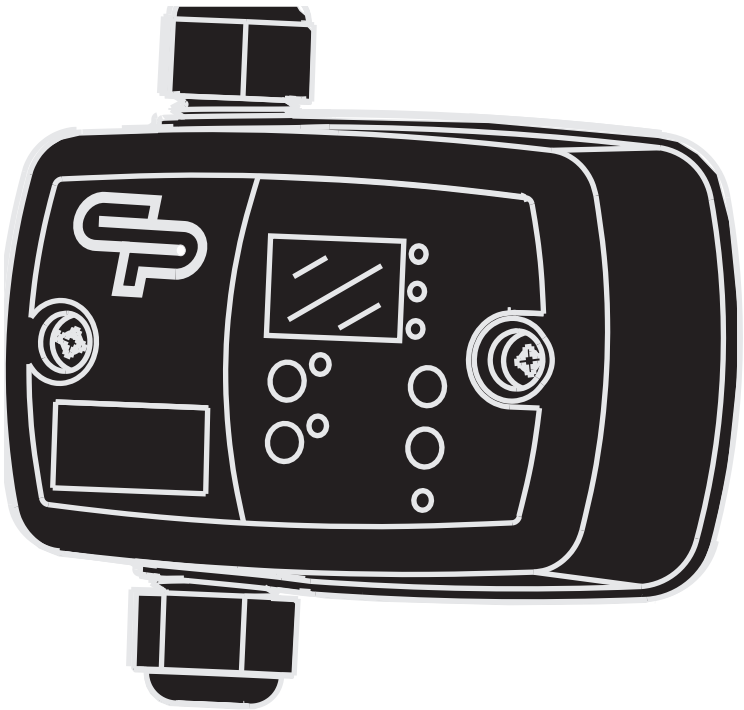
# SWITCHMATIC 1
# SWITCHMATIC 2
# SWITCHMATIC 3

**EN**



# ADVANCED SETTINGS

Risk of damaging the pressure assemblies and/or the plant.

Risk by electric shock.

Risk for people and/or objects.

CE

## 1. GENERAL
Read carefully the instructions before installing this unit. Verify the technical characteristics of the motor in order to assure the compatibility with the device.

## 2. 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.
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 features of the basic SWITCH- MATIC includes instantaneous reading of current drawn. This patented system controls and manages the overcurrent, dry-run operation and fast-cycling.
Unit SWITCHMATIC 2 in addition to all the features of individual assembly includes the option to be synchronized to another unit SWITCHMATIC 2 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.

## 3. 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.
- Volt-free contact for monitoring the alarms displayed in the screen (only version in-out).
- Connections for a level switch, its use is optional (in-out models only).
- Available settings:
  - Stand-by mode.
  - Minimum period between fast cycles.
  - Start and stop delay.

## 4. TECHNICAL CHARACTERISTICS
| | |
|---|---|
| • Rated motor power: | 0,37-2,2 kW (SW1-SW2) |
| • Power supply: | ~1 x 110-230 V (SW1-SW2)<br>~1 x 48-230 Vac/Vdc (SW3)<br>~1 x 24 Vac/Vdc (SW3 24V) |
| • Electric outlet: | Dry contact (SW3) |
| • Nominal pressure | 1.3MPa/13bar |
| • Frequency: | 50/60Hz |
| • Max. current: | 16 A, cos fi ≥ 0.6 (SW1-2-3)<br>10 A, cos fi ≥ 0.6 (SW3 24V) |
| • Protection degree: | IP55 |
| • Max water Temperature: | 50ºC (23ºC for WRAS listed units) |
| • Max environment Temperature: | 60ºC |
| • Cut-in range (start pressure) | 0,5÷11,5 bar |
| • Cut-ot range (stop pressure) | 1÷12 bar |
| • Max. differential (Pstop-Pstart) | 11,5 bar |
| • Minimum diff. (Pstop-Pstart) | SW2: 0,5 bar/SW1-3: 0,3 bar<br>SW2 synchro: 1 bar |
| • Factory setting (start/stop) | 3/4 bar |
| • Hydraulic inlet | G1/4" Fem. - NPT 1/4" Fem. |
| • Net weight (without cables) | 0,3 kg |

## 5. HYDRAULIC INSTALLATION (diagram A)
SWITCHMATIC units 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.

## 6. ELECTRIC 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 responsability 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 (clase A o AC). It is compulsory to use a magnetothermic 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 ⏚ (SW1-2) or C1, C2 and ⏚ to the control panel (Only SW3)
- Do the power supply connection L1, N and ⏚. (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 conductors 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.

## 7. CONTROL PANEL (diagram D)
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 | Is showed on screen instantaneous pressure or instantaneous current consumption |
| ADJUSTMENT MODE | Is displayed on screen the adjusted start pressure blinking.<br>Is displayed on screen the adjusted stop pressure blinking.<br>Is displayed the adjusted rated current blinking (only SW2). |
| ALARM MODE | Is displayed the alarm code |
| STAND-BY MODE | Are displayed 3 flashing dots |
| BASIC CONFIGURATION MODE | Is displayed the sequence of basic configuration parameters |
| ADVANCED CONFIGURATION MODE | Is displayed the sequence of advanced configuration parameters |

| 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 |
| | ( ( O ) ) | Pump ON |
| START | O | Is displayed the start pressure |
| | ( ( O ) ) | Adjusting start pressure |
| STOP | O | Is displayed the stop pressure |
| | ( ( O ) ) | Adjusting stop pressure |
| 🔔 | O | Ratified dry-running or overload alarms |
| | ( ( O ) ) | Dry-running alarm performing ART or overload alarm preforming any of the 4 restore attempts |
| | (((O))) | Fast-cycling alarm |

| P-BUTTON | TOUCH | ACTION |
|---|---|---|
| ⏻ | click! | **From state ON**: unit OFF.<br>**From state OFF**: the pump starts and keeps operating until reaching Pstop.<br>**From any configuration MENU**: the parameter value is accepted. |
| | HOLD DOWN | **From state ON**: unit OFF.<br>**From state OFF**: the pump starts and keeps operating until the push-button is released. |
| ▲ | click! | Pstart is displayed on the screen for 3 seconds. |
| | 3" | Pstart adjustment mode. |
| ▼ | click! | Pstop is displayed on the screen for 3 seconds. |
| | 3" | Pstop adjustment mode. |
| A | click! | Is displayed on the screen instantaneous current consumption.<br>If it is already displayed then we switch to instantaneous pressure view. |
| | 3" | Rated current adjustment. |

**8. 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 A during 3 seconds.
   - The current intensity value is displayed on screen, LED A lights up and display is flashing.
   - By mean of ▲ and ▼ is adjusted 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 ▲ during 3 seconds.
   - The start pressure value is displayed on screen, LED START lights up and display is flashing.
   - By mean of ▲ and ▼ is adjusted the start pressure from 0,5 to 7 bar (+ version=11 bar).
   - Press ⏻ for validation.
4. Set the cut-out (stop) pressure:
   - Press ▼ during 3 seconds.
   - The stop pressure value is displayed on screen, LED STOP lights up and display is flashing.
   - By mean of ▲ and ▼ is adjusted 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 MENUS. See the next chapter.

**Remark 1: it is important to introduce exactly the rated current specified on the nameplate of the pump.**

**9. BASIC MENU ▲+ ▼ (diagram C)**

- Press simultaneously ▲ + ▼ during 5 seconds.
- By mean of ▲ or ▼ 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 beetween bar and psi. | bar |
| 2 | rc0 | rc2 | Fast-cycling alarm:<br>- rc0: alarm unabled.<br>- rc1: activated, when hammering is detected it is delayed the start in order to protect the pump.<br>- rc2: alarm is activated and the pump is stopped upon detection. | rc2 |
| 2.1 | r.01 | r.99 | Only if fast-cycling alarm has been activated in the previous step (rc1&rc2). It can be choosed the maximum time period between 3 consecutive starts that will be considered fast cycling (between 1 sec. and 99 sec.) | 3 seconds |
| 3 | Sb0 | Sb1 | Stand-by mode activated (Sb1), for low power consumption, or unabled (Sb0). | Sb0 |

## 10. ADVANCED MENU + +

- Press simultaneously + + during 5 seconds.
- By mean of or the values can be changed.
- Press for validation.
- The parameters sequence is:

| 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 Switchmatic2)**. Sets the minimum gap between Pstart 1 and Pstart 2 and/or Pstop 1 and Pstop 2. | d.05 |
| 3 | **ct0** | **ct9** | **(Only Switchmatic2)** Sets a time delay between 0 and 9 seconds to the start (is not available in synchronized operation mode). | ct0 |
| 4 | **d00** | **d99** | Sets a time delay between 0 and 99 seconds to the stop. | d00 |
| 5 | **AE1** | **AE0/ AE2** | (Only in Switchmatic 2) Select **AE0** to dissable 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 with 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. See Note 2. | P0.0 SW2 P1.0 SW1 |
| 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 Switchmatic 2)** It allows setting a % of nominal current above which the device will activate the overcurrent protection. | c20 |
| 9 | **tE0** | **tE1 tE2** | **(Only Switchmatic 2 in-out)** 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 the 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** | **(Only Switchmatic 2)** 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 |

**Remark 2:**
**Basic SWITCHMATICS 1 and 3 can only detect dry-running operation through the minimum pressure. By default, the device adjusts the minimum pressure to 1 bar below the start-up pressure (Pstart). If Pstart is less than 1 bar, it adjusts it to 0.5 bar below.**
**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 SWITCHMATICS 1 and 3 would activate a false dry-running alarm. However, the alarm would be fully justified.**
**If these concepts are not clear, it is preferable not configure this protection or install the SWITCHMATIC 2 with accurate and easy setting of dry-run detection.**

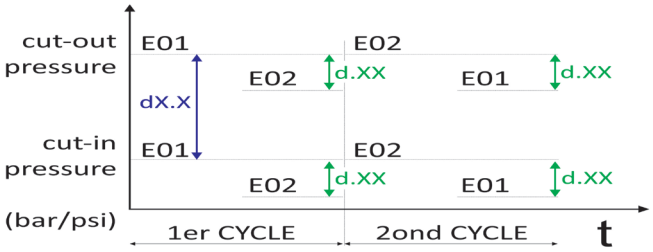
**Remark 3:**
**By choosing "no" (normally open) it will operate as an auxiliary pressure control element in the suction of the pump. It will restart when the suction pressure reaches the configured PStart.**
**Example: - PStop: 0,9 bar**
**- PStart: 1,2 bar**

## 11. 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: + +
   - 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 beetween the starting pressure of main and auxiliary pumps, it is also the difference beetween stop pressures of both pumps.

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




2. Press repeatedly until exit the ADVANCED MENU.
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 in both units in order to activate the synchronization.

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

## 12. PRESSURE SENSOR CALIBRATION

In case of wrong lecture of the pressure sensor it can be adjusted again.

For the pressure sensor calibration is necessary to have a pressure gauge in the installation. Proceed following next steps:

ZERO REGULATION

1. Open the taps living the hydraulic net without pressure.
2. Press simultaneously the buttons ⏻ and ▲ until the display show 0.0 flashing.
3. Press ⏻ to validate.

FULL SCALE

1. Start the pump and close all the taps to pressurize the installation and reach the cut-out pressure. (If the pump does not start, please hold the button ⏻ to reach the cut-out pressure)
2. Press simultaneously the buttons ⏻ and ▼ till the display flashes with a figure.
3. Adjust the pressure with the arrows push-buttons until the value on the display maches with the pressure reading.
4. Press ⏻ to validate.

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

## 13. REGISTER OPERATION DATA AND ALARMS ▲ + ▼ + A (ONLY FOR SWITCHMATIC 2)

- Press simultaneously ▲+ ▼ + A during 5 seconds.
- 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<br>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.<br>▲+ ▼ -> All the alarms are restored except the operation data. | |

## 16. 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 (microdisconnection). Operating value: I <20% I learned. Pollution degree 2 (clean environment). Rated impulse voltage: cat II / 2500V. Temperatures for ball test: enclousure (75) and PCB (125).

## 14. WARNINGS AND ALARMS

| COD. | | DESCRIPTION | SYSTEM REACTION |
|---|---|---|---|
| A01 | O | DRY-RUNNING (Only for SWITCHMATIC 2) | When is detected a dry-run operation the pump is automatically stopped. By mean 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-button. 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.<br>If at any time the pressure exceeds the minimum pressure, the operation is restored automatically and the alarm is cleared.<br>Normal operation can also be restored manually by pressing ENTER. |
| A21 | ((O)) | DRY-RUNNING (BY EXTERNAL LEVEL INPUT) | Only if tE1 has been activated in the advanced programming menu.<br>The alarm is displayed on the screen when the float switch detects a low level of water in the suction tank, stopping the operation of the pump. It is automatically restored when there is water again. |
| A02 | O | OVERLOAD (Only SW2) | Overcurrent alarm is activated when the nominal pump current is exceeded.<br>4 automatic reset attempts prior to the final alarm are performed.<br>During the attempts display will show current.<br>Normal operation can also be restored manually by pressing ENTER. |
| | ((O)) | | |
| A04 | (((O))) | FAST CYCLING (Hammering) | This alarm can be unabled 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).<br>If it has been activated rc1, this alarm does not stop the normal operation but are added 5 seconds to the start delay in order to protect the electric pump.<br>If it has been activated rc2, the pump is stopped.<br>To RESET the normal operation press ENTER. |
| A05 | O | DAMAGED PRESSURE TRANSMITTER | CONTACT WITH YOUR SUPPLIER. |
| A30 | O | ANTI-FLOODING | Anti-flooding alarm has been activated because the pump has been operating without stop during the period previously set in the advanced menu.<br>Reset the unit using ENTER push-button. |

## 15. EC STAMENT OF COMPLIANCE

COELBO CONTROL SYSTEM, S.L. States, on our own responsibility, that all materials here with related comply with the following European Directives:

- 2014/35/EU.
- 2014/30/EU.
- 2011/65/EU+2015/863/EU.

Name:

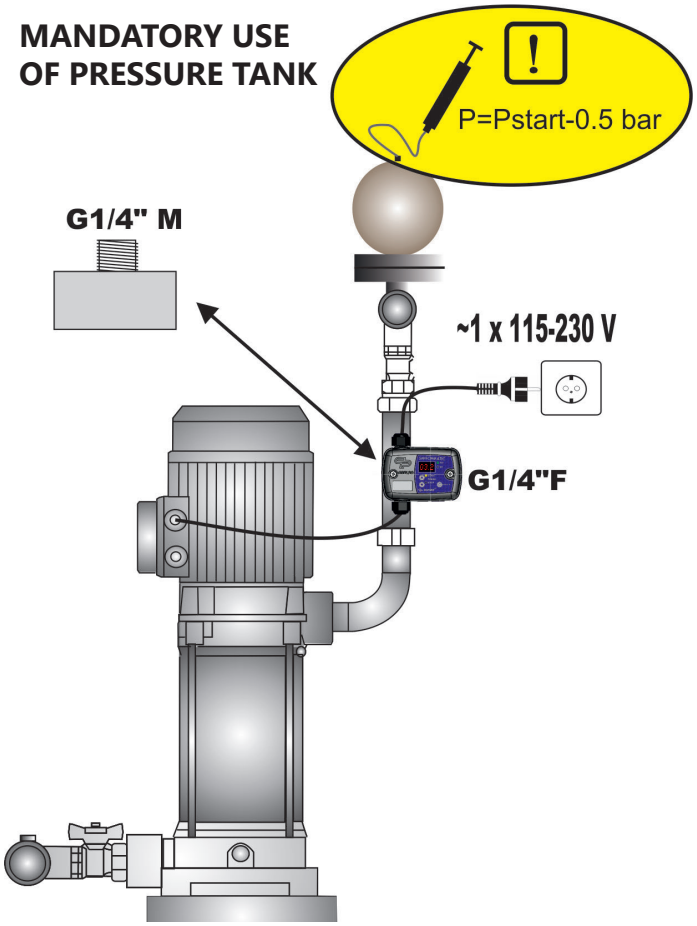
- SWITCHMATIC 1 /1+
- SWITCHMATIC 2/2+
- SWITCHMATIC 3/3+

Standards : EN-60730-2-6, EN-60730-1, EN-61000-6-1, EN-61000-6-3, IEC-60730-1, IEC-60730-2-6

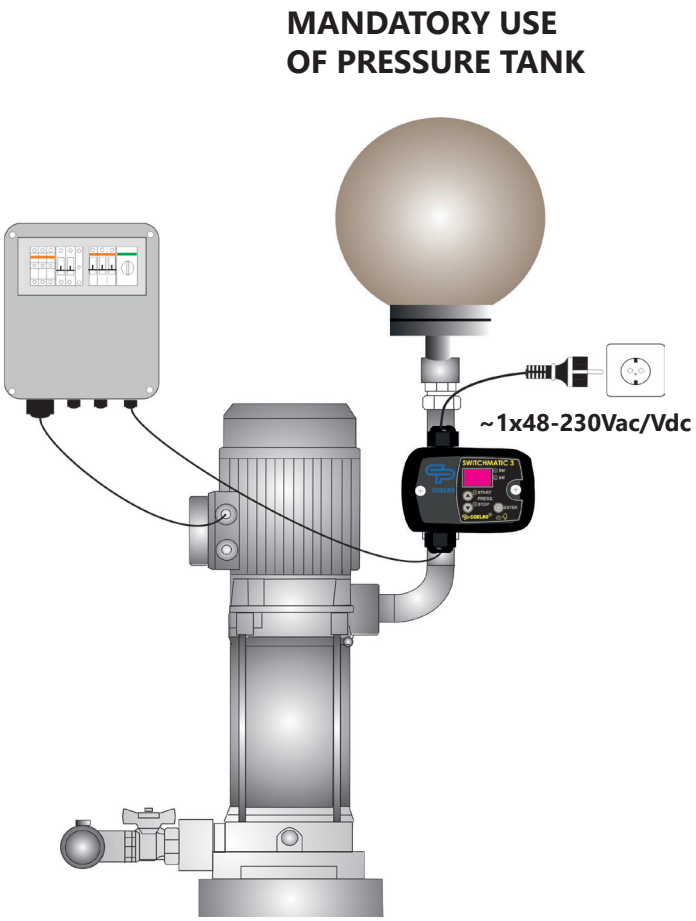
# DIAGRAM A

INDIVIDUAL

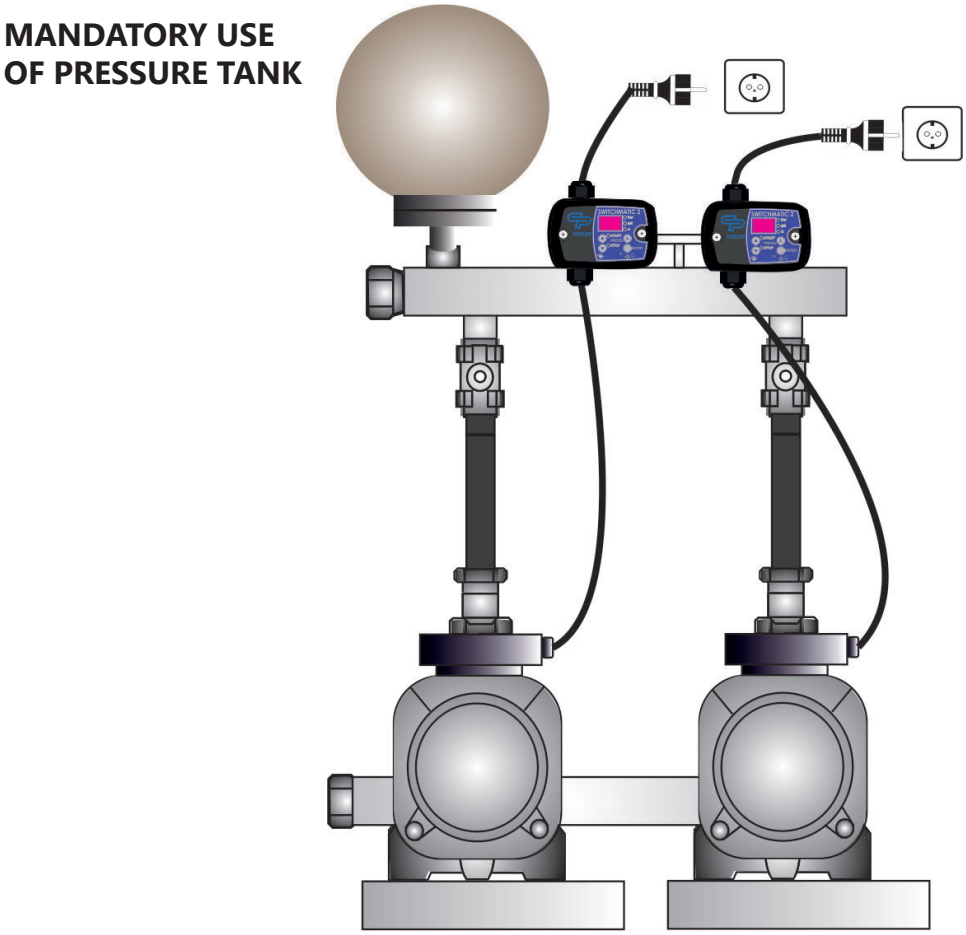
SWITCHMATIC 1/2



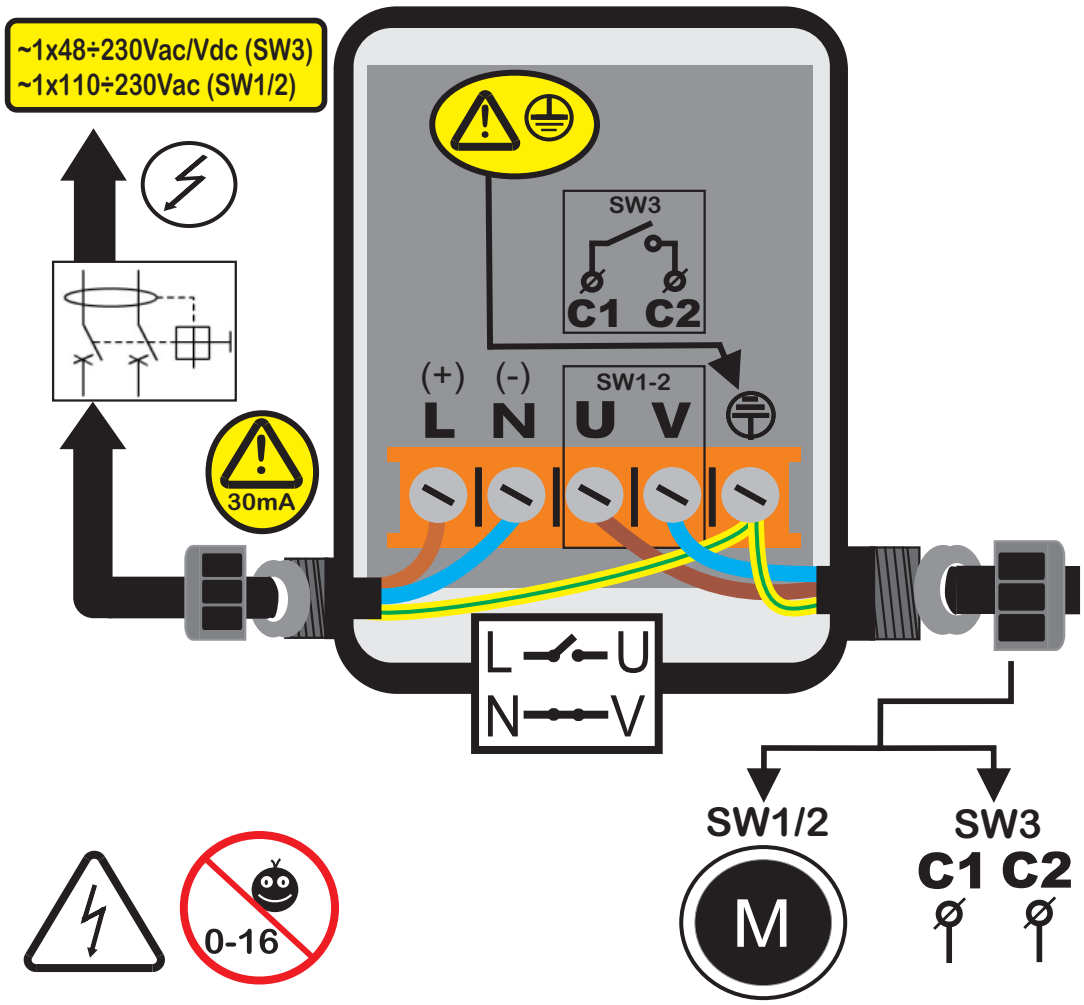

SWITCHMATIC 3



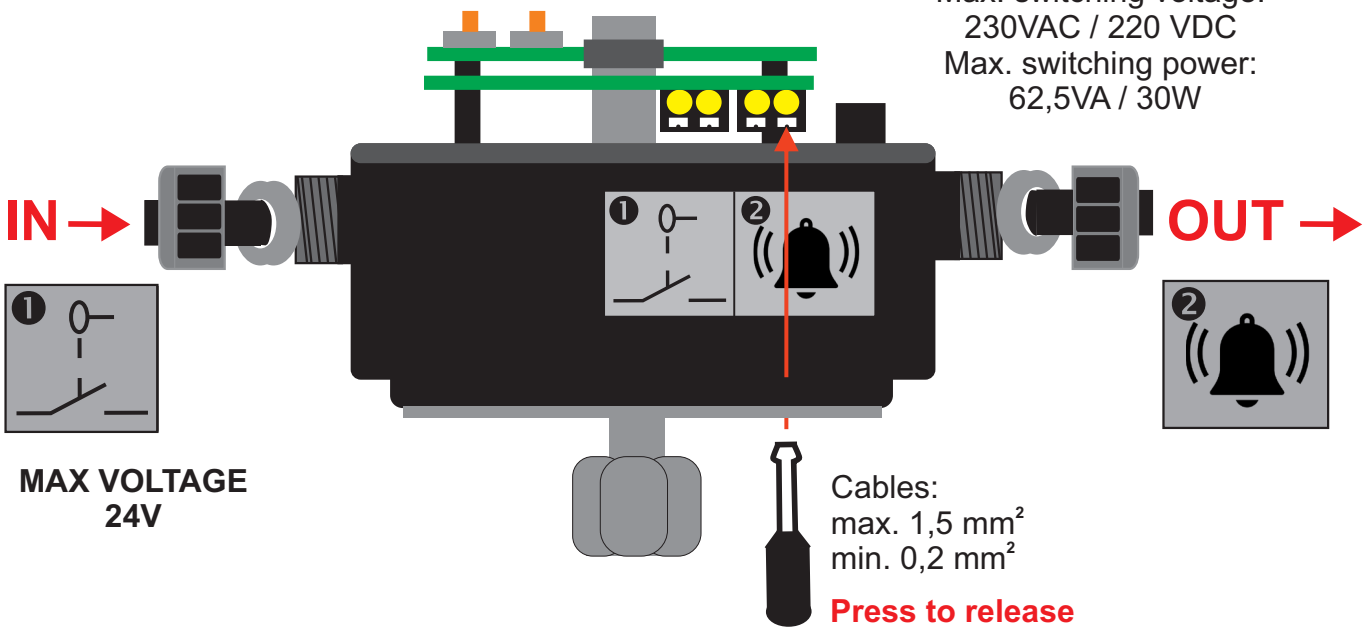

SYSTEM (ONLY SW2)



## 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

SWITCHMATIC 1 / 3

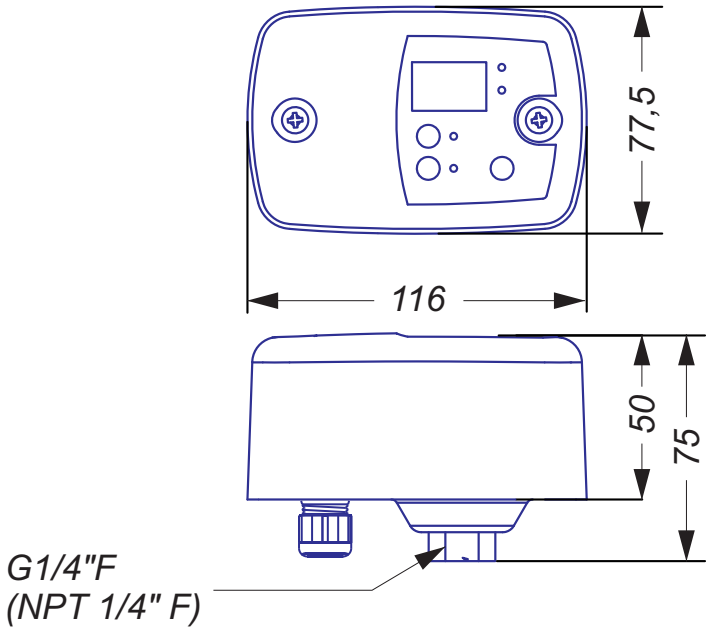



SWITCHMATIC 2




# DIMENSIONS

SWITCHMATIC 1 / 2




SWITCHMATIC 2 / 3 in-out

