



# TCR7400 ModBus Serial Line Advanced Thermostat



# Contents

<b>4</b>	<b>Chapter 1: Quick Start</b>
4	Device Features
4	Installation Instructions
5	User Interface / Navigation
6	First-time Configuration
7	Absolute Setpoint Settings
8	Relative Setpoint Settings
8	Schedule Settings
8	Clock Settings
9	Color Settings
9	Info / QR Code
10	ModBUS Parameters Table
<b>16</b>	<b>Appendix A: Safety Information</b>
<b>19</b>	<b>Appendix B: Publisher's Info</b>

# Quick Start

# 1

The TCR7400 is an ambient thermostat with a touchscreen color display which is able to measure the local temperature, humidity and presence. This an application developed on FreeStudio / FreeStudio Plus for the programmable AVP target.

The display can be used to change the setpoints of temperature and humidity, to define an hourly and weekly schedule and to set the speed of a fan eventually. It also shows the physical properties which are locally measured and can furthermore be used to show other properties sent by the supervisor, as the external temperature and the air quality.

The thermostat is fully configurable (e.g. the hourly schedule can be enabled/disabled) through the display and the home page is customizable (e.g. some information like the setpoints, the working mode and the season can be shown/hidden).

The communication takes place through the ModBUS protocol (RS485 SL) and it is an optimal plug-and-play accessory for TM17x logic controllers configured as Master.

Depending on the model, the TCR7400 can have the following probes on-board:

- only temperature;
- temperature and humidity;
- temperature, humidity and presence (PIR).

The power supply is 24VAC/DC and it is intended for wall-mounting.

This manual version is for TCR7400 version 1.03 or newer versions.

## Device Features

- Multilanguage: English and Italian.
- Hourly schedules: based on 4 profiles, of which 2 are customizable.
- User interface with configurable colors.
- Comfort and Economy Setpoints for each working mode.
- Absolute and relative Setpoint.
- Configurable icons visibility.

## Installation Instructions

For the installation instructions (mounting, power supply connection, RS485 – ModBUS SL connection) refer to the instruction sheet provided with the device.

## User Interface / Navigation

The User Interface of the device is made of a color touchscreen and its background and text colors can be customized.

The backlight is always active at the minimum set value, which gets to 100% while the user is interacting with the screen and after a certain timeframe after the last interaction or detected human presence.



After a certain pre-defined time of permanence in a page, in case of inactivity, the interface switches automatically back to the previous page.






A sample of the thermostat home page and the action related to each icon are listed below.

COMMAND ICONS




Icons visibility and selectability based on the configuration


Locally turn ON/OFF the thermostat


Select the season mode (Cooling, Heating, Auto)


Select the working mode (Comfort, Eco, Night)




Access the Settings menu




Change the setpoints / navigate through the pages



Show current Setpoint with a single tap.  
Go to the Setpoint page with a double tap, if in Absolute Setpoint mode.



Show the current fan speed



Change the fan speed

STATUS ICONS

Room

On

Upper part: it shows the room name

Lower part: it shows the regulation status, which can be:

On

Off

On by Remote

Off by Remote

Standby


On Override

determined by the local button


override from the supervisor, it has the priority over any other local setting

Profiles are enabled and the current time band is set to Standby





On by local override (Profiles overridden)



Show the ModBUS Connection Status



Show the presence of an Alert

Show the current season mode (Cooling, Heating, Auto, Sanitary Water); middle-right icon.


P1

P2


24h Off

24h On

Show the currently active Profile



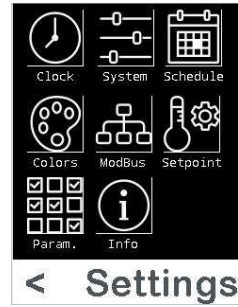
Show whether the unit is in heat recovery mode



Show whether the unit is in dehumidification mode

## First-time Configuration

The first configuration requires to set the values of the parameters available under Settings > Param. and under Settings > ModBus.

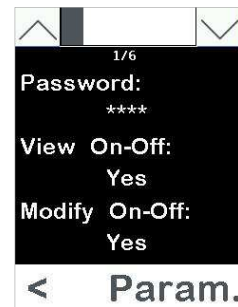


### Param. Setting

The Password for Param. is 1909.

The following parameters can be changed:

- **View On-Off.** Show/hide the On/Off button.
- **Modify On-Off** Ability to change the On/Off status by a tap.
- **View Season** Show/hide the Season button.
- **Summer Winter** Enable/disable the Summer and Winter seasons mode availability.
- **Auto** Enable/disable the Auto mode availability.
- **View Mode** Show/hide the Working Mode (Comfort, Eco, Night) button.
- **Select Eco** Enable/disable the selection of the Eco mode.
- **Select Night** Enable/disable the selection of the Night mode.
- **Temp. Setpoint** Relative/Absolute/No.  
The “No” option disables the ability to change the temperature setpoint from the display.
- **Scheduler** Enable/disable the Scheduler.
- **Air Quality** Show the Air Quality remote probe value.
- **Humidity** Show the humidity.
- **Humidity Reg.** Enable/disable the humidity regulation.
- **External Temp.** Show the external temperature.
- **View Fan** Show the fans set.
- **Fan Settings** Enable/disable to change the fans setting.



These parameters correspond to what can be set by the ModBUS register 16600 (*Thermostat Configuration Word 1*).

## ModBus Setting

The Password for ModBus is 1909.

The following parameters can be changed:

- **Address** ModBUS Address of the device.
- **Baud rate** Baud rate of the ModBUS communication.
- **Parity** Parity of the ModBUS communication.
- **Stop bit** Stop bit of the ModBUS communication.
- **Timeout** Timeout used to determine the connection status (online / offline).
- **Reboot** Command for device reboot. Not required for ModBus parameters change.

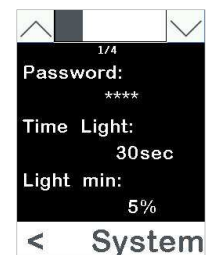


## System Setting.

The Password for System is 1512.

The following parameters can be changed:

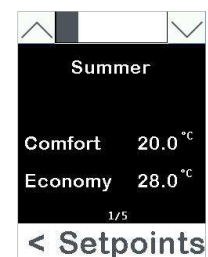
- **Time Light** Timeframe of active backlight after the last action (or PIR activity).
- **Light min** Backlight % value, used after Time Light is reached.
- **Page Timeout** Timeout after which the actual page is closed.
- **Language** System Language.
- **Unit** Unit used to display and change the temperatures from the display.
- **Cal. Temp.** Embedded temperature sensor calibration.
- **Cal. RH** Calibration parameter for RH embedded sensor.
- **Ambient Name** Room Name.
- **Differential** Thermostat Differential.
- **Auto Diff.** Differential for the Changeover Cooling/Heating in Auto Mode.



## Absolute Setpoint Settings

The Settings > Setpoint page allows to change the setpoints for the various working modes. This is also possible to be done from the home page, if the Setpoint is set to Absolute in the Parameters configuration page.

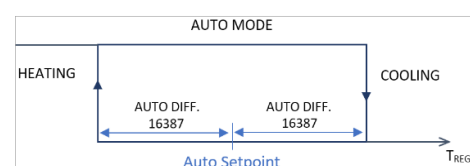
Here it is possible to modify the temperature and humidity setpoints for the Summer and the Winter seasons regarding the Comfort and Economy profiles. It is also possible to set the Auto temperature setpoint.



**Night mode.** The Night mode uses the Economy setpoint and disables the visualization of the fan speed (it will be set by the supervisor). Therefore, not set is present for this mode.

**Mode visibility.** If the mode is not visible, it is forced to Comfort.

The image shows how the differential for the changeover Cooling/Heating in Auto Mode is considered.





## Relative Setpoint Settings

The Relative Setpoint settings can be seen and changed only from the Home Page, if the Setpoint is set to Relative in the Parameters configuration page.

The Comfort/Eco/Night Setpoint can be changed from the Setpoint page only by using the System password.

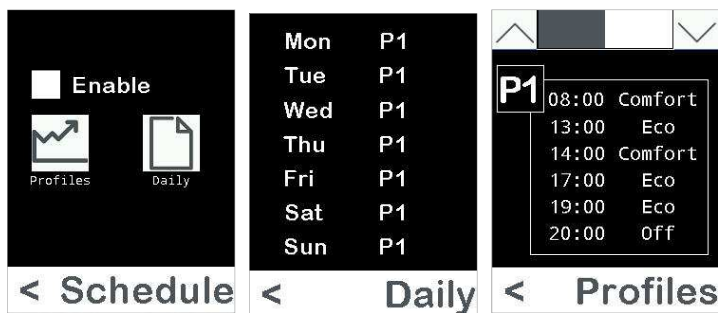
The thermostat operates in an equivalent way to the Comfort/Eco/Night Setpoint mode, but the current setpoint is determined as the sum of the Comfort/Eco/Night and the Relative sets.

## Schedule Settings

The Schedule allows to assign a different profile to each day of the week.

There are four available profiles: two customizable (P1 and P2), plus a 24h ON and a 24h OFF. Each customizable profile contains six time-events.

The Comfort, Economy and Night working modes can be selected only if they are enabled.



## Clock Settings

Under Settings > Clock, it is possible to setup the current date and time and also to enable/disable the Daylight Saving for Europe and for the USA.



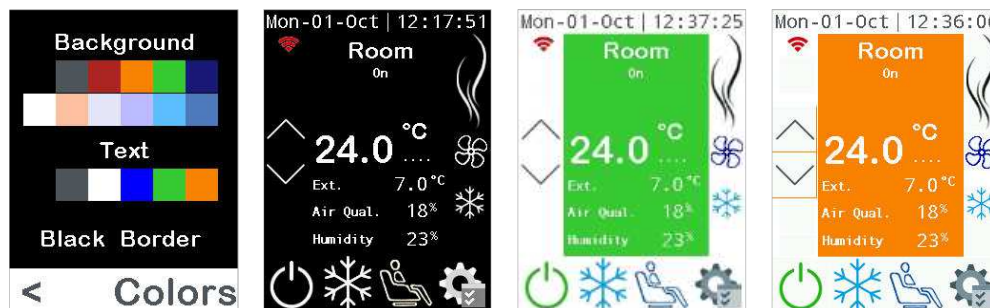


## Color Settings

Under Settings > Colors, you can customize your device with the most suitable color combination.

What can be changed is:

- the background color;
- the text color;
- the border color (black or white).



## Info / QR Code

The Settings > Info page contains a QR code. This is customizable by acting on the ModBUS registers.

## ModBUS Parameters Table

ModBUS Address	Designation	Um	Min	Max	Default
<b>SETTINGS (R/W EEPROM)</b>					
<b>8196</b>	<b>Unit of temperature measurement</b> This parameter has effect only on the temperatures visualized on the display. All the ModBUS parameters are in °C. Possible values: 0: °C, 1: °F	num	0	1	0
<b>8198</b>	<b>ModBUS Address of the device</b>	num	0	247	1
<b>8201</b>	<b>Stop bit of the ModBUS communication</b>	num	1	2	1
<b>8202</b>	<b>Parity of the ModBUS communication</b> 0: Null; 1: Odd; 2: Even	num	0	2	2
<b>8203</b>	<b>Baud rate of the ModBUS communication</b> 0: 9600; 1: 19200; 2: 38400; 3: 57600; 4: 115200	num	0	4	2
<b>8205</b>	<b>System Language</b> 0: English; 1: Italian	num	0	65535	0
<b>8206</b>	<b>Calibration parameter for RH embedded sensor</b>	%/10	-1000	1000	0
<b>8207</b>	<b>Backlight time</b> Timeframe of active backlight after the last action (or PIR activity)	sec	0	3600	30
<b>8250</b>	<b>Backlight minimum value</b> Backlight % value, used after the Backlight time (8207 reg) is reached	%	0	100	5
<b>16384</b>	<b>Minimum Temperature Setpoint</b>	°C/10	0		150
<b>16385</b>	<b>Maximum Temperature Setpoint</b>	°C/10			400
<b>16386</b>	<b>Auto Temperature Setpoint</b>	°C/10	(Reg 16384 )	(Reg 16385)	200
<b>16387</b>	<b>Differential for Auto Changeover</b> Differential for the Changeover Cooling/Heating in Auto Mode	°C/10	5	50	50
<b>16388</b>	<b>Setpoint summer Comfort</b>	°C/10	(Reg 16384 )	(Reg 16389)	250
<b>16389</b>	<b>Setpoint. summer Economy</b>	°C/10	(Reg 16388 )	(Reg 16385)	280
<b>16390</b>	<b>Reserved for future use</b>				
<b>16391</b>	<b>Setpoint winter Comfort</b>	°C/10	(Reg 16392 )	(Reg 16385)	210
<b>16392</b>	<b>Setpoint winter Economy</b>	°C/10	(Reg 16384 )	(Reg 16391)	180
<b>16393</b>	<b>Reserved for future use</b>				
<b>16394</b>	<b>Thermostat Differential</b>	°C/10	1	50	20
<b>16395</b>	<b>Embedded sensor calibration</b> Calibration of embedded NTC temperature sensor (overwrite the bios par)	°C/10	-100	100	0
<b>16396</b>	<b>Relative temperature setpoint</b>	°C/10	– (Reg 16397 )	(Reg 16397)	0

ModBUS Address	Designation	Um	Min	Max	Default
16397	Maximum variation range of the relative temperature setpoint	°C/10	10	100	30
16400	<b>On/Off by keyboard</b> It keeps the state of the On/Off button pressed on the display (not used if not visualized: considered always to TRUE)				FALSE
16401	<b>Mode EEPROM Setting</b> Forced to Comfort if not visible. 0: Eco, 1: Comfort, 2: Night				1
16402	<b>Season EEPROM Setting</b> 0: Summer, 1: Winter, 2: Auto				0
16403	<b>Fan Speed EEPROM Setting</b> 0: Off, 1: Min, 2: Med, 3: Max, 4: Auto				0
16410	<b>Setpoint Humidification Eco</b>	%R.H.	0	(Reg 16411)	45
16411	<b>Setpoint Humidification Comfort</b>	%R.H.	(Reg 16410)	100	50
16412	<b>Setpoint Dehumidification Eco</b>	%R.H.	(Reg 16413)	100	60
16413	<b>Setpoint Dehumidification Comfort</b>	%R.H.	0	(Reg 16412)	55
16450	<b>DayLight Region</b> 0: Europe, 1: USA/Canada				0
16451	<b>DayLight Enable</b>				FALSE
16452	<b>Time Events Enable</b>				FALSE
16453	<b>Time events profile Monday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16454	<b>Time events profile Tuesday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16455	<b>Time events profile Wednesday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16456	<b>Time events profile Thursday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16457	<b>Time events profile Friday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16458	<b>Time events profile Saturday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16459	<b>Time events profile Sunday</b> 1: P1, 2: P2, 3: P3 – 24h On, 4: P4 – 24h Off				1
16460	<b>Time event #1 profile #1</b> Unit: minutes (60 · hours + minutes)	min	0	1439	480
16461	<b>Mode event #1 profile #1</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				2
16462	<b>Time event #2 profile #1</b> Unit: minutes (60 · hours + minutes)	min	0	1439	780
16463	<b>Mode event #2 profile #1</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				1
16464	<b>Time event #3 profile #1</b> Unit: minutes (60 · hours + minutes)	min	0	1439	840

ModBUS Address	Designation	Um	Min	Max	Default
<b>16465</b>	<b>Mode event #3 profile #1</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				2
<b>16466</b>	<b>Time event #4 profile #1</b> Unit: minutes (60 · hours + minutes)	min	0	1439	1020
<b>16467</b>	<b>Mode event #4 profile #1</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				1
<b>16468</b>	<b>Time event #5 profile #1</b> Unit: minutes (60 · hours + minutes)	min	0	1439	1140
<b>16469</b>	<b>Mode event #5 profile #1</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				1
<b>16470</b>	<b>Time event #6 profile #1</b> Unit: minutes (60 · hours + minutes)	min	0	1439	1200
<b>16471</b>	<b>Mode event #6 profile #1</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				0
<b>16472</b>	<b>Time event #1 profile #2</b> Unit: minutes (60 · hours + minutes)	min	0	1439	480
<b>16473</b>	<b>Mode event #1 profile #2</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				2
<b>16474</b>	<b>Time event #2 profile #2</b> Unit: minutes (60 · hours + minutes)	min	0	1439	780
<b>16475</b>	<b>Mode event #2 profile #2</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				1
<b>16476</b>	<b>Time event #3 profile #2</b> Unit: minutes (60 · hours + minutes)	min	0	1439	840
<b>16477</b>	<b>Mode event #3 profile #2</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				2
<b>16478</b>	<b>Time event #4 profile #2</b> Unit: minutes (60 · hours + minutes)	min	0	1439	1020
<b>16479</b>	<b>Mode event #4 profile #2</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				1
<b>16480</b>	<b>Time event #5 profile #2</b> Unit: minutes (60 · hours + minutes)	min	0	1439	1140
<b>16481</b>	<b>Mode event #5 profile #2</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				1
<b>16482</b>	<b>Time event #6 profile #2</b> Unit: minutes (60 · hours + minutes)	min	0	1439	1200
<b>16483</b>	<b>Mode event #6 profile #2</b> 0: Off, 1: Eco, 2: Comfort, 3: Night				0
<b>16500</b>	<b>Room Name</b>				Room
<b>16506</b>	<b>Page Timeout</b> Timeout after which the actual page is closed.	sec	10		60
<b>16507</b>	<b>Modbus Connectivity Error Timeout</b> (set to error if no message received)	sec	2	999	10

ModBUS Address	Designation	Um	Min	Max	Default
<b>16600</b>	<b>Thermostat Configuration Word 1</b> Bit 0: Show Mode Icon (Eco, Comfort, Night) Bit 1: Enable ability to select Eco Mode from keyboard Bit 2: Enable ability to select Night Mode from keyboard Bit 3: Show Cooling/Heating/Auto Icon Bit 4: Enable ability to select Cooling/Heating Mode from keyboard Bit 5: Enable ability to select Auto Mode from keyboard Bit 6: Show On/Off Icon Bit 7: Enable ability to change On/Off from keyboard Bit 8: Enable Setpoint and Temperature Thermostat Bit 9: Enable Time Bands Bit 10: Remote Air Quality - Priority to VOC Bit 11: Show Humidity on display Bit 12: Enable Humidity Setpoint Bit 13: Use External Temperature Probe Bit 14: Show Fans on display Bit 15: Enable changing Fans setting				FFFF
<b>16601</b>	<b>Thermostat Configuration Word 2</b> (future use)				FFFF
<b>16602</b>	<b>Thermostat Configuration Word 3</b> (future use)				FFFF
<b>16603</b> <b>16604</b> <b>16605</b>	<b>Reserved for developers</b>				
<b>16700</b>	<b>QR code string part 1</b> (default page if this variable is empty)				
<b>16716</b>	<b>QR code string part 2</b>				
<b>16732</b>	<b>QR code string part 3</b>				
<b>16748</b>	<b>QR code string part 4</b>				
<b>16764</b>	<b>QR code string part 5</b>				
<b>COMMANDS (R/W RAM)</b>					
<b>8220</b>	<b>Value to write in RTC: seconds</b>	sec	0	59	0
<b>8221</b>	<b>Value to write in RTC: minutes</b>	min	0	59	0
<b>8222</b>	<b>Value to write in RTC: hours</b>	hours	0	23	0
<b>8223</b>	<b>Value to write in RTC: day of week</b>	num	0	6	0
<b>8224</b>	<b>Value to write in RTC: day of month</b>	num	1	31	1
<b>8225</b>	<b>Value to write in RTC: month</b>	num	1	12	1
<b>8226</b>	<b>Value to write in RTC: year</b>	num	0	99	0
<b>8227</b>	<b>Command for RTC Update</b>	flag	0	1	0
<b>9000</b>	<b>Input for Air Quality CO2 Remote Sensor</b>	ppm	0		-32766
<b>9001</b>	<b>Input for Air Quality VOC Remote Sensor</b>	%	0	100	-32766
<b>9002</b>	<b>Input for Humidity Remote Sensor</b>	%	0	100	-32766
<b>9003</b>	<b>Input for External Temp. Remote Sensor</b>	°C/10			-3276.6

ModBUS Address	Designation	Um	Min	Max	Default
9004	<b>Input for Regulation Temp. Remote Sensor</b> Used if <>-32765.	°C/10			-32765
9005	<b>Input for Remote Alarm Word 1</b> (used to determine a Global Alarm)				0
9006	<b>Input for Remote Alarm Word 2</b> (used to determine a Global Alarm)				0
9007	<b>Command Word 1</b> Bit 0: Enable Remote On/Off (0: Off, 1: On) Bit 1: Remote On/Off Status (0: Off, 1: On) Bit 2: Enable Remote Season (0: Off, 1: On) Bit 3-4: Remote Season (0: Summer, 1: Winter, 2: Auto) Bit 5: Cooling/Heating with Remote Auto (0: Cooling, 1: Heating) Bit 6: Enable Remote Eco/Comfort/Night (0: Off, 1: On) Bit 7-8: Remote Mode (0: Eco, 1: Comfort, 2: Night) Bit 9: Enable Remote Fan (0: Off, 1: On) Bit 10-11-12: Remote Fan (0: Off, 1: Min, 2: Med, 3: Max, 4: Auto) Bit 13-14: Remote Fan Speed Status when Fan Auto is selected (0: Off, 1: Min, 2: Med, 3: Max) Bit 15: Enable remote setpoint mode. When TRUE, the register 8963 will be used as setpoint and can be changed remotely (it becomes R/W). When FALSE, register 8963 is read-only.				0
9008	<b>Command Word 2</b> Bit 0: Dehumidification Icon Status (0: Off, 1: On) Bit 1: Recovery Icon Status (0: Off, 1: On) Bit 2: Force Status of Cooling/Heating/Sanitary Water Icon (0: Off, 1: On) Bit 3-4: Forced Status of Cooling/Heating/Sanitary Water Icon (0: Off, 1: Cooling, 2: Heating, 3: Sanitary Water)				0
9009	<b>Command Word 3</b> (reserved for future use)				0
<b>STATUS (Read-only RAM)</b>					
8208	<b>NTC thermistor sensor</b> Value read by the embedded temperature sensor	°C/10, °F/10			
8209	<b>RH humidity sensor</b> Value read by the embedded relative humidity sensor	%/10			
8210	<b>PIR proximity sensor.</b> Value read by the presence sensor	digit			
8212	<b>RTC Second value</b>	sec	0	59	
8213	<b>RTC Minute value</b>	min	0	59	
8214	<b>RTC Hour value</b>	hours	0	23	
8215	<b>RTC Day of week value</b>	num	0	6	
8216	<b>RTC Day of the month value</b>	num	1	31	
8217	<b>RTC Month value</b>	num	1	12	
8218	<b>RTC Year value</b>	num	0	99	
8219	<b>RTC Status</b> 0: RTC initialized. 1: RTC initialization error	flag	0	1	
8960	<b>Active profile number.</b> 0: Profiles disabled, 1: P1; 2: P2; 3: P3; 4: P4)				
8961	<b>Current Working Mode.</b> TRUE: Heating; FALSE: Cooling				

ModBUS Address	Designation	Um	Min	Max	Default
<b>8962</b>	<b>Thermostat Enabled</b> 0: No request; 1: Cooling; 2: Heating; – 32768: Disabled/Off				
<b>8963</b>	<b>Current Temperature Setpoint</b> When the Bit 15 of the 9007 register is TRUE, this register becomes the current remote setpoint. See the description of the 9007 register for further details.	°C/10			
<b>8964</b>	<b>Current Humidification Setpoint</b>	%			
<b>8965</b>	<b>Current Dehumidification Setpoint</b>	%			
<b>8966</b>	<b>Thermostat Regulation Probe</b>	°C/10			
<b>8967</b>	<b>Thermostat Regulation Error.</b> Determined as: Reg.Probe – Setpoint	°C/10			
<b>8968</b>	<b>Status of remote commands - Reset Alarm Request</b> Bit 0: enable remote Season not allowed (icon not shown) Bit 1: enable Remote Eco/Comfort/Night not allowed (icon not shown) Bit 2: enable Remote Fan not allowed (icon not shown) Bit 3: Alarm Reset Request Bit 4...7: 0000 = Not Used 0001 = Off by Remote 0010 = On by Remote 0011 = Standby Override 0100 = On Override 0101 = Standby 0110 = On 0111 = Off Bit 8...9: Current Season 00 = Summer 01 = Winter 10 = Auto 11 = Not Used Bit 10...11: Current Mode 00 = Economy 01 = Comfort 10 = Night 11 = Not Used				
<b>8969</b>	<b>Humidity Embedded Probe</b>	%	0	100	



# Safety Information

## A Appendix

### Before You Begin

#### General

The products specified in this document have been tested under actual service conditions. Of course, your specific application requirements may be different from those assumed for this and any related examples described herein. In that case, you will have to adapt the information provided in this and other related documents to your particular needs. To do so, you will need to consult the specific product documentation of the hardware and/or software components that you may add or substitute for any examples specified in this documentation. Pay particular attention and conform to any safety information, different electrical requirements and normative standards that would apply to your adaptation.

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#### **WARNING:** REGULATORY INCOMPATIBILITY

Be sure that all equipment applied and systems designed comply with all applicable local, regional and national regulations and standards. Failure to follow these instructions can result in death, serious injury, or equipment damage.

#### Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved. Failure to observe this information can result in injury or equipment damage.

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only the user or integrator can be aware of all the conditions and factors present during installation and setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safeties and interlocks which can be effectively and properly used. When selecting automation and control equipment, and any other related equipment or software, for a particular application, the user or integrator must also consider any applicable local, regional or national standards and/or regulations.

Some of the major software functions and/or hardware components used in the proposed architectures and examples described in this document cannot be substituted without significantly compromising the performance of your application. Further, any such substitutions or alterations may completely invalidate any proposed architectures, descriptions, examples, instructions, wiring diagrams and/or compatibilities

between the various hardware components and software functions specified herein and in related documentation. You must be aware of the consequences of any modifications, additions or substitutions.

A residual risk, as defined by EN/ISO 12100-1, Article 5, will remain if:

- it is necessary to modify the recommended logic and if the added or modified components are not properly integrated in the control circuit;
- you do not follow the required standards applicable to the operation of the machine, or if the adjustments to and the maintenance of the machine are not properly made (it is essential to strictly follow the prescribed machine maintenance schedule);
- the devices connected to any safety outputs do not have mechanically-linked contacts.



**CAUTION:** EQUIPMENT INCOMPATIBILITY

Read and thoroughly understand all device and software documentation before attempting any component substitutions or other changes related to the application examples provided in the document. Failure to follow these instructions can result in injury, or equipment damage.

## Start-Up and Test

Before using electrical control and automation equipment after design and installation, the application and associated functional safety system must be subjected to a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such testing be made and that enough time is allowed to perform complete and satisfactory testing.



**CAUTION:** EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in injury, or equipment damage.

Verify that the completed system, including the functional safety system, is free from all short circuits and grounds, except those grounds installed according to local regulations. If high-potential voltage testing is necessary, follow the recommendations in equipment documentation to help prevent injury or equipment damage.

## Operations and Adjustments

Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly installed and operated.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the hands and other parts of the body are free to enter the pinch points or other hazardous areas where serious injury can occur. Software products alone

cannot protect an operator from injury. For this reason, the software cannot be substituted for or take the place of point-of-operation protection.



**WARNING:** UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

**Note**

Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the examples and implementations suggested herein. It is sometimes possible to adjust the equipment incorrectly and this produce unsatisfactory or unsafe operation. Always use the manufacturer instructions as a guide to functional adjustments. Personnel who have access to these adjustments must be familiar with the equipment manufacturer instructions and the machinery used with the electrical equipment.

Only those operational adjustments actually required by the machine operator should be accessible to the operator. Access to other controls should be restricted to help prevent unauthorized changes in operating characteristics.

# Publisher's Info



This library's publisher is the **HVAC Solution Center / HVAC Application Experts Center** based in Italy:

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