



MT-622R

TWO STAGE DIGITAL CONTROLLER WITH ALARM AND CYCLIC TIMER AND PROCESS TIMER

Ver.03



MT622V03-01T-13826

1 - DESCRIPTION

MT-622R is a temperature controller that uses a J type thermocouple sensor; it has two outputs for temperature control and an internal audible alarm. It also has a timer that can operate in different modes, triggered by digital inputs, which indicates the end time of one or two processes.

The first stage can use a cyclic preheating mode, and the second stage may operate as an alarm, cyclic timer or indication of the end of a process. You can also use 5 configurable formulas, which allow one to quickly change the values of the setpoint temperature and the hysteresis of the first stage and the process time.

2 - APPLICATIONS

- Fryers
- Ovens

3 - TECHNICAL SPECIFICATIONS

Power supply: MT-622Ri - 115/230 Vac $\pm 10\%$ (50/60 Hz)
MT-622RiL - 12/24 Vac/dc

Temperature control: -50 to 600°C / -58 to 999°F

Resolution: 1°C/1°F

Dimensions: 71 x 28 x 71 mm

Operating temperature: 0 to 50°C/32 to 122°F

Operating humidity: 10 to 90% RH (non-condensing)

Current per output: OUT 1 - 16 (8) A/250 VAC 1HP - 4000W

OUT 2 - 5 (3) A/250 VAC 1/8HP

Sensor: J type Thermocouple (sold separately)

4 - SETTINGS

4.1 - Adjust the control temperature (SETPOINT) and process time.

If it is configured not to use formulas (F03 = 0):

- Press and hold the **SET** key for two seconds, until the message **SEE** appears;
- Then the message **SP1** will appear and it will be possible to adjust the stage 1 setpoint;
- Use the keys **▼** and **▲** to change the value, and press **SET** to confirm.

It will then be possible to adjust the setpoint of stage 2 **SP2** and the process time (**ET1**).

Note 1: The adjustment of the stage 2 setpoint can only be configured if the unit is set to operate as a thermostat (F29 = 0 or 1).

Note 2: When F49=4, it is possible to set a time lapse for each timer, identified by the message **ET1** and **ET2**.

If it is set to use formulas (F03 = 1):

Each formula can be configured to use different values for the setpoint, hysteresis of stage 1 and the time of the process. To select the formula:

- Press and hold the **SET** key for two seconds, until the message **SEE** and **SP1** appears;
- You will then see the currently selected formula.
- Use the **▼** or **▲** keys to select which of the 5 formulas will be used:

FC1 - Formula 1;

FC2 - Formula 2;

FC3 - Formula 3;

FC4 - Formula 4;

FC5 - Formula 5.

To confirm the selection, press **SET**.

Then one can adjust the setpoint of stage 2 **SP2**, if configured to operate as a thermostat (F29 = 0 or 1).

Note 1: The values of the functions of each formula are configured in the parameter menu.

Note 2: The formulas are linked only to the first timer. In case of F49=4, only the value of **ET2** can be configured manually.

4.2 - Changing Parameters

- Access the F01 function by simultaneously pressing the **▼** and **▲** keys for 2 seconds until [fun] appears, then release. **ET1** will then appear, press **SET** (short press).
- Use the **▼** or **▲** keys to enter the access code (123) and, when ready, press **SET**.
- After the **▼** or **▲** keys to access the desired function.
- After selecting the function, press **SET** (short press) to display the value configured for that function.
- Use the **▼** or **▲** keys to change the value, and when ready, press **SET** to store the configured value and return to the function menu.
- To exit the menu and return to normal operation (temperature indication) press **SET** (long press) until **---** appears.

4.3 - Table of parameters

Fun	Description	CELSIUS				FAHRENHEIT			
		Min	Max	Unit	Standard	Min	Max	Unit	Standard
F01	Access Code (123)	-	-	-	-	-	-	-	-
F02	Indicator Offset (offset)	-10	10	-	0	-18	18	-	0
F03	Using formulas in the 1st stage	0	1	-	0	0	1	-	0
F04	Operation Setpoint of the 1st stage (rc1)	-50	600	°C	-50	-58	999	°F	-58
F05	Operation Setpoint of the 1st stage (rc2)	-50	600	°C	-50	-58	999	°F	-58
F06	Operation Setpoint of the 1st stage (rc3)	-50	600	°C	-50	-58	999	°F	-58
F07	Operation Setpoint of the 1st stage (rc4)	-50	600	°C	-50	-58	999	°F	-58
F08	Operation Setpoint of the 1st stage (rc5)	-50	600	°C	-50	-58	999	°F	-58
F09	Differential control of the 1st stage (rc1) (*)	1	40	°C	1	1	104	°F	2
F10	Differential control of the 1st stage (rc2)	1	40	°C	1	1	104	°F	2
F11	Differential control of the 1st stage (rc3)	1	40	°C	1	1	104	°F	2
F12	Differential control of the 1st stage (rc4)	1	40	°C	1	1	104	°F	2
F13	Differential control of the 1st stage (rc5)	1	40	°C	1	1	104	°F	2
F14	Process time (rc1)	1	999	sec./min.	5	1	999	sec./min.	5
F15	Process time (rc2)	1	999	sec./min.	5	1	999	sec./min.	5
F16	Process time (rc3)	1	999	sec./min.	5	1	999	sec./min.	5

F17	Process time (rc4)	1	999	sec./min.	5	1	999	sec./min.	5
F18	Process time (rc5)	1	999	sec./min.	5	1	999	sec./min.	5
F19	Timebase of the Timer	0	1	-	1	0	1	-	1
F20	Operational Mode of the 1st stage	0	2	-	1	0	2	-	1
F21	Minimum setpoint allowed to the end user (1st stage)	-50	600	°C	-50	-58	999	°F	-58
F22	Maximum setpoint allowed to the end user (1st stage)	-50	600	°C	600	-58	999	°F	999
F23	Minimum delay to re-connect the output of the 1st stage	0	999	sec.	0	0	999	sec.	0
F24	Temperature to terminate preheating	-50	600	°C	60	-58	999	°F	140
F25	Time base used to preheat	0	3	-	0	0	3	-	0
F26	Time that preheating is connected	1	999	sec./min.	1	1	999	sec./min.	1
F27	Time that preheating is disconnected	1	999	sec./min.	1	1	999	sec./min.	1
F28	Maximum cycling time (if F20 = 2)	1	999	min.	5	1	999	min.	5
F29	Operational Mode of the 2nd stage	0	10	-	1	0	10	-	1
F30	Minimum setpoint allowed to the end user (2nd stage)	-50	600	°C	-50	-58	999	°F	-58
F31	Maximum setpoint allowed to the end user (2nd stage)	-50	600	°C	600	-58	999	°F	999
F32	Control differential (hysteresis) of the 2nd stage	1	20	°C	1	1	36	°F	2
F33	Minimum delay to re-connect the output of the 2nd stage	0	999	sec.	0	0	999	sec.	0
F34	Alarm disability time when turning the controller on	0	999	min.	0	0	999	min.	0
F35	Time the ALARM/TIMER is on	1	999	sec./min.	1	1	999	sec./min.	1

F36	Time ALARM/TIMER is off	0	999	sec./min.	1	0	999	sec./min.	1
F37	Time to reactivate the alarm when manually disabled	ET1	999	min.	ET1	ET1	999	min.	ET1
F38	Timebase of cyclical timer	0	3	-	0	0	3	-	0
F39	Time for activation of 2nd stage cyclic timer	0	999	sec.	5	0	999	sec.	5
F40	Operation Mode of audible alarm	0	2	-	1	0	2	-	1
F41	Activation point of audible alarm (lower limit)	-50	600	°C	-50	-58	999	°F	-58
F42	Activation point of audible alarm (upper limit)	-50	600	°C	600	-58	999	°F	999
F43	Time audible alarm is connected	0	999	sec.	1	0	999	sec.	1
F44	Time audible alarm is disconnected	0	999	sec.	1	0	999	sec.	1
F45	Audible alarm disability time when turning the controller on	0	999	min.	0	0	999	min.	0
F46	Time to reactivate the audible alarm when manually disabled	ET1	999	min.	ET1	ET1	999	min.	ET1
F47	Enabling and viewing mode of the process timer	0	2	-	2	0	2	-	2
F48	Audible alert at the end of the process (Buzzer)	0	1	-	1	0	1	-	1
F49	Operational mode of digital inputs	0	4	-	0	0	4	-	0
F50	Intensity of the digital filter	0	9	-	0	0	9	-	0

4.4 - Description of parameters

F01 - Access Code

This is necessary when you want to change the configuration parameters. It is not necessary to insert this code to see the set parameters.

F02 - Indicator Offset (offset)

Allows the compensation of eventual deviations in temperature reading, caused by the change of the sensor or changing the length of the cable.

F03 - Using formulas in the 1st stage

Allows one to configure the controller in order to use the formulas or not:

FC1 - No: If setup this way, the instrument will not use the receipt values in the control routines. For this, setpoint 1 **SP1** will be used and process time **ET1**, which are adjusted through the easy access menu. The differential control to be used will be the same as formula 1, **FC1** "Differential control of the 1st stage (rc1)."

The value set in **SP1** can be set between **FC1** "Minimum setpoint allowed to the end user (1st stage)" and **FC2** "Maximum setpoint allowed to the end user (1st stage)."

FC2 - Yes: If configured this way, the instrument uses the control routines of the setpoint values, differential control and process time of the formula that is active.

The formula selection will be made through the easy access menu, in the same way as adjusting the setpoint. However, the value shown on the display will be the name of the formula that is active. Example: **FC1**

F04 - Operation setpoint for the 1st stage (rc1)

F05 - Operation setpoint for the 1st stage (rc2)

F06 - Operation setpoint for the 1st stage (rc3)

F07 - Operation setpoint for the 1st stage (rc4)

F08 - Operation setpoint for the 1st stage (rc5)

These parameters specify the desired temperature for each formula in the 1st stage.

F09 - Differential control of the 1st stage (rc1) (*)

F10 - Differential control of the 1st stage (rc2)

F11 - Differential control of the 1st stage (rc3)

F12 - Differential control of the 1st stage (rc4)

F13 - Differential control of the 1st stage (rc5)

These parameters specify the desired temperature for each formula in the 1st stage.

(*) The function F09 is used when F03 = 0 together with **SP1** or when F03 = 1 in combination with setpoint **FC1**.

F14 - Process Time (rc1)

F15 - Process Time (rc2)

F16 - Process Time (rc3)

F17 - Process Time (rc4)

F18 - Process Time (rc5)

These parameters specify the duration of the process for each formula.

F19 - Timebase of the Timer

Allows one to select which time base will be used to count the processing time

- ☐ - Seconds
- ☐ - Minutes

F20 - Operational mode of the 1st stage

Allows one to configure the operating mode of the 1st stage.

☐ - **Cooling:** The 1st stage operates in the cooling mode. To control the temperature, the instrument uses one of the selected formulas or the adjusted setpoint and the adjusted time. In this mode the control of the instrument is permanently operating with output **OUT 1** to maintain the desired temperature. The process time does not imply the shutdown of the output **OUT 1** at the end of the process. It is only indicated by the message **[END]** on the display and the sounding of the internal BUZZER.

☐ - **Heating:** The 1st stage operates in the heating mode. To control the temperature, the instrument uses one of the selected formulas or the adjusted setpoint and the adjusted time. In this control mode the instrument is permanently operating with output **OUT 1** to maintain the desired temperature. The process time does not imply shutdown of output **OUT 1** when the process ends. It is only indicated by the message **[END]** on the display and the sounding of the internal BUZZER.

☐ - **Preheating/Heating:** This mode of operation is similar to the heating mode, however, when connecting the controller, preheating is carried out. This preheating is accomplished by switching the state of the output of **OUT 1**. The amount of time per cycle that the output remains switched on and off is set in the functions F26 and F27. The controller stays in the preheating mode until the temperature set in F24 is reached, or until the time set in F28 is reached. When reaching the temperature or time limit of the preheating, the controller switches to operate in the heating mode. The apparatus only performs pre-heating when it is connected.

F21 - Minimum setpoint allowed to the end user (1st stage)

F22 - Maximum setpoint allowed to the end user (1st stage)

The electronics limits have the purpose of preventing, by mistake, the use of very high or low set temperature setpoints

F23 - Minimum delay to re-connect the output of the 1st stage

It is the minimum time that the output of the 1st stage is off, i.e. the time between the last stop and the next start.

Note: This time is only taken into account after the end of the time in F26 and if F20 = 2 case.

F24 - Temperature to terminate preheating

Temperature that the output stops **OUT 1** preheating and starts to operate in the heating mode.

To carry out the preheating F20 must be set to (F20 = 2) when connecting the controller.

F25 - Time base used to preheat

Allow the setting of the time bases in order to turn on and off the output **OUT 1** when operating in the preheating mode. The possible settings for time on and time off are respectively:

- ☐ - Seconds/Seconds;
- ☐ - Seconds/Minutes;
- ☐ - Minutes/Seconds;
- ☐ - Minutes/Minutes.

F26 - Time that preheating is connected

This function is to adjust the time that the controller stays connected with output **OUT 1** connected when the 1st stage is in the preheat mode.

F27 - Time that preheating is disconnected

This function is to adjust the time that the controller stays connected with output **OUT 1** disconnected when the 1st stage is in the preheat mode.

F28 - Maximum cycling time (if F20 = 2)

This function is a safety feature to finalize the preheating mode. It limits the maximum time of operation in the cyclical mode, if the temperature read by the controller does not reach the value set in F24. After this time, the controller starts to operate in the heating mode, as a simple thermostat, even without reaching the temperature set in F24.

F29 - Operational mode of the 2nd stage

- ☐ - Refrigeration
- ☐ - Heating
- ☐ - Alarm intra-band
- ☐ - Alarm extra-range
- ☐ - The extra-range alarm related to the first stage (**[SP1]** - F30 and **[SP1]** + F31), is considered as the absolute values of F30 and F31.

- ☐ - Independent Cyclic timer
- ☐ - Cyclic timer triggered by the setpoint of the 1st stage
- ☐ - 1st stage coupled to the cyclic timer (timer starts on)
- ☐ - 1st stage coupled to the cyclic timer (timer starts off)
- ☐ - Output of the cyclic timer is always connected when the output of the 1st stage is connected.

☐ - End of process alarm

Note: When F29 = 10, the output **OUT 2** is triggered at the end of the process according to the times set in functions F35 and F36.

F30 - Minimum setpoint allowed to the end user (2nd stage)

F31 - Maximum setpoint allowed to the end user (2nd stage)

The electronic limits have the purpose of preventing the use, by mistake, of very high or low temperature setpoints. When the 2nd stage is defined as an alarm, the setpoints are defined in F30 and F31.

F32 - Control differential (hysteresis) of the 2nd stage

This is the temperature difference (hysteresis) between turning on and off the 2nd stage output.

F33 - Minimum delay to re-connect the output of the 2nd stage

This is the minimum time in which the output of the 2nd stage is off, i.e. the time between the last stop, and the next start up (only if F29 = 0 or 1).

F34 - Alarm disability time when turning the controller on (F29 = 2, 3 or 4)

This function is to disable the alarm for a period of time because the system has not yet reached the working temperature.

F35 - Time the ALARM/TIMER is on

This function is to adjust the time that the output of the 2nd stage will remain activated if it is set as an alarm or timer.

F36 - Time the ALARM/TIMER is off

This function is to adjust the time that the output of the 2nd stage remains switched off if it is configured

as an alarm or timer. To always keep the alarm triggered, just set "0" in this function.

F37 - Time to reactivate the alarm when manually disabled

This function sets the manual disability of the alarm. If you enter an alarm condition, this can be manually disabled by simultaneously pressing the **▲** and **SET**.

If a value between 1 and 999 minutes is set when it reaches an alarm condition and is disabled manually, it can only be activated again after that time elapses. If the automatic mode is selected (**[RUE]**), the alarm, after being disabled, will only be triggered if the normal condition returns and alarm condition returns, with no time limit. Set to 0, the manual disability is itself disabled.

- [RUE]** - Alarm will sound again when you leave and return to the alarm condition
- ☐ - Manual disability disabled

☐ ~ **[999]** - Time that the output of alarm remains disabled (in minutes)

F38 - Timebase of Cyclic timer (F29 = 5, 6, 7, 8 or 9)

If the output **OUT 2** is configured as a cyclic timer, the time base in which the output remains switched on and switched off can be set to seconds or minutes. The setting of the switched on and switched off the time base is, respectively:

- ☐ - Seconds/Seconds;
- ☐ - Seconds/Minutes;
- ☐ - Minutes/Seconds;
- ☐ - Minutes/Minutes.

F39 - Time for activation of 2nd stage cyclic timer

This is the delay time to activate the cyclic timer if it is set to be triggered by the setpoint of the 1st stage (F29 = 6).

F40 - Operational Mode of the audible alarm

- ☐ - Intra-band alarm
- ☐ - Extra-band alarm

☐ - Alarm relating to the first stage (**[SP1]** - F41 and **[SP1]** + F42), considering the absolute values of F41 and F42.

F41 - Activation point of the audible alarm (lower limit)

This is the lowest temperature to activate the audible alarm according to the operating mode selected.

F42 - Activation point of audible alarm (upper limit)

This is the upper temperature to activate the audible alarm according to the operating mode selected.

F43 - Time audible alarm is connected

Time that the audible alarm will remain powered (active cycle). To disable the audible alarm, adjust the value "0" for this function

F44 - Time audible alarm is disconnected

Time that the audible alarm will remain off (inactive cycle). To disable the audible alarm, adjust the value "0" for this function

F45 - Audible alarm disability time when turning the controller on

This is the time that the buzzer will remain off, even in an alarm condition. This time is to disable the audible alarm while the system has not yet reached working conditions.

F46 - Time to reactivate the audible alarm when manually disabled

This function sets the manual disability of the audible alarm. If it enters in an alarm condition, the audible alarm can be manually disabled by simultaneously pressing the keys **▲** and **SET**.

If a value between 1 and 999 minutes is set, when the audible alarm reaches an alarm condition and is disabled manually, it can only be activated again after that time elapses. If the automatic mode is selected (**[RUE]**), the audible alarm, after being disabled, will only be triggered if the normal condition and the alarm condition returns, with no time limit. Set to 0, the manual disability is disabled.

- [RUE]** - The audible alarm sounds again when leaving and there is a new alarm situation
- ☐ - Disabled

☐ ~ **[999]** - Time in which the audible alarm remain disabled (in minutes)

F47 - Enabling and viewing mode of the process timer

This function is used to enable or disable the process timer. If it is enabled, it may be configured to, during the process, show the temperature or remaining time. The choice of the information to be displayed when the timer is triggered depends on the user's needs.

- ☐ - Disabled
- ☐ - During the process it shows temperature
- ☐ - During the process it shows the remaining time

F48 - Audible alert at the end of the process (Buzzer)

- ☐ - Disables the audible alarm to indicate the end of the process
- ☐ - Enables the audible alarm to indicate the end of the process

F49 - Operational mode of digital inputs

This function allows one to set the operating mode of the digital inputs:

☐ - DIG1 (START) and DIG2 (STOP) (1 timer):

The digital input 1 (**DIG1**) or **▼** operates as **START** or **PAUSE** and the digital input 2 (**DIG2**) or **▲** operates as a **STOP** command.

The controller applies the configured value in process time to a single internal timer.

By triggering the digital input 1 (**DIG1**) or **▼**, the controller starts the timing process.

PAUSE: If the timing of the process is in progress and the digital input 1 (**DIG1**) or **▼** is triggered, the count will stop and one must again press the digital input 1 (**DIG1**) or **▼** to continue.

By triggering the digital input 2 (**DIG2**) or **▲**, the timing of the process is terminated.

If the process is terminated and digital input 1 (**DIG1**) or **▼** is triggered, the controller will start a new count for the process time.

☐ - DIG1 (START1/STOP1) and DIG2 (START2/STOP2) - 2 timer's

impulse = START/STOP:

In this mode of operation of the digital inputs (**DIG1** and **DIG2**), the controller will operate with 2 independent timers. The two timers use the same process time.

The digital input 1 (**DIG1**) operates as the command for **START1/STOP1** for timer 1.

The digital input 2 (**DIG2**) operates as the command for **START1/STOP2** for timer 2.

In this mode of operation **PUSH BUTTON** type keys are provided (without mechanical retention of the contact). When operating the key the electrical contact changes its state and upon release it returns to the idle condition (NA).

-If the timer 1 is stopped and the digital input 1 key is pressed (**DIG1**) the message

[SE1] will be shown on the display and timer 1 will start.

If timer 1 is operating and the digital input 1 (**DIG1**) key is pressed the message **[E n 1]** will be shown on the display and this will stop timer 1.

-If the timer 2 is stopped and the digital input 2 key is pressed (**DIG2**) the message **[S E 2]** will be shown on the display and timer 2 will start.

-If the timer 2 is operating and the digital input 2 (**DIG2**) key is pressed then message **[E n 2]** will be shown on the display and this will stop timer 2.

[2] - DIG1 (START1/STOP1) and DIG2 (START2/STOP2) - 2 timers input closed = START, input open = STOP:

In this mode of operation of the digital inputs (**DIG1** and **DIG2**), the controller will operate with 2 Independent timers. The two timers use the same process time.

The digital input 1 (**DIG1**) operates as the command for **START1/STOP1** for timer 1.

The digital input 2 (**DIG2**) operates as the command for **START2/STOP2** for timer 2.

In this operating mode the ON/OFF type keys are provided (NA with mechanical contact retention). When operating the key the electrical contact changes its state and upon release it does not return to the idle condition.

By changing the position of key 1 from OFF (**STOP1**) to ON (**START1**), the message **[S E 1]** will be shown on the display and the controller will start timer 1.

By changing the position of key 1 from ON (**START1**) to OFF (**STOP1**), the message **[E n 1]** will be shown on the display and the controller will stop timer 1.

By changing the position of key 2 from OFF (**STOP2**) to ON (**START2**), the message **[S E 2]** will be shown on the display and the controller will start timer 2.

By changing the position of key 2 from ON (**START2**) to OFF (**STOP2**), the message **[E n 2]** will be shown on the display and the controller will stop timer 2.

[3] - DIG1 (START1/STOP1) and DIG2 (START2/STOP2) - 2 timers open input = START, input closed = STOP:

In this mode of operation of the digital inputs, the controller will operate with 2 Independent timers. The two timers use the same process time.

The digital input 1 operates as the command for **START1/STOP1** for timer 1.

The digital input 2 operates as the command for **START2/STOP2** for timer 2.

In this operating mode the ON/OFF type keys are provided (NF with mechanical contact retention). When operating the key the electrical contact changes its state and upon release it does not return to the idle condition.

By changing the position of key 1 from OFF (**START1**) to ON (**STOP1**), the message **[S E 1]** will be shown on the display and the controller will start timer 1.

By changing the position of key 1 from ON (**STOP1**) to OFF (**START1**), the message **[E n 1]** will be shown on the display and the controller will stop timer 1.

By changing the position of key 2 from OFF (**START2**) to ON (**STOP2**), the message **[S E 2]** will be shown on the display and the controller will start timer 2.

By changing the position of key 2 from ON (**STOP2**) to OFF (**START2**)

[4] - DIG1 (START1 /STOP1) e DIG2 (START2/STOP2) -Two independent timer impulse = START/STOP:

This operation mode works like F49=1, except that timer 1 and 2 will measure different time lapses. The time lapses are configured through **[E n 1]** and **[E n 2]**, described in the item 4.1.

Note:

In the operational modes 1, 2, 3 or 4 the keys **[]** and **[]** on the front panel of the controller will not be available for the **START** and **STOP** commands.

If timers 1 and 2 are stopped and the **[]** key on the front panel of the controller is pressed, it will show the maximum and minimum temperature recorded. To clear the record just hold the key **[]** pressed.

F50 - Intensity of the digital filter

This filter is intended to simulate the increase of the sensor mass, thereby increasing its response time (thermal inertia). The higher the value set in this function the higher the response time of the sensor will be.

5 - EASY ACCESS FUNCTIONS

5.1 - Process Timer

5.1.1 - Description

The process timer is a timer. It is started manually and after the end of the programmed time it shows the message **[E n d]** on the display, if **F49 = 0**. If **F49** is equal to **1, 2, 3** or **4**, the controller will be operating with two independent timers (a command given by the digital input 1 - **DIG1** and another command given by digital 2 - **DIG2**) and thus the messages displayed for the end of each timer are **[E n 1]** and **[E n 2]**, respectively.

By using the **F48** function, the instrument may be set to emit an audible alarm at the end of the process.

Note that the end of the process does not affect the output "**OUT 1**".

5.1.2 - Simple Timer (F49 = 0)

Press the **[]** key or digital input button 1 (**DIG1**) to start the process. The timer starts counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n d]** is intermittently shown on the display for ten seconds, and then goes back to showing the indicated temperature.

If necessary pause the count during the process (pause), press **[]** or the digital input button 1 (**DIG1**). To continue, press **[]** again or the input button **DIG1**. You can tell if the process is in progress or paused by the LED indicator at the bottom right corner of the display **[]**, which remains lit if the count has stopped.

To end the process before the set time, press **[]** or the digital input button 2 (**DIG2**). At the end of the set time, the message **[E n d]** is shown on the display intermittently for two seconds, and then goes back to showing the indicated temperature.

5.1.3 - Two timers using 2 buttons (F49 = 1)

In this operation mode, two keys normally with open contacts of the push button type should be used (without mechanical retention of the contact) with digital inputs **DIG1** and **DIG2**. Each digital input starts and stops a process.

Press the digital input 1 button (**DIG1**) to start process 1, the message **[S E 1]** will be shown in the display. The timer starts counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n 1]** will be shown on the display intermittently until **DIG1** is pressed, and then returns to show the indicated temperature.

To end process 1 before the time set, press **DIG1** again. The message **[E n 1]** will be shown on the display intermittently for 2 seconds.

To start process 2, press the digital input button 2 (**DIG2**), the message **[S E 2]** will be displayed. The timer starts counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n 2]** is shown on the display intermittently until **DIG2** is pressed, then returns to show the indicated temperature.

To end process 2 before the set time, press **DIG2** again. The message **[E n 2]** will be shown on the display intermittently for 2 seconds.

The two processes may occur at the same time, it is not necessary to terminate a process to start another.

5.1.4 - Two timers using 2 NA keys (F49 = 2)

In this mode of operation two keys with normally open contacts should be used as digital inputs **DIG1** and **DIG2**. Each digital input starts and stops a specific process. The process occurs while the key has its contacts closed, and terminates at the end of the set time or if the switch contacts are opened.

To start process 1, close the contacts of the digital input 1 (**DIG1**). The following message will be shown **[S E 1]** and the timer will start counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n 1]** will be shown on the display intermittently until the switch contacts **DIG1** are open and return to show the indicated temperature.

To start process 2 close the contacts of digital input 2 (**DIG2**). The following message will be shown **[S E 2]** and the timer will start counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n 2]** will be shown intermittently on the display until the switch contacts **DIG2** are open then return to be shown as the indicated temperature.

The two processes may occur at the same time, it is not necessary to terminate a process to start another.

5.1.5 - Two timers using 2 NF keys (F49 = 3)

In this mode of operation two keys with normally closed contacts should be used as digital inputs **DIG1** and **DIG2**. Each digital input starts and stops a specific process. The process occurs while the key has its contacts open, and is terminated at the end of the set time or if the switch contacts are closed.

To start process 1 open the contacts of digital input 1 (**DIG1**). The following message will be shown **[S E 1]** and the timer will start counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n 1]** will be shown on the display intermittently until the switch contacts **DIG1** are closed then return to be shown as the indicated temperature.

To start process 2 open the contacts of digital input 2 (**DIG2**). The following message will be shown **[S E 2]** and the timer will start counting the time indicated by the flashing LED at the bottom right corner of the display **[]**. At the end of the set time, the message **[E n 2]** will be shown on the display intermittently until the switch contacts **DIG2** are closed then return to be shown as the indicated temperature.

The two processes may occur at the same time, it is not necessary to terminate a process to start another.

5.1.6 - Two independent timer through two push-button (F49=4)

This operation mode works like item 5.1.3, except that timer 1 and 2 will measure different time lapses. The time lapses are configured through **[E n 1]** and **[E n 2]**, described in the item 4.1.

5.1.7 - Display of information during the process

If the process timer is running, press **[SET]** to change the information shown on the display. By pressing the key, the message will be displayed and then the information. The data that can be seen is:

- [E - 1]** - Temperature sensor
- [E P 1]** - Remaining process time 1
- [E P 2]** - Remaining process time 2

5.2 - Records of maximum and minimum temperatures

If there is no ongoing process, when pressing **[]** the minimum recorded temperature will appear.

Then the maximum temperature recorded will appear.

To reset the records, just hold the **[]** key down when the min. and max. temperatures are shown until **[r S E]** appears.

5.3 - Disabling the Alarm

The output **OUT 2** can be configured to act as an alarm. If the alarm is triggered, it can be disabled by pressing **[]** and **[SET]** simultaneously. This disability can be set using F37. With F37 = 0, this function is disabled. Set with a value between 1 and 999 the alarm is disabled by the selected number of minutes. In the automatic mode (**[H u E]**) the alarm is disabled and will only be triggered again by exiting and returning to the alarm condition.

5.4 - Disabling the audible alarm

Analogously to the disability of the alarm, the audible alarm can also be disabled. If it is activated, press **[]** and **[SET]** simultaneously to disable the audible alarm. The disability of the audible alarm can be set in F46. With F46 = 0, this function is disabled. Setting a value between 1 and 999 the audible alarm is disabled by the selected number of minutes. In the automatic mode (**[H u E]**) the audible alarm is disabled and will only be triggered again by exiting and returning to the alarm condition.

5.5 - Summary

- [SET]** - for 2 Seconds - Setpoint adjustment and process time
- []** and **[]** - for 2 seconds - Access to the parameters menu
- []** and **[SET]** - Disables alarm (if activated)
- []** and **[SET]** - Disables audible alarm (if activated)

Process timer is not activated:

[] - Maximum and minimum temperature records (press and hold to clear the record)

Process timer is activated:

[SET] - Display information (time or temperature)

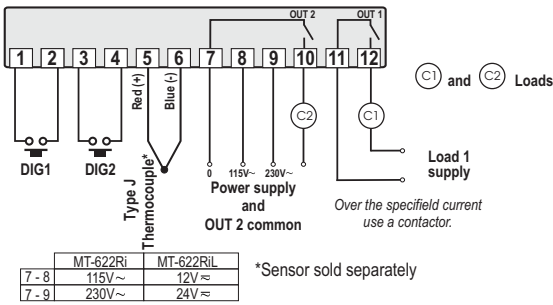
6 - SIGNALS

- OUT 1** - Output of the 1st stage connected;
OUT 2 - Output of the 2nd stage connected;
BUZZ - Internal Buzzer (audible alarm) triggered;
[Err] - Sensor disconnected or temperature outside specified range;
[Flashing] - Flashing: Counting the running time/access: The count time is paused.
[End] - End of process time (F49 = 0);
[End1] - End of process time 1;
[End2] - End of process time 2;
[St1] - Start of process 1
[St2] - Start of process 2

7 - UNIT SELECTION (°C/°F)

To determine the unit that the instrument will work, access the function "F01" with the access cod 231 and confirm with the key **SET** . Press the key **▲** . **[Unit]** will appear. Press **SET** than use **▲** or **▼** to choose between **[°C]** or **[°F]** and confirm with **SET** . After select the unit **[F01]** will appear and the instrument returns to the function "F01". Every time that the unit is changed, the parameters must be configured again, because they assume the standard values.

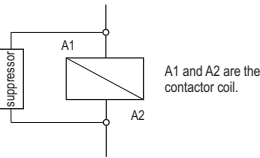
8 - WIRING DIAGRAM



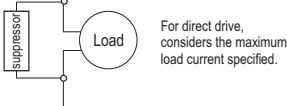
IMPORTANT

- As chapters of IEC 60 364 norms:
- 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 drive pass for.
 - 3: Install suppressor of transient (RC filter) in parallel to loads, as for to increase the useful life of the relays.

Wiring diagram of suppressor in contactors



Wiring diagram of suppressor linking in loads direct drive



ENVIRONMENTAL INFORMATION

Package:
The packages material are 100% recyclable. Just dispose it through specialized recyclers.

Products:
The electro components of Full Gauge controllers can be recycled or reused if it is disassembled for specialized companies.

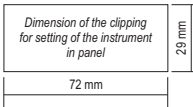
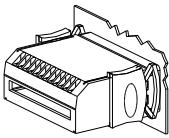
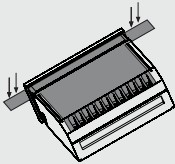
Disposal:
Do not burn or throw in domestic garbage the controllers which have reached the end-of-life. Observe the respectively law in your region concerning the environmental responsible manner of dispose its devices. In case of any doubts, contact Full Gauge controls for assistance.



PROTECTIVE VINYL:

This adhesive vinyl (included inside the packing) protects the instruments against water drippings, as in commercial refrigerators, for example. Do the application after finishing the electrical connections.

Remove the protective paper and apply the vinyl on the entire superior part of the device, folding the flaps as indicated by the arrows.



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