PCT-120E plus Ver.03

DIGITAL PRESSURE CONTROLLER AND INDICATOR

Functions Lock | Control Functions Shutdown | Serial Programming | IP 65 FRONT Protection Level | Hourmeter | Sitrad Supervisory System | Modbus Protocol

Have this manual in your hands using the **FG Finder** app.

PCT120EV03-02T-19870

1. DESCRIPTION

The **PCT-120E plus** is an easy to install and operate two-stage pressure controller designed for systems that require effective pressure control. Operating in pressurization, despressurization, refrigeration, heating or alarm mode, it directly controls loads of up to 1HP. It also has digital inputs that allow external devices to be used for protecting the controller system, hourmeters that store the number of hours compressors/pumps are operating and indicate when maintanance should be performed on them. Operating in combination with temperature sensors, it also performs dynamic and adiabatic condensation control, dynamic evaporation, superheating and subcooling monitoring, promoting greater energy efficiency in the system. It also has serial output for communication with Sitrad and an intelligent locking function, preventing unauthorized persons from changing the control parameters.
The controller allows you to configure the RS-485 communication port for the MODBUS-RTU protocol. For more information about the implemented commands and the registration table, contact Full Gauge Controls.

2. APPLICATIONS

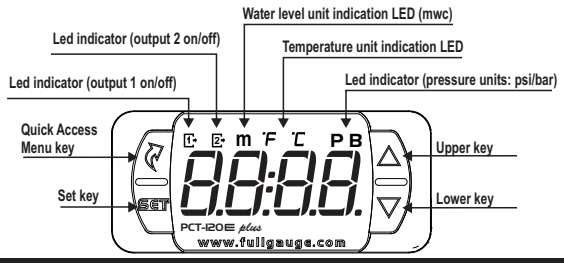
• Control over suction or discharge in refrigeration systems, air compressors, semi-artesian pumps, water tanks and filters, superheating and subcooling monitoring.

3. TECHNICAL SPECIFICATIONS

Power supply	**PCT-120E Plus:** **PCT-120EL Plus 12Vac/dc:** **PCT-120EL Plus 24Vac/dc:**		90~240Vac (50/60 Hz) 12Vac/dc 10% (50/60 Hz) 24Vac/dc 10% (50/60 Hz)
Approximate consumption			± 4VA
Operating temperature			-20 a 60°C / -4 a 140°F
Operating humidity			10 to 90% UR (no condensation)
Pressure control range			-14 to 850 psi / -1 to 58.6 bar (configurable sensor operating range)
Pressure sensor input			**(*)** P1 e P2: 4 - 20mA
Pressure resolution			1 psi / 0,1 bar
Temperature sensor / Digital Input			**(*)** T1 and T2 : Temperature Sensor (SB19, SB41, SB59 and SB70) These inputs can be configured individually as digital inputs
Temperature control range			-50 to 200°C / -58 to 392°F
Temperature resolution			0,1°C / 1°F
Maximum current		**NA**	OUT 1 / OUT 2 120-240 Vac, 12A Resistive, 100K cycles 120-240 Vac, 8A General Use, 100K cycles 240 Vac, 1HP, 100k cycles 120 Vac, 1/2HP, 100k cycles
		NF	OUT 1 / OUT 2 120-240 Vac, 10A Resistivo, 100K ciclos
Water level control range			0 to 250 mwc (configurable sensor operating range)
Water level resolution			0,1 mca
Digital Inputs			Configurable dry contact
Protection level			IP 65 (frontal)
Product dimensions			76 x 34 x 77 mm (W x H x D) (2,99 x 1,33 x 3,03")
Dimensions of the clip for fixing the instrument			71±0,5 x 29 ± 0,5 mm (2,80 x 0,01 x 1,14 x 0,01")

(*) Sensors sold separately

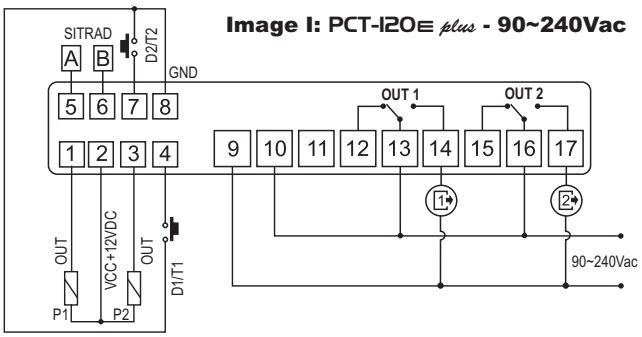
4. INDICATORS AND KEYS



5. INSTALLATION

5.1 Installation - Electric connections

Image I: PCT-120E plus - 90~240Vac



Electrical connection of temperature sensors/digital inputs:
D1/T1: Pins 4-8
D2/T2: Pins 7-8

Electrical connection of pressure sensors:
VCC: 12Vdc
OUT: 4~20mA

Image II: PCT-120EL plus - 12 Vac/dc

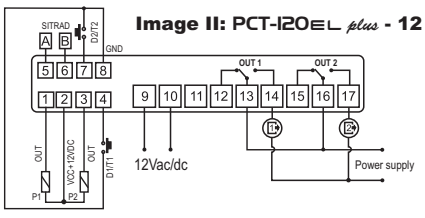
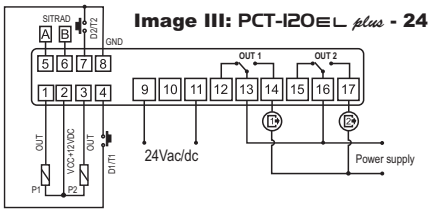
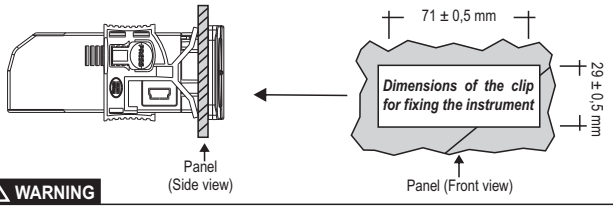


Image III: PCT-120EL plus - 24 Vac/dc



5.2 Installation panel



⚠ WARNING

FOR INSTALLATIONS THAT REQUIRE WATER TIGHTNESS, THE OPENING TO INSTALL THE CONTROLLER MUST BE 71,5 x 29,5 mm (28,15 x 11,6 in) MAXIMUM. THE SIDE LATCHES MUST BE FIXED SO THAT THEY PRESS THE SEALING GASKET TO PREVENT INFILTRATION BETWEEN THE OPENING AND THE CONTROLLER.

⚠ IMPORTANT

IT IS ESSENTIAL TO USE THE CORRECT TOOLS IN ORDER TO AVOID DAMAGES TO THE INSTRUMENT'S CONNECTION TERMINALS:
⊖ 3/32"(2.4mm) SLOTTED SCREWDRIVER FOR ADJUSTMENTS IN THE SIGNAL TERMINALS;
⊕ PHILLIPS SCREWDRIVER #1 FOR ADJUSTMENTS AT THE POWER TERMINALS.

6. INSTALLATION PROCEDURE

a) Cut out the panel plate (Image IV - item 10) where the controller shall be fastened, with sizes X = 71±0.5 mm and Y = 29±0.5 mm;
b) Remove side locks (Image V - item 10): to do that, compress the central elliptical part (with the Full Gauge Controls logo) and displace the locks backwards;
c) Introduce the controller in the notch made on the panel, inwards (Imagem VI- item 10);
d) Place the locks again and then displace them until they compress into the panel, fastening the controller to the housing (see arrow indication in Image V - item 10);
e) Perform the electric installation as described in item 5.1;
f) Adjust the parameters as described in item 7.

⚠ **ATTENTION: for installations requiring liquid tight sealing, the notch sizes for the controller installation should be no more than 70.5x29mm. The side locks should be fastened so that they press the sealing rubber avoiding infiltration between the notch and the controller.**

Protector vinyl - Image VI (item 10)

It protects the controller when installed at a site subject to water spills, such as refrigerated counters. This adhesive vinyl is supplied with the instrument in the package.

⚠ **IMPORTANT: Make the application only after completing the electrical connections.**

a) Retreat the side locks (Image V - item 10);
b) Remove the protective film from the adhesive vinyl face;
c) Apply the vinyl over the entire upper part, bending the flaps, as indicated by the arrows - Image VI (item 10);
d) Reinstall the locks.

NOTE: *The vinyl is transparent, allowing visualization of the wiring system of the instrument.*

6.1 Connecting the temperature sensors

- Connect the wires of the **T1 Sensor** to terminals ''4 and 8'', the wires of the **T2 sensor** to terminals and ''7 and 8'', the polarity is indifferent.
- The length of the sensor cables can be increased by the user themselves up to 200 meters (650 ft.), using a 2x24 AWG PP cable.
-For immersion in water, use a thermometric well (Image VII - item 10), available in the Full Gauge Controls product line (sold separately).

6.2 Connecting the pressure sensors

- Connect the wires of the **P1 Sensor** to terminals ''1 and 2 '', the wires of the **P2 sensor** to terminals and ''2 and 3'', Pay attention to the polarity of the pressure sensor wires (image I - item 5.1).
- The length of the sensor cables can be increased by the user themselves up to 200 meters (650 ft.), using a 2x24 AWG PP cable.

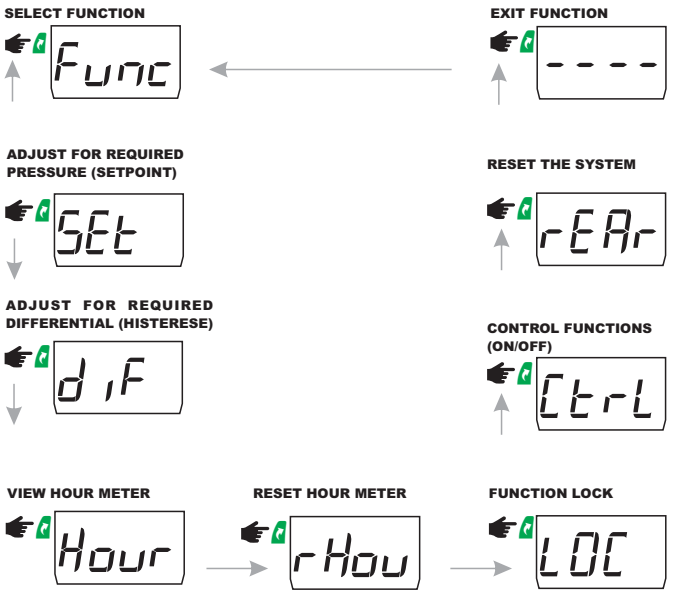
6.3 Recommendations from NBR5410 and IEC60364 standards

- Install surge protectors to the controller's power supply.
- Install transient suppressors - suppressor filter (type RC) - in the circuit to increase the working life of the controller's relay.
- The sensor cables can be together, but not in the same conduit as the power supply fot the controller or the loads.

7. OPERATIONS

7.1 Quick Access Menu Map

To access or browse the quick access menu, use the key (quick touch) while the controller is displaying the pressure. Each touch displays the next function in the list to confirm, use the key (quick touch).



7.2 Quick access keys map

When the controller is displaying the standard screen, the following keys can be used as shortcuts for the functions below:

SET	**Pressed for 2 seconds: Setpoint adjustment.**
	Quick touch: Maximum and minimum temperatures/pressures display.
	Pressed for 2 seconds: Clear history when records are being displayed.
	Pressed for 4 seconds: If operating in the well/tank control mode, displays the time of the current status of the cyclical timer.
	Quick touch: Momentarily toggles the display of pressure/temperatures.
	Pressed for 2 seconds: Inhibits alarms.
	Pressed for 4 seconds: If operating in rotation mode, displays the operating time of the outputs.
	Enter the quick access menu
	Pressed for 5 seconds: Control Functions Shutdown
	Enters function selection

7.3 Basic operations

7.3.1 Adjusting the setpoint

To enter the setpoint adjustment menu, press for 2 seconds until [SEt] is displayed or use the quick access menu key. The message [SP1] and then the value to adjust the setpoint of stage 1 will be displayed in sequence.

- If the 1st stage is set to pressurization, depressurization or floating condensation pressure, the set pressure will be displayed. If set to cooling, heating, or floating condensation temperature, the set temperature will be displayed. If set to control wells or water reservoirs, the water level in [nCA] (meters of water column) configured will be displayed. When programmed as a differential pressure controller, the difference in the set pressure is displayed.

Use the keys or to change the value and press to confirm.

- If the 2nd stage is configured as pressurization, depressurization or floating evaporation pressure, the message [SP2] and then the set pressure will be displayed. If configured as cooling or heating, the message [SP2] and then the set temperature will be displayed. If configured as adiabatic condensation, the message [SP2] and then the set differential temperature will be displayed.

Again, use the keys or to change the value and press to confirm.

Finally, the indication [- - - -] is signaled concluding the configuration.

Note: *In order to be able to adjust the temperature setpoint in the 1st stage, the T1 temperature sensor must be enabled in the to configure the temperature setpoint in the 2nd stage, the T2 temperature sensor must be enabled in the "[FS8] - Digital input 2 operating mode".*

Note: *If the 2nd stage is set to alarm or rotation, the [SP2] message will not be displayed. If the 2nd stage is set as an adiabatic condensation control, the adjusted value will be relative to the temperature difference between the T1 and T2 temperature sensors.*

7.3.2 Functions Lock

The use of the functions lock brings greater security to the operation of the instrument. When it is active, the setpoint and other parameters can be visible to the user but are protected against undue changes [FB2] = [2]. Also, it is possible to lock changes of control functions and leave the adjustment of the setpoint and hysteresis adjustments enabled [FB2] = [1].

To activate functions lock, access the [LOC] option in the quick access menu. The [no] message will be displayed (lock must be enabled and inactive). With that on the display, press the key for the time configured for the functions lock [FB3], the activation is indicated by the [LOC] [On] message. To enable the use of this function, [FB2] must be configured with 1 or 2.

The message [LOC] when you try to change the parameters indicates that the function lock is active. To unlock the controller, turn the controller off and on again with the key pressed and hold it down until the message [LOC] [OFF] indicates the unlocking (10 seconds).

7.3.3 Control functions shutdown

Turning the control functions off allows for the controller to operate just as pressure or temperature indicator, keeping the control output and the alarms offline. This feature can be enabled or disabled through the "Control functions shutdown [FB4]" .When enabled, the control and alarm functions are turned off ([CtrL] [OFF]) or on ([CtrL] [On]) through the [CtrL]. Option on the quick access menu. When the control functions are off, the message [OFF] will be displayed alternately with the pressure or temperature and the other messages. It is also possible to switch the control functions on/off by pressing the key for five seconds.

Note: *When the control functions are switched back on, the time set in the "delay" function "[F03] - When the instrument is powered on (initial delay) is counted".*

7.3.4 Minimum and Maximum Records

Pressing the (quick touch) key while the pressure/temperature is displayed will show the message [rE9] then the minimum pressure/temperature and maximum pressure/temperature recorded.

Note: *If the key is pressed while the records are being displayed the values will be reset and the message [rSEt] will be displayed.*

7.3.5 Alarm Inhibition

A pressure/temperature alarm can be inhibited by pressing for two seconds. For new alarm indications, the instrument must exit and re-enter an alarm condition and remain so until the time set in the "Alarm Validation Time (OUT 1 and OUT 2) [FS1]" is exceeded.

7.3.6 Hourmeter

The hours meter indicates the number of hours the outputs configured as pressurization/depressurization/heating/cooling have been working. The hourmeter can be viewed through the quick access menu ( ) in the option [Hour] and the working time of each output is displayed in hours. The maximum output operation time for maintenance can be set through the functions "Maximum output OUT1 operation time for maintenance [F23]" and "Maximum output OUT2 operation time for maintenance [FS6]". When the number of on-output hours reaches the value set in these functions, an alert will be shown on the display: [MAn1] when output 1 or [MAn2] when output 2, indicating that the maintenance should be performed in the corresponding output.

To disable the alert or reset the hourmeter counter, access option [rHou] in the quick access menu ( ), use keys or to select the hourmeter to reset ([Out1] or [Out2]) and press . The message [rSt1] or [rSt2], will be displayed depending on the output chosen.

7.3.7 Display of elapsed time in the cyclical timer and manual adjustment of the cyclical timer state

When the 1st stage is configured to control of the semi-artesian well and water tank (pressure control with cyclical timer), the elapsed time can be viewed in the cyclical timer by pressing the key for 4 seconds until the [CYCL] message appears. Releasing the , key will display the current state [tOn] or [tOFF] and the elapsed time of the cyclical timer. If the key is pressed and maintained during the display of the cyclic timer time, the control state of the cyclic timer is changed from "on" to "off", or vice versa, regardless of the elapsed time. Changing the cyclic timer status will display the message [- - - -].

7.3.8 Display of the running time of the outputs in rotation mode and choice of output:

If the 2nd stage is set to rotation, press the key for 4 seconds until the [rod] message appears. When the , key is released, the active output [Out1] or [Out2] will display and then the time (in minutes) that the output remained on. If the key is pressed and held while the times are displayed, the times will be reset. Once this is done, the message [rSEt] will be displayed and then [Out1] or [Out2] indicating which output will be the first to be activated. Every time the times are reset, the actuation goes to the next output.

7.3.9 Reset the Controller [rEAr]

If the maximum number of automatic resets has been reached, the controller will be locked by an interlock alarm condition. This option allows you to reset the controller, providing there is no current alarm condition in the system.

7.3.10 View other measurements

Press (short press) until the message [MEAS] appears on the display to enter the temporary display mode.

Press until the desired measurement appears on the display as follows:

- [SP1] - Active Setpoint for the first stage
- [SP2] - Active Setpoint for the second stage
- [P-1] - Pressure at the transducer P1
- [P-2] - Pressure at the transducer P2
- [P1-2] - Pressure differential between P1 and P2
- [nCA] - Depth or Height of the water level in mca
- [ntrS] - Depth or Height of the water level in relation to the surface (in meters)
- [t-1] - Temperature from sensor T1
- [t-2] - Temperature from sensor T2
- [t1-2] - Temperature differential between T1 and T2
- [SAt1] - Saturation Temperature, referring to the pressure transducer P1
- [SAt2] - Saturation Temperature, referring to the pressure transducer P2
- [SuP] - Superheating
- [Sub] - Subcooling

The message related to the chosen measure will alternate with the measurement value.

If a measurement is deactivated, it will not be shown.

Note: This reading will remain on the display for 15 minutes or until the key or the key is pressed (brief press).

Note: In this mode, alarm messages and the preferred display ([F02]) will be ignored.

7.4. Selection of pressure and temperature units

To select the unit in which the instrument will operate enter the function [FU1] using the access code [231] then press the key . Then, select the desired pressure unit [PSI] or [bAr] using the key, confirming by pressing , after which select the desired temperature unit [°C] or [°F] using the keys, confirming by pressing .

Whenever one of the units is changed the configuration of the functions assume the factory default, so they need to be configured again.

7.5. Advanced Operations

The functions menu can be accessed through the quick access menu, option [Func] or by pressing and simultaneously during the measure unit display. To allow change of parameters, enter [FU1] by pressing (quick touch) and using the keys or enter code one hundred and twenty-three (123), and then confirm with . For changing the other functions, browse the menu through the keys or and proceed the same way in order to adjust them. To exit the menu and return to the normal operation, press (long touch) until [- - - -] is displayed.

Obs.:If the functions lock is enabled, when pressing the or , the controller will display the message [LOC] and will not allow parameter adjustment.

7.6 Parameter Table

Fun	Description	PSI / °C				BAR / °F			
		Min	Max	Unit	Default	Min	Max	Unit	Default
F01	Access code	0	999	-	0	0	999	-	0
F02	Display indication mode	1	14	-	1	1	14	-	1
F03	Delay when powering the instrument on (initial delay)	0(No)	9999	min.	0(No)	0(No)	9999	min.	0(No)
F04	1st stage operation mode (OUT 1)	0	6	-	1(press)	0	6	-	1(press)
F05	Pressure Setpoint OUT1	-14,5	3191	PSI	150,0	-1,0	220,0	BAR	10,3
F06	Pressure control differential (Hysteresis) OUT1	0,1	1600	PSI	20,0	0,1	110,3	BAR	1,3
F07	Minimum pressure setpoint allowed for the end user OUT1	-14,5	3191	PSI	-14,5	-1,0	220,0	BAR	-1,0
F08	Maximum pressure setpoint allowed for the end user OUT1	-14,5	3191	PSI	232,0	-1,0	220,0	BAR	16,0
F09	Lower transducer pressure limit P1 (pressure at 4mA)	-14,5	3191	PSI	0,0	-1,0	220,0	BAR	0,0
F10	Upper transducer pressure limit P1 (pressure at 20mA)	-14,5	3191	PSI	232,0	-1,0	220,0	BAR	16,0
F11	Transducer pressure offset P1	-50,0	50,0	PSI	0,0	-3,4	3,4	BAR	0,0
F12	Low pressure in transducer P1 alarm	-14,5	3191	PSI	-14,5	-1,0	220,0	BAR	-1,0
F13	High pressure in transducer P1 alarm	-14,5	3191	PSI	232,0	-1,0	220,0	BAR	16,0
F14	OUT1 temperature setpoint	-50,0	200,0	°C	0,0	-58,0	392,0	°F	32,0
F15	Temperature control differential (Hysteresis) OUT1	0,1	20,0	°C	1,0	0,1	36,0	°F	1,8
F16	Minimum temperature setpoint allowed for the end user OUT1	-50,0	200,0	°C	-50,0	-58,0	392,0	°F	-58,0
F17	Maximum temperature setpoint allowed for the end user OUT1	-50,0	200,0	°C	200,0	-58,0	392,0	°F	392,0
F18	S1 sensor temperature indication offset	-5,0	5,0	°C	0,0	-9,0	9,0	°F	0,0
F19	Low temperature alarm sensor T1	-50,0	200,0	°C	-50,0	-58,0	392,0	°F	-58,0
F20	High temperature alarm sensor T1	-50,0	200,0	°C	200,0	-58,0	392,0	°F	392,0
F21	Time for setpoints validation (OUT1)	0(No)	30	seg.	0(No)	0(No)	30	seg.	0(No)
F22	Minimum output off time (delay between activations) OUT1	0(No)	9999	seg.	0(No)	0(No)	9999	seg.	0(No)
F23	Maximum output operating time OUT1 for maintenance (hourmeter)	0(No)	9999	horas	0(No)	0(No)	9999	horas	0(No)
F24	Lower pressure limit in mwc of transducer P1 (4 mA)	0,0	250,0	mca	0,0	0,0	250,0	mca	0,0
F25	Upper pressure limit in mwc of transducer P1 (20 mA)	0,0	250,0	mca	250,0	0,0	250,0	mca	250,0
F26	P1 transducer depth offset	-10,0	10,0	mca	0,0	-10,0	10,0	mca	0,0
F27	Control of semi-artesian wells or water tanks	0	1	-	0	0	1	-	0
F28	Setpoint for semi-artesian wells or water tanks	0,1	250,0	mca	50,0	0,1	250,0	mca	50,0
F29	Hysteresis for semi-artesian wells or water tanks	0,1	250,0	mca	10,0	0,1	250,0	mca	10,0
F30	Transducer P1 installation level for control of wells/tanks	0,0	999,9	m	500,0	0,0	999,9	m	500,0
F31	Critical water level for control of wells/tanks	0(No)	250,0	mca	0(No)	0(No)	250,0	mca	0(No)
F32	Wells/tanks control time on (cyclical timer)	1	9999	min	1	1	9999	min	1
F33	Wells/tanks control time off (cyclical timer)	0(No)	9999	min	0(No)	0(No)	9999	min	0(No)
F34	Filter Control - Difference (P1-P2) for starting the pump	-14,5	3191	PSI	7,0	-1,0	220,0	BAR	0,4
F35	Filter Control - Difference (P1-P2) for shutting down the pump	-14,5	3191	PSI	20,0	-1,0	220,0	BAR	1,3
F36	Enable alarm for changing the filter	0(No)	1(Yes)	-	0(No)	0(No)	1(Yes)	-	0(No)
F37	2nd stage operation mode (OUT2)	0	10(Off)	-	10(Off)	0	10(Off)	-	10(Off)
F38	Pressure Setpoint OUT2	-14,5	3191	PSI	150,0	-1,0	220,0	BAR	10,3
F39	Pressure control differential (Hysteresis) OUT2	0,1	1600	PSI	20,0	0,1	110,3	BAR	1,3
F40	Minimum pressure setpoint allowed for the end user OUT2	-14,5	3191	PSI	-14,5	-1,0	220,0	BAR	-1,0
F41	Maximum pressure setpoint allowed for the end user OUT2	-14,5	3191	PSI	232,0	-1,0	220,0	BAR	16,0
F42	Lower transducer pressure limit P2 (pressure at 4mA)	-14,5	3191	PSI	0,0	-1,0	220,0	BAR	0,0
F43	Upper transducer pressure limit P2 (pressure at 20mA)	-14,5	3191	PSI	232,0	-1,0	220,0	BAR	16,0
F44	Transducer pressure offset P2	-50,0	50,0	PSI	0,0	-3,4	3,4	BAR	0,0
F45	Low pressure in transducer P2 alarm	-14,5	3191	PSI	-14,5	-1,0	220,0	BAR	-1,0
F46	High pressure in transducer P2 alarm	-14,5	3191	PSI	232,0	-1,0	220,0	BAR	16,0
F47	OUT2 temperature setpoint	-50,0	200,0	°C	0,0	-58,0	392,0	°F	32,0
F48	Temperature control differential (Hysteresis) OUT2	0,1	20,0	°C	1,0	1,0	36,0	°F	1,8
F49	Minimum temperature setpoint allowed for the end user OUT2	-50,0	200,0	°C	-50,0	-58,0	392,0	°F	-58,0
F50	Maximum temperature setpoint allowed for the end user OUT2	-50,0	200,0	°C	200,0	-58,0	392,0	°F	392,0
F51	T2 sensor temperature indication offset	-5,0	5,0	°C	0	-9,0	9,0	°F	0,0
F52	Low temperature alarm sensor T2	-50,0	200,0	°C	-50,0	-58,0	392,0	°F	-58,0
F53	High temperature alarm sensor T2	-50,0	200,0	°C	200,0	-58,0	392,0	°F	392,0
F54	Time for setpoints validation (OUT2)	0(No)	30	seg.	0(No)	0(No)	30	seg.	0(No)
F55	Minimum output off time (delay between activations) (OUT2)	0(No)	9999	seg.	0(No)	0(No)	9999	seg.	0(No)
F56	Maximum output operating time OUT2 for maintenance (hourmeter)	0(No)	9999	horas	0(No)	0(No)	9999	horas	0(No)
F57	Alarm Validation Time (OUT1 and OUT2)	0(No)	9999	seg.	0(No)	0(No)	9999	seg.	0(No)
F58	Operating mode of the digital input 1	0(Off)	13	-	0(Off)	0(Off)	13	-	0(Off)
F59	Operating mode of the digital input 2	0(Off)	13	-	0(Off)	0(Off)	13	-	0(Off)
F60	Rotation time between OUT1 and OUT2	1	9999	min.	1	1	9999	min.	1
F61	Flow switch validation time	0(No)	9999	seg.	0(No)	0(No)	9999	seg.	0(No)
F62	Number of attempts to alert about lack of flow	1	9999	-	1	1	9999	-	1
F63	Cooling fluid	1	23	-	5	1	23	-	5
F64	Superheating calculation	0(Off)	4	-	0(Off)	0(Off)	4	-	0(Off)
F65	Low superheating alarm	0,0	200,0	°C	5,0	0,0	360,0	°F	9,0
F66	High superheating alarm	0,0	200,0	°C	10,0	0,0	360,0	°F	18,0
F67	Subcooling calculation	0(Off)	2	-	0(Off)	0(Off)	2	-	0(Off)
F68	Low subcooling alarm	0,0	200,0	°C	5,0	0,0	360,0	°F	9,0
F69	High subcooling alarm	0,0	200,0	°C	10,0	0,0	360,0	°F	18,0
F70	Floating condensation control (Dynamic Setpoint)	1	2	-	1	1	2	-	1
F71	Floating condensation - Float start temperature	-50,0	200,0	°C	30,0	-58,0	392,0	°F	86,0
F72	Adiabatic condensation - Minimum external temperature (safe level)	-50,0	200,0	°C	-50,0	-58,0	392,0	°F	-58,0
F73	Adiabatic condensation - Difference (T1-T2) for starting the pump	-50,0	200,0	°C	1,0	-58,0	392,0	°F	33,8
F74	Adiabatic condensation - Difference (T1-T2) for shutting down the pump	-50,0	200,0	°C	3,0	-58,0	392,0	°F	37,4
F75	Floating evaporation (Dynamic Setpoint) - Float start temperature	-50,0	200,0	°C	30,0	-58,0	392,0	°F	86,0
F76	Activation mode for the P1 pressure alarms	0(No)	3	-	0(No)	0(No)	3	-	0(No)
F77	Activation mode for the P2 pressure alarms	0(No)	3	-	0(No)	0(No)	3	-	0(No)
F78	Activation mode for the T1 temperature alarms	0(No)	3	-	0(No)	0(No)	3	-	0(No)
F79	Activation mode for the T2 temperature alarms	0(No)	3	-	0(No)	0(No)	3	-	0(No)
F80	Number of times the temperature and pressure alarms will be automatically reset	1	10	-	3	1	10	-	3
F81	Delay time until control is returned after a pressure / temperature alarm goes off	1	99	min.	3	1	99	min.	3

Fun	Description	PSI / °C				BAR / °F			
		Min	Max	Unit	Default	Min	Max	Unit	Default
F02	Functions lock mode	0	2	-	0	0	2	-	0
F03	Time for functions lock	15	60	seg.	15	15	60	seg.	15
F04	Control functions shutdown	0(No)	2	-	0(No)	0(No)	2	-	0(No)
F05	Address of the instrument in the RS-485 network	1	247	-	1	1	247	-	1

7.6.1 Description of the parameters

F01 - Access Code:
It is required when intending to change the configuration parameters. Entering of the code is not required if the intention is just visualizing the parameters adjusted.
It allows entering of the expected access codes:
123 - Allows access for changing the table parameters
231 - Allows the unit of pressure and temperature measurement to be set

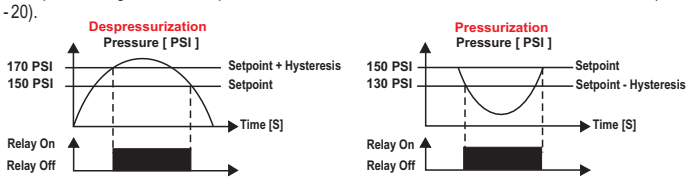
F02 - Display indication mode:
Specify the display preference:
1 - Pressure in the transducer P1
2 - Pressure in the transducer P2
3 - Pressure differential between P1 and P2
4 - Depth/height of water level in an mwc
5 - Depth/height of water level in relation to surface (in meters)
6 - Sensor T1 temperature
7 - Sensor T2 temperature
8 - Temperature differential between T1 and T2
9 - Saturation temperature related to the pressure transducer P1
10 - Saturation temperature related to the pressure transducer P2
11 - Superheating temperature
12 - Subcooling temperature
13 - Display alternately the P1 transducer pressure and the P2 Transducer pressure
14 - Display alternately the P1 transducer pressure and the T2 Sensor Temperature
If the measurement is not available (e.g. sensor is disabled), the message End will be displayed.

F03 - Delay when powering the instrument on (initial delay):
This is the time elapsed from initialization, during which the instrument just displays the pressure/temperature without activating outputs or validating alarms. In multi-instrument installations, spikes in demand can be prevented by assigning different values to this function and causing loads to be triggered at different times.
This function can be disabled by adjusting it to the minimum value 0 no .

F04 - 1st stage operation mode (OUT1):
0 - Depressurization
1 - Pressurization
2 - Cooling
3 - Heating
4 - Floating Condensation Control
5 - Control for semi-artesian wells and water tanks (pressure control with cyclical timer)
6 - Filter control (differential pressure control)
Note: *In order for OUT1 to operate in cooling or heating modes, the T1 temperature sensor must be enabled in the "digital input 1 operating mode F58".*

F05 - Pressure Setpoint OUT1:
This is the reference value for pressure control.

F06 - Pressure control differential (Hysteresis) OUT1:
It is the pressure difference (hysteresis) between switching control output ON and OFF.
Example: To control the pressure in 150 PSI (setpoint) with differential of 20 PSI. Therefore, in the depressurizing mode, the output will be switched off at 150 PSI and switched back on at 170 PSI (150 + 20).
In the pressurizing mode, the output will be switched off at 150 PSI and switched back on at 130 PSI (150 - 20).



F07 - Minimum pressure setpoint allowed for the end user OUT1:
Avoids regulation of excessively low setpoint pressures by mistake.

F08 - Maximum pressure setpoint allowed for the end user OUT1:
Avoids regulation of excessively high setpoint pressures by mistake.

F09 - Lower transducer pressure limit P1 (pressure at 4mA):
Pressure applied to the pressure transducer when a 4 mA current in PSI or Bar is displayed in its output.

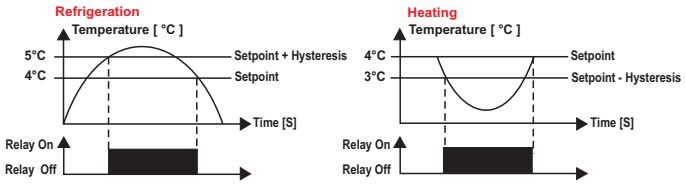
F10 - Upper transducer pressure limit P1 (pressure at 20mA):
Pressure applied to the pressure transducer when a 20 mA current in PSI or Bar is displayed in its output.
Note: *When the 1st stage operational mode is set to control semi-artesian wells and water tanks, the mwc unit is used and the instrument factors in the values for the F24 and F25 positions for the to the pressure sensor limits.*

F11 - Transducer pressure offset P1:
Allows to compensate reading differences of the pressure transducer.

F12 - Low pressure in transducer P1 alarm:
F13 - High pressure in transducer P1 alarm:
These are the minimum and maximum values for triggering the pressure alarm in the P1 transducer. If these values are exceeded, the instrument displays low pressure PLo1 or high pressure PHi1, messages, but these events only show up in alarms after the time set in the "F51 - *Alarm validation time*" setting.

F14 - OUT1 temperature setpoint:
It is the reference value for the temperature control.

F15 - Temperature control differential (Hysteresis) OUT1:
It is the temperature difference (hysteresis) between switching control output ON and OFF.
Example: One wants to control the temperature at 4.0°C (setpoint) with a differential of 1.0°C. Consequently, the output will be turned off at 4.0°C and turned on again at 5.0°C (4.0 + 1.0) in cooling mode, and the output will be turned off at 4.0°C and turned on again at 3°C (4.0 - 1.0) in heating mode.



F16 - Minimum temperature setpoint allowed for the end user OUT1:
Avoids regulation of excessively low setpoint temperatures by mistake.

F17 - Maximum temperature setpoint allowed for the end user OUT1:
Avoids regulation of excessively high setpoint temperatures by mistake.

F18 - T1 sensor temperature indication offset:
Allows compensating deviations in the sensor temperature reading.

F19 - Low temperature alarm sensor T1:
F20 - High temperature alarm sensor T1:
These are the minimum and maximum values for triggering the temperature alarm in the T1 transducer. These alarms are validated only after the time specified in the "Alarm validation time" setting.

F21 - Time for setpoints validation (OUT1):
Upon reaching the setpoint the pressure or temperature must remain in this condition until this time has elapsed and then switch off the control output (it avoids overshooting in the pump/compressor activation).
This function can be disabled by adjusting it to the minimum value 0 no .

F22 - Minimum output off time (delay between activations) (OUT1):
It is the minimum time the output will remain off, i.e. the length of time between the last start up and the next stop. The main purposes of this function are: minimize interferences in the mains of the facility caused by the simultaneous activation of loads and avoid unnecessary activation of loads when there are fast variations of pressure in the system.
This function can be disabled by adjusting it to the minimum value 0 no .

F23 - Maximum output operating time OUT1 for maintenance (hourmeter):
Whenever the output is activated the apparatus will count its operating time. When the counted time is equal or longer than the one set in this function, the display will show the message MAn1, signaling that the compressor/pump must be serviced.

F24 - Lower pressure limit in mwc of transducer P1 (4 mA):
Water level in (mwc) when the pressure transducer displays a 4 mA current in its output.

F25 - Upper pressure limit in mwc of transducer P1 (20 mA):
Water level in (mwc) when the pressure transducer displays a 20 mA current in its output.

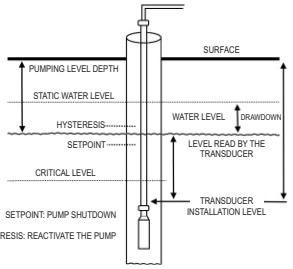
mwc x pressure conversion	
1 mca	10,197 bar
1 mca	0,703 PSI

Note: *Use the conversion table above to properly choose the pressure transducer. Example: for a 200 PSI transducer, the maximum limit in this function is 140.6 mwc (200 PSI*0.703 = 140.6 mwc).*

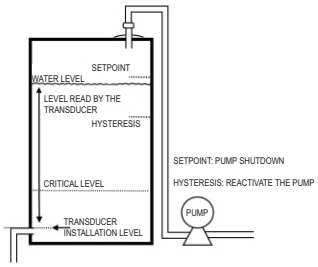
F26 - P1 transducer depth offset:
Allows to compensate water level reading differences of the pressure transducer.

F27 - Control of semi-artesian wells or water tanks:
Selects the control mode (semi-artesian wells or tanks) if the "F04 - *1st stage operating mode(OUT1)*" function is set to control semi-artesian wells and water tanks.
0 - Semi-artesian wells control (depressurization with cyclical timer). This mode controls the pump for withdrawing water from semi-artesian wells, indicating the water level coming from the P1 transducer reading.
1 - Water tank control (pressurization with cyclical timer). This mode controls the pump for supplying water into the tanks, indicating the water level coming from the P1 transducer reading.
Installation examples:

SEMI-ARTESIAN WELL



WATER TANK



F28 - Setpoint for semi-artesian wells or water tanks:
It is the reference value for controlling the water level. Level (in mwc) where the pump is switched off.

F29 -Hysteresis for semi-artesian wells or water tanks:
The difference in level between the pump switched ON and OFF.

F30 - Transducer P1 installation level for control of wells/tanks:
It is the reference value representing the distance (in meters) from the surface to the depth/height at which the P1 transducer is installed.
The value displayed when the display mode is equal to [ntrS] - *Depth/height of water level relative to the surface (in meters) will be the difference between this level and the water level read by the P1 transducer.*

F31 - Critical water level for control of wells/tanks:
Level (in mwc) at which the low water level alarm is generated [Ah2o].
If set as the control for the semi-artesian well, the pump is switched off if this level is reached in order to prevent the pump from running dry.
This alarm is only generated after the time specified in the "[FS7] - *Alarm validation time*" setting.

F32 - Wells/tanks control time on (cyclical timer):
F33 - Wells/tanks control time off (cyclical timer):
These functions allow the length of time that instrument will control the pump operation to be regulated when the "[F04] - *1st stage operating mode (OUT1)*" setting is set to control semi-artesian wells and water tanks (pressure switch with cyclical timer).
During the time it's turned on, the pump is controlled by the parameters for the water level setpoint and hysteresis. During the time it's turned off, the pump will continuously stay turned off and the level alarm will be ignored. This time is needed for the level of the well water to regenerate.
By setting the time to 0 (off), the control will remain constantly active.
Reversing the cyclical timer status can be performed manually through digital input 2 by setting the "[FS9] - *Digital input 2 operating mode*" to reverse the cyclical timer.

F34 - Filter Control - Difference (P1-P2) for starting the pump:
Allows the pressure difference between the filter inlet transducer (P1) and the filter outlet transducer (P2) to be set in order to release the passage of liquid (pump or valve). When the pressure difference (P1-P2) is less than or equal to the value set in this function, the passage of liquid to the filter is released.

F35 - Filter Control - Difference (P1-P2) for shutting down the pump:
Allows the pressure difference between the filter inlet transducer (P1) and the filter outlet transducer (P2) to be set in order to close the passage of liquid (pump or valve). When the pressure difference (P1- P2) is higher than or equal to the value set in this function, the passage of liquid to the filter is shut.

F36 -Enable alarm for changing the filter:
Allows the alarm for changing the filter to be enabled.
When the difference (P1-P2) is greater than the value set in the "[F35] - *Filter Control - Difference (P1-P2) to turn off the pump*" function and remain at this value during the time set in the "[FS7] - *Alarm Validation Time (OUT1 and OUT2)*" function, an alarm [AF it] is generated and the instrument remains in this condition until a reset is performed via a digital input. To do this, the "Digital input 1 operating mode" function must be set as an alarm reset for changing the filter.

F37 - 2nd stage operation mode (OUT2):
- [0] - Depressurization
- [1] - Pressurization
- [2] - Cooling
- [3] - Heating
- [4] - Rotation
- [5] - Alarm
- [6] - Adiabatic condensation control (differential thermostat)
- [7] - Pressure floating evaporation control (depressurization)
- [8] - Depressurization using pressure transducer P1
- [9] - Pressurization using pressure transducer P1
- [OFF] - Off output

Nota[1]: *In order for OUT2 to operate in cooling or heating modes, the T2 temperature sensor must be enabled in the "[FS9] - Digital input 2 operating mode".*
Nota[2]: [5] - Alarm - The output will be triggered if there is any alarm.
Nota[3]: *Options 8 and 9 use as a reference the parameters related to pressure transducer P1, so pressure transducer P2 and all parameters related to pressure P2 are ignored.*

F38 - Pressure Setpoint OUT2:
This is the reference value for pressure control.

F39 -Pressure control differential (Hysteresis) OUT2:
It is the pressure difference (hysteresis) between switching control output ON and OFF.

F40 - Minimum pressure setpoint allowed for the end user OUT2:
Avoids regulation of excessively low setpoint pressures by mistake.

F41 - Maximum pressure setpoint allowed for the end user OUT2:
Avoids regulation of excessively high setpoint pressures by mistake.

F42 -Lower transducer pressure limit P2 (pressure at 4mA):
Pressure applied to the pressure sensor when the output current is 4 mA.

F43 - Upper transducer pressure limit P2 (pressure at 20mA):
Pressure applied to the pressure sensor when the output current is 20 mA.

F44 -Transducer pressure offset P2:
Allows variants in the transducer pressure reading to be compensated.

F45 - Low pressure in transducer P2 alarm:
F46 - High pressure in transducer P2 alarm:
These are the minimum and maximum values for triggering the pressure alarm in the P2 transducer.
If these values are exceeded, the instrument displays low pressure [PLo2] or high pressure [Ph i2], messages, but these events only show up in alarms after the time set in the "[FS7] - *TAlarm validation time*" setting.

F47 - OUT2 temperature setpoint:
It is the reference value for the temperature control.

F48 - Temperature control differential (Hysteresis) OUT2:
It is the temperature difference (hysteresis) between switching control output ON and OFF.

F49 - Minimum temperature setpoint allowed for the end user OUT2:
Avoids regulation of excessively low setpoint temperatures by mistake.

F50 - Maximum temperature setpoint allowed for the end user OUT2:
Avoids regulation of excessively high setpoint temperatures by mistake.

F51 - T2 sensor temperature indication offset:
Allows compensating deviations in the sensor temperature reading.

F52 - Low temperature alarm sensor T2:
F53 - High temperature alarm sensor T2:
These are the minimum and maximum values for triggering the temperature alarm in the T2 transducer.
These alarms are validated only after the time specified in the "[FS7] - *Alarm validation time*" setting

F54 - Time for setpoints validation (OUT2):
Upon reaching the setpoint the pressure or temperature must remain in this condition until this time has elapsed and then switch off the control output (it avoids overshooting in the pump/compressor activation)..
This function can be disabled by adjusting it to the minimum value 0 [no].

F55 -Minimum output off time (delay between activations) (OUT2):
It is the minimum time the output will remain off, i.e. the length of time between the last start up and the next stop. The main purposes of this function are: minimize interferences in the mains of the facility caused by the simultaneous activation of loads and avoid unnecessary activation of loads when there are fast variations of pressure in the system.
This function can be disabled by adjusting it to the minimum value 0 [no].

F56 - Maximum output operating time OUT2 for maintenance (hourmeter):
Whenever the output is activated, the apparatus will count its operating time. When the counted time is equal or longer than the one set in this function, the display will show the message [MAn2], signaling that the compressor/pump must be serviced.

F57 - Alarm Validation Time (OUT1 and OUT2):
This is the time that a (pressure or temperature) alarm will remain disabled even in alarm conditions.
This inhibition time starts to be counted after the power on delay expires.
A low pressure ([PLo i] or [PLo2]) and high pressure ([Ph i] or [Ph i2]) event needs to remain in this condition for the time set in this function so that the instrument can generate low pressure ([AP iL] or [AP2L]) and high pressure ([AP ih] or [AP2h]) alarms.
The low temperature ([At iL] and [At2L]), high temperature ([At ih] and [At2h]), subcooling ([AsbL] and [Asbh]), superheating ([AsPL] and [AsPh]),filter change ([AF iL]) alarms and low water level alarm [ALLo], are also validated only in the time set in this function.
The external alarms for the digital inputs ([din i] and [din2]), do not have a time for validation.
If an alarm is inhibited by the user (by pressing the ▼ key for two seconds), this time is reset.
This function can be disabled by adjusting it to the minimum value 0 [no].

F58 - Operating mode of the digital input 1:
It allows choosing the operating mode of the digital input 1.
- [0] - Disable
- [1] - Temperature sensor 1
- [2] - Enables 1st stage control (OUT1) (external switch, N.O. contact)
- [3] - Enables 1st stage control (OUT1) (external switch, N.C. contact)
- [4] - Time reset for rotation and choice of output (pulser, N.O. contact)
- [5] - Time reset for rotation and choice of output (pulser, N.C. contact)
- [6] - External alarm [din i] functioning in the OUT1 output turning it off (N.O. contact)
- [7] - External alarm [din i] functioning in the OUT1 output turning it off (N.C. contact)
- [8] - Alarm reset for filter change (pulser, N.O. contact)
- [9] - Alarm reset for filter change (pulser, N.C. contact)
- [10] - Inhibition of alarms (N.O. contact)
- [11] - Inhibition of alarms (N.C. contact)
- [12] - Switch off the controller (contact N.O)
- [13] - Switch off the controller (contact N.C)

F59 - Operating mode of the digital input 2:
It allows choosing the operating mode of the digital input 2.
- [0] - Disable
- [1] - Temperature sensor 2
- [2] - Enables 1st stage control (OUT2) (external switch, N.O. contact)
- [3] - Enables 1st stage control (OUT2) (external switch, N.C. contact)
- [4] - Flow switch (N.O. contact)
- [5] - Flow switch (N.C. contact)
- [6] - External alarm [din2] functioning in the OUT2 output turning it off (N.O. contact)
- [7] - External alarm [din2] functioning in the OUT2 output turning it off (N.C. contact)
- [8] - Reverses the state of the cyclical timer (pulser, N.O. contact)
- [9] - Reverses the state of the cyclical timer (pulser, N.C. contact)
- [10] - Inhibition of alarms (N.O. contact)
- [11] - Inhibition of alarms (N.C. contact)
- [12] - Switch off the controller (contact N.O)
- [13] - Switch off the controller (contact N.C)

F60 -Rotation time between OUT1 and OUT2:
If the "[F37] - *2nd stage (OUT2) operating mode*" function is set to rotate, the OUT2 output will operate as a backup for the OUT1 output, thus activation of the outputs will alternate over time causing each pump to work for a certain time and accumulate similar usage times.
After the time set in this function is exceeded, the control output will be alternated in the **next cycle.**
Note: *If the "[F37] - 2nd stage (OUT2) operating mode" function is set to rotate, the control parameters (pressure, temperature and alarms) related to the 2nd stage will be ignored, because OUT2 control will be related to the 1st stage parameters.*

F61 - Flow switch validation time:
Operating in rotation, pressurization, or depressurization mode, the flow switch contact is expected to be closed as soon as an output is activated (OUT1 or OUT2).
Operating in pressurization or depressurization mode: If the flow switch is not triggered during the time set in this function, the number of attempts to alert about a lack of flow is increased.
Operating in rotation mode: If the flow switch is not triggered during the time set in this function, the currently active pump is turned off, the number of attempts to alert about a lack of flow is increased and the running attempt goes to the other pump.
If the flow switch is not enabled in the "[FS9] - *Operating mode of digital input 2*" function, this validation will not be run.
This function can be disabled by adjusting it to the minimum value 0 [no].

F62 - Number of attempts to alert about lack of flow:
If the number of attempts to alert about a lack of flow set in this function is reached, the outputs are turned off and a message on the lack of water flow [FLo]. In this case, the outputs remain off and the system can only be re-established by resetting the rotation (by digital input or pressing the ▼ key (see item 6.3.8)).
The number of attempts for each output is reset when the flow switch is closed.

F63 - Cooling fluid:
Allows to define the cooling fluid that will be used in the calculations for superheating, subcooling, floating condensation, and floating evaporation.
[1] - R22
[2] - R32
[3] - R134A
[4] - R290
[5] - R404A
[6] - R407A
[7] - R407C
[8] - R407F
[9] - R410A
[10] - R422A
[11] - R422D
[12] - R427A
[13] - R441A
[14] - R448A
[15] - R449A
[16] - R450A
[17] - R452A
[18] - R507A
[19] - R513A
[20] - R600A
[21] - R744
[22] - R1234YF
[23] - R1234ZE (E)

F64 - Superheating calculation:
The superheating control indicates how much gas is above the saturation temperature (boiling point) at a certain pressure.
A pressure transducer in the suction line and a temperature sensor at the evaporator outlet or in the compressor input (total) is required.
Superheating = suction temperature - saturated vapor temperature (flow curve).
[0] - Disable
[1] - Performs the calculation through the P1 pressure transducer and T1 temperature sensor
[2] - Performs the calculation through the P2 pressure transducer and T2 temperature sensor
[3] - Performs the calculation through the P1 pressure transducer and T1 temperature sensor and turns the OUT1 output off in the event of low superheating or high superheating alarms
[4] - Performs the calculation through the P2 pressure transducer and T2 temperature sensor and turns the OUT2 output off in the event of low superheating or high superheating alarms
Note: *When a stage is set as an alarm, rotation, control of semi-artesian wells and water tanks or filter control, the corresponding output will not be turned off in the event of a low superheating or high superheating alarm.*

F65 - Low superheating alarm:
Temperature limit for indicating a low superheating [ASPL].
A low superheating indicates a high dosage of cooling fluid in the evaporator, which may damage the compressor through the intake of liquid.

F66 - High superheating alarm:
Temperature limit for indicating a high superheating alarm [ASPH].
A high superheating indicates a low dosage of cooling fluid in the evaporator, which may cause high temperatures in the compressor through the intake of superheated gas, in addition to reduced evaporator capacity and reduced compressor operating life.

F67 - Subcooling calculation:
The subcooling control indicates how much cooling fluid is colder than the condensing temperature needed to prevent loss of performance by evaporating the cooling fluid prior to the expansion valve.
A pressure transducer in the liquid line and a temperature sensor at the condenser outlet is required.
Subcooling = saturated liquid temperature - temperature in the liquid line.
[0] - Disable
[1] - Performs the calculation through the P1 pressure transducer and T1 temperature sensor
[2] - Performs the calculation through the P2 pressure transducer and T2 temperature sensor

F68 - Low subcooling alarm:
Temperature threshold for indicating a low subcooling alarm [ASbL].
A low subcooling indicates a low heat exchange in the evaporator and a risk of flash gas prior to the expansion valve.

F69 - High subcooling alarm:
Temperature threshold for indicating a high subcooling alarm [ASbH].
A subcooling may indicate high pressures in the system.

F70 - Floating condensation control (Dynamic Setpoint):
The floating condensation control is intended to dynamically adjust the setpoint according to the temperature in the external environment, reducing energy consumption and increasing the performance coefficient of the system. The setpoint [SP1] is reduced in proportion to a reduction in the external temperature. Every 1°C/°F at which the outside temperature is reduced, 1°C/°F in the setpoint is reduced or the equivalent in PSI/BAR according to the curve of the fluid saturation pressure.
[1] - Control over floating condensation **pressure** using the P1 pressure transducer to measure discharge pressure and uses the T1 temperature sensor to measure external temperature and **reduce** the 1st stage pressure (**depressurization**) setpoint [SP1].
[2] - Control over floating condensation **temperature** using the T1 temperature sensor to measure the temperature in the output of the condenser and uses the T2 temperature sensor to measure external temperature and **reduce** the 1st stage () temperature setpoint [SP1].
Note: *For Floating Condensation Control to work, it is necessary to set the "*[F04]* - 1st Stage Operation Mode (OUT1)" function as Floating Condensation Control. In case of low subcooling alarm* [ASbL]*, the setpoint will return to its original value.*

F71 - Floating condensation - Float start temperature
Temperature measured in the external sensor, below which the control of floating condensation begins to reduce the setpoint.

If the floating condensation is controlled through pressure, the minimum setpoint is limited by the value defined in the "[F07] - *Minimum setpoint of pressure permitted to the end user OUT1*" function.
If the floating condensation is controlled through temperature, the minimum setpoint is limited by the value defined in the "[F16] - *Minimum setpoint of temperature permitted to the end user OUT1*" function.
Note: *The control of floating condensation pressure, this pressure is converted to temperature through the saturation of fluid curve.*

F72 - Adiabatic condensation - Minimum external temperature (safe level):
Minimum threshold of temperature in the T1 sensor for evaporative condensation control to function. When T1 is below this value, the OUT2 output will not be activated (it remains off).

F73 - Adiabatic condensation - Difference (T1-T2) for starting the pump:
Allows the temperature difference between the external environment sensor (T1) and the sensor after the water curtain (T2) to release the passage of water (water pump or valve). When the temperature difference (T1-T2) is less than or equal to the value set in this function, the passage of water to the curtain is released. Water is sprayed by the pump (or valve) controlled by the OUT2 output reducing the dry-bulb temperature of the air passing through the water curtain providing low condensation temperatures in hot and dry climates, increasing the efficiency of the system.

F74 - Adiabatic condensation - Difference (T1-T2) for shutting down the pump:
Allows the temperature difference between the external environment sensor (T1) and the sensor after the water curtain (T2) to shut the passage of water (water pump or valve). When the temperature difference (T1-T2) is higher than or equal to the value set in this function, the passage of water to the curtain is blocked.
Note: *In order for the adiabatic condensation control to operate, the "*[F37]* - 2nd Stage Operating Mode (OUT2)" is set as the adiabatic condensation control (differential thermostat) and the T1 and T2 temperature sensors are enabled on the digital inputs.*

F75 - Floating evaporation (Dynamic Setpoint) - Float start temperature:
Temperature measured in the external sensor, below which the control of floating evaporation begins to increase the setpoint.
The maximum setpoint is limited by the value set in the "[F41] - *Maximum setpoint of pressure permitted to the end user OUT2*" function.
The floating evaporation control is intended to dynamically adjust the setpoint according to the temperature in the external environment, reducing energy consumption and increasing the performance coefficient of the system. The setpoint [SP2] is **elevated** in proportion to a reduction in the external temperature. Every 1°C/°F at which the outside temperature is reduced, the 1°C/°F equivalent is **elevated** in PSI/BAR in the setpoint according to the curve of the fluid saturation pressure.
Using the P2 pressure transducer to measure suction pressure and using the T2 temperature sensor to measure external temperature and increase the setpoint pressure (depressurization) of the 2nd stage [SP2].
Note: *In order for the floating condensation control to operate, the "*[F37]* - 2nd Stage Operating Mode (OUT2)" function needs to be set as the pressure (depressurization) floating evaporation control and the temperature sensors are enabled on the digital inputs. In the event of a high temperature alarm (*[AE1h]*), the setpoint will return to its original value.*

F76 - Activation mode for the P1 pressure alarms:
F77 - Activation mode for the P2 pressure alarms:
F78 - Activation mode for the T1 temperature alarms:
F79 - Activation mode for the T2 temperature alarms:
It enables you to operate the control outputs, turning them off in the event of a pressure (high / low) or temperature (high / low) alarm:
Note: *The OUT2 output will not be switched off, in case it is set as as alarm in* [F37].

[0] - Don't activate the outputs
[1] - Only activate output OUT1
[2] - Only activate output OUT2
[3] - Activate both outputs

F80 - Number of times the temperature and pressure alarms wil be automatically reset:
Number of times they can be automatically reset within 1 hour.
Whenever possible, the controller will try to correct the problem that set off an alarm. The reset system allows the user to configure how many times the controller will attempt to correct the issue automatically (automatic reset) before giving up and turning off the output as programmed through the functions [F76] to [F79].
When the number of automatic resets allowed within 1 hour is exceeded, the system displays the message [Alnt] - Interlock alarm, which requires the system to be reset manually.
To do this, access the quick menu via the key , according to chapter 6. Select [rEAr] and use a short press of the key to confirm

F81 - Delay time until control is returned after a pressure / temperature alarm goes off:
This is the length of time the controller will keep the output switched off (as programmed using functions [F76] to [F79]) after the automatic correction of a pressure / temperature alarm).

F82 -Function lock mode:
This allows and configures the function lock (see item 6.3.2).
[0] - Does not allow the function lock
[1] - It allows a partial lock where the control functions will be locked but the adjustment of the setpoint and hysteresis, date views, and maximum and minimum record views are allowed
[2] - It allows the full lock, enabling only the date views and maximum and minimum record views

F83 - Time for functions lock:
Allows control functions lock (see item 6.3.2).
[15] - [60] - Defines the time in seconds for the controller to activate.

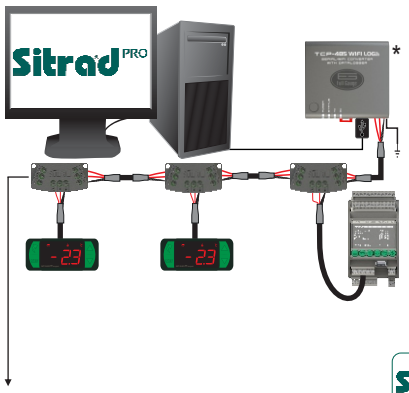
F84 - Control functions shutdown:
Allows the turning off of the control functions (see item 6.3.3).
[0] - Disables the control functions shutdown
[1] - Enables to activate/deactivate the control functions only if the functions are unlocked
[2] - Enables to activate/deactivate the control functions even if the functions are locked

F85 -Address of the instrument in the RS-485 network:
Instrument's network address for communicating with Sitrad software.
Note: *There can be no more than one instrument with the same address on a network.*

8. SIGNALING

End	Error in the choice of the measurement to ideally be displayed. Parameterize the function F02 - Display indication mode.
ErP1	Error in the P1 pressure transducer: Transducer disconnected, damaged or not enabled.
ErP2	Error in the P2 pressure transducer
Ert1	Error in the T1 temperature sensor: Sensor disconnected, damaged or not enabled.
Ert2	Error in the T2 temperature sensor.
PLo1	Low pressure in the P1 transducer.
PLo2	Low pressure in the P2 transducer.
Phi1	High pressure in the P1 transducer.
Phi2	High pressure in the P2 transducer.
AP1L	Low pressure in transducer P1 alarm.
AP2L	Low pressure in transducer P2 alarm.
AP1h	High pressure in transducer P1 alarm.
AP2h	High pressure in transducer P2 alarm.
At1L	Low temperature in sensor T1 alarm.
At2L	Low temperature in sensor T2 alarm.
At1h	High temperature in sensor T1 alarm.
At2h	High temperature in sensor T2 alarm.
Ah2o	Low water level alarm in well/tank alarm.
Aint	Interlock alarm
Flo	Lack of water flow alert in the rotation mode.
AFIL	Alarm for changing the filters.
ASbL	Low sub-cooling alarm.
ASbh	High sub-cooling alarm.
ASPL	Low superheating alarm.
ASPh	High superheating alarm.
MAn1	OUT1 compressor/pump maintenance warning.
MAn2	OUT2 compressor/pump maintenance warning.
din1	Digital input alarm 1.
din2	Digital input alarm 2.
inib	Alarm inhibited.
LOC On	Function lock.
LOC OFF	Function unlock.
OFF	Control functions turned off.
ECAL	Contact Full Gauge.
PPPP	Reconfigure the values of the functions.

9 INTEGRATING CONTROLLERS, RS-485 SERIAL INTERFACE AND COMPUTER



INTERFACE SERIAL RS-485

Device used to establish the connection of Full Gauge Controls instruments with Sitrad®.

Full Gauge offers different interface options, including technologies such as USB, Ethernet, Wifi, among others.
For more information, consult Full Gauge Controls.
Sold separately.

MODBUS PROTOCOL

The controller allows you to configure the RS-485 communication port for the MODBUS-RTU protocol. For more information about the implemented commands and the registration table, contact Full Gauge Controls.

Sitrad PRO — Keep Sitrad updated at site: http://www.sitrad.com

CONNECTION BLOCK

It is used to connect more than one controller to the Interface. The wire connections must be made as follows: Terminal **A** of the controller connect to terminal **A** of the connection block, which in turn, must be connected to terminal **A** of the Interface. Repeat the procedure for terminals **B** and ⏚, being ⏚ the cable screen.

10. ANNEXES -Reference images

Image IV

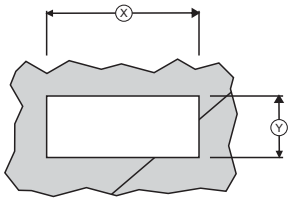


Image V

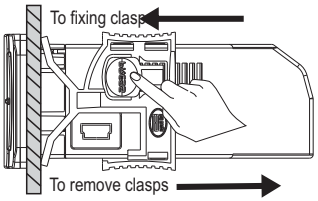


Image VI

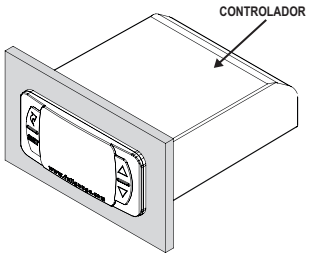


Image VI

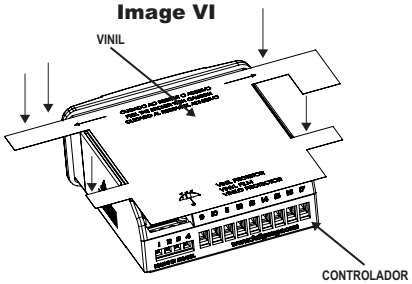
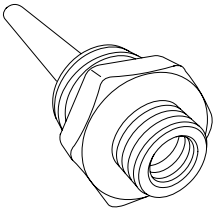


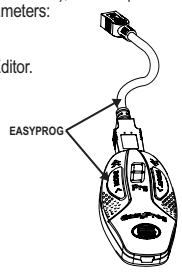
Image VII



11. OPTIONAL ITEMS - Sold Separately

EasyProg - version 2 or later

It is an accessory which stores the parameters of controllers. At any time, It is possible to load new parameters of a controller and unload them on a production line (of the same controller), for example.
It is provided with three types of connections for loading or unloading the parameters:
- Serial RS-485: It is connected via RS-485 network to the controller
(only for those controllers provided with RS-485).
- USB: It is connected to the computer via USB port, using the Sitrad Preset Editor.
- Serial TTL: The controller may be connected directly to **EasyProg**
via Serial TTL connection.

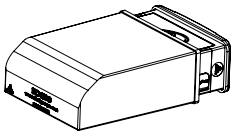


IMPORTANT

IN ORDER TO COMMUNICATE WITH EASYPROG, THE EQUIPMENT MUST NOT BE LINKED TO SITRAD SOFTWARE.

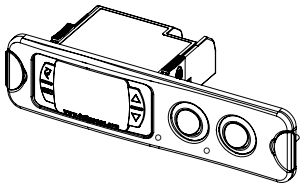
Ecase

Recommended for the Evolution line, it prevents water from entering the back part of the instrument. It protects the product when the installation site is washed.



Extension Frame

The Full Gauge Controls extension frame allows the installation of Evolution and Ri line controllers with maximum measures of 76x34x77mm (2,99x1,31x3,03") (dimensions of the clipping for fixing in the extension frame are 71x29mm (2,80x1,14)) in varied situations, as it eliminates precision cut to embed the instrument. It allows customization through a sticker with the brand and company contact, in addition to being accompanied by two 10A (250 Vac) switches that can trigger internal light, air curtain, on/off system or fan.



12. WARRANTY

ENVIRONMENTAL INFORMATION

Packaging:
The materials used in the packaging of Full Gauge products are 100% recyclable. Try to perform disposal through specialized recyclers.

Product:
The components used in Full Gauge controllers can be recycled and reused if disassembled by specialized companies.

Disposal:
Do not incinerate or dispose the controllers that have reached the end of their service as household garbage. Observe the laws in your area regarding disposal of electronic waste. If in doubt, please contact Full Gauge Controls.

TERMO DE GARANTIA - FULL GAUGE CONTROLS

Products manufactured by Full Gauge Controls, as of May 2005, have a two (02) year warranty, as of the date of the consigned sale, as stated on the invoice. They are guaranteed against manufacturing defects that make them unsuitable or inadequate for their intended use.

EXCEPTIONS TO WARRANTY

The Warranty does not cover expenses incurred for freight and/or insurance when sending products with signs of defect or faulty functioning to an authorized provider of technical support services. The following events are not covered either: natural wear and tear of parts; external damage caused by falls or inadequate packaging of products.

LOSS OF WARRANTY

Products will automatically lose its warranty in the following cases:
- The instructions for assembly and use found in the technical description and installation procedures in Standard IEC60364 are not obeyed;
- The product is submitted to conditions beyond the limits specified in its technical description;
- The product is violated or repaired by any person not a member of the technical team of Full Gauge Controls;
- Damage has been caused by a fall, blow and/or impact, infiltration of water, overload and/or atmospheric discharge.

USE OF WARRANTY

To make use of the warranty, customers must send the properly packaged product to Full Gauge Controls together with the invoice or receipt for the corresponding purchase. As much information as possible in relation to the issue detected must be sent to facilitate analysis, testing and execution of the service.

These procedures and any maintenance of the product may only be provided by Full Gauge Controls Technical Support services in the company's headquarters at Rua Júlio de Castilhos, 250 - CEP 92120-030 - Canoas - Rio Grande do Sul – Brasi

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