

REEFE DIGITAL PRESSURE SWITCH



INSTRUCTION MANUAL

MODEL: EPS1 | EPS2 | EPS3

CODE: 24195 | 26274 | 24881 | 26281 | 30882

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GENERAL

Carefully read the instructions before installing this unit. Verify the technical characteristics of the motor to assure the compatibility with the device. Since these units are rated at IP55, they need to be suitably protected from the weather, and the sun, by way of a cover. The membrane over the front panel can be susceptible to warping when damaged by excessive sun exposure and, thereby, allow ingress of water into the electrical internals of the switching device.

DESCRIPTION (diagram A)

SWITCHMATIC 1 is an electronic pressure switch with integrated digital manometer. It manages the start and stop of a single-phase pump up to 2.2kW (3 HP) (SW1-2). Cut-in and cut-out pressures are easily adjustable through the users control panel See Startup (Diagram C).

Wiring is analogous to the traditional electromechanical switch.

It can operate as a differential pressure switch and as reverse pressure switch.

Unit SWITCHMATIC 2 in addition to all the above features of the basic SWITCH- MATIC 1 includes instantaneous reading of current drawn. This patented system controls and manages the overcurrent, dry-run operation and fast-cycling functions.

Unit SWITCHMATIC 2 in addition to all the features of individual assembly includes the option to be synchronized to another unit SWITCHMATIC 2, thereby, managing and protecting 2 pumps operating in cascade with alternated starting sequence. The SWITCHMATIC 3 unit is ideal for a control panel as it has a dry contact output.

CLASSIFICATION AND TYPE

According to IEC 60730-1 and EN 60730-1 this unit is a control sensor device, electronic, independent assembly, programming type A with action type 1B (micro disconnection). Operating value: $I < 20\%$ I learned. Pollution degree 2 (clean environment). Rated impulse voltage: cat II / 2500V. Temperatures for ball test: enclosure (75) and PCB (125).

Operating Characteristics (diagram C)

- Adjustable cut-in and cut-out pressures.
- Integrated digital pressure gauge with bar and psi indication.
- Inner pressure transmitter.
- Dry-run protection:
 - Through minimum adjusted height for basic SWITCHMATIC 1/3.
 - Through the instantaneous current consumption in case of SW2.
- Overcurrent protection.
- Overvoltage protection.
- ART Function (Automatic Reset Test). When the device has stopped the pump by the intervention of the dry-running protection system, the ART tries, with scheduled basis, to re-start the pump in order to restore the water supply. See "ART. Automatic reset function". Must be activated in the step 6 of the ADVANCED MENU (Ar1).
- Fast cycling: when the hydropneumatic tank has lost too much air and, consequently, frequent start-stop cycles are produced this alarm is activated and is delayed the start of the pump. Activated (rc2).
- Manual start push-button (ENTER).
- 3 operation modes: differential, reverse and synchronized.
- Control panel with 3-digit display, LED indicator lights and push-buttons.
- Available settings:
 - Stand-by mode.
 - Minimum period between fast cycles.
 - Start and stop delay.
- Volt-free contact for monitoring the alarms is displayed on the screen (only version A).

Technical Characteristics

Rated Motor Power	0,37-2,2 kW (SW1-SW2)
Power Supply	-1 x 110-230 V (SW1-SW2)
Electric Outlet	-1 x 48-230 Vac/Vdc (SW3) Dry contact (SW3)
Nominal Pressure	1MPa/10bar (plus: 1.3MPa / 13bar)
Frequency	50/60Hz \geq 0.6
Protection degree	IP55
Max water Temperature	50°C
Max environment Temperature	60°C
Cut-in range (start pressure)	0.5÷7 bar (version plus=11 bar)
Cut-out range (stop pressure)	1÷8 bar (version plus=12 bar)
Max. differential (Pstop-Pstart)	7.5 bar (version plus=11,5 bar)
Minimum differential (Pstop-Pstart)	SW: 0.5 bar
Factory Setting	SW2 synchro: 1 bar 3/4 bar (start/stop)
Hydraulic inlet	G1/4" Female - NPT 1/4" Fem.
Net weight (without cables)	0.3 kg

Hydraulic Installation (diagram A)



SWITCHMATIC equipment must be threaded to a fitting G1/4" male at the pump's outlet.

Before connecting the SWITCHMATIC verify that the hydraulic system is properly installed, especially if the hydropneumatic tank is pressurized.

Electronic Connection (diagram B)



The electric connection must be performed by qualified personal in compliance with regulation of each country. Before doing manipulations inside the device, it must be disconnected from the electric supply. Wrong connection could spoil the electronic circuit.

The manufacturer declines all responsibility in damages caused by wrong connections.

When carrying out the electrical connection it is compulsory to use a differential switch of high sensitivity: I = 30 mA (class A or AC). It is compulsory to use a magneto thermic switch adapted at the motor load. Check if power supply is between 115-230V (SW1-2).

If you have purchased the unit without cables follow diagram B:

- Use cables type H07RN-F 3G1 or 3G1,5 with section enough to the power installed.
- Do the pump connection U, V and Earth (SW1-2) or C1, C2 and to the control panel (Only SW3)
- Do the power supply connection L1, N and Earth (SW1-2-3) or 24V + and - (SW3 24V)


- The earth conductor must be longer than the others. It will be the first one to be mounted during the assembly and the last one to be disconnected during the dismantling. **The earth conductor connections are compulsory!**
- (Only version in-out) The device has a volt-free contact for monitoring the alarms displayed in the screen originated by irregularities or problems of the system. See Diagram C for connection.
- (Only version in-out) There is a level switch input in the auxiliary circuit. See Diagram C for connection.





Control Panel (diagram C)

The meanings of the different control panel elements are summarized on the following tables, where:

- O means lit LED light.
- ((O)) means slow-flashing.
- (((O))) means fast-flashing.

DISPLAY	ACTION
OPERATION MODE	Instantaneous pressure or instantaneous current consumption is shown on screen
ADJUSTMENT MODE	The adjusted stop pressure (blinking) is displayed on screen. The adjusted rated current blinking (only SW2) is displayed on screen.
ALARM MODE	The alarm code is displayed.
STAND-BY MODE	Are displayed 3 flashing dots
BASIC CONFIG. MODE	The sequence of basic configuration parameters is displayed.
ADVANCED CONFIG. MODE	The sequence of advanced configuration parameters is displayed.

LEDS	STATE	MEANING
Bar	O	It indicates the instantaneous pressure in bar
	((O))	It indicates the instantaneous pressure in bar + pump operating (only SW1/SW3)
psi	O	It indicates the instantaneous pressure in psi
	(O)	It indicates the instantaneous pressure in psi + pump operating (only SW1/SW3)
A (only SW2)	O	It indicates the instantaneous current consumption in Ampere units
START	((O))	Pump is ON
	O	Is displayed the start pressure
	((O))	Adjusting start pressure
STOP	O	Displays the stop pressure
	((O))	Adjusting stop pressure
	O	Ratified dry-running or overload alarms
	((O))	Dry-running alarm performing ART or overload alarm performing any of the 4 restore attempts
	((((O)))	Fast-cycling alarm














P-BUTTON	TOUCH	ACTION
	Press	From state ON: unit OFF. From state OFF: the pump starts and keeps operating until reaching Pstop From any configuration MENU: the parameter value is accepted.
	HOLD DOWN	From state ON: unit OFF. From state OFF: the pump starts and keeps operating until the push-button is released.
 UP ARROW	Press	Pstart is displayed on the screen for 3 seconds
	Hold for 3 Sec	Pstart adjustment mode.
 DOWN ARROW	Press	Pstop is displayed on the screen for 3 seconds.
	Hold for 3 Sec	Pstart adjustment mode.
 AMPERE	Press	Instantaneous current consumption is displayed on the screen. If it is already displayed, then we switch to instantaneous pressure view.
	Hold for 3 Sec	Rated current adjustment.

Startup (diagram C)








Before starting the device, please read the previous sections, especially “Hydraulic Installation” and “Electrical connection”.

Follow next steps:

1. Only for type SW2 set the pump rated current intensity value.
 - Press  and hold for 3 second duration.
 - The current intensity value is displayed on screen, LED A lights up and display is flashing.
 - By mean of  and  is adjusting the rated current reflected in the characteristics plate of the motor. See Note 1.
 - Press  for validation.
2. Start the device by pressing 
3. Set the cut-in (start) pressure:
 - Press  for 3 second duration.
 - The start pressure value is displayed on screen, LED START lights up and display is flashing
 - By mean of  and  adjust the start pressure from 0.5 to 7 bar (+ version = 11 bar).
 - Press  for validation.
4. Set the cut-out (stop) pressure:
 - Press  3 second duration.
 - The stop pressure value is displayed on screen, LED STOP lights up and display is flashing.
 - By mean of  and  adjust the stop pressure from 1 to 8 bar (+ version = 12 bar).
 - Press  for validation.
5. The unit is ready to operate but more optional adjustments can be set through basic and advanced MENU. See the next chapter.







Remark 1: it is important to enter the exact current specified on the nameplate of the pump.

Basic Menu + (diagram C)

- Press simultaneously  +  for 5 second duration.
- The stop pressure value is displayed on screen, LED STOP lights up and display is flashing.
- By mean of  and  the values can be changed.
- Press  for validation.
- The parameters sequence is :

it	TYPE		SYSTEM REACTION	FACTORY SETTING
1	BAR	P	We can select the pressure units displayed between bar and psi.	bar
2	rc0	rc2	Fast-cycling alarm: <ul style="list-style-type: none"> • rc0: alarm unabled • rc1: activated, when hammering is detected it delays the start in order to protect the pump. • rc2: alarm is activated and the pump is stopped upon detection. 	rc2
3	r.01	r.99	Only if fast-cycling alarm has been activated in the previous step (rc1&rc2), then selection of the maximum time period between 3 consecutive starts, which will be considered fast cycling (between 1 sec. and 99 sec.) can be chosen.	3 seconds
4	Sb0		Stand-by mode activated (Sb1), for low power consumption, or disabled (Sb0).	Sb0

Advanced Menu + +

- Press simultaneusly  +  +  for 5 second duration.
- By mean of  or  the values can be changed.
- Press  for validation.

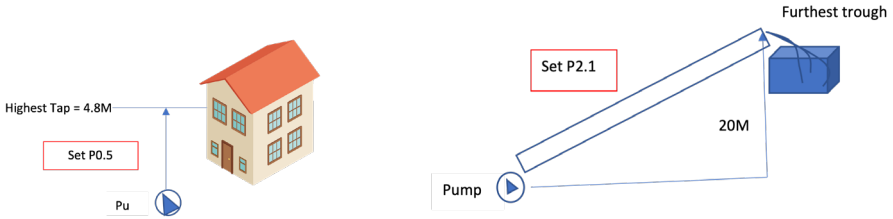
This is the parameters sequence:

it	TYPE		SYSTEM REACTION	FACTORY SETTING
1	nc	no	Select the operation MODE as a conventional pressure switch (nc = normally closed) or reverse (no = normally open). *see remark 3	nc
2	E00	E01/02	(Only Switchmatic2). Select the operation mode individual (E00) or Master/Slave (E01/ E02) in case of be assembled in groups of two pumps.	E00
2.1	d.05	d.1	(Only Switchmatic 2). Sets the minimum gap between Pstart 1 and Pstart 2 and/or Pstop1 and Pstop 2.	d.05
3	ct0	ct9	Sets a time delay between 0 and 9 seconds to the start (is not available in synchronized operation mode).	ct0
4	dt0	dt9	Sets a time delay between 0 and 9 seconds to the stop.	dt0
5	AE1	AE0/AE2	(Only Switchmatic 2). Select AEO to disable dry run alarm by current consumption. To have a dry run protection, the minimum pressure value must be set. Select AE1 to enable dry run alarm without auto-learning mode. In this mode, the SW2 will learn the real consumption of the pump. Select AE2 to enable dry run alarm without auto-learning mode. In this case, when the pump consumes a 40% less of the value set as rated current, the dry run alarm will appear.	
6	Ar0	Ar1	Activation of the automatic restore system ART (Ar1) o disable (Ar0)	Ar0
7	P0.0	Px.x	It allows setting a minimum operating pressure under which the device would determine dry-running operation. It is very usefull in the basic model SWITCHMATIC where there is no reading of current intensity drawn. See Note 2.	0 bar 0 psi
7.1	t05	t99	Set the time period between 5 and 99 seconds below the minimum operating pressure that will be considered a dry-running operation.	20"
8	c10	c30	(Only Switchmatic2) It allows setting a % of nominal current above which the device will activate the overcurrent protection.	c20
9	tE0	tE1 tE2	(Only Switchmatic2) It manages the external inputs of the in-out auxiliary circuit (on request). tE0 : means disabled. tE1 : minimum level contact input. It would trigger alarm A21. tE2 : external input. It allows to activate/deactivate the device by means of an external contact, for example a timer. If tE2 is enabled and external contact deactivates the equipment, the display shows "EL-"	tE0
9.1	co1	co0	Only in case of tE1 activated. co1: nc (normally closed contact). co0: no (normally open contact).	co1
10	H00	H99	Anti-flooding configuration. If activated, it stops the pump after programmed time (in minutes) of continuous operation. Disabled (H00), 1 minute (H01)...99 minutes (H99)	H00
11	r	rS1	If we change rS0 to rS1 and push ENTER default values are restored.	rS0

Note 2:

Basic SWITCHMATIC 1/3 can only detect dry-running operation through the minimum pressure. This means that the installer must determine the water column of the installation, the start pressure of the pump and place the minimum pressure below the start pressure.

Pressurise the system to reach shut off head and then press the OFF (power) button open the highest fixture, now taking note of the digital screen press ON (power) button again. The first reading before the motor started is the static line head (pressure) set (P) to 0.1Bar above this value.



It can also occur that pumping system is running out of its curve so that the pump is unable to provide the minimum pressure because the flow requirement is excessive. In this case SWITCHMATIC 1/3 would activate a false dry-running alarm.

If these concepts are not clear, it is preferable not to configure this protection or install the SWITCHMATIC 2 with accurate and easy setting of dry-run detection. Note 3:




By choosing “no” (normally open) it will operate as an auxiliary pressure control element in the suction of the pump. It will restart when the suction pressure reaches the configured PStart.

Example:

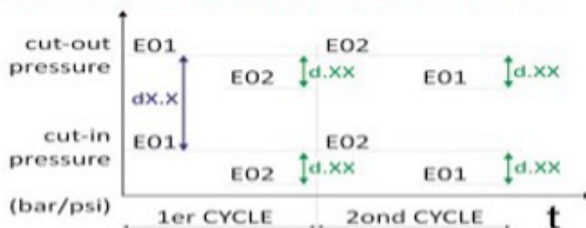
- PStop: 0,9 bar
- PStart: 1,2 bar


Synchronisation (ONLY FOR SWITCHMATIC 2)

SWITCHMATIC 2 can be synchronized to another unit SWITCHMATIC 2 managing and protecting 2 pumps operating in cascade with alternated starting sequence. Next steps must be followed:



1. GO TO ADVANCED MENU:  +  +  for 5 second duration.
 - In step 2: select E01 in a unit (this one will be the master) and select E02 in the other unit (this one will be the slave).
 - In step 3: select identical parameters of gap between pressures d.XX. This is the difference between the starting pressure of main and auxiliary pumps, it is also the difference between stop pressures of both pumps.

Differential (dX.X) = Pstop - Pstart ≥ 1 bar
Gap (d.XX) = Pstop1 - Pstop2 = Pstart1 - Pstart2



2. Press  repeatedly until the ADVANCED MENU is exited.
3. SET **identical** cut-in and cut-out pressures in both units.

To optimize the synchronization, the minimum difference between the start and stop pressures must be at least 1 bar.




4. Press  in order to disable the units. Is displayed “OFF”.
5. Press  again both units in order to activate the synchronization.

Note 4: after 10 cycles the unit configured E01 will display pressure and the unit configured E02 will display current in Amps.




Pressure Sensor Calibration

In case of wrong selection of the pressure sensor, it can be adjusted again. For the pressure sensor calibration, it is necessary to have a pressure gauge in the installation. Proceed following the next steps:

ZERO REGULATION

1. Open the taps leaving the hydraulic network without pressure.
2. Press simultaneously the buttons  and  until the display is flashing 0.0.
3. Press  to validate.





FULL SCALE

1. Start the pump until cut-out of the pressure switch.
2. Press simultaneously the buttons  and  till the display flashes with a figure.
3. Adjust the pressure with the arrows push-buttons to get the pressure desired.
4. Press  to validate.



Note 5: pressure sensor calibration should not be a normal event. If it is frequently repeated contact the technical service.

Register Operation Data and Alarms + +

(ONLY FOR SWITCHMATIC 2)

- Press simultaneously  +  +  for 5 second duration.
- Press  to advance in the REGISTER.
- The DATA sequence is:

MESSAGE	DESCRIPTION	SCOPE
rEC		
HF xxx	Controller operating hours	0-65535
HP xxx	Pump operating hours	0-65535
CF xxx	Operating cycles Number of start-stop cycles	0-999999
Cr xxx	Number of connections to the power supply	0-65535
A01 xxx	Number of A01 alarms.	0-999
A02 xxx	Number of A02 alarms.	0-999

A04 xxx	Number of A04 alarms.	0-999
A05 xxx	Number of A05 alarms.	0-999
A11 xxx	Number of A11 alarms.	0-999
APM xxx	Number of over-pressure alarms (---).	0-999
rPM x.x	Maximum registered pressure.	
rSt	ENTER -> EXIT.  +  -> All the alarms are restored expect the operation data.	

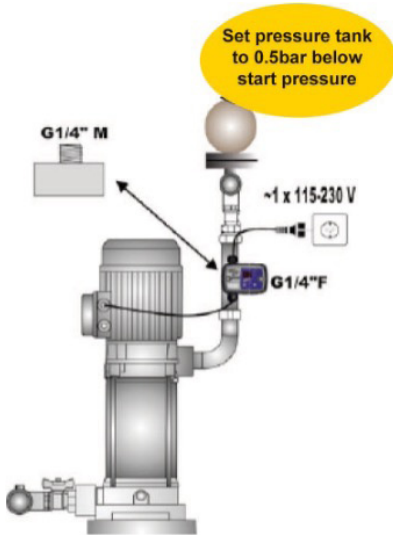
Warnings and Alarms

COD.	ALARM	DESCRIPTION	SYSTEM REACTION
A01	O	DRY RUNNING (Only for SWITCHMAT-IC 2)	When a dry-run operation is detected, the pump is automatically stopped. By means of ENTER the normal operation can be manually restored.
	((O))		After the activation of the dry-running alarm if the Automatic system reset (ART) is enabled, a first attempt at 5 minutes and then an attempt every 30 minutes for 24 hours is performed in order to restore the normal operation. This alarm can also be reset manually with the ENTER push-but- ton. If the alarm persists after 24 h we find a definitive alarm.
A11	O	DRY RUNNING (BY MINIMUM PRESSURE)	Is displayed during normal operation if the pressure is below the minimum pressure (Px.x) - previously set - during a period (txx) - also previously set - in the ADVANCED MENU. If at any time the pressure exceeds the mi- nimum pressure, the operation is restored automatically, and the alarm is cleared. Normal operation can also be restored manually by pressing ENTER.
A02	O	OVERLOAD (Only SW2)	Overcurrent alarm is activated when the nominal pump current is exceeded.
	((O))		4 automatic reset attempts prior to the final alarm is performed. During the attempts, display will show current. Normal operation can also be restored manually by pressing ENTER.
A04	((((O)))	FAST CYCLING (Hammering)	This alarm can be disabled or activated in the BASIC MENU. The alarm is activated when 3 consecutive cycles occur in a range lower than the set time (between cycle and cycle). If it has been activated rc1, this alarm does not stop the normal operation but adds 5 seconds to the start delay in order to protect the electric pump. If it has been activated rc2, the pump is stopped. To RESET the normal operation press ENTER.
A05	O	DAMAGED PRESSURE TRANSMITTER	CONTACT WITH YOUR SUPPLIER.

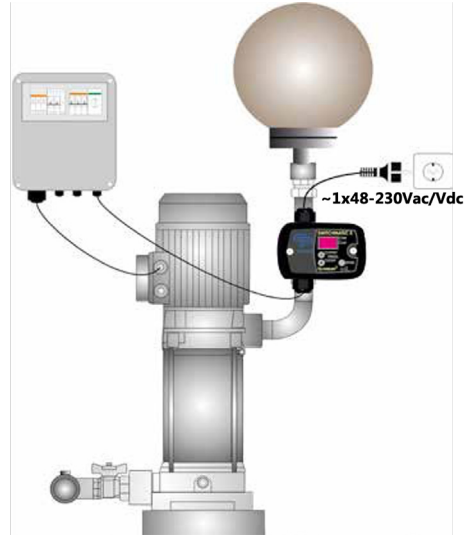
DIAGRAM A

INDIVIDUAL

SWITCHMATIC 1/2



SWITCHMATIC 3



GROUPAL (ONLY SW2)

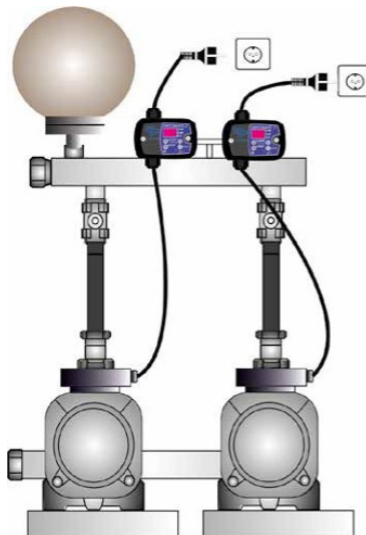


DIAGRAM B: POWER SUPPLY AND MOTOR

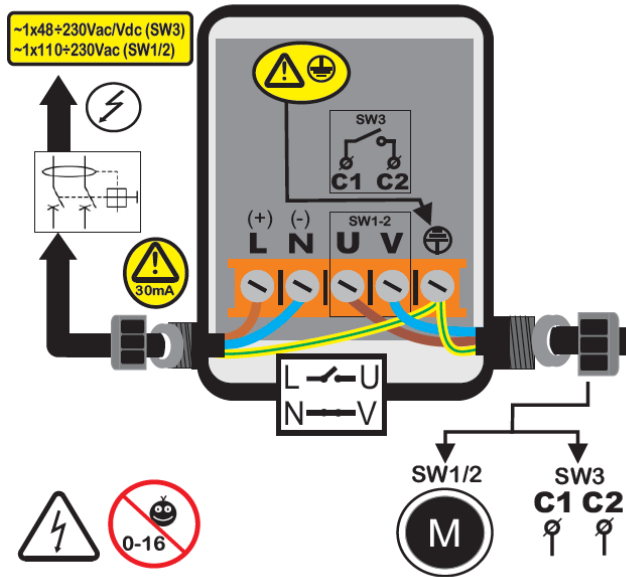


DIAGRAM C: AUXILIARY CIRCUIT IN-OUT

CONTACTS RATING

Max. switching voltage:
230VAC / 220 VDC
Max. switching power:
62,5VA / 30W

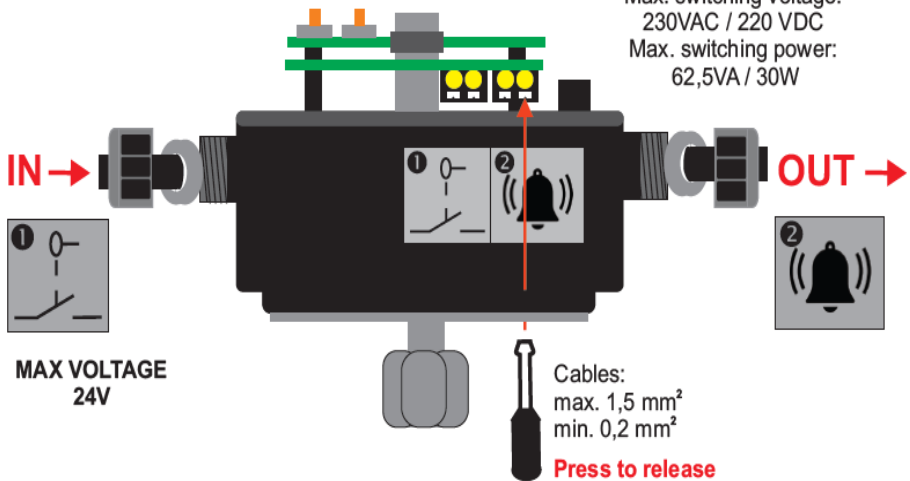
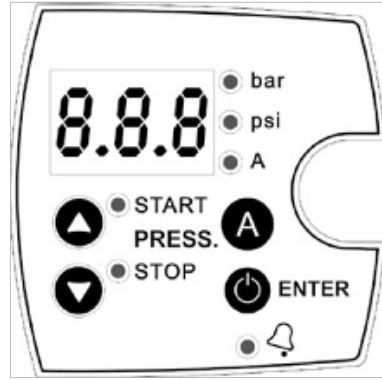


DIAGRAM D

EPS 1

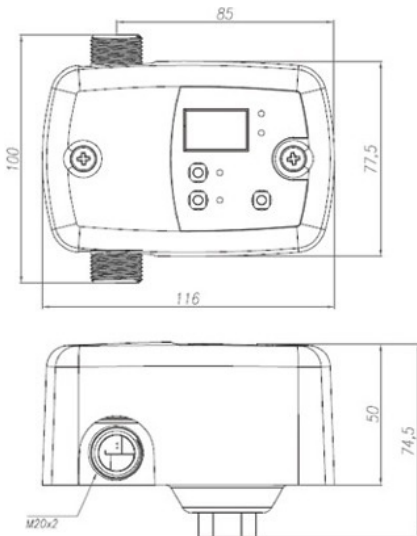


EPS 2

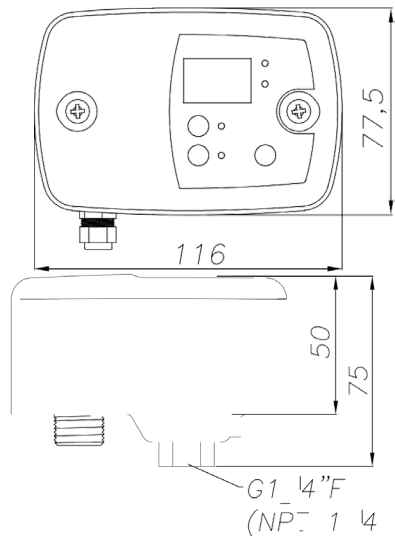


DIMENSIONS

EPS 1



EPS 2



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