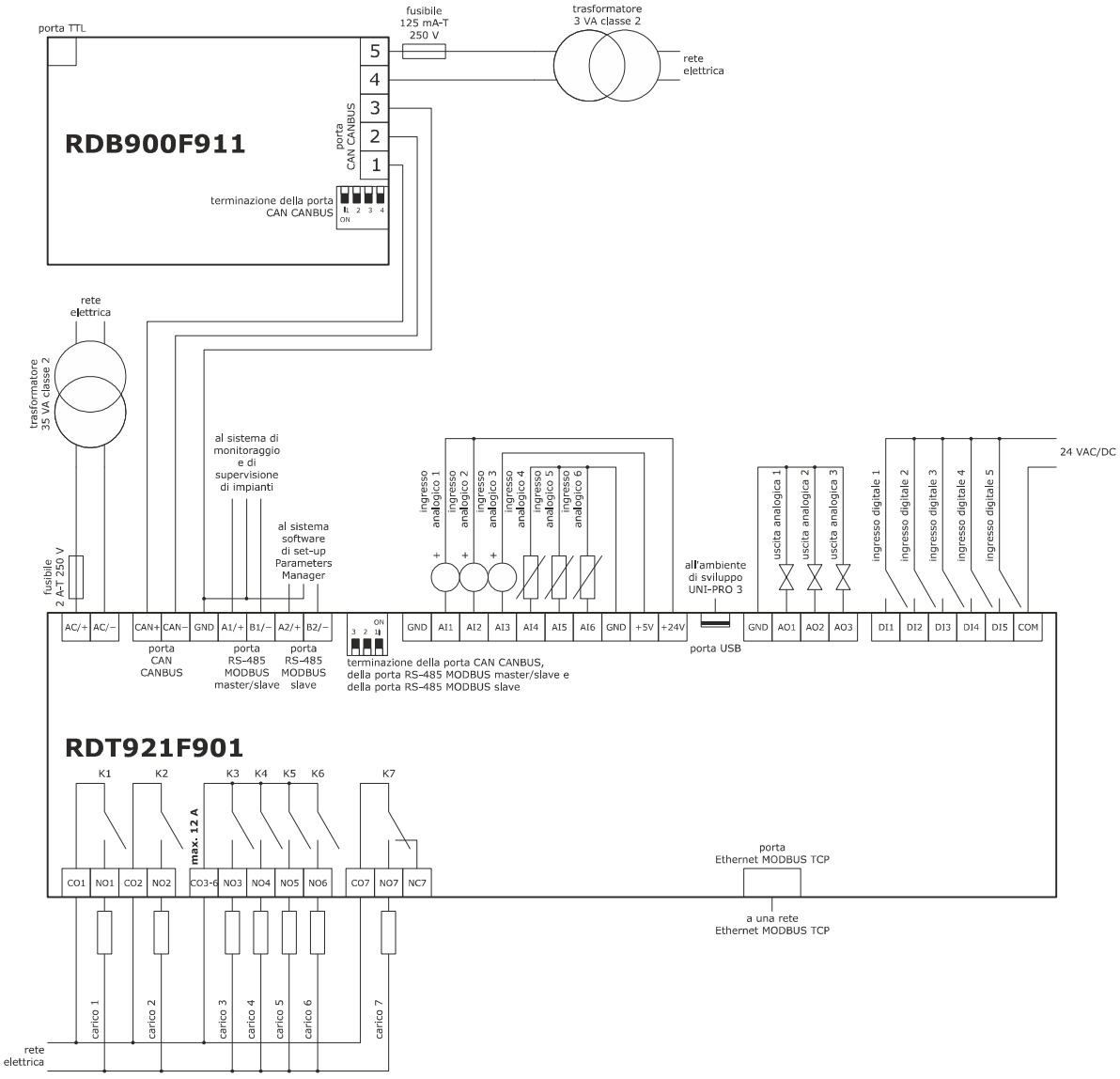
The devices can polarise the RS-485 MODBUS master/slave port; the polarisation can be set through the configuration parameter.

4.7 RS-485 MODBUS slave port polarisation

The devices cannot polarise the RS-485 MODBUS slave port; the polarisation must be carried out by another device.

4.8 Example of electric connection

The following drawing shows and example of the electric connection of the devices.



4.9 Warnings for the electric connection

- do not use electric or pneumatic screwdrivers on the device terminal board
- if the device has been taken from a cold to hot place, humidity could condense inside; wait about 1 hour before powering it
- make sure that the power supply voltage, the frequency and the operational electric power of the device, correspond with those of the local power supply; see chapter 8 “TECHNICAL DATA”
- disconnect the device power supply before proceeding with any type of maintenance
- connect the device to a RS-485 network using a twisted pair
- connect the device to a CAN network using a twisted pair
- position the power cables as far away as possible from the signal cables
- do not use the device as a safety device
- for repairs and information regarding the device, contact the SAUTER ITALIA sales network.

5 USER INTERFACE

5.1 Keypad

The following table shows the meaning of the keypad of the devices.

KEY	PRESET FUNCTION
esc	cancel, hereinafter also "ESC key"
◁	left shift, hereinafter also "LEFT key"
△	increase, hereinafter also "UP key"
▽	decrease, hereinafter also "DOWN key"
▷	right shift, hereinafter also "RIGHT key"
↵	confirm, hereinafter also "ENTER key"

The keypad is not available in the blind versions.

5.2 LED warning lights

The following table shows the meaning of the LED warning lights of the devices.

LED	MEANING
ON	power supply LED if it is on, the device is powered if it is off, the device is not powered
RUN	run LED if it is on, the application software shall be compiled and executed in *release* mode if it is flashing very slowly, the application software shall be compiled in *debug* mode if it is flashing slowly, the application software shall be executed in *debug* mode if it is flashing quickly, the application software shall be compiled, executed in *debug* mode and stopped at a *breakpoint* if it is off: - the device is not compatible with the application software - the device is not authorised to operate with the *Special ABL (Application Block Libraries)*
⚠	system alarm LED if it is on, a system alarm has been triggered that cannot be reset through the application software if it is flashing very slowly, the external FLASH memory is being accessed if it is flashing slowly, a system alarm had been triggered with automatic reset if it is flashing quickly, a system alarm had been triggered with manual reset if it is off, no system alarm has been triggered

CAN	CAN CANBUS communication LED if it is on, the device is configured to communicate via CAN CANBUS with another device, but the communication has not been established if it is flashing slowly, the CAN CANBUS communication has been established, but is not entirely correct if it is flashing quickly, the CAN CANBUS communication shall established and be entirely correct if it is off, no CAN CANBUS communication is in progress
L1	Auxiliary LED The operation of this LED can be set via development environment

For additional information, please refer to the following chapters.

6 CONFIGURATION

6.1 Configuration of a built-in LCD controller

To access the procedure, proceed as follows:

1. Check that the power is on.
2. Keep the UP and DOWN keys pressed for 2 s: the following menu (hereinafter, the "Main menu") shall appear on the display,

<RDT 921 F901>
Info
English
Parameters
Networks
Backup/Restore
Diagnostic
Debug

To access the sub-menus, proceed as follows:

3. Press and release the UP or DOWN key to select the relevant sub-menu.
4. Press and release the ENTER key.

To access the "Parameters", "Networks", "Password" and "Backup/Restore" sub-menus, proceed as follows:

5. Starting from point 2, press and release the UP or DOWN key to select the relevant sub-menu.
6. Press and release the ENTER key.
7. Press and release the ENTER key again to set the password
8. Press and release the DOWN key repeatedly to set "**-19**".
9. Press and release the ENTER key again.

To adjust a parameter, proceed as follows:

10. From point 9, press and release the UP or DOWN key to select the parameter (some parameters are included in sub-menus; press and release the ENTER key to access them).
11. Press and release the ENTER key.
12. Press and release the UP or DOWN key to change the value.
13. Press and release the ENTER key to confirm the set value
14. Press and release the ESC key repeatedly to go back to the "Main menu".

To change the language of the application software, proceed as follows:

15. From point 2, press and release the UP or DOWN key to select the "Language" item (the default setting is "English").
16. Press and release the ENTER key.
17. Press and release the UP or DOWN key to change the language.
18. Press and release the ENTER key to confirm the set value

To change the current date and time, proceed as follows:

19. Starting from point 2, press and release the UP or DOWN key to select the "Current date and time" item.
20. Press and release the ENTER key.
21. Press and release the UP or DOWN key to change the value.
22. Press and release the ENTER or RIGHT keys to confirm the value and change the following field (press and release the LEFT or RIGHT keys to move between fields)
23. Repeat points 21 and 22.

To copy the controller parameters to a USB peripheral device, proceed as follows:

24. Check that the power is on.
25. Connect the peripheral device to the controller.
26. Access the "Backup/Restore" sub-menu, then choose "Parameters key" (Choose "Backup Memory" for the backup memory)
27. Press and release the UP or DOWN key to select "Application par" to copy the parameters of the application software, or "Hardware config" to copy the configuration parameters.
28. Press and release the UP or DOWN key to select "Save on the key"

29. Press and release the ENTER key: the parameters shall be copied from the controller into the peripheral device (the process usually requires a few seconds; if an error should be present, the System alarm LED (see paragraph 5.2 LED warning lights) shall light up and an Err. value shall be input in the Key Par (in the "Diagnostic" sub-menu) parameter.
30. Disconnect the peripheral device

To copy the USB peripheral device parameters to the controller, proceed as follows:

31. Check that the power is on.
32. Connect the peripheral device to the controller.
33. Access the "Backup/Restore" sub-menu, then choose "Parameters key" (Choose "Backup Memory" for the backup memory)
34. Press and release the UP or DOWN key to select "Restore from the key".
35. Press and release the ENTER key: the parameters shall be copied from the peripheral device into the controller (the process usually requires a few seconds; if an error should be present, the System alarm LED (see paragraph 5.2 LED warning lights) shall light up and an Err. value shall be input in the Key Par (in the "Diagnostic" sub-menu) parameter.
36. Disconnect the peripheral device

Copying the peripheral device parameters tp the controller is allowed provided that the controllers firmware coincides.

To exit the procedure, proceed as follows:

37. Press and release the ESC key repeatedly; any changes shall not be saved.

Disconnect the power supply after changing the configuration.

6.2 Configuration of a controller through a remote user interface

The following procedures show an example of how to configure a controller through a remote user interface (in the example, ***RDB 900 F901***) and its user interface.

Proceed as follows:

1. Disconnect the power supply of the controller and the interface.
2. Connect the controller to the interface through the CAN CANBUS port; see chapter 4 "ELECTRIC CONNECTION".
3. Keep the ESC and RIGHT keys pressed for 2 sec.
4. Connect the power supply of the controller and the interface.
5. When the interface display shows the following menu, release the ESC and RIGHT keys.

RDT 900 F901
Parameters
Contrast
CAN Network
Modbus
Info
Debug

6. Press and release the UP or DOWN key to select "CAN Network".
7. Press and release the ENTER key.
8. Press and release the ENTER key again to set the password
9. Press and release the DOWN key repeatedly to set "**-19**".
10. Press and release the ENTER key again.
11. Set the "NW Node" parameter using the UP or DOWN keys to select the parameter and the ENTER key to change and confirm the relevant value.

The default address of the CAN node of a controller is 1 (operate on the remote user interface to set the "NW Node" parameter to *[1] 1*).

12. Disconnect the user interface power supply
13. Connect the user interface power supply
14. Keep the LEFT and ENTER keys pressed for 2 s: the following menu shall appear on the display,

Network Status			
Loc	99	OK	> >
1	1	OK	> >
2	2	OK	> >
3	0	-	> >
4	0	-	> >
5	0	-	> >

15. Press and release the UP or DOWN key to select the device
16. Press and release the ENTER key: the "Main menu" of the device shall be shown on the display.
17. Proceed as shown in paragraph 6.1 “Configuration of a built-in LCD controller”.

6.3 List of configuration parameters

6.3.1 Configuration parameters of the "Info" menu

The following table shows the meaning of the configuration parameters of the "Info" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
PROJ	parameter available in read only mode				Information on the application project (project, version and revision)
FW	parameter available in read only mode				Information on the firmware (code, version, revision and sub-revision)
HW	parameter available in read only mode				Information on the hardware (version, revision, generic (G) or special (S))
SW	parameter available in read only mode				Information on the development environment (version and revision).
SN	parameter available in read only mode				Information on the serial number and the results of the production tests
MASK	parameter available in read only mode				Information on the mask (depends on the manufacturer's coding system)
DATE	parameter available in read only mode				date and time of the latest compilation of the application project.

6.3.2 Configuration parameters of the "Parameters" menu

The following table shows the meaning of the configuration parameters of the "Parameters" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
AI1	- - -	- - -	- - -	NTC	type of probe analog port 1 NI1000 = probe Ni 1000 PTC = PTC probe NTC = NTC probe 0-20mA = Transducer 0-20 mA 4-20mA = Transducer 4-20 mA 0-5V = Transducer 0-5 V ratiometric 0-10V = Transducer 0-10 V PT1000 = Pt 1000 probe NTCK2 = Type 2 NTC probe NTCK3 = Type 3 NTC probe RESIST = electric resistance reading

AI2	- - -	- - -	- - -	NTC	type of probe analog port 2 NI1000 = probe Ni 1000 PTC = PTC probe NTC = NTC probe 0-20mA = Transducer 0-20 mA 4-20mA = Transducer 4-20 mA 0-5V = Transducer 0-5 V ratiometric 0-10V = Transducer 0-10 V PT1000 = Pt 1000 probe NTCK2 = Type 2 NTC probe NTCK3 = Type 3 NTC probe RESIST = electric resistance reading
AI3	- - -	- - -	- - -	NTC	type of probe analog port 3 NI1000 = probe Ni 1000 PTC = PTC probe NTC = NTC probe 0-20mA = Transducer 0-20 mA 4-20mA = Transducer 4-20 mA 0-5V = Transducer 0-5 V ratiometric 0-10V = Transducer 0-10 V PT1000 = Pt 1000 probe NTCK2 = Type 2 NTC probe NTCK3 = Type 3 NTC probe RESIST = electric resistance reading
AI4	- - -	- - -	- - -	NTC	type of probe analog port 4 NI1000 = probe Ni 1000 PTC = PTC probe NTC = NTC probe PT1000 = Pt 1000 probe NTCK2 = Type 2 NTC probe NTCK3 = Type 3 NTC probe RESIST = electric resistance reading
AI5	- - -	- - -	- - -	NTC	type of probe analog port 5 NI1000 = probe Ni 1000 PTC = PTC probe NTC = NTC probe PT1000 = Pt 1000 probe NTCK2 = Type 2 NTC probe NTCK3 = Type 3 NTC probe RESIST = electric resistance reading
AI6	- - -	- - -	- - -	NTC	type of probe analog port 6 NI1000 = probe Ni 1000 PTC = PTC probe NTC = NTC probe PT1000 = Pt 1000 probe NTCK2 = Type 2 NTC probe NTCK3 = Type 3 NTC probe RESIST = electric resistance reading

Al Err Time	0	240	s	2	analog ports time-out (if no communication with an analog port is detected after this span of time, the controller notifies an analog input error)
AO impulse	1	50	ms/10	20	duration of the cut phase impulse
AO1	- - -	- - -	- - -	0-10V	type of signal analog port 1 FAN = FAN (for cut phase module) 0-10V = 0-10 V PWM = PWM (Pulse With Modulation)
freq	10	2000	Hz	1000	frequency of the analog port 1 PWM-type signal
delay ph.	0	50	ms/10	0	displacement of the phase-cutting impulse from analog port 1
AO2	- - -	- - -	- - -	0-10V	type of signal analog port 2 FAN = FAN (for phase-cutting module) 0-10V = 0-10 V PWM = PWM (Pulse With Modulation)
freq	10	2000	Hz	1000	frequency of the analog port 2 PWM-type signal
delay ph.	0	50	ms/10	0	displacement of the phase-cutting impulse from analog port 2
AO3	- - -	- - -	- - -	0-10V	type of signal analog port 3 0-20mA = 0-20 mA 4-20mA = 4-20 mA 0-10V = 0-10 V
I/O Timeout (1)	1	240	s	60	CANBUS communication time-out to check the remote I/O values (after this span of time has elapsed with no CANBUS communication, the controller I/O is disabled)
AI1 filter	OFF	ON	- - -	ON	analog input 1 filter coefficient
AI2 filter	OFF	ON	- - -	ON	analog input 2 filter coefficient
AI3 filter	OFF	ON	- - -	ON	analog input 3 filter coefficient
AI4 filter	OFF	ON	- - -	ON	analog input 4 filter coefficient
AI5 filter	OFF	ON	- - -	ON	analog input 5 filter coefficient
AI6 filter	OFF	ON	- - -	ON	analog input 6 filter coefficient
DI1 filter	OFF	ON	- - -	ON	digital input 1 filter coefficient
DI2 filter	OFF	ON	- - -	ON	digital input 2 filter coefficient

DI3 filter	OFF	ON	- - -	ON	digital input 3 filter coefficient
DI4 filter	OFF	ON	- - -	ON	digital input 4 filter coefficient
DI5 filter	OFF	ON	- - -	ON	digital input 5 filter coefficient
En. Prg Level (1)	- - -	- - -	- - -	NO	access to the level first page enabled by pressing a combination of keys YES = yes, proceeding as follows: - keep the ENTER key pressed for 3 sec. to access the first page of level 1 - keep the ENTER and ESC keys pressed for 3 sec. to access the first page of level 2 - keep the LEFT and RIGHT keys pressed for 3 sec. to access the first page of level 3
Password indi (1)	- - -	- - -	- - -	NO	restriction between the access passwords of the various levels NO = It is not necessary to set a password to access the levels below the one already accessed YES = it is necessary to set a password to access each level
Ena BkMem RTC (1)	- - -	- - -	- - -	YES	clock and backup storage functions enabled
Backlight (2)	- - -	- - -	- - -	TIME	type of backlight OFF = the backlight is never on ON = the backlight is always on TIME = the backlight stays on for the period of time after the latest key operation set with the *B. Time* parameter
B. Time (2)	0	60	s	240	backlight duration (only if the *Backlight* parameter is set in *TIME* mode)
Contrast (2)	0	100	- - -	50	display contrast
Date Char Sep (2)	- - -	- - -	- - -	/	date separator ASCII character
Year format (2)	- - -	- - -	- - -	YY	year format YY = two digits (e.g. *13*) YYYY = four digits (e.g. *2013*)

Date format (2)	- - -	- - -	- - -	D-M-Y	date format D-M-Y = day, month and year M-D-Y = month, day and year Y-M-D = year, month and day
Time Char Separator (2)	- - -	- - -	- - -	:	time separator ASCII character
Time With Sec (2)	- - -	- - -	- - -	YES	time displayed with seconds YES = yes
Time AM/PM (2)	- - -	- - -	- - -	NO	time format NO = 24 h (e.g. *15:20*) YES = 12 h (e.g. *3:20 PM*)

6.3.3 Configuration parameters of the "CAN Bus" sub-menu of the "Networks" menu

The following table shows the meaning of the configuration parameters of the "CAN Network" section of the "CAN Bus" sub-menu or the "Networks" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
MyNode	1	127	- - -	1	local CAN node or device address
Master	- - -	- - -	- - -	YES	enabled to function as master in a CAN network YES = yes
Baud	- - -	- - -	- - -	20K	baud rate of the CAN-type communication 20K = 20.000 baud 50K = 50.000 baud 125K = 125.000 baud 500K = 500.000 baud
Timeout	1	60	s	5	remote CAN-type communication timeout, i.e., communication with the other network elements (after the time set with this parameter has elapsed with no CAN-type communication with an element, the element is disabled).
Network Node	[1] 0	[32] 127	- - -	[1] 99	address of the CAN nodes or of the other network elements (e.g. for [1] 2) [1] = node 2 = node address
TSEG1	- - -	- - -	- - -	- - -	reserved
TSEG2	- - -	- - -	- - -	- - -	reserved
SJW	- - -	- - -	- - -	- - -	reserved
BTR	- - -	- - -	- - -	- - -	reserved
Status	parameter available in read-only mode				CAN machine status INIT = initialisation STOPPED = stop CAN OPERAT = operating PRE-OP = in pre-operating mode
Bus Status	parameter available in read-only mode				CAN bus status OK = status OK WARNING = attention PASSIVE = bus in receiving mode only BUS OFF = bus stopped
Cnt Rx	parameter available in read-only mode				number of packets received

Cnt Tx	parameter available in read-only mode	number of packets sent
Cnt Ovf	parameter available in read-only mode	number of overflow packets
Cnt Passive	parameter available in read-only mode	number of passages to the passive state
Cnt Bus Off	parameter available in read-only mode	number of passages to the passive state

6.3.4 Configuration parameters of the "UART1" sub-menu of the "Networks" menu

The following table shows the meaning of the configuration parameters of the "UART1" sub-menu or the "Networks" menu concerning the RS-485 MODBUS master/slave port.

The parameters are visible if the application software allows the port to be configured to support the MODBUS communication protocol.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
Address	1	247	- - -	1	MODBUS address of the device (significant only if the communication protocol is of the MODBUS slave type)
Baudrate	- - -	- - -	- - -	9600	baud rate of the MODBUS-type communication 1200 = 1.200 baud 2400 = 2.400 baud 4800 = 4.800 baud 9600 = 9.600 baud 19200 = 19.200 baud 28800 = 28.800 baud 38400 = 38.400 baud 57600 = 57.600 baud
Parity	- - -	- - -	- - -	EVEN	MODBUS-type communication parity NONE = none ODD = odd EVEN = even
Stop	- - -	- - -	- - -	1 BIT	number of stop bits of the MODBUS-type communication 1 BIT = 1 bit 2 BIT = 2 bit
Timeout	2	240	s	10	local MODBUS-type communication timeout, i.e., device timeout (this parameter sets a delay from the sending of a request after which, if no answer is received, the request sending is considered failed and the next request is sent; it is significant only if the communication protocol is of the MODBUS master type).
Polarization	- - -	- - -	- - -	NO	RS-485 MODBUS slave port polarisation NO = the device does not polarise the RS-485 slave port YES = the device polarises the RS-485 slave port

6.3.5 Configuration parameters of the "UART2" sub-menu of the "Networks" menu

The following table shows the meaning of the configuration parameters of the "UART2" sub-menu or the "Networks" menu concerning the RS-485 MODBUS slave port.

The parameters are visible if the application software allows the port to be configured to support the MODBUS communication protocol.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
Address	1	247	- - -	1	MODBUS address of the device (significant only if the communication protocol is of the MODBUS slave type)
Baudrate	- - -	- - -	- - -	9600	baud rate of the MODBUS-type communication 1200 = 1.200 baud 2400 = 2.400 baud 4800 = 4.800 baud 9600 = 9.600 baud 19200 = 19.200 baud 28800 = 28.800 baud 38400 = 38.400 baud 57600 = 57.600 baud
Parity	- - -	- - -	- - -	EVEN	MODBUS-type communication parity NONE = none ODD = odd EVEN = even
Stop	- - -	- - -	- - -	1 BIT	number of stop bits of the MODBUS-type communication 1 BIT = 1 bit 2 BIT = 2 bit
Timeout	0	9999	ms	1000	local MODBUS-type communication timeout, i.e., device timeout (this parameter sets a delay from the sending of a request after which, if no answer is received, the request sending is considered failed and the next request is sent; it is significant only if the communication protocol is of the MODBUS master type).

6.3.6 Configuration parameters of the "Ethernet" sub-menu of the "Networks" menu

The following table shows the meaning of the configuration parameters of the "Ethernet" sub.menu of the "Networks" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
MAC	parameter available in read-only mode				reserved
Eth IP	- - -	- - -	- - -	192.168.0.2	IP address
Subnet Mask	- - - -	- - - -	- - - -	255.255.255.0	subnet Mask
Adr Gateway	- - - -	- - - -	- - - -	192.168.0.1	gateway address

Port MB Slave	- - -	- - -	- - -	- - -	MODBUS slave port
Port MB Master	- - -	- - -	- - -	- - -	MODBUS master port
Web Server Port	- - -	- - -	- - -	- - -	Web Server port

6.3.7 Configuration parameters of the "USB" sub-menu of the "Networks" menu

The following table shows the meaning of the configuration parameters of the "USB" sub-menu of the "Networks" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
USB Status Device	parameter available in read-only mode				reserved
Device Status Idle Speed	parameter available in read-only mode				reserved

6.3.8 Configuration parameters of the "Password" menu

The following table shows the meaning of the configuration parameters of the "Password" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
Level 1:	-32768	32768	- - -	0	value of the level 1 access password
	- - -	- - -	- - -	ON	enabling of the level 1 access password OFF = no password needs to be set to access level 1 ON = it is necessary to set a password to access level 1
Level 2:	-32768	32768	- - -	0	value of the level 2 access password
	- - -	- - -	- - -	ON	enabling of the level 2 access password OFF = no password needs to be set to access level 2 ON = it is necessary to set a password to access level 2
Level 3:	-32768	32768	- - -	0	value of the level 3 access password
	- - -	- - -	- - -	ON	enabling of the level 3 access password OFF = no password needs to be set to access level 3 ON = it is necessary to set a password to access level 3

Level 4:	-32768	32768	- - -	0	value of the level 4 access password
	- - -	- - -	- - -	ON	enabling of the level 4 access password OFF = no password needs to be set to access level 4 ON = it is necessary to set a password to access level 4
Level 5:	-32768	32768	- - -	0	value of the level 5 access password
	- - -	- - -	- - -	ON	enabling of the level 5 access password OFF = no password needs to be set to access level 5 ON = it is necessary to set a password to access level 5
Timeout	0	240	s	240	timeout of access passwords (after this time has elapsed from the latest keypad operation, it is necessary to set a new password to access the relevant level, if so required).

6.3.9 Configuration parameters of the "Diagnostics" menu

The following table shows the meaning of the configuration parameters of the "Diagnostics" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
Memory	parameter available in read-only mode				status of non-volatile memory OK = no error ERR = error
RTC	parameter available in read-only mode				clock status OK = no error ERR = error LOW = data loss DISAB = disabled
STACK	parameter available in read-only mode				stack status OK = no error ERR = error (overflow)
5V RATIO	parameter available in read-only mode				status of the voltage supply of the ratiometric transducers OK = no error ERR = error (voltage out of range)
24V SENSOR	parameter available in read-only mode				status of the supply voltage of 0-20 mA, 4-20 mA and 0-10 V transducers OK = no error ERR = error (voltage out of range)

MATH	parameter available in read-only mode	math status OK = no error ERR = error (overflow, under flow, division by zero or NaN)
KEY PAR	parameter available in read-only mode	result of the upload or download of the application software parameters or of a configuration through USB drive. OK = procedure completed successfully ERR = procedure not completed successfully

6.3.10 Configuration parameters of the "Debug" menu

The following table shows the meaning of the configuration parameters of the "Debug" menu.

PARAM.	MIN.	MAX.	M. U.	DEF.	DESCRIPTION
Main run time	parameter available in read-only mode				application software main cycle time (in ms)
max main time	parameter available in read-only mode				application software maximum main cycle time (in ms)
free stack main	parameter available in read-only mode				minimum free stack main (in byte)
100ms run time	parameter available in read-only mode				application software run time timed at 100 ms
100 ms max time	parameter available in read-only mode				application software maximum run time timed at 100 ms
free stack 100 ms	parameter available in read-only mode				application software free stack of the interrupt cycle at 100 ms (in byte)
5V PROBE	parameter available in read-only mode				measurement of voltage supply of the ratiometric transducers
24V PROBE	parameter available in read-only mode				measurement of the supply voltage of 0-20 mA, 4-20 mA and 0-10 V transducers
24V	parameter available in read-only mode				measurement of the supply voltage coming from the upper board

Notes:

(1) to display the parameter, press the RIGHT key

(2) to display the parameter, press the RIGHT key; this parameter is not available in the built-in LED and blind versions.

7 TECHNICAL DATA

7.1 Technical data

Purpose of the command device:	operating command device.
Construction of the command device:	built-in electronic device.
Container:	grey self-extinguishing.
Heat and fire protection class:	D.
Dimensions:	142.0 x 128.0 x 60.0 mm (5.590 x 5.039 x 2.362 in; L x H x D); 8 DIN modules The dimensions refer to the device with all the screw-in removable terminal boards in place.
Method of mounting the command device:	on a DIN 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), track in a control panel.
Protection grade:	- IP20 overall - IP40 for the front.
Connections	- screw in removable terminal board, male only 3,5 mm pitch (0,137 in) for wires up to 1,5 mm² (0,0028 in²): power supply, analog inputs, digital inputs, analog outputs and ports RS-485 MODBUS slave, RS-485 MODBUS master/slave and CAN CANBUS - screw in removable terminal board, male only 5 mm pitch (0,196 in) for wires up to 2,5 mm² (0,0038 in²): digital outputs - type A USB connector: USB port - RJ45 F phone connector: MODBUS TCP, Web Server, BACnet IP Ethernet port.

	The maximum lengths of the connection cables are:
	- power supply: 100 m (328 ft)
	- analog inputs: 100 m (328 ft)
	- transducers power supply: 100 m (328 ft)
	- digital inputs: 100 m (328 ft)
	- analog outputs PWM: 1 m (3.280 ft)
	- analog outputs 0-20 mA, 4-20 mA and 0-10 V: 100 m (328 ft)
	- digital outputs (electromechanical relay): 100 m (328 ft)
	- digital outputs (controls for solid state relays) 100 m (328 ft)
	- RS-485 MODBUS slave and RS-485 MODBUS master/slave ports: 1,000 m (3,280 ft); please refer also to the *MODBUS specifications and implementation guides* available at http://www.modbus.org/specs.php
	- CAN CANBUS port:
	  - 1.000 m (3.280 ft) with baud rate 20.000 baud
	  - 500 m (1.640 ft) with baud rate 50.000 baud
	  - 250 m (820 ft) with baud rate 125.000 baud
	  - 50 m (164 ft) with baud rate 500.000 baud
	- USB port: 1 m (3.280 ft)
	To wire the device, the use of the CJAV31 kit (to be ordered separately) is recommended: screw-in removable terminal boards, female only, 3.5 mm pitch (0.137 in) for wires up to 1.5 mm² (0,0028 in²) and screw-in removable terminal boards, female only, 5 mm pitch (0.196 in) for wires up to 2.5 mm² (0,0038 in²) .
	To program the device, the use of the 0810500018 or 0810500020 connection cables (to be ordered separately) s recommended: the 0810500018 cable is 2.0 m (6.56 ft) long , the 0810500020 cable is 0.5 m (1.640 ft) long.)

Operating temperature:	- from -10 to 55 °C (from 14 to 131 °F) for the built-in models - from -20 to 55 °C (from -4 to 131 °F) for the blind models
Storage temperature:	from -25 to 70 °C (from -13 to 158 °F).
Humidity for use:	from 10 to 90 % relative humidity without condensate.
Command device pollution situation:	2.
Height at which it is used:	from 0 to 2,000 m (from 0 to 6,591 ft).
Height at which it can be transported:	from 0 to 3,048 m (from 0 to 10,000 ft).
Environmental standards:	- RoHS 2011/65/CE - WEEE 2012/19/EU - REACH (CE) regulation n. 1907/2006.
EMC standards:	- EN 60730-1 - IEC 60730-1.

Power supply:	- 24 VAC, 50/60 Hz (±3 Hz), 20 VA max. not insulated - 20... 40 VDC, 12 W max. not insulated supplied by a class 2 circuit. Protect the power supply with a 2A-T 250 V fuse If the device runs on direct current, it shall be necessary to pay attention to the polarity of the supply voltage.
Rated impulse voltage:	4 KV.
Overvoltage category:	III.
Class and structure of software:	A.
Clock:	integrated (with primary lithium battery)
	Battery autonomy without power supply: 5 years at 25 °C (77 °F).
	Drift: ≤ 30 s/ month at 25 °C (77 °F).
Digital inputs:	5 inputs: - 3 configurable via configuration parameter for PTC, Ni 1000, NTC or Pt 1000 probes - 3 configurable via configuration parameter for PTC, NTC, Ni 1000, Pt 1000 probes, transducers 0-20 mA, 4-20 mA, 0-5 V ratiometric or 0-10 V.
	Ratiometric transducers 0-5 V power supply: 5 VDC (+0 %, -12 %), 60 mA max. Transducers power supply 0-20 mA, 4-20 mA e 0-10 V: 12 DC (+50 %, -25 %), 120 mA max. The maximum current distributable by the two power supplies is 120 mA.
	<u>Digital inputs Ni 1000 (1 Kohm @0°C, 32°F)</u> Measurement field: -50 .. 260°C (-58 .. 500°F) Precision: +/- 0.5% del FS da -50 a 250 Resolution : 0,1 °C. Conversion time: 100 ms. Protection: none.
	<u>Digital inputs NTC (10 K @ 25 °C, 77 °F)</u> Type of sensor: ß3435. Measurement field: from -50 to 120 °C (from -58 to 248 °F). Precision: - ±0.5 % of scale end from -40 to 100 °C - ±1 °C from -50 to -40 °C and from 100 to 120 °C. Resolution :0.1 °C. Conversion time: 100 ms. Protection: none.

	Digital inputs NTC (10 K @ 25 °C, 77 °F) Type of sensor: NTC type 2. Measurement field: from -40 to 86 °C (from -40 to 186 °F). Precision: ±1 °C. Resolution :0,1 °C. Conversion time: 100 ms. Protection: none.
	Digital inputs NTC (10 K @ 25 °C, 77 °F) Type of sensor: NTC type 3. Measurement field: from -40 to 86 °C (from -40 to 186 °F). Precision: ±1 °C. Resolution :0,1 °C. Conversion time: 100 ms. Protection: none.
	Digital inputs Pt 1000 (1 K @ 0 °C, 32 °F) Measurement field: from -100 to 400 °C (from -148 to 752 °F). Precision: - ±0,5 % of scale end from -100 to 200 °C - ±2 °C from 200 to 400 °C. Resolution :0.1 °C. Conversion time: 100 ms. Protection: none.
	Digital inputs 0-20 mA and 4-20 mA Input resistance: ≤ 200 . Precision: ±0.5 % of scale end. Resolution :0.01 mA. Conversion time: 100 ms. Protection: none; maximum allowable current at each input is 25 mA.
	Digital inputs 0-5 V raziometrici and 0-10 V Input resistance: ≥ 10K . Precision: ±0.5 % of scale end. Resolution :0.01 V. Conversion time: 100 ms. Protection: none.
Digital inputs:	5 inputs - 2 at 24 VAC/DC, 50/60 Hz/2 KHz opto-isolated; - 3 at 24VAC/DC 50/60 Hz opto-isolated.
	Digital inputs at 24 VAC/DC, 50/60 Hz Power: - 24 VAC (±15 %), 50/60 Hz (±3 Hz) - 24 VDC (+66 %, -16 %). Input resistance: ≥ 10K . Protection: none.

	Digital inputs at 24 VAC/DC, 2 KHz Power: - 24 VAC (±15 %), 50/60 Hz (±3 Hz) - 24 VDC (+66 %, -16 %). Input resistance: ≥ 10K . Protection: none.
Analog outputs:	3 outputs: - 2 configurable via configuration parameter for PWM or 0-10 V - 1 configurable via configuration parameter for 0-20 mA, 4-20 mA or 0-10 V.
	Analog outputs PWM Power: 10 VDC (+16 %, -25 %), 10 mA max. Frequency: 0... 2 KHz. Duty: 0... 100 %. Protection: none.
	Analog outputs 0-20 mA and 4-20 mA Input resistance: 40... 300 . Precision: ±3 % of scale end. Resolution :0.05 mA. Conversion time: 1 s. Protection: none.
	Analog outputs 0-10 V Input resistance: 1 K. Precision: ±3 % of scale end. Resolution :- +2 %, -5 % of scale end for utilities with impedance from 1 to 5 K - ±2 % of scale end for utilities with impedance> 5 K. Conversion time: 1 s. Protection: none.
Digital outputs:	7 outputs: - according to model: - 6 SPST electromechanical relays with 3 A res. @ 250 VAC (K1... K6) - 2 24 VAC/DC, 600 mA max solid state relays (K1 and K2) controls and 4 SPST electromechanical relays with 3 A res. @ 250 VAC (K3... K6) - 1 SPDT electromechanical relay with 3 A res. @ 250 VAC (K7). The device guarantees double insulation between each connector of the digital outputs and the other parts of the device.
Type 1 or Type 2 actions:	Type 1.
Complementary features of Type 1 or Type 2 actions:	C.

Displays:	according to model: - none (blind model) - 4+4 digit custom display custom (built-in LED model) - single-colour LCD graphic display 128 x 64 pixel (built-in LCD model).
Communication port:	5 ports: - 1 RS-485 port with MODBUS slave communication protocol - 1 RS-485 port with MODBUS master/slave, BACnet MS/TP communication protocol (which can be set with the development environment) - 1 CAN port with CANBUS communication protocol - 1 USB port: - 1 Ethernet port with MODBUS TCP, Web Server, BACnet IP communication protocol.

The BACnet communication protocol is in alternative to the Web Server functionality.
The actual version implements a BACnet® standardized device profile B-ASC, which doesn't require the managing of Scheduler and Calendar objects, instead required for the B-AAC profile.

RDT 921 F901

Configurable controllers

Hardware manual ver. 1.0

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