BORDIGNON

# FSZ Force Stabilizer

## INSTRUCTION MANUAL



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## INDEX

WARNINGS ..... 4

INTRODUCTION ..... 5

DESCRIPTION ..... 5

CONNECTION ..... 6

FUNCTIONING (SET UP) ..... 7

START SIGNAL SET UP ..... 8

MINIMUM AND MAXIMUM LIMITS ..... 9

TIME-OUT ..... 9

SAFETY PRESSURE SWITCH ..... 9

PROGRAM MANAGEMENT ..... 10

CHANGE SUPERUSER PASSWORD ..... 11

ALARMS ..... 11

$N_2$ VENTING BOX ..... 13

VALVE BLOCK ..... 13

USER'S MANUAL ..... 13

DEVICE DRAWING ..... 14

ELECTRIC DIAGRAM ..... 15

# WARNINGS

## NO

Do not perform mechanical work on the device

Do not connect other devices to the panel

Do not disassemble or remove components of the box

Do not connect or disconnect the wires while the device is connected to 230 V AC power.
Do not make changes to the panel

Do not fasten the charging device to vibrating surfaces

Maintenance must be performed only by authorized staff

## YES


Use only nitrogen

Panel must be closed when working

Protect the panel from liquids, scraps and dust

Max. operating temperature 80° (176° F)

## INTRODUCTION

Bordignon FSZ (Force Stabilizer) device has been designed to adjust, to monitor and keep constant the nitrogen pressure in a gas springs  linked system inside a die.
This device allows to compensate possible small deviations of nitrogen pressure due to temperature variations or leaks in the system but it is not designed to compensate big alterations of the nitrogen pressure.
Thanks to a Start impulse this device checks the pressure of the nitrogen gas springs at every cycle when the die is open (gas springs in rest position) and adjusts the gas pressure in order to keep it constant.
The electronic panel allows a constant visualization of the measured pressure and displays the input parameters, the operating functions and the possible alarms. It's also possible to save up to 20 programs, each one of them with its own parameters.

## DESCRIPTION

**FIG. 1**

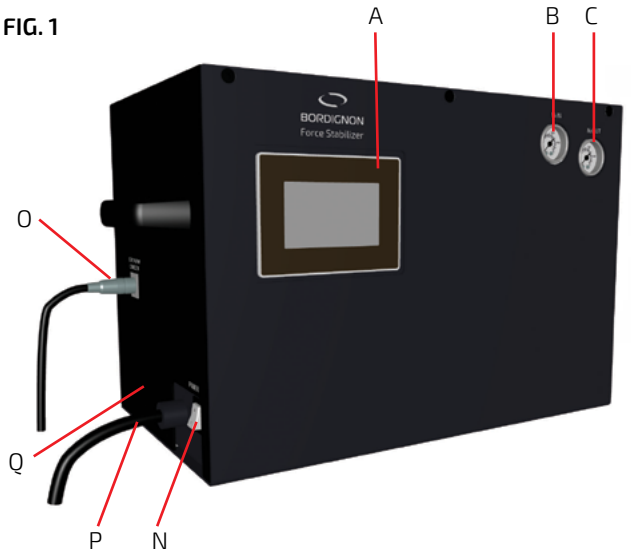
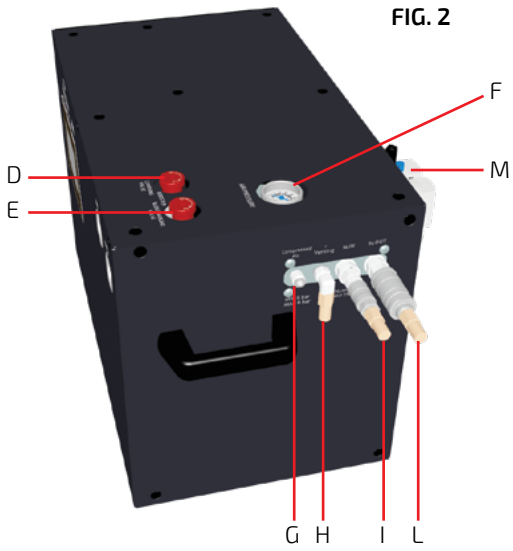



**FIG. 2**




A: touch screen
B: $N_2$ IN pressure gauge
C: $N_2$ OUT pressure gauge (max. available pressure)
D: BOOSTER charging valve
E: BOOSTER discharging valve
F: air pressure gauge
G: compressed air inlet (min. 6 bar, max. 8 bar)
H: $N_2$ venting fitting
I: $N_2$ IN (max. 250 bar)
L: $N_2$ OUT
M: air filter/lubricator [1]
N: main switch
O: START/ALARM connector [2]
P: power cable
Q: safety pressure switch adjusting screw

[1] The FSZ lubricator is supplied already adjusted for the minimum quantity of oil necessary. To change this adjustment, contact BORDIGNON.
N.B.: Use only lubricating oil for spraying systems.

[2] Connector "O" allows the following connections:
START contact
ALARM contact

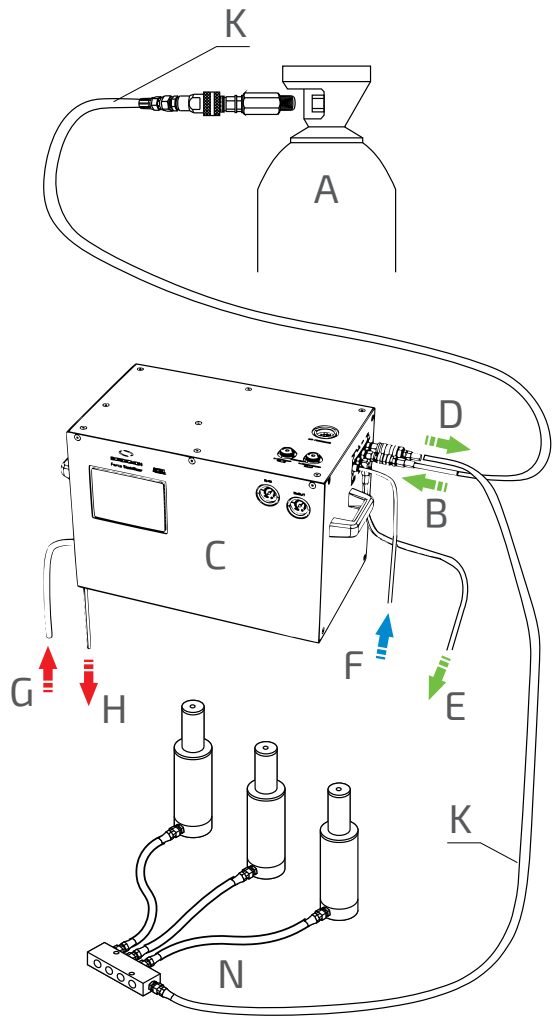
**Connector "O" for START/ALARM  contacts is supplied with contact pins inside only but with no wire. Wiring must be done by the user in order to connect the device to the press system.**

## CONNECTION

For the following explanation, please refer to the drawing in fig. 3.
The device must be connected to the nitrogen gas tank "A" and to the nitrogen gas springs system "N". The inlet pressure must never be higher than 250 bar.
In a nitrogen gas springs system the FSZ can replace the control panel. In those circumstances where it has to be connected to a control panel, the FSZ device must be directly connected to one of the connecting ports (for example G1/8 holes) in the panel. In others words, the device will not work properly if there is a non-return valve since gas must flow in both directions.

- Plug the wire "G" of the FSZ "C" to the power supply 230 V AC 50-60Hz.
- Connect compressed air to connector "F". Min. pressure 6 bar. Max. pressure 8 bar.
- Connect the pipe of the nitrogen tank "A" to connector "B".
- Connect the nitrogen gas springs system "N" to connector "D" with pipes "K".
- Arrange the wiring for START-ALARM "H" connection to the press system.

**Attention!** During the discharging process, gas will come out from output "E". See "$N_2$ Venting" paragraph on pag. 13.




A: Nitrogen $N_2$ tank
B: $N_2$ inlet
C: FSZ Force Stabilizer
D: $N_2$ outlet to gas springs system
E: $N_2$ Venting outlet
F: compressed air inlet (min. 6 bar, max. 8 bar)
G: power cable (230V AC)
H: contacts to press system (START/ALARMS)
K: hoses: type and length according to application
N: nitrogen gas springs system

fig. 3

## FUNCTIONING - SET UP

- Press switch "N" to turn the panel on (fig. 1). Wait until the startup screen appears (fig. 4).
- Press ENTER on the touch screen (fig. 4). The panel will display the main screen (fig. 5)
- According to the User's levels of qualification, three passwords-protected levels allow the access to operation settings. These levels are indicated in the screen by a padlock that can be closed, open black color, open orange color (table 1 – pag. 8). To switch from one level to the other, press the padlock icon to open the page and enter the password (fig. 6).
- To start the system enter a USER or SUPERSUER password, access the Set Up page and press SET.
- The main screen (fig. 5) displays the current pressure of the system and on top a status bar with the name of the program. This bar can assume three colors:
  gray: if the Start contact coming from the press is open;
  green: if the Start contact is closed and the system is operational;
  red: if the Start contact is closed but the system is not operational.
- To view the working parameters and change them, press SET UP (fig.5) to enter the SET UP screen (fig. 7).

**Warning! Always check the color of the status bar to ensure that the FSZ device is operating in automatic mode when the press is running.**

fig. 4

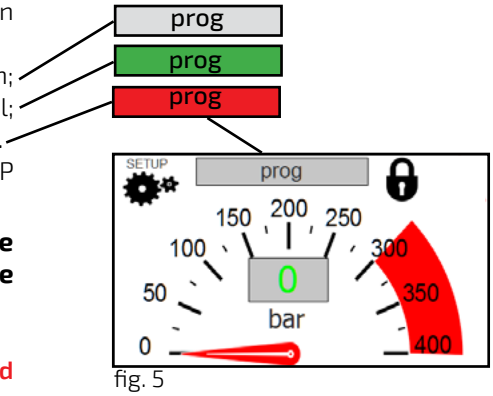


fig. 5

**Attention! Before starting the charging process, draw the piston rod out of the nitrogen gas springs up to full extension.**

It is suggested not to use the FSZ to charge a gas springs sytem from scratch since it would take a long time. It will be better to do this operation in a standard way.

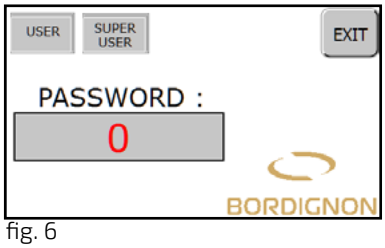


fig. 6

- The effective pressure (measured in real time) of the system can be viewed in green digits on top of the SET UP screen (fig. 7)
- Mind that the die must be open and the nitrogen gas springs in rest position (fig. 8 – step B). Nitrogen tank must be open.
- Tap PRESSURE and enter the desired value in bar. Example: 120
- Tap SET to start the manual charging process
- The green electrovalve displayed on top left of the screen (fig. 7) will turn on. The increasing pressure can be viewed on the top central box of the screen.
- To discharge the system manually, tap DISCHARGE (fig. 7), the red electrovalve displayed on top right of the screen will turn on and pressure will drop to 0.

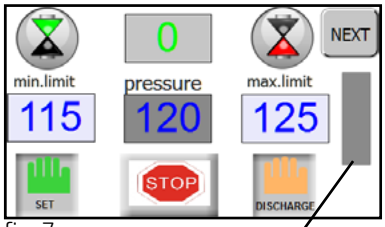
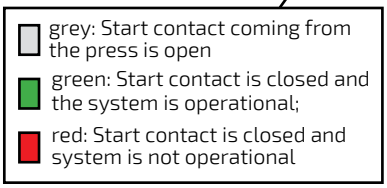


fig. 7




The Set Up page also features a status bar that has the same colors as the one on the main page to indicate the system status (fig. 7).
STOP can be pressed whenever nitrogen charging or discharging procedure needs to be stopped.

**Attention!** Alarm A5 will appear if User presses STOP during the automatic working process of the FSZ (active Start signal coming from the press).
Check the alarm information on page 12.

| SYMBOL | | PASSWORD | FUNCTIONS |
|---|---|---|---|
| 🔒 | USER SUPERUSER | 1111 | • Automatic operation<br>• View of working parameters<br>• View of the alarms<br>• Reset of alarms A2 and A3 |
| 🔓 | USER SUPERUSER | 1234 | • Automatic operation<br>• View of working parameters<br>• View and reset of all alarms<br>• View of the User's manual<br>• Possibility to stop, charge and discharge the system manually<br>• System start after power-on and after an alarm |
| 🔓 | USER SUPERUSER | 2468* | • Automatic operation<br>• View of working parameters<br>• View and reset alarms<br>• View of the User's manual<br>• Possibility to stop, charge and discharge the system manually<br>• Possibility to change working parameters<br>• Save and load the programs<br>• Language selection of the alarm descriptions<br>• System start after power on, after an alarm and after program changing |

table 1

* To change the SUPERUSER 🔓 password , follow instructions on page 11.

## START SIGNAL SET UP

The device is activated at every single cycle by a Start impulse and it measures and adjusts the nitrogen pressure when the gas springs are in the resting position.
For this reason the Start signal must be activated during the upstroke of the die and must be off during the downstroke of the die before the gas springs start being compressed. See fig. 8.
To be activated, the Start needs a switch that closes the Start contact just after the gas springs have completely returned to full extension during the upstroke of the die. The switch should then open the Start contact to turn it off just before the gas springs start being compressed. This way FSZ has the longest usable time to compensate the pressure.
Start connection must be done by the User with connector START/ALARM. Wire connection details can be found on page 3 of electrical diagram attached to this manual..

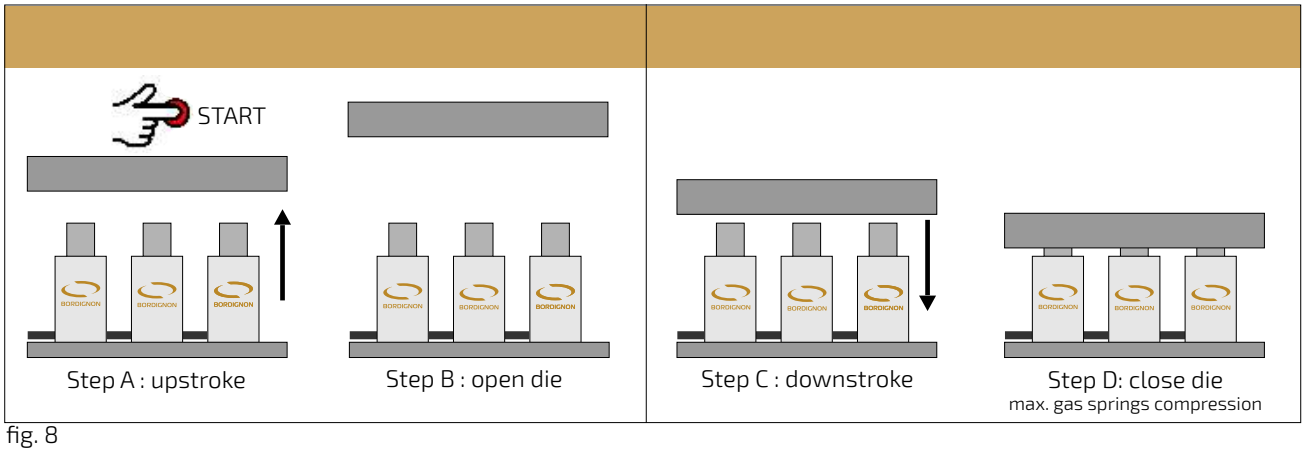



fig. 8

## MINIMUM AND MAXIMUM LIMITS

Max.limit and min.limit parameters are pressure tolerances values. When the measured pressure exceeds these limits the system begins to compensate the difference from the working pressure parameter that has been set.
This function allows to control gas leaks and overpressure.
The minimum and maximum limits are automatically calculated by the PLC as explained in the following example:
Pressure parameter: 120 bar
Min. limit: 120 bar – 5 bar (default value)= 115 bar
Max. limit: 120 bar + 5 bar (default value)= 125 bar
SUPERUSER can change these limits by pressing "min. limit" and max.limit" (fig.7 – page 7) and entering new parameters as long as the difference from the set working pressure is not lower than 5 bar.
For set pressure values lower than 5 Bar the minimum threshold is automatically set to zero.

## TIME OUT

When the initial pressure (gas springs completely extended) has exceeded the values that have been set, the FSZ device starts to compensate the pressure by adding or expelling the nitrogen gas in the system (START must be active). If the compensation process takes longer than the time-out parameter, an alarm will appear.
The time (seconds) is counted only when the START signal is active, and it adds up cycle after cycle.
The set default value is 30 sec. The SUPERUSER can change this value from min. 5 sec. to max. 300 sec.. According to the characteristics of the gas springs system (nitrogen gas volume, etc..) and in general to the application, the User may change this parameter.

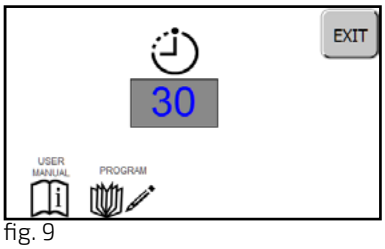


fig. 9

fig. 10

**Setting of the time-out parameter:**

- press NEXT in the SET UP screen (fig. 7). The TIME SETTING page will appear. (fig. 9);
- tap on the central box that shows the current parameter (fig. 9);
- set the time between min. 5 sec to max 300 sec. on the key board and press Enter (fig. 10);
- TIME SETTING screen (fig. 9) will appear. Press EXIT to go back to main screen (fig. 5).

## SAFETY PRESSURE SWITCH

The FSZ device is equipped with a safety pressure switch that is fully independent from the main system that measures and compensates the pressure. It must be calibrated in order to avoid problems of overpressure.
The FSZ device monitors and adjusts the initial pressure (gas springs not compressed). The safety pressure switch instead monitors the final pressure (gas springs compressed).
When the safety pressure switch detects an overpressure, an alarm is triggered and the FSZ device discharges nitrogen gas until pressure decreases below the pressure switch threshold.

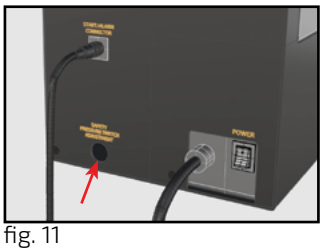


fig. 11

**The safety pressure switch supplied with the FSZ is calibrated at 300 bar (max. settable value)**

How to adjust the safety pressure switch:
1 - check that START is not active;
2 - charge the gas springs system at the required pressure following instructions in the "Functioning/Set Up" paragraph (pag. 7)
3 - press the gas springs down to end of stroke (fig. 8 - step D);
4 - unscrew the control screw on the safety pressure switch into the hole (fig. 11) until the contact opens and the discharging valve starts working (fig. 7 - page 7);
5 - screw back the screw for just one turn. Check that the discharging valve turns off;
6 - reset the alarm;
7- Press SET from Set Up menu.
If alarm A1 = "Safety switch max. pressure" (fig. 20 - page 11 appears after adjusting the pressure switch, turn the screw a little more as explained in step 5 and reset the alarm again. Press SET from Set Up menu.

## PROGRAMS MANAGEMENT

SUPERUSER mode allows to create up to 20 programs saving the pressure parameters, the min. and max. limits and the Time out value. The program in operation can be seen at the top on the main screen (fig. 5)
To access Program settings, tap SET UP on the main screen (fig. 5), then NEXT on the SET UP page(fig. 7) and subsequently PROGRAM on TIME SETTING screen (fig. 9) . Now the Program window will open (fig. 12).
The program can be selected in two ways:

- Press ▲▼ on the right of the screen and scroll the program list (fig. 12).
- Press the name of the loaded program in blue digits. Example: Set 0 (fig. 12). The first of two pages will open with the program list.

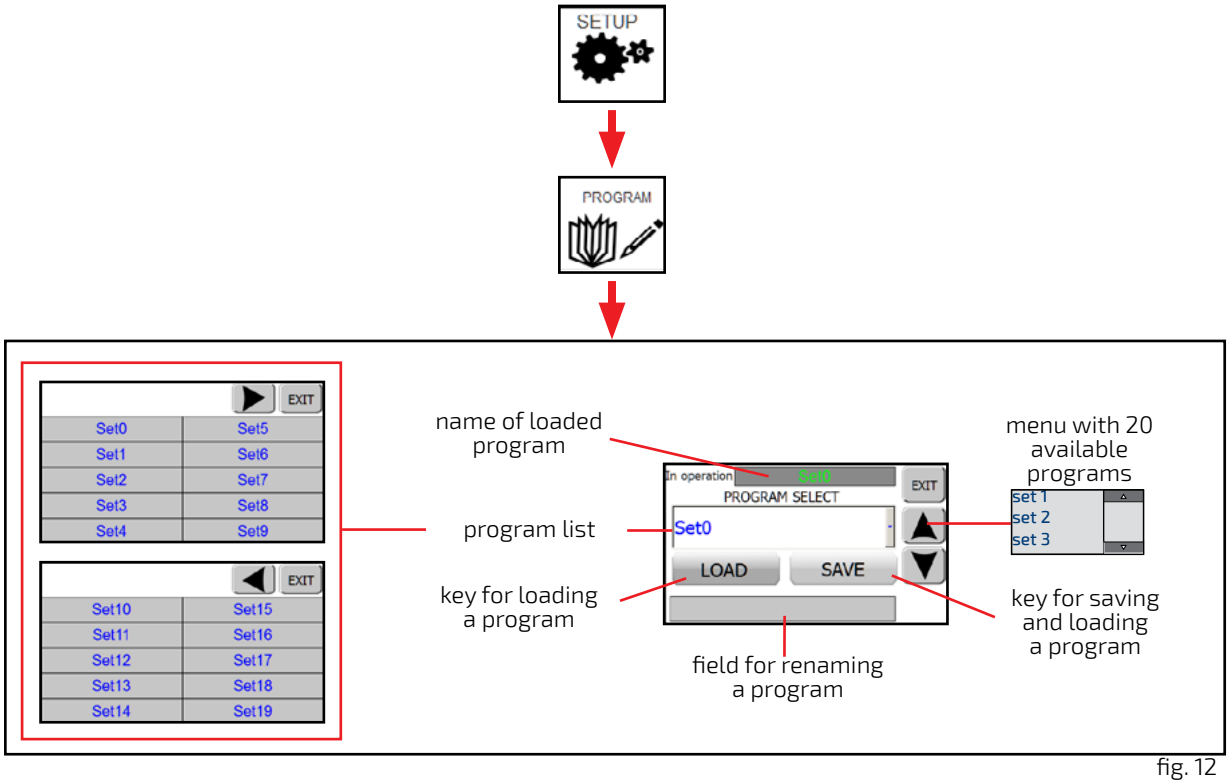



fig. 12

**Saving a new program:**

1. Set Up the FSZ device with all parameters.
2. Get into the Program window.
3. Select the program from the scrolling menu or by pressing the name of the loaded program in blue digits (fig. 12).
4. Enter the name of the new program on the bottom field with blue letters.
5. Press SAVE to save and load the new program.
6. Make sure that the name of the new program appears on the "in operation" box. Press EXIT.

**Loading a program from the menu:**

1. Get into the Program window.
2. Select the program from the scrolling menu or by pressing the name of the loaded program in blue digits (fig. 12)
3. Press LOAD.
4. Check the box at the top on the screen: the name of the loaded program should appear in green letters. Press EXIT.

When a program is loaded, automatic operation stops. The status bar turns red. To activate the system with the new parameters loaded, press SET from the Set Up page. This operation can only be performed by SUPERUSER

## CHANGE OF SUPERUSER PASSWORD

SUPERUSER password can be changed following these steps:

- If the padlock on the main screen (fig. 13) is closed, tap on the padlock icon, enter the current password and get into the SUPERUSER mode. The SUPERUSER icon (fig. 14) will now turn green.
- Press Bordignon logo (fig. 14) and a new window will open to set the password
- Press NEW PASSWORD box (fig. 15). Type the new password on the keyboard. Press ENTER
- Once the new password has been entered, press SET key (fig. 15). The display will now show the new password on top of the screen. Press EXIT.
- Close the padlock typing 1111. Press EXIT.

In case of forgotten password, contact Bordignon for technical support.

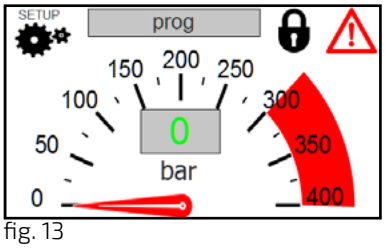


fig. 13

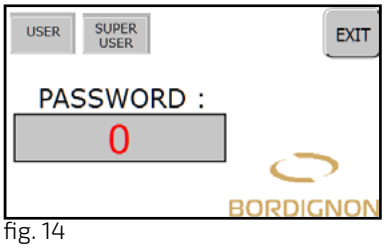


fig. 14

## ALARMS

The operator in SUPERUSER mode can change the language of the alarm information (Italian – English – German).

Press NEXT on SET UP screen (fig. 16) to get into the TIME SETTING page (fig. 17). Then press the icon USER MANUAL at the bottom left of the screen. In following page it will be possible to set the preferred language (fig. 18).

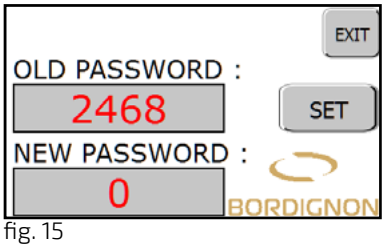


fig. 15

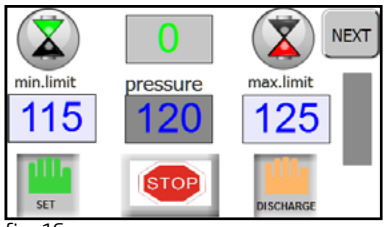


fig. 16

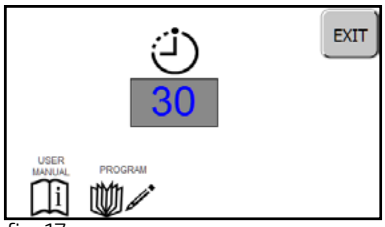


fig. 17

fig. 18

In case of anomalies, the system will generate an alarm that will be displayed both on the main screen (fig. 19) and on the Set Up screen (fig. 16).
When this occurs, press on the alarm sign to get more information. The alarm description will be displayed on the page that opens (fig. 20).
On this page, press INFO and the list of alarms will appear in a row (fig. 21). Press the one in red color to get helpful information in order to understand and solve the problem.

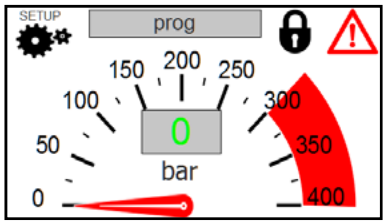


fig. 19

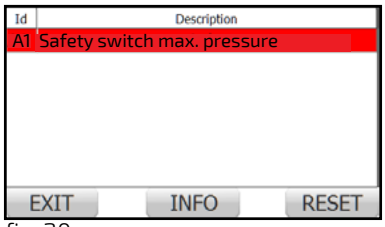


fig. 20

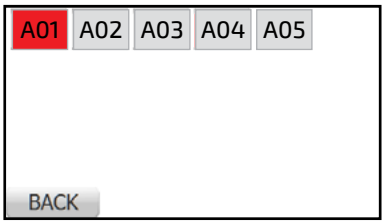


fig. 21

When an alarm occurs, the device, if properly connected with the START/ALARM connector, sends a signal to stop the press. By resetting the alarms, the press can start working again.

| ALARM | NAME | DESCRIPTION | TROUBLE SHOOTING |
|---|---|---|---|
| **A1** | **Safety switch max. pressure** | The device has reached the max. pressure set on the safety pressure switch.<br>See paragraph "Safety pressure switch" (pag. 9). | • Possible critical overpressure. Look for what may be the reason.<br>• Safety switch pressure set too low<br>• Disconnected/damaged safety pressure switch contacts<br>• If the problem is solved, reset the alarm and press SET from the SET UP page. |
| **A2** | **Charging Time out (charging time exceeded)** | Charging time higher than the one set in Time Out | • Check nitrogen gas leaks in the linked system<br>• Check proper functioning of charging valve  (for example pressing SET on SET UP menu to test a manual charging)<br>• Check available nitrogen gas pressure<br>• Check air pressure (minimum 6 bar)<br>• TIME OUT time set too low |
| **A3** | **Discharging Time out (discharging time exceeded)** | Discharging time higher than the one set in Time Out | • Check proper functioning of discharging valve  (for example pressing DISCHARGE on SET UP menu to test a manual discharging)<br>• Check air pressure (minimum 6 bar)<br>• TIME OUT time set too low |
| **A4** | **Damaged internal transducer (pressure measurement error)** | This alarm refers to the pressure transducer inside the device and it occurs when the measured pressure changes too fast in a set time.<br>**Attention! In case of alarm A4, the display may show "0" in the current pressure box but the system is actually still charged.**<br>To discharge pressure keep "DISCHARGE" key pressed until completely discharge | • Check nitrogen gas pressure and air pressure available<br>• If the problem is solved, reset the alarm and press SET from the SET UP page.<br>• If the problem persists, contact BORDIGNON for technical support |
| **A5** | **Stop button pressed during automatic operation (with Start contact activated)** | If STOP button is pressed when the Start is active, the working process will stop and this alarm will appear.<br>**Attention: To re-start the automatic process, reset the alarm and press SET on SET UP page**.<br>Charge and discharge functions will be disabled until SET button is not pressed. | • reset the alarm<br>• press SET on Set Up page |

## $N_2$ VENTING BOX

The FSZ device is equipped with a venting element named "N2 Venting box" (fig. 22), to which the FSZ device is to be connected using the supplied 2-metre hose and the 90° elbow fitting (see "H" in fig. 2).
Nitrogen gas vented by the FSZ device is released into the atmosphere through the "N2 Venting box" element.
Although nitrogen gas venting is normal and safe in this application, it should take place in a well-ventilated area to avoid the risk of oxygen deficiency in the surrounding atmosphere.
Nitrogen gas springs must be protected from contact with liquid or solid contaminants, including (for example) stamping lubricants, solvents, and water as well.

fig. 22

Nevertheless, in case contaminants do penetrate into the gas springs system (under operating conditions or other circumstances), they may be released in atmosphere along with the nitrogen gas through the "N2 Venting box" element. Therefore, it is recommended to place the "N2 Venting box" element in an appropriate container and take proper precautions (for example, selecting a suitable type of container and its placement), depending on the potential effects that the release of these contaminants could have on property and personnel.
In any case, for all the above-mentioned indications and observations, refer to the applicable regulations in the country of use.

## VALVE BLOCK

The optional device Valve Block (fig. 23) allows to disconnect the FSZ from the nitrogen gas springs linked system leaving the latter under pressure.
By closing the valve, the nitrogen gas inside the FSZ and inside the pipe could be discharged keeping the gas springs system under pressure.
Further information on request.

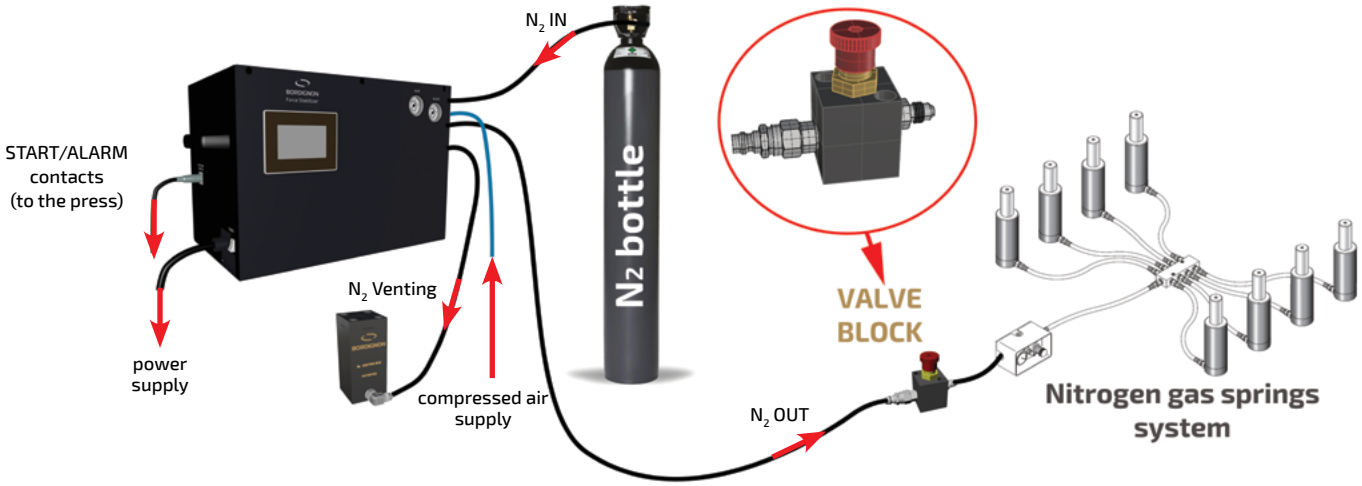


fig. 23

## INSTRUCTION MANUAL

This manual can be viewed and/or downloaded by scanning a QR code (fig. 25) after pressing the User Manual icon from Time Setting screen (fig. 24).
Instruction manual is available in Italian, English and German languages

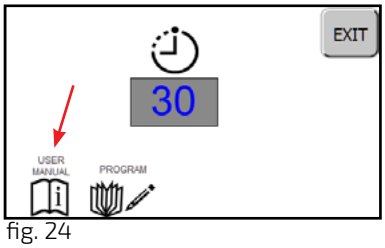
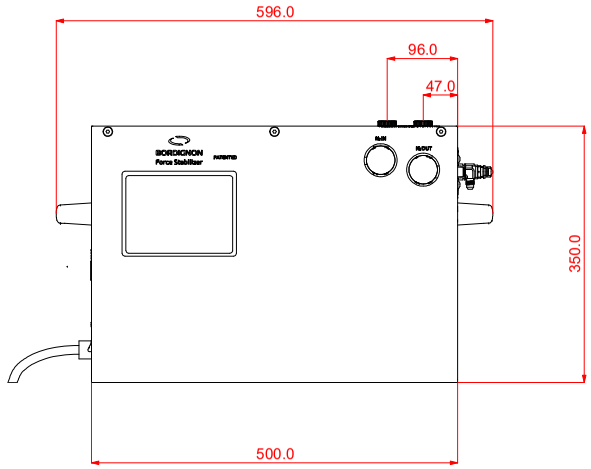
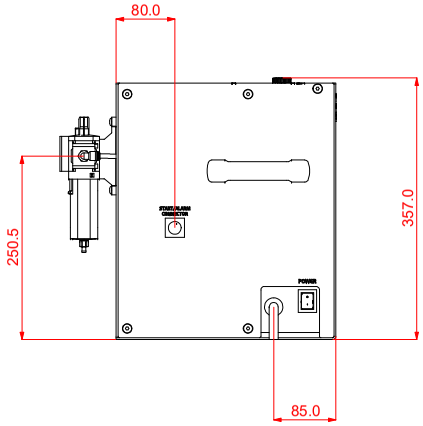
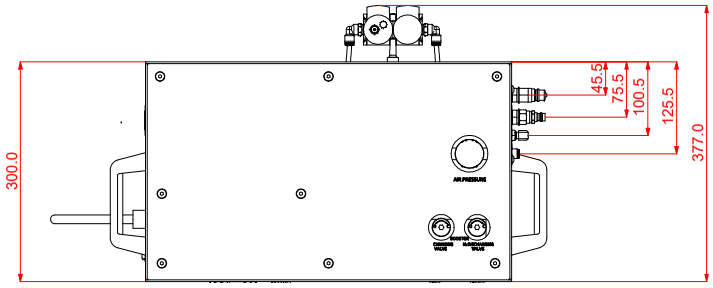


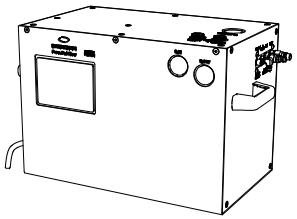
fig. 24

fig. 25



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| BORDIGNON Srl<br>36028 ROSSANO V.TO (VI) ITALY | |
| DESIGNER | RINALDO FLAVIO |
| VERIFIER | BORDIGNON SIMONE |
| DATE | 26-09-2024 |
| PIECE TYPE | FSZ Force Stabilizer |

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# SCHEMA ELETTRICO
# *WIRING DIAGRAM*
# *SCHEMA ELECTRIQUE*
# *SCHALTPLAN*
# *ESQUEMA ELECTRICO*

Macchina : FSZ – STABILIZZATORE DI FORZA

*Machine* : FSZ – FORCE STABILIZER

| | | | |
|---|---|---|---|
| PROGETTAZIONE | | | TENSIONE ESERCIZIO |
| | | | TENSIONE COMANDI |
| | | | TENSIONE SEGNALI |

| REV. | DESCRIZIONE REVISIONE | DATA | DISEGNATORE |
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| DATA | 14/09/2012 |
| ULTIMA MODIF. | 10/10/2024 |
| DISEGNAT. | |
| VISTO | |
| APPROV. | |

SOST. DA:

NORME

CLIENTE:

RIF.:

FILE
BaseAz_V02.sch

SOST. IL:

ORIGINE

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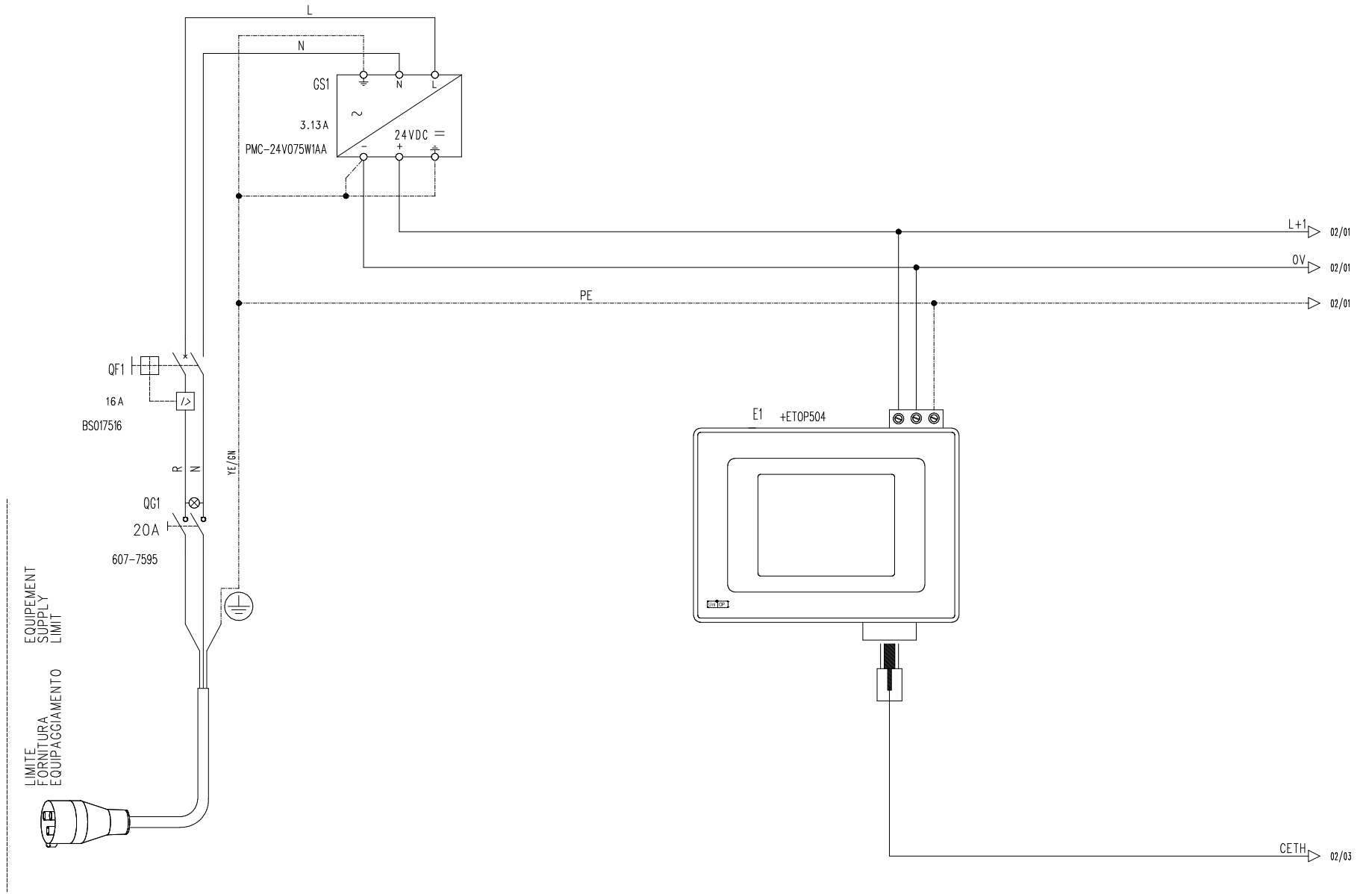
T.F. 04

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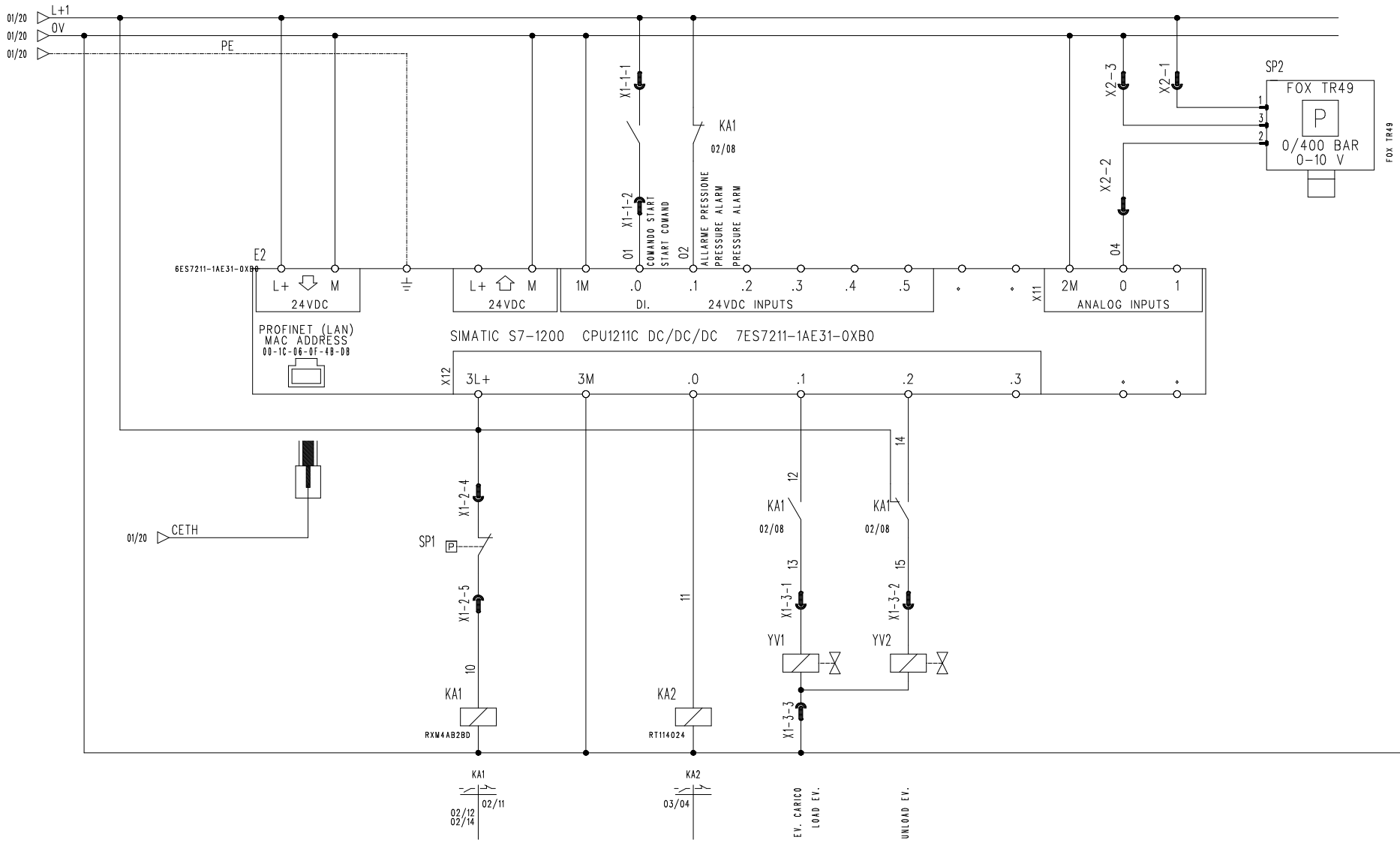
| BORDIGNON | FSZ – STABILIZZATORE DI FORZA<br>FSZ – FORCE STABILIZER | ALIMENTAZIONI – POWER SUPPLY | File: | BaseAz_V02.sch | PAGE N.:01 |
| | | | Date: | 14/09/2012 | of N.:04 |
| | | | Page redraft. : | 10/10/2024 | NEXT PAGE: 02 |
| | Client: | Serial No.: | Designer: | | |

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| BORDIGNON | FSZ – STABILIZZATORE DI FORZA<br>FSZ – FORCE STABILIZER | COLLEGAMENTI PLC – PLC CONNECTIONS | File: | BaseAz_V02.sch | PAGE N.:02 |
| | | | Date: | 14/09/2012 | of N.:04 |
| | | | Page redraft. : | 10/10/2024 | NEXT PAGE: 03 |
| | Client: | Serial No.: | Designer: | | |

CONNETTORE X1-1
CONNECTOR X1-1
START E ALLARME
START AND ALARM

CONNETTORE X1-2
CONNECTOR X1-2
PRESSOSTATI
PRESSURES

CONNETTORE X1-3
CONNECTOR X1-3
ELETTROVALVOLE
ELECTROVALVES

L+1 — X1-1-1
01 — X1-1-2
20 — X1-1-3
KA2 02/11
21 — X1-1-4
22 — X1-1-5

X2-1 START CYCLE
X2-2 START CICLO
X2-3
X2-4
X2-5
X2-6

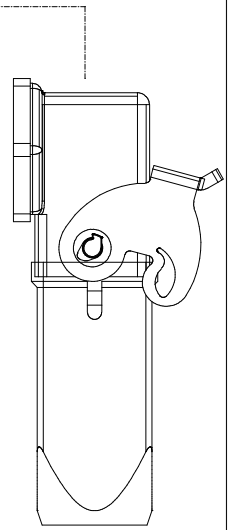
L+1 — X1-2-1
04 — X1-2-2
0V — X1-2-3
L+1 — X1-2-4
10 — X1-2-5

SP2
FOX TR49
P
0/400 BAR
0-10 V
1
2
3
PRESSOSTATO LAVORO
WORKING PRESSURE

SP1
PRESSOSTATO SICUREZZA
PRESSURE SAFETY

13 — X1-3-1 — +
15 — X1-3-2 — +
0V — X1-3-3 — –
X1-3-4
X1-3-5

YV2 — EV. SCARICO – UNLOAD EV.
YV1 — EV CARICO – LOAD EV.

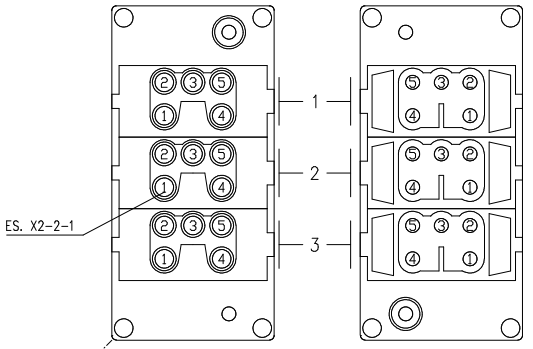


X2

| |
|---|
| 09 12 005 2633 |
| 09 12 005 2733 |
| 09 20 003 0801 |
| 09 20 003 1440 |

FEMMINA
FEMALE

MASCHIO
MALE




X1 X1

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| BORDIGNON | FSZ – STABILIZZATORE DI FORZA<br>FSZ – FORCE STABILIZER | CONNESSIONI – WIRING | File: BaseAz_V02.sch<br>Date: 14/09/2012<br>Page redraft. : 10/10/2024<br>Designer: |
| | Client: | Serial No.: | PAGE N.:03<br>of N.:04<br>NEXT PAGE: 04 |

| SIGLA | DESCRIZIONE ARTICOLO | COSTRUTTORE | CODICE ARTICOLO | CODICE INTERNO | Q.TA' | PAGINA |
|---|---|---|---|---|---|---|
| E1 | INTERFACCIA OPERATORE eTop504 | SITEK | +ETOP504 | | 1 | 01 |
| E2 | UNITA' CENTRALE CPU 1211C | SIEMENS | 6ES7211-1AE31-0XB0 | | 1 | 02 |
| GS1 | ALIMENTATORE MONOFASE 240V - 24Vdc 3,125A | DELTA | PMC-24V075W1AA | | 1 | 01 |
| KA1 | RELE' MINIATURA 4 CONTATTI 24Vdc | SCHNEIDER ELECTRIC | RXM4AB2BD | | 1 | 02 |
| | ZOCCOLO PER RELE' RX | SCHNEIDER ELECTRIC | RXZE2S114M | | 1 | |
| KA2 | RELE' 1 CONTATTI 12A | SCHRACK | RT114024 | | 1 | 02 |
| | ZOCCOLO PER RT 5 PIN PASSO 3,5mm | RELPOL | GZT92 | | 1 | |
| QF1 | INTERRUTTORE AUTOMATICO 1 POLO 16A CURVA C | SCHRACK | BS017516 | | 1 | 01 |
| QG1 | INTERRUTTORE A BILANCERE 20A | MARQUADT | 607-7595 | 1935.3113 | 1 | 01 |
| SP1 | | | | | | 02 |
| SP2 | | | | | | 02 |
| SP2/1 | | | | | | 03 |
| YV1 | | | | | | 02 |
| YV2 | | | | | | 02 |



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FSZ - STABILIZZATORE DI FORZA

ELENCO COMPONENTI

Client:

Serial No.:

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|---|---|
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| Date: | 14/09/2012 |
| Page redraft. : | 10/10/2024 |
| Designer: | L.Pasin |

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