



# MT-516CVT

TEMPERATURE CONTROLLER WITH CYCLICAL  
TIMER AND VOLTAGE MONITOR

Ver. 07



MT516CVT07-03T-10843

## 1. DESCRIPTION

**MT-516CVT** controls and indicates temperature, it can be configured for refrigeration or heating. It has a cyclical timer and voltage monitor. Through F13 and F14 functions it is possible to determine voltage limits, that when exceeded, after some seconds, the thermostat and cyclical timer outputs will turn off. Using True RMS\* measurement technology the controller is able to measure voltages in the most diverse situations of electric net, thus guaranteeing a bigger precision in the protection of the application components.

\*True RMS: Is the real and effective voltage value which also includes the voltage generated by high frequency noise in the distributing network (harmonic distortion). This is the actual voltage applied to the connected load (example: electric motor, compressor). This method allows the precise voltage measurement for any type of wave form. Other measurement methods give correct value of applied voltage only for perfect sine wave forms.

## 2. APPLICATION

- Milk coolers
- Chambers and balconies
- Heat pumps

## 3. THECHNICAL SPECIFICATIONS

- Power supply with internal transformer: 240 Vac± (50/60 Hz)
- Control temperature: -50 to 105°C (decimal resolution between -10 and 100°C)  
-58 to 221°F
- Maximum current per output: 5(3)A/250Vac 1/8HP- Dimensions: Diameter: 60 mm / Dept: 40 mm
- Operation temperature: 0 to 50°C / 32 to 122°F
- Operation humidity: 10 to 90% RH (without condensation)

## 4. CONFIGURATIONS

### 4.1 - Control temperature adjust (SETPOINT)

- Press **SET** for 2 seconds until **5EE** appears. The control temperature to be adjusted will appear.
- Use the keys **▼** and **▲** to change the value and then press **SET** again to record it.

### 4.2 - Parameters table

Fun	Description	Minimum	Maximum	Default
F01	Access code: 123 (one hundred and twenty-three)	-	-	-
F02	Offset indication <sup>(1)</sup>	-5°C / -9°F	5°C / 9°F	0°C / 0°F
F03	Operation mode	0-refrig.	1-heat.	0-refrig.
F04	Minimum set allowed to the user	-50°C / -58°F	105°C / 221°F	4.0°C / 39°F
F05	Maximum set allowed to the user	-50°C / -58°F	105°C / 221°F	5.0°C / 41°F
F06	Control differential (hysteresis)	0.1°C / 1°F	20°C / 36°F	1.0°C / 2°F
F07	Delay to turn the compressor on	0 sec.	999 sec.	180 sec.
F08	Time base of timer	0-sec.	1-min.	1-min.
F09	Timer time on	1 sec./min.	999 sec./min.	3 sec./min.
F10	Timer time off	1 sec./min.	999 sec./min.	12 sec./min.
F11	Timer initial status	0-off	1-on	1-on
F12	Timer always on while compressor on <sup>(2)</sup>	0-no	1-yes	1-yes
F13	Minimum work voltage (protection) <sup>(3)</sup>	190 Volts	280 Volts	195 Volts
F14	Maximum work voltage (protection) <sup>(3)</sup>	190 Volts	280 Volts	260 Volts
F15	Voltage offset	-50 Volts	50 Volts	0 Volts
F16	Time for outputs act by voltage out of the range <sup>(3)</sup>	1 sec.	30 sec.	10 sec.
F17	Display indication mode <sup>(4)</sup>	0	2	0
F18	Digital input attach mode <sup>(5)</sup>	0	2	0

<sup>(1)</sup> F02 - Display offset  
F02 function allows to correct eventual shunting lines in the reading, proceeding of the sensor exchange or alteration of sensor cable length.

<sup>(2)</sup> F12 - Timer always on while compressor on  
This function serves for some applications, for example, in milk coolers, when timer commands that agitator that will keep "on" while refrigeration is "on", if you program "1" (yes).

<sup>(3)</sup> Voltage Monitoring  
If the value of the voltage exceeds the limits adjusted in F13 and F14 the compressor will be turned off automatically after passed the time adjusted in the F16 function.  
The Led "VOLTS" will blink slowly in the display, together with the the line voltage indication.  
If the tension back to the established limits the compressor will only be turned on again after passed the To disable the voltage monitoring, adjust the same value for the functions F13 and F14.

<sup>(4)</sup> F17 - Display indication mode  
The F17 function allows to alternate between the following indications:

<input type="checkbox"/> 0	Only temperature
<input type="checkbox"/> 1	Only voltage
<input type="checkbox"/> 2	Temperature and voltage alternatingly

<sup>(5)</sup> F18 - Digital input attach mode  
It allows to choose how the digital input will interact with the outputs THERM and TIMER:

<input type="checkbox"/> 0	Digital input disable: THERM and TIMER work independent of the digital input.
<input type="checkbox"/> 1	Digital input enable and attached to the TIMER output: While the key of the digital input will be opened the TIMER output is kept off, and when the key will be closed the output works normally.
<input type="checkbox"/> 2	Digital input enable and attached to the THERM and TIMER outputs: While the key of the digital input will be opened the THERM and TIMER outputs are kept off, and when the key will be closed the outputs work normally.

## 4.3 - Unit selection (°C / °F)

To define the unit that the system will use to operate, enter into the functions menu **F01** using the access code "231" and confirm it by hitting key **SET**. The indication **Un** will appear, press **▼** or **▲** to choose between: **°C** or **°F** and confirm with key **SET**. After selecting the unit the **FAD** will appear, and the instrument will return to the function **F01**. Whenever the unit is altered, the parameters should be reconfigured, since they assume "standard" values.

## 4.4 - Parameters alteration

- Press the keys **▼** and **▲** together to access F01 function, for 2 seconds until **FUn** appears and release it **F01** will appear in the display and the press **SET** (short touch).
- Use the keys **▼** and **▲** to enter with the access code (123), and then press **SET** to enter.
- Use the keys **▼** and **▲** to access the desired function.
- After select the function, press **SET** (short touch) to display the configured value for that function.
- Use the keys **▼** and **▲** to change the value and then press **SET** to record the configured value and return to functions menu.
- To return to the normal operation, press **SET** until **--** appear.

## 5. FUNCTIONS WITH FACILITATED ACCESS

Registers of minimum and maximum  
Press **SET**. It will appear the indication **U** afterwards the minimum and maximum registered voltages. Then will appear the indication **E** and then the minimum and maximum registered temperatures.

Note: To reset the registers, keep the key **SET** pressed during the visualization of the registers until **rSL** appear.

### Changing the timer status manually

- To change the timer output (on ↔ off) independently of the programming, keep the key **▼** for 4 seconds, until **--** appear.

### To visualize the elapsed process time

- To visualize the elapsed process time, press **▲**.

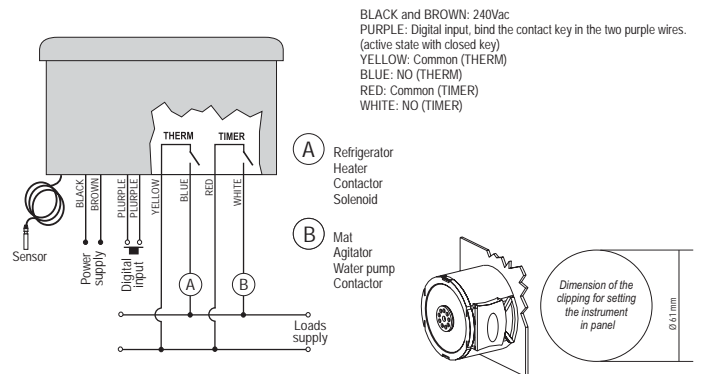
### To display temperature, voltage or the electric line frequency

To see the actual voltage and frequency of the electric line when the controller is configured for temperature exhibition just press **▼** quickly. It will be showed the current voltage followed by the frequency of the electric line, indicated by the indication **F**.  
Equally to visualize the temperature while the controller is showing the voltage just press lightly the **▼** key.

## 6. SIGNALLING

- THERM - Thermostat output on
  - VOLTS (always on) - Voltage visualization
  - VOLTS (blinking slowly) - Voltage out of the range
  - VOLTS (blinking quickly) - Error in the measurement of voltage
  - TIMER - Cyclical timer output on
  - Err** - Detached sensor or temperature outside the specified range
  - OPn** - Digital input opened key
- If the instrument shows in the display the message **PPP** it means that some parameter value outside of the acceptable range was detected and it needs to be corrected.

## 7. WIRING DIAGRAM



Note: The sensor cable length can be increased by the user until 200 meters using the PP 2 x 24 AWG cable. For immersion in water use thermometric well.

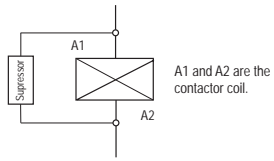
**IMPORTANT**

According to the chapters from the IEC60364 standard:

1. Install protectors against over voltage on power supply.
2. Sensor cables and computer signals can be together, however not at the same place where power supply and load wires pass for.
3. Install suppressors of transients (RC filters) in parallel to loads to increase the usefull life of the relays.
4. The withdrawal or substitution of the adhesive panel frontal as well as alterations in the electronic circuit on the part of the user implies in the cancellation of guarantee.

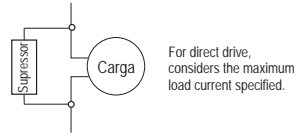
For more information contact our application eng. department through e-mail [support@fullgauge.com](mailto:support@fullgauge.com) or dial +55 51 3475.3308.

Wiring diagram of suppresor in contactors



A1 and A2 are the contactor coil.

Wiring diagram of suppresor linking in loads direct drive



For direct drive, considers the maximum load current specified.