Operation and Maintenance Manual

Enerpac CLNC12

Coordinated Lifting Network Controller

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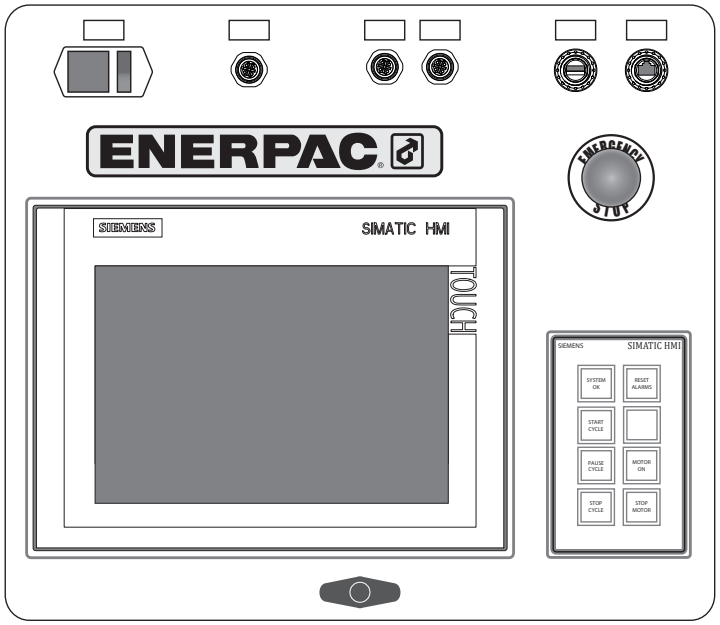

⚠ To reduce the risk of injury, user must read and understand this document before use.

ABOUT US

Enerpac is a global market leader in high pressure hydraulic tools, controlled force products, portable machining, on-site services and solutions for precise positioning of heavy loads. As a leading innovator with a 110-year legacy, Enerpac has helped move and maintain some of the largest structures on earth. When safety and precision matters, elite professionals in industries such as aerospace, infrastructure, manufacturing, mining, oil & gas and power generation rely on Enerpac for quality tools, services and solutions. For additional information, visit www.enerpac.com.

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WARRANTY

Refer to the Enerpac Global Warranty document for terms and conditions of the product warranty. Such warranty information can be found at www.enerpac.com.

NAMEPLATE

ENERPAC

Avenida Valdelaparra 27 Building 1
28108 Alcobendas (Madrid), Spain
T: +34 91 884 88 06

INDUSTRIAL CONTROL PANEL FOR INDUSTRIAL MACHINERY

Serial Number:	**RWWYYHE-00**
Full Load Amperes:	**0,95 A**
Largest Motor:	**-**
Largest Motor FLA:	**-**
Voltage:	**100 V AC ... 240 V AC**
Phase & Frequency:	**1 Phase + GND, 60 Hz**
Max. SCCR:	**10 Ka rms symmetrical, 480 V max.**
SCCR Protection Device:	**10 Ka rms symmetrical, 480 V max.**
UL Enclosure Rating:	**12**
Diagram Number:	**CLN12 (REV. R)**

CE

Contents

1. Safety

Read all instructions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the product and/or damage to other property. Enerpac cannot be responsible for any damage or injury from unsafe use, lack of maintenance, or incorrect operation. Do not remove warning labels, tags, or decals. In the event that any questions or concerns arise, contact Enerpac or a local Enerpac distributor for clarification.

Save these instructions for future use.

If you have never been trained on high-pressure hydraulic safety, consult your distributor or service center for information about Enerpac Hydraulic Safety Courses.

This manual follows a system of safety alert symbols, signals, words, and safety messages to warn the user of specific hazards. Failure to comply with these warnings could result in death or serious personal injury, as well as damage to the equipment or other property.

The Safety Alert Symbol appears throughout this manual. It is used to alert you to potential physical injury hazards. Pay close attention to Safety Alert Symbols and obey all safety messages that follow this symbol to avoid the possibility of death or serious injury.

Safety Alert Symbols are used in conjunction with certain Signal Words that call attention to safety messages or property damage messages and designate a degree or level of hazard seriousness. The Signal Words used in this manual are DANGER, WARNING, CAUTION, and NOTICE.

⚠ DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious personal injury.

⚠ WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious personal injury.

⚠ CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate personal injury.

NOTICE Indicates information considered important, but not hazard related (e.g. messages related to property damage). Please note that the Safety Alert Symbol will not be used with the signal word.

1.1 Safety Precautions

⚠ WARNING

Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Always wear protective head-wear, ear protectors, footwear and gloves (at a minimum rigger type gloves) suitable for safe operation of the tool. The protective clothing must not interfere with safe operation of the tool or restrict the ability to communicate with co-workers.
- Be sure your workplace is safe. Follow the instructions in your workplace's standard operating procedures and be sure to observe all communicated safety precautions.
- Read and completely understand the safety precautions and instructions in this manual before operating the system or preparing it for use. Always follow all safety precautions and instructions, including those that are contained within the procedures of this manual.
- Ensure all hydraulic components are rated to a safe working pressure of 700 bar (10,150 psi).
- Never set the relief valve to a higher pressure than the maximum rated pressure of the system. Higher settings may result in equipment damage and/or personal injury.
- Do not overload equipment. Never attempt to move a load weighing more than the capacity of the system. Overloading causes equipment failure and possible personal injury.
- Be sure setup is stable before moving load.
- Always perform a visual inspection of the system before placing it into operation. If any problems are found, do not use the tool. Have the tool repaired and tested by an Enerpac Authorized Service Center before it is returned to service.
- Never use a tool that is leaking oil. Do not use the equipment if is damaged, altered or in need of repair.
- Be sure the operator has completed safety induction training, specific to the work surroundings. The operator should be thoroughly familiar with the controls and the proper use of the tool.
- The operator must be of at least the minimum age required by applicable local regulations, laws and the facility standard operating procedures.
- Never attempt to relieve hydraulic pressure by loosening a coupler.
- Never use force to unseat a coupler check ball that is under hydraulic pressure.
- Take every precaution to prevent oil leaks from occurring. High pressure oil leaks can penetrate the skin, resulting in serious injury.
- Do not over-tighten connections; connections need only be secure and leak free. Over tightening can cause premature thread failure.

- Loose or cross threaded fittings can be potentially dangerous if pressurized. Never stand directly in line with any hydraulic connection while pressurizing.
- Never strike the equipment while it is pressurized or moving load. Components under tension may become dislodged, allowing them to become dangerous projectiles. Uncontrolled release of pressurized hydraulic oil could also occur.
- Avoid striking the equipment at any time, even when it is not pressurized or moving load. Striking the tools could cause permanent damage to system components and may affect its functioning.
- Always maintain communication with the operator during procedure to avoid accidents. Use hand signals, two- way radios or other appropriate forms of communication (as required by applicable laws and regulations) if the load is not visible to the operator.
- Closely watch the load at all times during operation. Stop work immediately if the load becomes unstable or appears to be moving unsteadily.
- Immediately replace worn or damaged parts. Use only genuine Enerpac parts from approved distributors or service centers. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.
- To minimize risk of personal injury keep hands and feet away from the tool and workpiece during operation.
- High voltage is present inside the pump even when motor is off. Always be certain that the pump is stopped and disconnected from AC power supply before performing any inspection, maintenance or repair procedures.
- Do not leave the pump unattended in the workplace when connected to AC power supply. Take all reasonable precautions to avoid unauthorized use.
- Take precautions so that the pump is not switched on accidentally.
- If it is not possible to unplug the pump power cord from the AC power outlet, the power must be turned off and locked out at the AC power supply.
- Always disconnect the pump from AC power supply before transporting it.
- Do not unplug the pump by pulling on the cord. To unplug, grasp the plug, not the cord.
- If the cord and/or plug are damaged, do not connect the pump to a live electrical outlet. Repair or replace the damaged items as required and be sure the grounding conductor is properly wired before reconnecting the pump to the outlet. Consult a qualified electrician if grounding conductor wiring procedures are not completely understood or if there is any doubt as to whether the pump is properly grounded.
- Do not modify the plug provided with the pump. If the plug will not fit in the outlet, have a proper outlet installed by a qualified electrician.
- If the pump must be reconnected for use on a different type of electric circuit, the reconnection should be made by a qualified electrician. After the reconnection, the pump should comply with all local codes and ordinances.

⚠ CAUTION

Failure to observe and comply with the following precautions could result in minor or moderate personal injury. Property damage could also occur.

- Ensure components are protected from external sources of damage, such as moving machine parts, sharp edges, weld spatter, corrosive chemicals and excessive heat or flame.
- Keep hydraulic equipment away from flames and heat. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings.
- For optimum performance, do not expose hydraulic equipment to temperatures of 150˚F [65˚C] or higher. Protect all hydraulic equipment from weld spatter.
- To prevent damage to pump electric motor, check specifications. Use of incorrect power source will damage the motor.
- Do not use electric pumps in an explosive atmosphere. Adhere to all local and national electrical codes. A qualified electrician must do installation and modification
- Protect hoses and cylinders from weld spatter.
- Avoid damaging the hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe backpressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.
- Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
- Do not lift hydraulic equipment by the hose or couplers. Use the lifting handles provided on cylinders and clamp assemblies.
- Do not pull on a hose that is connected. If pulling forces are exerted on a hydraulic coupling the hose and coupling interface will weaken which may result in the hose bursting out of the coupling.
- Always lift a hose by the hose itself, whilst supporting the coupling.
- Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.
- During assembly the hose must be supported by necessary use bend guides to prevent twisting of the hose.
- Change worn or damaged hoses immediately.
- Do not use dirty or corroded couplings.

NOTICE

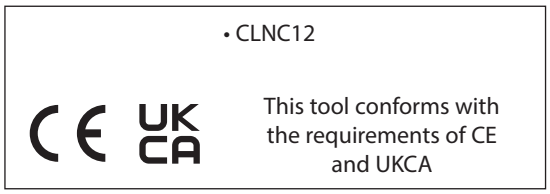
Failure to observe and comply with the following precautions could result in property damage and/or void the product warranty.

- In severe service conditions, be aware that the tools must be inspected, cleaned and lubricated more frequently than normal.

- If oil leakage is present, replace seals as required before placing the tool back into service.
- If any tool is dropped from a significant height, have it inspected and checked for proper operation before placing it back into service.
- While moving the hoses, prevent the couplings being dragged over the ground.
- Always follow the inspection and maintenance instructions contained in this manual. Perform maintenance and inspection activities at the specified time intervals.
- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Center in your area.
- To help ensure proper operation and best performance, use of Enerpac oil is strongly recommended.

2. Compliance Statement

2.1 EU Declaration of Conformity



Enerpac declares that this product has been tested and conforms to applicable standards and is compatible to all EU and UKCA requirements.

A copy of an EU Declaration as well as an UK Self-Declaration are enclosed with each shipment.

2.2 UL Certification

Enerpac declares that tall electrical components used on Enerpac CLNC12 carry the UL508A Industrial Control Panels.

3. Introduction

3.1 Overview

Enerpac is a global market leader in high pressure hydraulic tools, controlled force products and solutions for precise positioning of heavy loads.

CLNC12 controller is an HMI-based (Human Machine Interface) device which allows to remotely control multiple network devices.

Remote mode operation using the CLNC12 network controller allows operation of multiple HPUs from a single operator location. This mode provides the ability to access and operate all connected units in order to perform a coordinated, synchronized multipoint lift.

CLNC12 controller can be connected to up to 4 Split Flow Pumps (only for pumps with solenoid valves), 4 EVO systems or 12 EVOP units. In this way, the connection capacity of lifting or lowering points is increased, maintaining the precision and characteristics as a single unit.

3.2 Application

CLNC12 is designed to remotely control the synchronized movement of several hydraulic cylinders.

It can be used to connect Split Flow Pumps (SFP), EVO and EVOP units in a wide variety of lifting, lowering and pushing applications, such as: bridge deck lifting for bearing maintenance, machinery lifting and moving, skidding to move structures and buildings, and shipbuilding applications.

3.3 Delivery Instructions

Upon delivery all components must be inspected for damage incurred during shipping. If damage is found the carrier should be notified at once. Shipping damage is not covered by the Enerpac warranty. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

4. Transport

The controller network box CLNC12 controller is supplied into a protection/transportation case. Do not remove the controller from the case. The operator can work with the case opened. Be careful when handling weights. The weight of the controller in the case is 13 kg/29 lbs.

5. Features & Components

5.1 CLNC12

1. Touch screen
2. ON/OFF switch 115/230V electric supply plug
3. Wireless antenna connection (only available under request)
4. Communication IN plug
5. Communication OUT plug
6. USB connection
7. Ethernet connection
8. Emergency stop button
9. Keypad

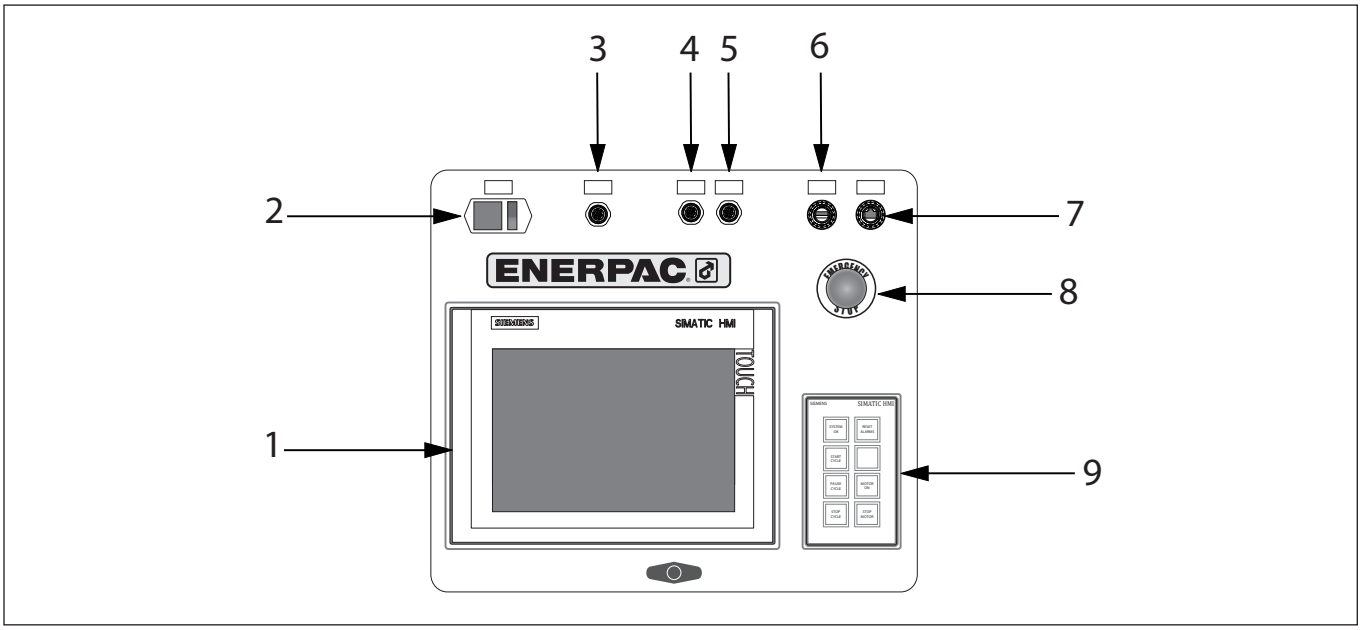


Figure 1: Major Features and Components of CLNC12

5.2 Keypad

1. System OK light
2. Start cycle button
3. Pause cycle button
4. Stop cycle button
5. Reset alarms button
6. Start motor button
7. Stop motor button

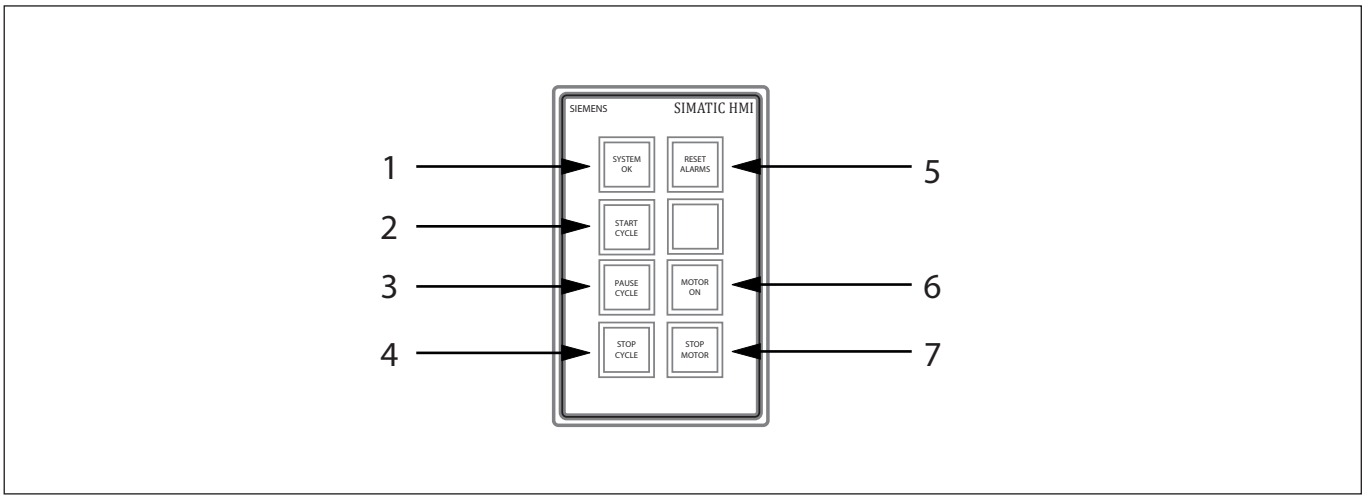


Figure 2: Major Features and Components of Keypad

6. Technical Product Data

6.1 Specifications

CLNC12 is designed to remotely operate and visualize the synchronized movements of SFPs, EVOs or EVOPs.

When working with SFPs, Enerpac recomends to purchase SFPKPT kit (pressure transducer removable kit) together with CLNC12. This kit allows to connect pressure transducers to the SFP. Pressure transducers are necessary for an optimal operation of the CLNC12.

NOTICE

It is not possible to connect SPFs, EVOs and EVOPs to CLNC12 at the same time. CLNC12 can only work with one type of HPU for each application.

7. Initial Setup

7.1 Electric Connections

7.1.1 EVOCOMM-25

This is the communication cable between the CLNC12 controller and the SFP, EVO or EVOP units.

CLNC12 is connected directly to EVOs and EVOPs through EVOCOMM-25 cable. For SFPs, CLNC12 is connected through EVOCOMM-25 cable to SFPKSS4 or SFPKSS8 (refer to instruction sheet L4474), which are connected to the SFP unit.

This cable is supplied with the following features:

- PUR 4x AWG20 + 1xaxAWG26.
- 4 x Power supply 24 V 16A.
- Temperature range: -20ºC ... +70ºC.
- Length 25 m.
- Connection male M12 0º - male M12 0º.

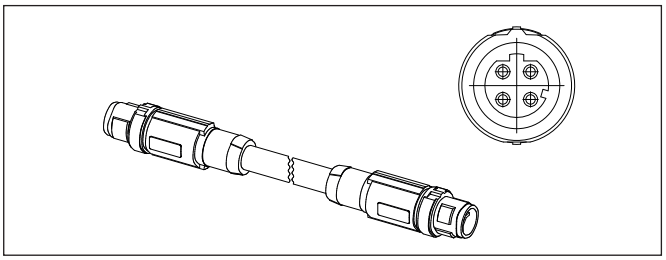


Figure 3: EVOCOMM-25 Cable Detail

7.1.2 Power cords 100 - 240V.

This cable supplies CLNC12 controller with electric power. It has the following features:

- IEC 13C 115/240V AC 10 A.
- Length 5 m.
- Male type CEE 7/7 and type B / female IEC 320 C13.

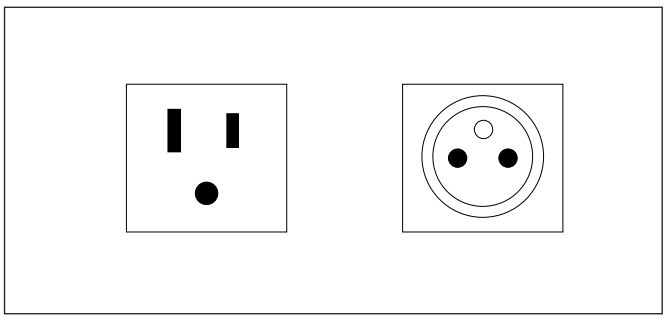


Figure 4: Type of Power Cords Supplied

7.2 CLNC12 Panel

The CLNC12 panel includes the controls to switch the controller on (see Figure 1).

1. Touch screen: In this screen the user can type, visualize and select the type of movement of the SFP, EVO or EVOP while working in the synchronized mode.
2. ON/OFF switch 115/230V electric supply plug: This is the connection where the CLNC12 power cord is plugged in. Through the switch, the user can turn the controller on or off.
3. Wireless antenna connection: This is the connection for wireless mode. This mode is only available under request.
4. Communication IN plug: This connector allows communication with the controller in synchronized applications.
5. Communication OUT plug: This connector allows communication with the controller in synchronized applications.
6. USB connection: A USB memory stick can be connected in this plug to save the movements values.
7. Ethernet connection: This connection is for service connection only. It is used by Enerpac Service Centre to load or modify the internal software.
8. Emergency stop button: Push this button under an emergency to stop the movement.
9. Keypad: This keyboard has a set of buttons for operating purposes.

7.3 Keypad

The major components of the Keypad are (see Figure 2):

1. System OK light: This light is on when the system is connected properly, without any alarm, and ready to work.
2. Start Cycle button: The user must push this button to start any movement with the cylinders.
3. Pause Cycle button: In automatic movements, this button is used to temporarily stop the movement. Pushing this button the values of the current movement (position, pressure, etc.) will be stored until the system is re-started. To restart the movement, the user must push the Start Cycle button.
4. Stop Cycle button: The user must push this button to stop any movement in the automatic mode.

The difference with the Pause Cycle button is that when this button is pushed, the parameters of the movement will be reset into the initial position of the cycle.

5. Reset alarms button: The operator must push this button to reset an alarm once the reason of the alarm has been solved.
6. Start Motor button: This button is used to start the central motors remotely when EVOs or EVOPs systems are connected. When working with SFPs, this button does not allow the motor to be switched on remotely, so the green light shows that the motor of the pump is switched on.
7. Stop Motor button: Pushing this button, the motor of the pump will be switched off.

There is a colour code in the keypad for every button. The following paragraphs detail the meaning of the button colours:

- Start Cycle:
  - Off: Button not available.
  - White: Cycle ready to start.
  - Green: Cycle running.
- Pause Cycle:
  - Off: Button not available.
  - White: Cycle ready to be paused.
  - Yellow: Cycle paused.
- Stop Cycle:
  - Off: Button not available.
  - Red: Cycle can be stopped.
- System OK:
  - Off: No communication available or stop alarms active.
  - Green: System ready.
- Reset Alarms:
  - Off: No active alarms.
  - Red: Active alarms.

7.4 Installation of SFP in a Network System.

7.4.1 Assigning a Different IP for each SFP.

The user must follow the following steps to connect the SFP in a network with the CLNC12:

1. Four individually numbered micro SD cards are supplied with the Control Box. Each micro SD card must be inserted in each SFP. Refer to the installation point included in the instruction manual L4474 supplied with the kit in order to assign individual IP addresses for each HPU.
2. Install the Control Box (SFPKSS4 or SFPKSS8) in each SFP frame. Refer to the installation point included in the instruction manual L4474 supplied with the kit.
3. Assign a different IP for each SFP in the network.

NOTICE

The user must follow the steps written in the instruction sheet L4474 concerning the IP assigning process. That process must be performed with each SFP isolated (with the pump no connected into the network).

4. Once each SFP has been assigned to an IP, the connection in network can be performed.

7.4.2 Connection into a SFP network

CLNC12 controller can be connected to up to 4 SFP connected in a network. CLNC12 must be connected to a Control Synchro Box with 4 or 8 outputs (SFPKSS4 or SFPKSS8) by the communication cable EVOCOMM-25. Refer to Figure 5 to see an example of a SFP network system communication.

NOTICE

Figure 5 shows the layout to connect CLNC12 to a SFP network. In the picture, CLNC12 controller appears connected to the first SFP, but the controller can be connected to any point of the network between two pumps. If CLNC12 controller is connected in the middle of the network, the EVOCOMM-25 from the previous pump must be connected to the IN plug of the CLNC12 controller and the next pump must be connected with a EVOCOMM-25 coming from the OUT plug.

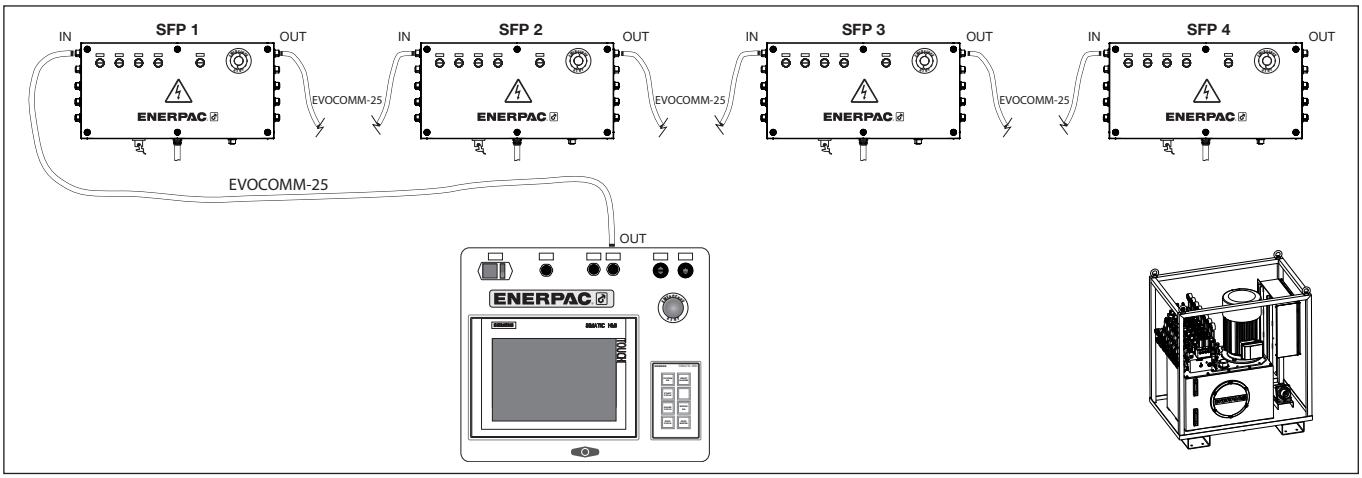


Figure 5: SFP Network Connection Scheme

7.5 Installation of EVO and EVOP in a network system.

7.5.1 Assigning a Different IP for each Unit

Before connecting each EVO or EVOP into the network, the user must follow the following steps. Refer to the pump's instruction sheet for further information:

1. Switch the pump on.
2. Go to the network screen.
3. Select the number of HPU associated with that unit. The number of HPU cannot be repeated. Each unit must have its own number.
4. Go back to the main screen.
5. Once each unit has been assigned to an IP, the connection in network can be performed.

7.5.2 Connection into a EVO or EVOP Network

When CLNC12 controller is connected to up to 4 EVOs or up to 12 EVOPs network, it must be connected directly to an EVO or EVOP by the communication cable EVOCOMM-25. Refer to Figure 6 for an example of an EVO/EVOP network system communication.

NOTICE

Figure 6 shows the layout to connect CLNC12 to a EVO/EVOP network. In the picture, CLNC12 controller appears connected to the first EVO, but the controller can be connected to any point of the network between two pumps. If CLNC12 controller is connected in the middle of the network, the EVOCOMM-25 from the previous pump must be connected to the IN plug of the CLNC12 controller and the next pump must be connected with a EVOCOMM-25 coming from the OUT plug (same procedure with EVOP).

8. SFP Screens

8.1 SFP Initial Screen

Figure 7: SFP Initial Screen

This is the first screen shown by the system in remote mode. From this screen the operator can access to the rest of screens in the system and set the features for the movements.

When the Start icon on the screen is pushed, the system will inquire the ID and Password to log into the user profile.

NOTICE

The system is submitted with the default user profile which is recorded with the user name: enerpac and password: 100.

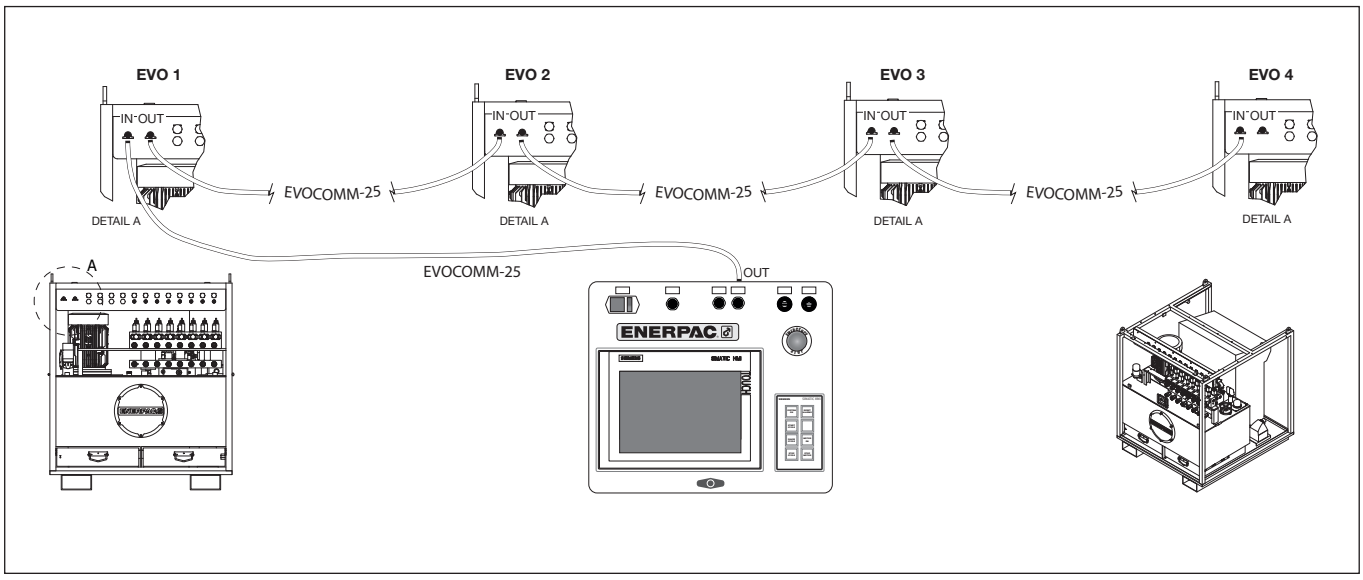


Figure 6: EVO/EVOP Network Connection Scheme

8.2 SFP Selection Screen

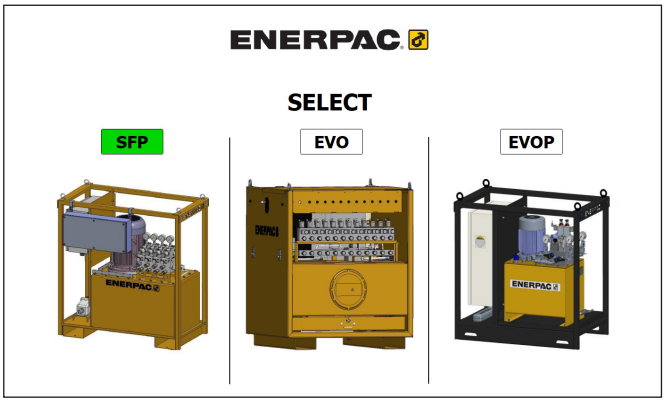


Figure 8: SFP Selection Screen

CLNC12 controller can be connected to different hydraulic equipments from Enerpac. In this screen, the operator can select the system to work with (in this case, SFP). When the system being used is selected, it turns green.

8.3 SFP Main Screen

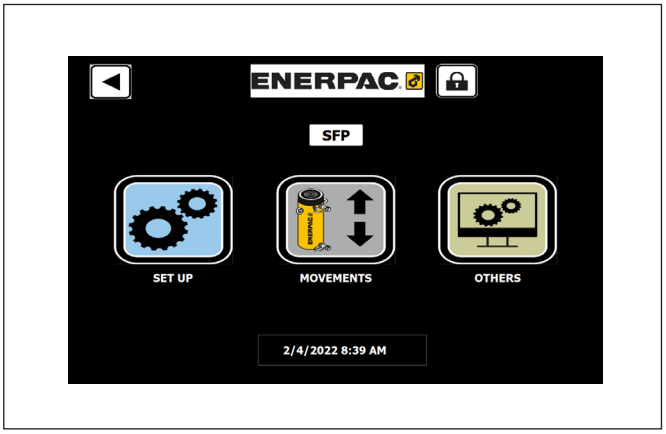


Figure 9: SFP Main Screen

This is the main menu screen of the software in SFP mode. From this screen, the user can access the screens to set up SFP's parameters. These screens are the screens to arrange cylinder's movements and the screens where the operator can adjust other parameters of the software not related with the movements.

8.3.1 SFP Setup Pop Up

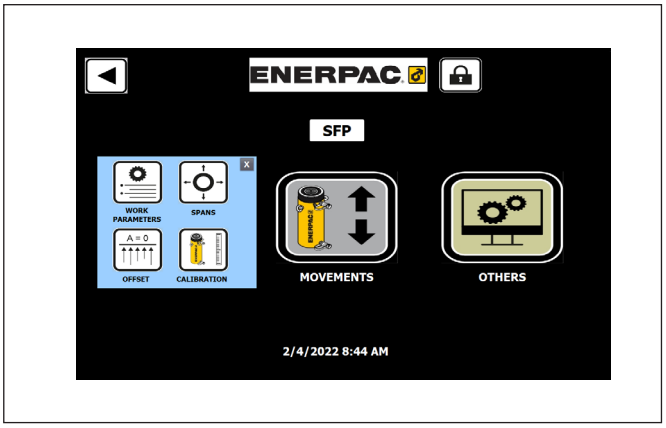


Figure 10: SFP Setup Pop Up

In this pop up the user can access to Work Parameters, Spans, Offset and Calibration screens.

Tapping on each button the user can access the screens of Set Up section.

The background colour of this section is blue. Every screen of this section will have a blue background.

8.3.2 SFP Movements Pop Up

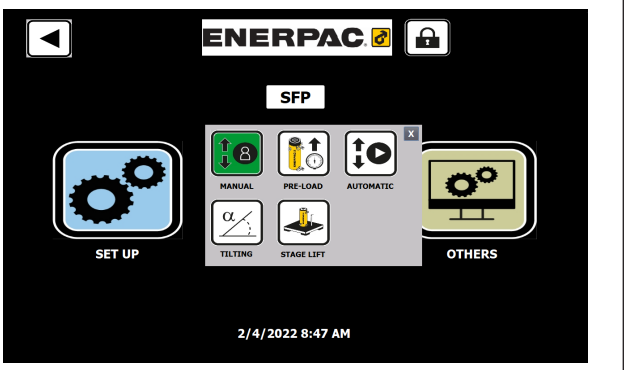


Figure 11: SFP Movements Pop Up

In this pop up the user can access to Manual, Preload, Automatic, Tilting and Stage Lift screens.

Tapping on each button the user can access the screens of movements section.

The background colour of this section is gray. Every screen of this section will have a gray background.

8.3.3 SFP Others Pop Up

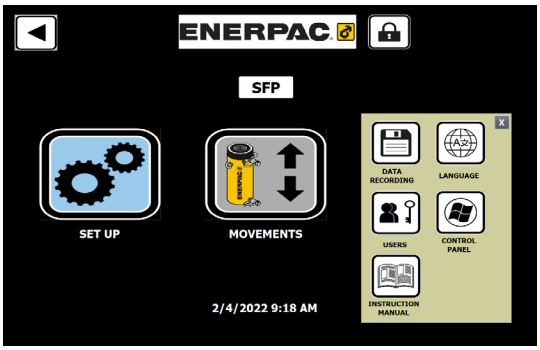


Figure 12: SFP Others Pop Up

In this pop up the user can access to Data Recording, Language, Users, Control Panel and Instruction Manual.

Tapping on each button the user can access the screens of Others section.

The background colour of this section is yellow. Every screen of this section will have a yellow background.

8.3.4 SFP Screen Slides

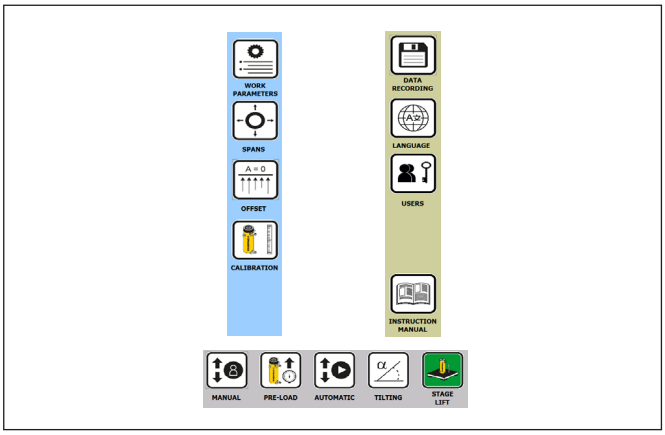


Figure 13: SFP Screen Slides

In the screens of each section there is an arrow which allows to merge a slide with the shortcuts to the screens of the section. Through these slides, the user can easily navigate between the screens.

In order to see the slides of that section, the user must tap the arrow placed in the screen. This arrow is set in a different place in each section. For Set up section the arrow is placed on the left of the screen, for the Movements section the arrow is placed on the lower right corner of the screen and for the Others section the arrow is on the right of the screen. Refer to Figure 13 to see the slides of every section.

8.4 SFP Screen's Header

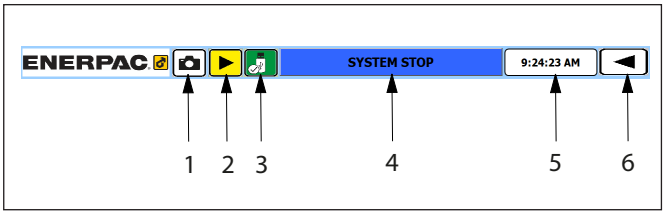


Figure 14: SFP Screen's Header

The software has a common header for all screens. This header has the following buttons (Refer to Figure 12):

1. Snapshot: This button makes a snapshot of the current screen and saves it in the USB memory inserted by the user. The screenshots are saved as PDF in "wincc_date" format.
2. Recording button: Pushing this button the user can start, pause and stop the data recording of the current movement. These values will be saved in the USB memory.
3. USB button: This button shows the status of the USB recording.
4. System status indicator: In this section the software displays the status of the system.
5. Time section: This section shows the current time. The local time can be adjusted in the control panel of the system. Refer to paragraph 8.17 for further details.
6. Back button: Through this button, the user can go to the previous screen.

8.5 SFP Work Parameters Screen

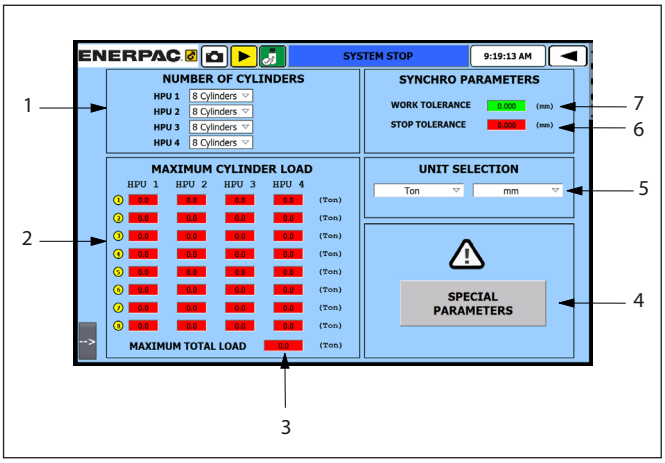


Figure 15: SFP Work Parameters Screen

In this screen the user must define some features and security parameters of the system. In this screen there are the following components:

1. Number of cylinders: The user must type the number of cylinders working with each HPU connected to the controller.
2. Maximum cylinder load: The user must type the maximum load expected for each cylinder. When this value is exceeded a warning alarm will be shown by the system but the movement will not be stopped.
3. Maximum total load: The user must type the maximum load expected of the cylinders involved in the current application. When this value is exceeded the movement will be stopped by the system.

WARNING

The maximum load expected of the cylinders must always be lower than the cylinde's capacity. Refer to the cylinder's features to know the maximum capacity of each cylinder.

4. Special Parameters button: Pushing this button, the user can access to the special parameters screen (refer to paragraph 8.5.1 for further details). The system will require an user name (parameters) and password (200).
5. Units Selection: The user can select the units whereby the system will show the values. This values can be:
   - Load units: lbs/1000, Ton (1000 kg), s Ton (2000 lbs) and kN.
   - Distance units: mm or inches.
6. Work tolerance: The user can type the synchronization value between the most extended and the most retracted cylinder. If this value is exceed the system will stop the movement of the most extended cylinder until the most retracted cylinder reaches the typed range.
7. Stop tolerance: When multiple cylinders work in a synchronized application, there is a range of desynchronization between the most extended and the most retracted cylinder. The user must

type in this box which is the maximum admissible value between the most extended and the most retracted cylinder. If this value is exceed the system will stop the movement through a stop alarm.

8.5.1 SFP Special Parameters Screen

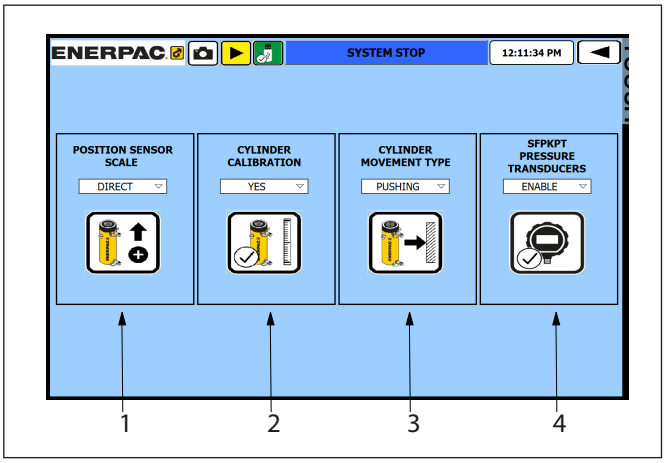


Figure 16: SFP Special Parameters Screen

The access to this screen is locked by an ID (parameters) and password (200). The user can access to this screen from the Parameters screen (refer to paragraph 8.5).

These are the buttons shown in this screen:

1. Position sensor scale: Depending on where the stroke sensor is placed, the user must select between direct or indirect movement. When the cylinder's plunger movement and the stroke sensor's wire are extending (positive movement), the movement is called direct. When the cylinder is extending but the stroke sensor wire is retracting (negative movement) the movement is called indirect. Refer to Figure 17 for further details.

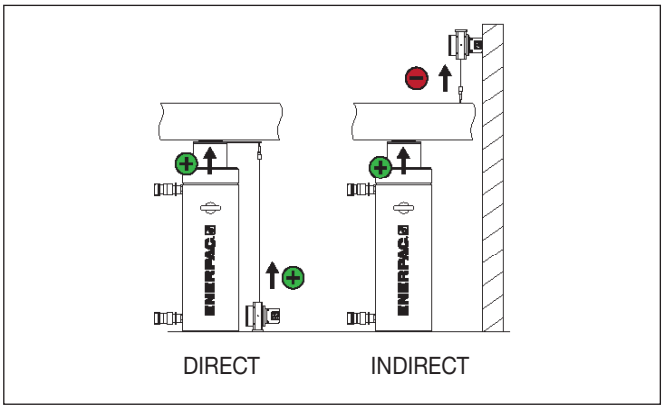


Figure 17: Direct and Indirect Layout

2. Cylinder calibration selection: The user must set if the calibration is going to be carried out or not, depending on the type of cylinder used. Refer to Figure 18 for details.

NOTICE

Calibration operation must be carried out depending on how the hook of the stroke sensor is attached. If the hook is attached to the cylinder's rod, or if an internal stroke sensor is used, the calibration must be performed. If the hook is attached directly to the load to be moved, then the calibration must be avoided.

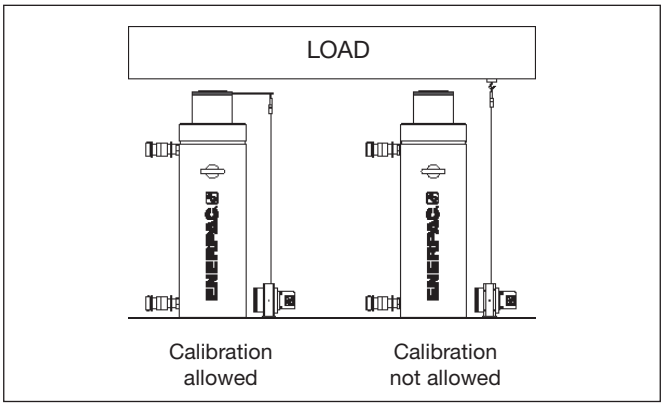


Figure 18: Calibration conditions

3. Cylinder movement type: This button allows the operator to choose between pushing and pulling applications.
4. SFPKPT kit installed: When the pressure transducer kit is installed this option must be enabled in order to see the hidden options in the rest of the screens.

8.6 SFP Spans Screen

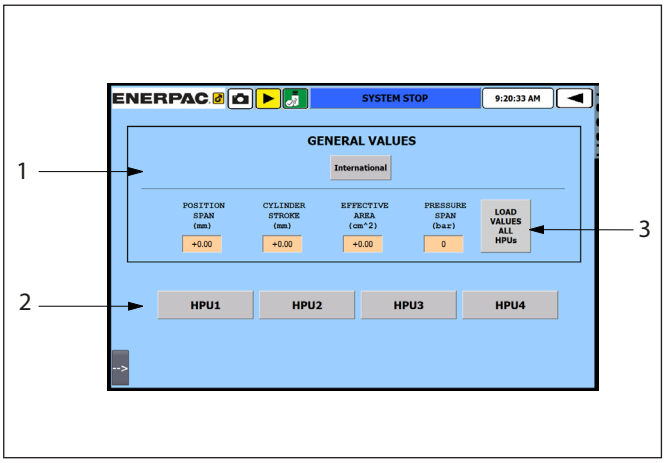


Figure 19: SFP Spans Screen

In this screen the user can enter the parameters of the elements used with the SFP in the movements, such as the cylinders installed in the application, to set the calculations of the movement.

These are the buttons shown in this screen:

1. Units button: The user can switch a different units system pushing this button. The units can be international for the International System of Units, or Imperial for the Imperial System of Units.
2. Hydraulic power unit: The user can select the HPU to apply the parameters (see Figure 20).
3. Load values button: With this button the user can copy identical spans values to all HPUs working in the synchronization.

The user can access to the Spans Parameters screen pressing on the HPU icon. In the boxes the user can type the following data (refer to Figure 20):

1. Position span: The user must type the maximum range of the stroke sensor which monitors the cylinder.

NOTICE

The standard stroke sensors position spans are 100, 125, 375, 500 ,750, 1000, 1250 and 2000 mm.

2. Cylinder stroke: The user must type the maximum stroke of the cylinder.
3. Effective area: The user must type the surface area of the pushing side of the cylinder.

NOTICE

Information of sensors and cylinders is available either on the product label or online at www.enerpac.com.

4. Pressure span: The user must type the pressure transducer's maximum range.

NOTICE

Stardard pressure transducers have a maximum reading of 11,600 psi (800 bar).

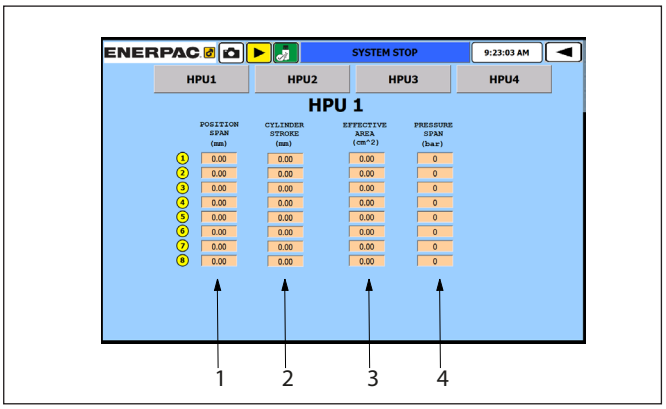


Figure 20: SFP Spans Parameters

8.7 SFP Offset Screen

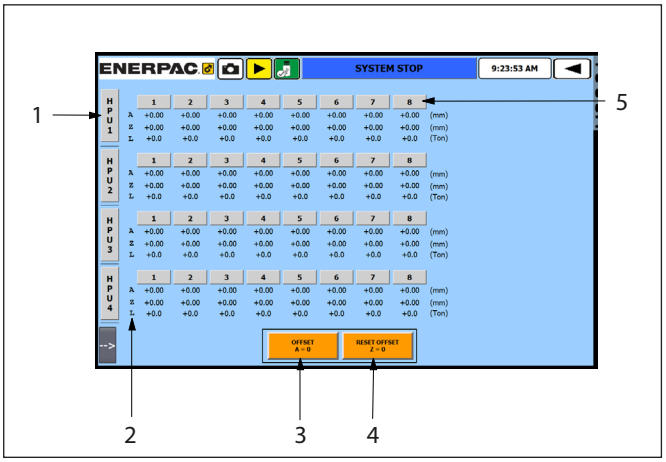


Figure 21: SFP Offset Screen

Offset is generally used to have a dimension reference when a load is going to be lifted to an unknown dimension and that load is subsequently lowered to the same location. Since the wire of the stroke sensor will normally need to be extended a short distance to engage the bottom of the load, the offset screen can save that value so the user can reference that starting point after the lift is completed. By assigning an offset value prior to start lifting the load, the user will have a reference point where the lift started.

"A" value normally represents the absolute extension of the stroke sensor between 0 and full extension. When the user presses and holds the Offset button (A=0), the current "A" value is stored in the memory as "Z", and "A" is reset to zero. "A" now becomes the reference value for the starting point of the lift. When the lift is complete, the user can press Reset button (Z=0) to reset "A" back to normal value.

In this screen the following elements are shown:

1. HPU selection buttons: The user must select the HPUs which will be involved in the movement or operation.
2. Movement values: There are some values that the system can show during the movement. These are:
   - A (Absolute position): The absolute position is the position of the cylinder's stroke sensor taken from the initial zero. This initial zero is the zero set in the calibration screen (refer to paragraph 8.8 for further details).
   - Z (Offset variable): Memory variable for a movement reference.
   - L (Load withstood by cylinder): This value shows the load being withstood by the cylinder.
3. Offset button: Push and hold this button for 3 seconds to convert value A into 0 and Z will keep the current value of A.

NOTICE

The offset value does not disappear when the equipment is turned off or there is a power failure. This value is maintained until the operator performs a reset of the Offset value.

4. Reset Offset button: Push and hold this button for 3 seconds to convert value Z into 0 and A will take the current value of Z and will add it to the current value.

$$A_f = A_i + Z$$

5. Cylinder selection buttons: The user must select the cylinders which will be involved in the movement or operation.

8.8 SFP Calibration Screen

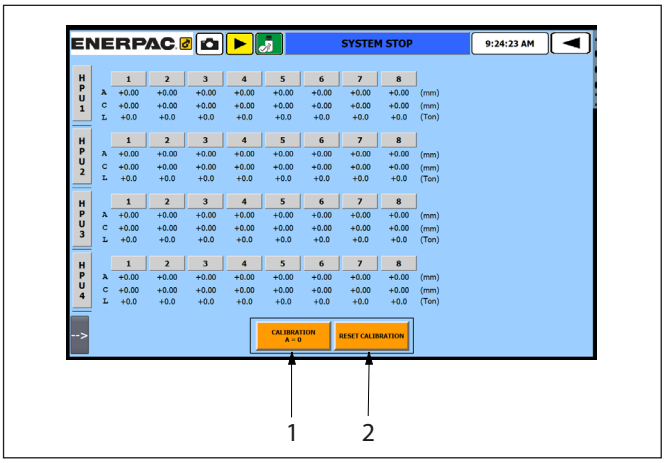


Figure 22: SFP Calibration Screen

When the stroke sensor wire is connected to the cylinder‘s rod, or if an internal stroke sensor is used, the system reads the extended length of the sensor (A value). In that moment, A has a real reading of the sensor. Refer to Figure 22 for details.

To equalize the stroke sensor position with the rod position, the user must carry on the calibration of the cylinder. When the calibration work is performed, the cylinder will have value A = 0 when retracted.

This screen has similar elements to the Offset screen. Two buttons are different:

1. Calibration: If the calibration is allowed, based on the location of the stroke sensor (refer to paragraph 8.5.1 for further details), this button allows calibrating (equalize the cylinder and the stroke sensor) and will set the Absolute position of the cylinder (A = 0).

The user must push and hold for 3 seconds this button to make the value effective.

CAUTION

This step should only be performed with the sensor connected to the cylinder’s rod fully retracted to ensure the sensor will be properly calibrated.

2. Reset Calibration button: If something goes wrong during calibration work, this button allows the operator to get back to the previous value of the Absolute position and reset the calibration done.

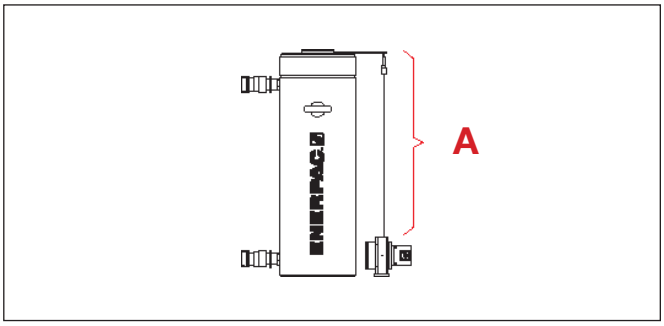


Figure 23: A value in a general purpose cylinder

8.9 SFP Manual Screen

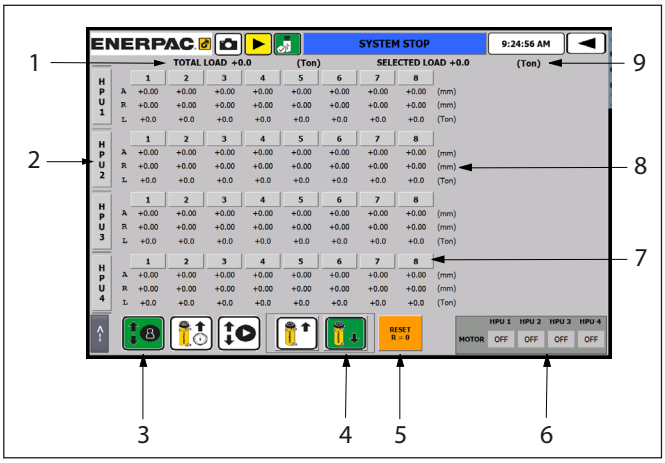


Figure 24: SFP Manual Screen

This screen belongs to the movements section. In this section the user must select the type of movement which is going to be executed.

In the case of the manual movements, the user can move the cylinders of the SFP having a total control of the movement. The user can extend or retract the cylinders by pushing and holding the start cycle button (Figure 2, item 2) and stop the movement just releasing the button. This work mode is used to make small positioning movements in the application.

The user can find the following elements in this screen (refer to Figure 24 for reference numbers):

1. Total load value: This value shows the load being withstood by all cylinders. This will be the sum of loads of the complete system.
2. HPU selection buttons: The user must select the HPUs which will be involved in the movement or operation.
3. Manual button: The user must select this button to activate the manual mode. When this button is selected, the background colour of the button will become green.
4. Extend/Retract buttons: When the manual button is selected the user must also choose a direction of motion. This can be extend to get the plunger out of the cylinder, or retract to get the plunger into the cylinder. The user must set what direction of movement is going to be executed.
5. Reset relative position button: When this button is pushed, the relative position of the cylinder is reset to zero. Refer to point 8 of this section for further details about the relative position.
6. Motor state: This section shows if the motor of each SFP connected to the controller is on or off.
7. Cylinder selection buttons: The user must select the cylinders which will be involved in the movement or operation.
8. Movement values: There are some values that the system can show during the movement. These are:
   - A (Absolute position): The absolute position is the position of the sensor taken from the initial zero. This initial zero can be adjusted to match the cylinder plunger position in the calibration screen (refer to paragraph 8.6 for further details).
   - R (Relative position): The relative position is the position of the plunger of the cylinder taken from the last zero set point. This is the reference value that the system uses to maintain synchronization between lifting points. Refer to point 5 of this section to reset position r).
   - L (Load withstood by cylinder): This value shows the load withstood by the cylinder in the current moment.
9. Selected Load value: This value shows the load being withstood by the selected cylinders.

Load values are obtained through the calculation of the pressure in the pressure line of the cylinder and the effective area typed in the spans screen (paragraph 8.6). These values therefore will be approximated with some error margin.

Some points are common elements in the movements screens. This elements will not be explained again in the following paragraphs.

8.10 SFP Preload Screen

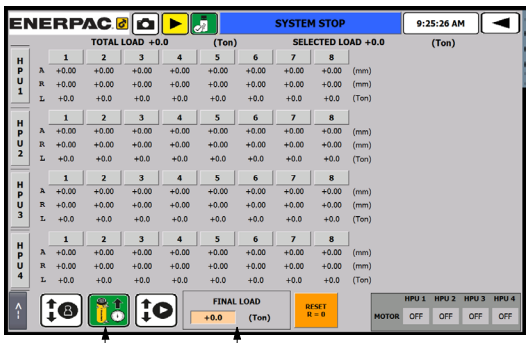


Figure 25: SFP Preload Screen

Preload screen contains similar elements to the Manual screen (Figure 24). The only changes are elements shown in Figure 25.

In this work mode, the operator has to define a target load that the cylinder must sustain. Cylinder piston will automatically move until it comes to support the specified load.

There are two important elements in this screen:

1. Preload button: Select this button to set the preload movement in the system. When this button is selected, the background colour of the button will become green.
2. Final Load parameter: The user must type the final load that the cylinder must reach to finish the cycle.

NOTICE

Enerpac recommends setting the final load value to less than 10% of the expected load.

NOTICE

In this work mode, cylinders will not perform synchronous movements. Each cylinder will not reach Final Load value at the same time.

8.11 SFP Automatic Screen

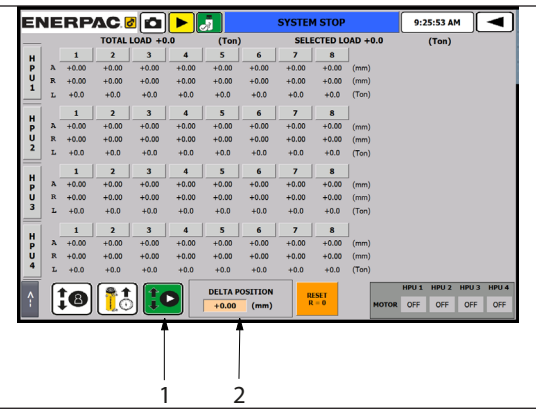


Figure 26: SFP Automatic Screen

Automatic screen contains similar elements to the Manual screen (Figure 24). The only changes are elements shown in Figure 26.

In this work mode the user inputs a distance increment towards which the cylinder moves.

In this screen there are the following elements:

1. Automatic button: Select this button to activate the automatic mode in the movement. When this button is selected, the background colour of the button will become green.
2. Delta Position value: The user must type in this box the increment of the current position which the cylinder must reach in the next cycle. This increment can be positive (if extending cylinders) or negative (if retracting cylinders).

NOTICE

When the cylinder calibration has been performed, the system will not let the user type a value higher than the stroke capacity of the cylinder. It is important the parameter of the cylinder stroke is correctly entered into the Spans screen (paragraph 8.6) to avoid cylinder damage.

When the cylinder calibration is not performed the system will use as the limit of stroke the stroke sensor maximum range, to avoid stroke sensor damage.

8.12 SFP Tilting Screen

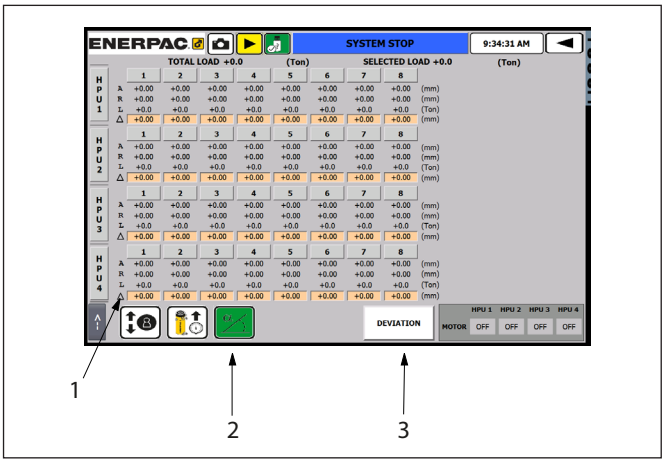


Figure 27: SFP Tilting Screen

Tilting screen contains similar elements to the Manual screen (Figure 24). The only changes are elements shown in Figure 27.

This movement allows making movements with load inclination purposes. This movement allows setting a different delta for each cylinder and make a synchronous movement of every cylinder in such a way that all the cylinders finish at the same time.

In this screen there are the following elements:

1. Delta Final Position: The user must type in this box the increment of the current position which the cylinders must reach in the next cycle. This target can be positive (if extending cylinders) or negative (if retracting cylinders). This value can be set individually for each cylinder, so when working with SFPs in tilting mode, some cylinders can be

retracting while others extend.

2. Tilting mode button: Select this button to set the tilting movement in the system. When this button is selected, the background colour of the button will become green.
3. Deviation button: This button shows the deviation screen. In this screen the user can check the details of the current tilting movement.

CAUTION

At the end of each cycle, all the cylinders will finish at the same time. The cylinders with smaller delta will have more stops and waiting time than those with bigger delta. Consider this features to avoid uncontrolled movements.

CAUTION

In the case of SFP´s, all cylinders will follow one direction when extending or retracting. There can´t be cylinders retracting while others are extending.

8.12.1 SFP Deviation Screen

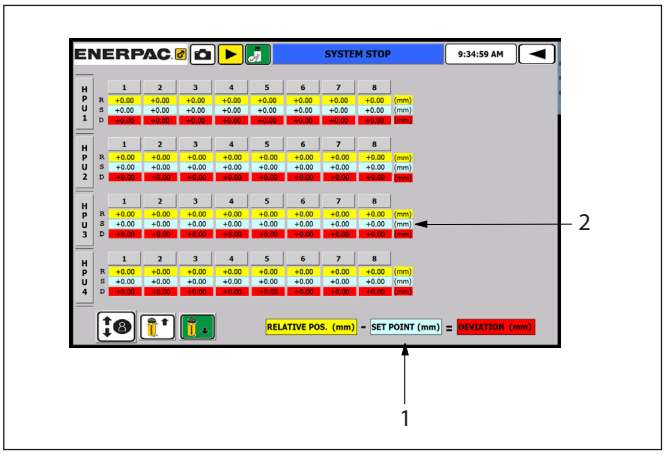


Figure 28: SFP Deviation Screen

In this screen the user can check the details of the current tilting movement.

There are two important elements in this screen:

1. Key formula: This area shows the formula used to make the calculations of tilting movement.

   Relative Position — Set Point = Deviations

2. Values of each cylinder to make the tilting movement:
   - R (Relative Position): This value shows the current position of the plunger of the cylinder.
   - S (Set Point): This value is the theoretical position which should have the plunger in the current moment, according to the internal calculations made by the system in order to all the cylinders reach the final delta target at the same time.
   - D (Deviation): This value is the difference between the theoretical position that should have the plunger according to the internal calculations of the software (set point), and the real position of the plunger in the current movement (Relative position).

This screen is for information only. The user cannot type or select any value.

8.13 SFP Stage Lift Screen

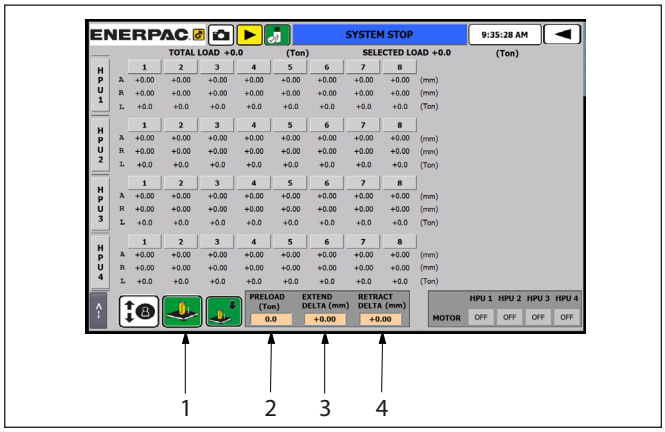


Figure 29: SFP Stage Lift Screen

Stage Lift screen contains similar elements to the Manual screen (Figure 24). The only changes are elements shown in Figure 29.

There are four important elements in this screen:

1. Stage Lift button: Select this button to set the stage lift movement in the system. When this button is selected, the background colour of the button will become green.
2. Preload value: The user must type the load that every cylinder must reach before starting a new cycle. This value is typically used to make contact with the load.
3. Extend Delta value: The user must type the distance cylinders should extend to create a space where operators could insert two outer blocks under the spreading plate. These outer blocks will support the load for the next extension.
4. Retract Delta value: The user must type the distance cylinders should retract to create a space where operators could insert a central block. This central block will support the load for the next movement.

Refer to the paragraph 11.8 for further details on how to use this work mode.

8.14 SFP Data Recording Screen

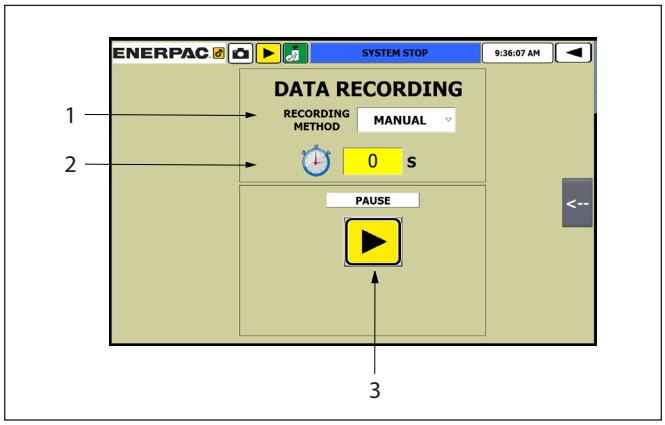


Figure 30: SFP Data Recording Screen

Through this screen the operator can record the movement data into an external drive. In this screen the following elements are shown (refer to Figure 30):

1. Recording method: Select the recording method (manual or automatic) for recording movement data purpose. When manual option is selected, the system will record only when the user pushes the record button. When automatic mode is selected, the system will automatically record the data when the system is moving.
2. Time period: The user must type the frequency of the data recording. The units used are seconds.
3. Recording button: Push this button to start/ pause recording the movements' data in the drive selected. When the button is yellow, the recording is paused and when it is green, the recording is running. If the system detecs any recording failure, icon will be red.

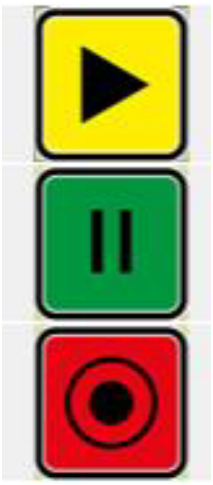


Figure 31: Recording Buttons

8.15 SFP Language Screen

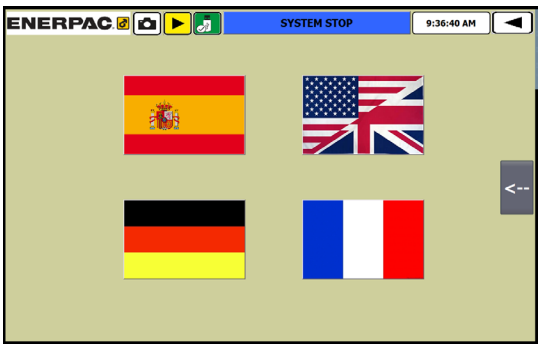


Figure 32: SFP Language Screen

The user can choose the alarms language in this screen. Select the language desired and tap the back button to go to the main screen.

8.16 SFP Language Screen

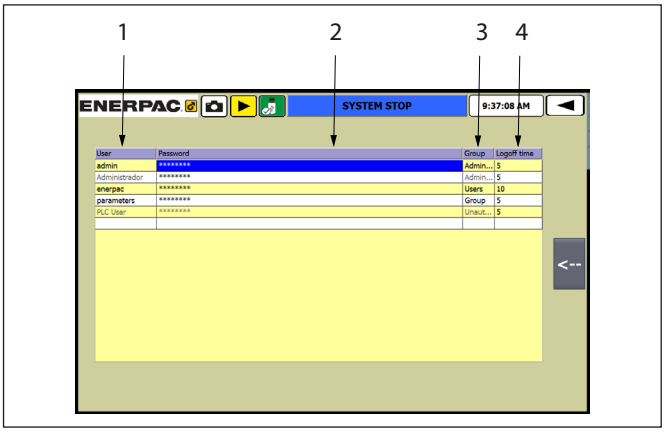


Figure 33: SFP Language Screen

In this screen the user can create and set several users to manage the system. The following elements are shown:

1. User: The operator must tap the cell of the table and type a new user. The system will inquire an ID and Password to log into each user profile.
   - Operator: This user has general access to operate the system. To access this user, it is required to enter the ID "enerpac" and password "100".
   - Expert: The expert has same access rights as the operator but can also access and operate the special parameters within the Work Parameters screen (see paragraph 9.5.1). This actions require a more advanced user because they are parameters that can completely affect the functionality of the equipment. To access this user, it is required to enter the ID "parameter" and password "200".
   - Administrator: This user is for use by factory authorized technicians only.
2. Password: In this column the operator must tap and type the password of each user (refer to point 1 of this section).
3. Group: The operator must tap and choose a group name for that user.
4. Logoff time: The operator must tap and type the number of minutes to log off the system with that user.

8.17 SFP Control Panel Screen

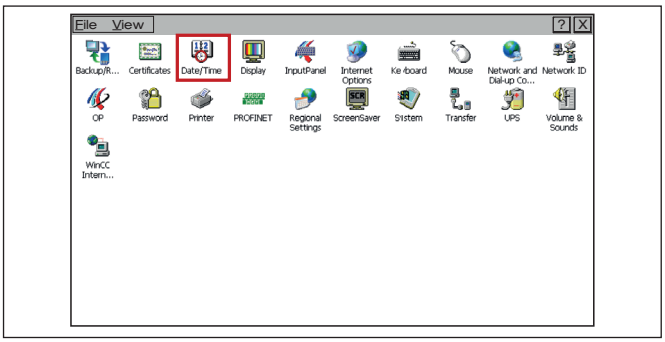


Figure 34: SFP Control Panel Screen

In this screen the user can set the date and time of the system.

8.18 SFP Instruction Manual Screen

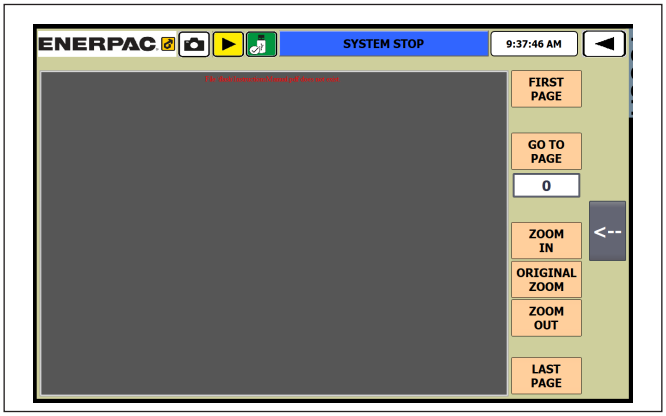


Figure 35: SFP Instruction Manual Screen

In this screen the operator can access to the Instruction Manual of the CLNC12 controller.

9. EVO Screens

9.1 EVO Initial Screen

Figure 36: EVO Initial Screen

This is the first screen shown by the system in remote mode. From this screen the operator can access to the rest of screens in the system and set the features for the movements.

When the Start icon on the screen is pushed, the system will inquire the ID and Password to log into the user profile.

NOTICE

The system is submitted with the default user profile which is recorded with the user name: enerpac and password: 100.

9.2 EVO Selection Screen

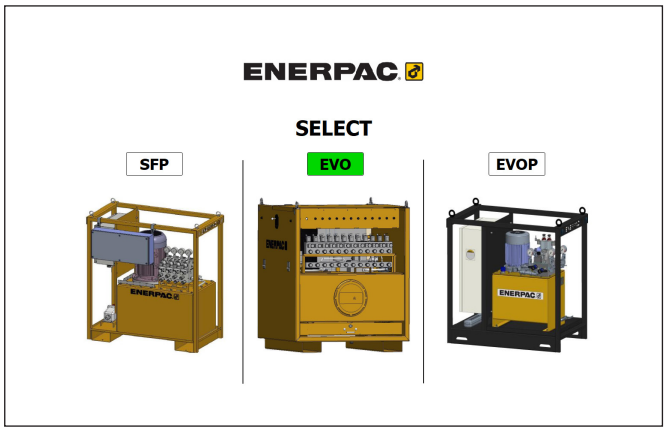


Figure 37: EVO Selection Screen

CLNC12 controller can be connected to different hydraulic equipments from Enerpac. In this screen, the operator can select the system to work with (in this case, EVO). When the system being used is selected, it turns green.

9.3 EVO Main Screen

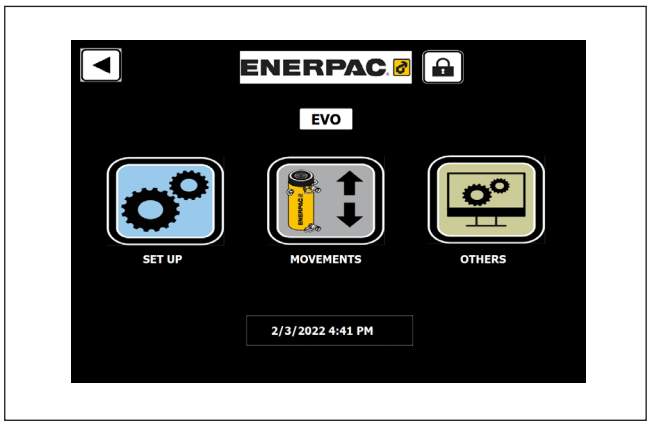


Figure 38: EVO Main Screen

This is the main menu screen of the software in EVO mode. From this screen, the user can access the screens to set up EVO's parameters. These screens are the screens to arrange cylinder's movements and the screens where the operator can adjust other parameters of the software not related with the movements.

9.3.1 EVO Setup Pop Up

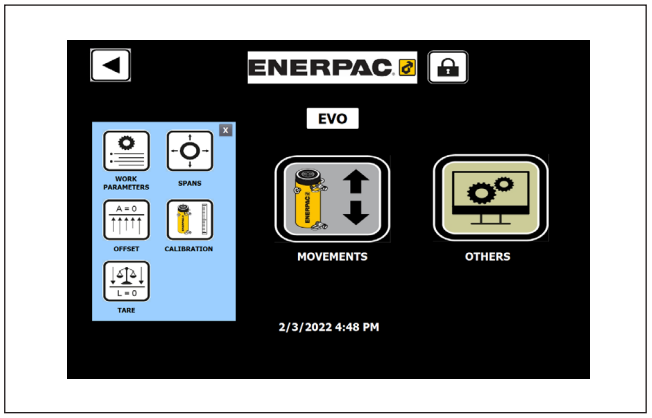


Figure 39: EVO Setup Pop Up

In this pop up the user can access to Work Parameters, Spans, Offset, Calibration and Tare screens. Tapping on each button the user can access the screens of Set Up section. The background colour of this section is blue. Every screen of this section will have a blue background.

9.3.2 EVO Movements Pop Up

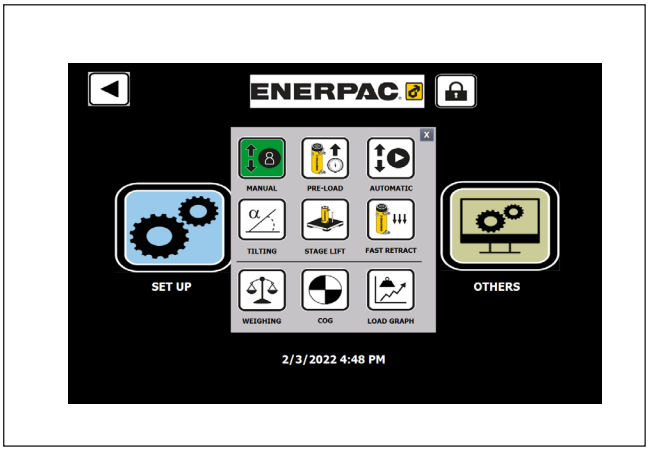


Figure 40: EVO Movements Pop Up

In this pop up the user can access to Manual, Preload, Automatic, Tilting, Stage Lift, Fast Retract, Weighing, COG and Load Graph screens.

Tapping on each button the user can access the screens of movements section. The background colour of this section is gray. Every screen of this section will have a gray background.

9.3.3 EVO Others Pop Up

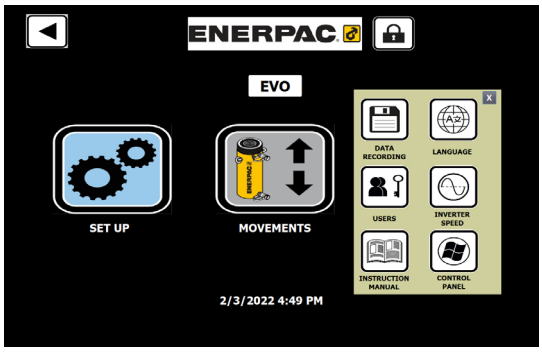


Figure 41: EVO Others Pop Up

In this pop up the user can access to Data Recording, Language, Users, Inverted Speed, Instructon Manual and Control Panel screens.

Tapping on each button the user can access the screens of Others section. The background colour of this section is yellow. Every screen of this section will have a yellow background.

9.3.4 EVO Screen Slides

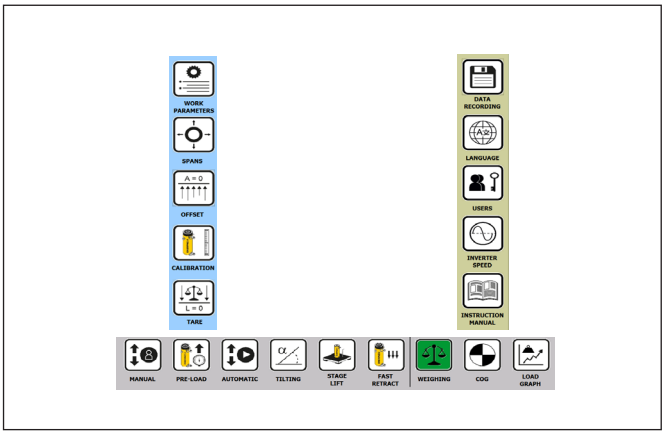


Figure 42: EVO Screen Slides

In the screens of each section there is an arrow which allows to merge a slide with the shortcuts to the screens of the section. Through these slides, the user can easily navigate between the screens.

In order to see the slides of that section, the user must tap the arrow placed in the screen. This arrow is set in a different place in each section. For Set up section the arrow is placed on the left of the screen, for the Movements section the arrow is placed on the lower right corner of the screen and for the Others section the arrow is on the right of the screen. Refer to Figure 42 to see the slides of every section.

9.4 EVO Screen's Header

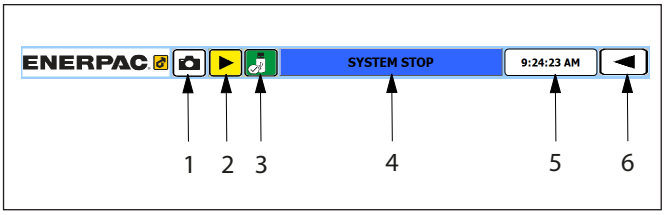


Figure 43: EVO Screen's Header

The software has a common header for all screens. This header has the following buttons (Refer to Figure 43):

1. Snapshot: This button makes a snapshot of the current screen and saves it in USB memory.
2. Recording button: Pushing this button the user can start, pause and stop the data recording of the current movement. These values will be saved in the USB memory.
3. USB button: This button shows the status of the USB recording.
4. System status indicator: In this section the software displays the status of the system.
5. Time section: This section shows the current time. The local time can be adjusted in the control panel of the system. Refer to paragraph 9.24 for further details.
6. Back button: Through this button, the user can go to the previous screen.

9.5 EVO Work Parameters Screen

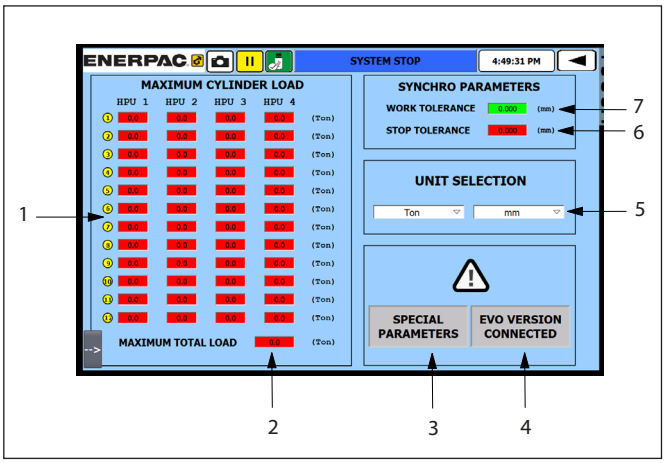


Figure 44: EVO Work Parameters Screen

In this screen the user must define some features and security parameters of the system. In this screen there are the following components:

1. Maximum cylinder load: The user must type the maximum load expected for each cylinder. When this value is exceeded a warning alarm will be shown by the system but the movement will not be stopped.
2. Maximum total load: The user must type the maximum load expected of the cylinders involved in the current application. When this value is exceeded the movement will be stopped by the system.

WARNING

The maximum expected load of the cylinders must always be lower than the capacity of the cylinders. Refer to the features of the cylinder to know the maximum capacity of each cylinder.

3. Special Parameters button: Pushing this button, the user can access to the special parameters screen (refer to paragraph 9.5.1 for further details). The system will require an user name (parameters) and password (200).
4. EVO version connected button: Pushing this button, the user can access to the EVO version connected screen (refer to paragraph 9.5.2 for further details). The system will require an user name (parameters) and password (200).
5. Units Selection: The user can select the units whereby the system will show the values. This values can be:
   - Load units: lbs/1000, Ton (1000 kg), s Ton (2000 lbs) and kN.
   - Distance units: mm or inches.
6. Stop tolerance: When multiple cylinders work in a synchronized application, there is a range of desynchronization between the most extended and the most retracted cylinder. The user must type the maximum admissible value between the most extended and the most retracted cylinder. If this value is exceed the system will stop the movement through a stop alarm.
7. Work tolerance: The user must type in this box which is the synchronization value between the most extended and the most retracted cylinder. If this value is exceed the system will stop the movement of the most extended cylinder until the most retracted cylinder reaches the range typed.

9.5.1 EVO Special Parameters Screen

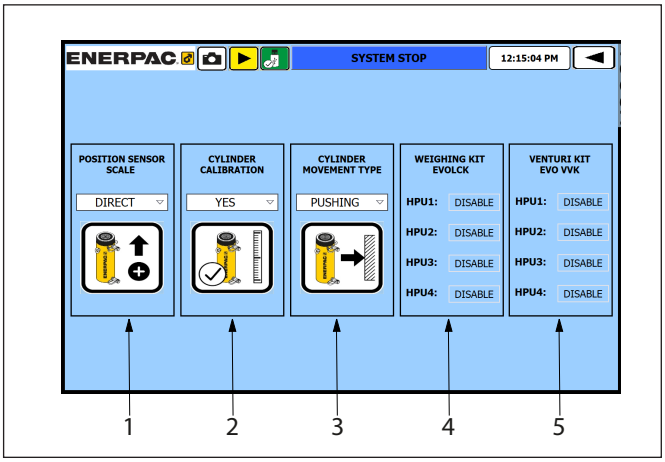


Figure 45: EVO Special Parameters Screen

The access to this screen is locked by an ID (parameters) and password (200). The user can access to this screen from the Parameters screen (refer to paragraph 9.5).

These are the buttons shown in this screen:

1. Position sensor scale: Depending on where the stroke sensor is placed, the user must select between direct or indirect movement. When the cylinder's plunger movement and the stroke sensor's wire are extending (positive movement), the movement is called direct. When the cylinder is extending but the stroke sensor wire is retracting (negative movement) the movement is called indirect. Refer to Figure 46 for further details.

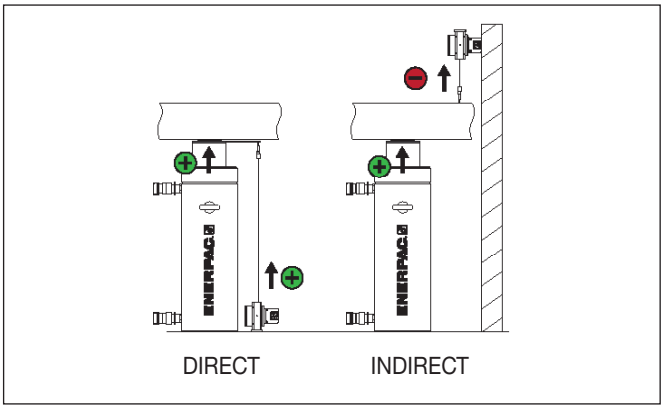


Figure 46: Direct and Indirect Layout

2. Cylinder calibration selection: The user must set if the calibration is going to be carried out or not, depending on the type of cylinder used. Refer to Figure 47 for details.

NOTICE

Calibration operation must be carried out depending on how the hook of the stroke sensor is attached. If the hook is attached to the cylinder's rod, or if an internal stroke sensor is used, the calibration must be performed. If the

hook is attached directly to the load to be moved, then the calibration must be avoided.

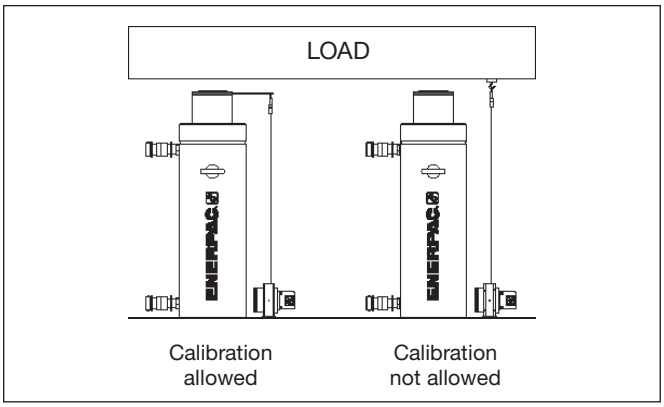


Figure 47: Calibration Conditions

3. Cylinder movement type: This button allows the operator to choose between pushing and pulling applications.
4. Weighing kit EVOLCK installed: When the weighing kit is installed this option must be enabled in order to see the hidden options in the rest of the screens.
5. Venturi kit VVK installed: When the venturi kit is installed this option must be enabled in order to see the hidden options in the rest of the screens.

9.5.2 EVO Version Connected Screen

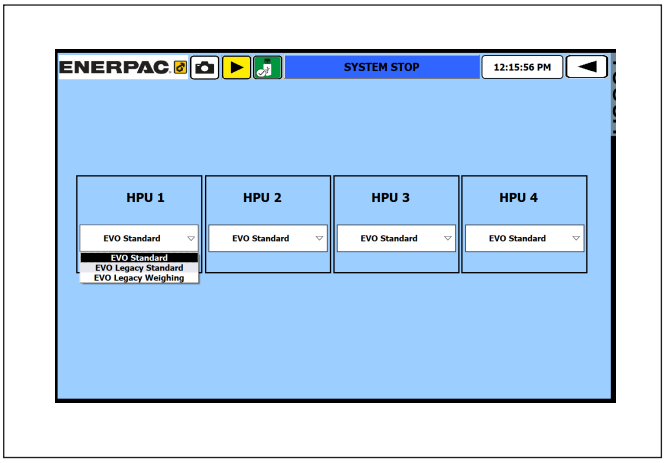


Figure 48: EVO Version Connected Screen

The access to this screen is locked by an ID (parameters) and password (200). The user can access to this screen from the Parameters screen (refer to paragraph 9.5).

In this screen the user can select the EVO versions connected to the CNCL12 between EVO Standard, EVO Legacy Standard and EVO Legacy Weighing.

9.6 EVO Spans Screen

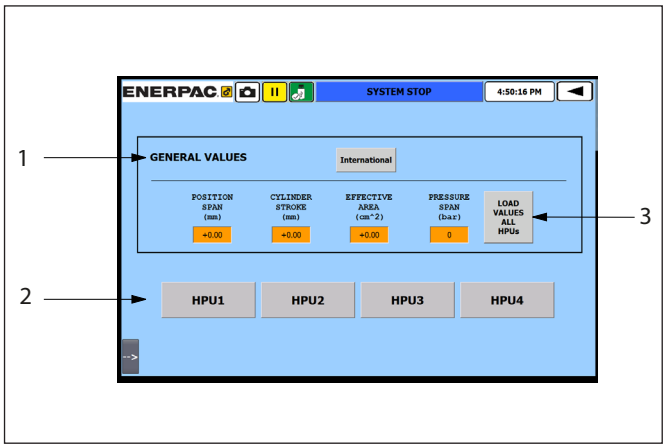


Figure 49: EVO Spans Screen

In this screen the user can enter the parameters of the elements used with the EVO system in the movements, such as the cylinders installed in the application, to set the calculations of the movement.

These are the buttons shown in this screen:

1. Units button: The user can switch a different units system pushing this button. The units can be international for the International System of Units, or Imperial for the Imperial System of Units.
2. Hydraulic power unit: The user can select the HPU to apply the parameters (see Figure 49).
3. Load values button: With this button the user can copy identical spans values to all HPUs working in the synchronization.

The user can access to the Spans Parameters screen pressing on the HPU icon. In the boxes the user can type the following data (refer to Figure 49):

1. Position span: The user must type the maximum range of the stroke sensor which monitors the cylinder.

NOTICE

The standard stroke sensors position spans are 100, 125, 375, 500 ,750, 1000, 1250 and 2000 mm.

2. Cylinder stroke: The user must type the maximum stroke of the cylinder.
3. Cylinder load sensor: Load sensors are set in local mode. Refer to L202210310 instruction sheet for further information.
4. Effective area: The user must type the surface area of the pushing side of the cylinder.

NOTICE

Information of sensors and cylinders is available either on the product label or online at www.enerpac.com.

5. Pressure span: The user must type the pressure transducer's maximum range.

NOTICE

Stardard pressure transducers have a maximum reading of 11,600 psi (800 bar).

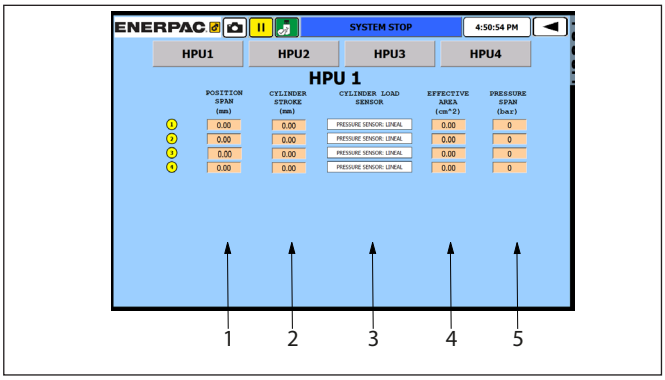


Figure 50: EVO Spans Parameters

9.7 EVO Offset Screen

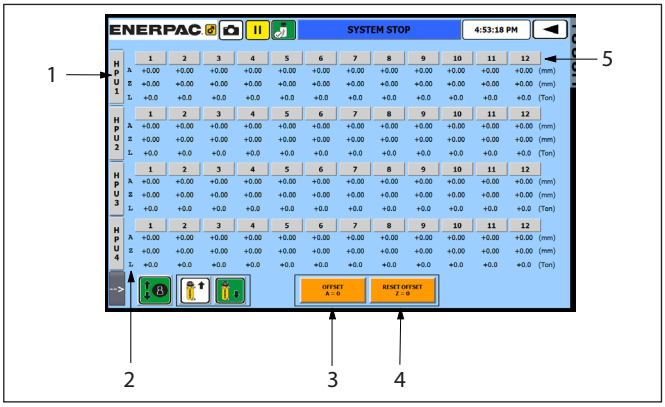


Figure 51: EVO Offset Screen

Offset is generally used to have a dimension reference when a load is going to be lifted to an unknown dimension and that load is subsequently lowered to the same location. Since the wire of the stroke sensor will normally need to be extended a short distance to engage the bottom of the load, the offset screen can save that value so the user can reference that starting point after the lift is completed. By assigning an offset value prior to start lifting the load, the user will have a reference point where the lift started.

“A” value normally represents the absolute extension of the stroke sensor between 0 and full extension. When the user presses and holds the Offset button (A=0), the current “A” value is stored in the memory as “Z”, and “A” is reset to zero. “A” now becomes the reference value for the starting point of the lift. When the lift is complete, the user can press Reset button (Z=0) to reset “A” back to normal value.

In this screen the following elements are shown:

1. HPU selection buttons: The user must select the HPUs which will be involved in the movement or operation.
2. Movement values: There are some values that the system can show during the movement. These are:
   - A (Absolute position): The absolute position is the position of the cylinder’s stroke sensor taken from the initial zero. This initial zero is the zero set in the calibration screen (refer to paragraph 9.8 for further details).
   - Z (Offset variable): Memory variable for a movement reference.
   - L (Load withstood by cylinder): This value shows the load being withstood by the cylinder.
3. Offset button: Push and hold this button for 3 seconds to convert value A into 0 and Z will keep the current value of A.

NOTICE

The offset value does not disappear when the equipment is turned off or there is a power failure. This value is maintained until the operator performs a reset of the Offset value.

4. Reset Offset button: Push and hold this button for 3 seconds to convert value Z into 0 and A will take the current value of Z and will add it to the current value.

$$A_f = A_i + Z$$

5. Cylinder selection buttons: The user must select the cylinders which will be involved in the movement or operation.

9.8 EVO Calibration Screen

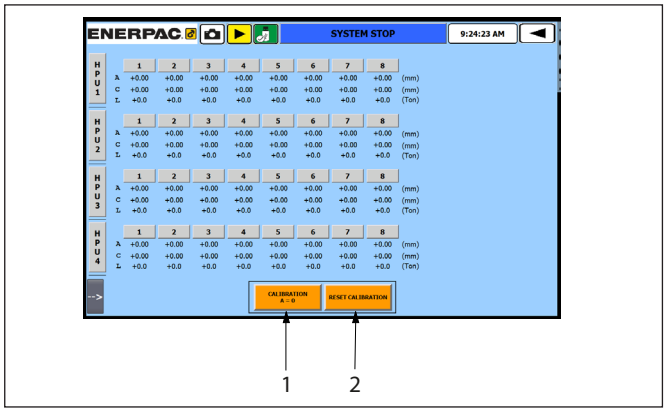


Figure 52: EVO Calibration Screen

A

When the stroke sensor wire is connected to the cylinder‘s rod, or if an internal stroke sensor is used, the system reads the extended length of the sensor (A value). In that moment, A has a real reading of the sensor. Refer to Figure 53 for details.

To equalize the stroke sensor position with the rod position, the user must carry on the calibration of the cylinder. When the calibration work is performed, the cylinder will have value A = 0 when retracted.

This screen has similar elements to the Offset screen. Two buttons are different:

1. Calibration: If the calibration is allowed, based on the location of the stroke sensor (refer to paragraph 9.5.1 for further details), this button allows calibrating (equalize the cylinder and the stroke sensor) and will set the Absolute position of the cylinder (A = 0).

The user must push and hold for 3 seconds this button to make the value effective.

CAUTION

This step should only be performed with the sensor connected to the cylinder’s rod fully retracted to ensure the sensor will be properly calibrated.

2. Reset Calibration button: If something goes wrong during calibration work, this button allows the operator to get back to the previous value of the Absolute position and reset the calibration done.

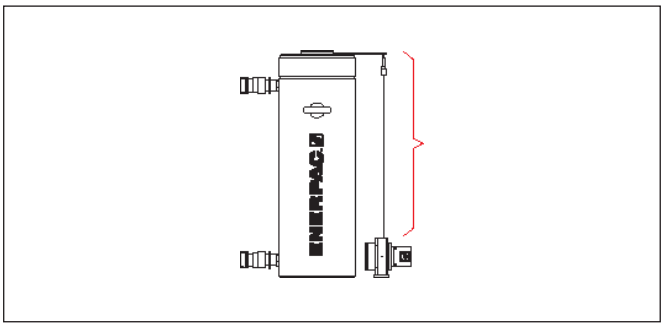


Figure 53: A value in a general purpose cylinder

9.9 EVO Tare Screen

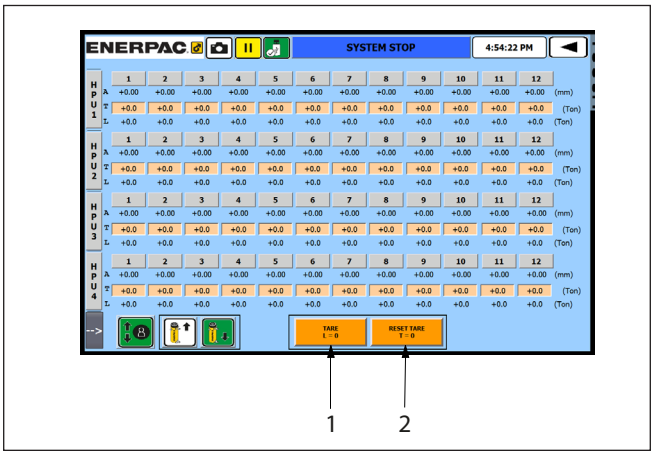


Figure 54: EVO Tare Screen

This screen has similar elements to the Offset screen.

Two buttons are different:

1. Tare: This button allows taring (reducing the displayed load to zero in order to remove the effect of lifting beams or other support structures). This will set the displayed load, L=0. The user must push and hold for 3 seconds this button to make the value effective.
2. Reset Tare button: If something goes wrong during tare work, this button allows the operator to get back to the previous value of load and reset the tare done

9.10 EVO Manual Screen

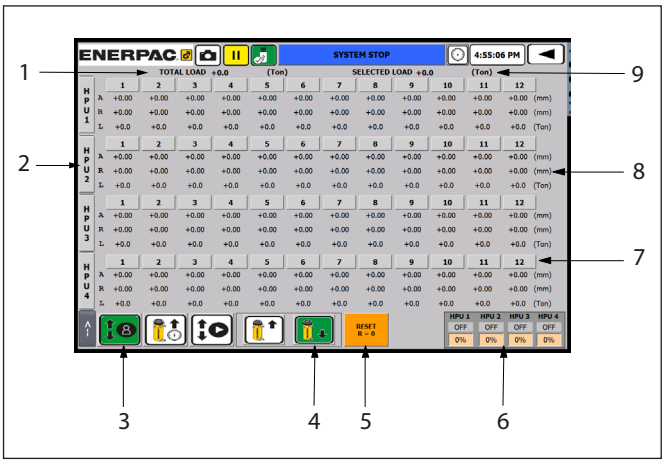


Figure 55: EVO Manual Screen

This screen belongs to the movements section. In this section the user must select the type of movement which is going to be executed.

In the case of the manual movements, the user can move the cylinders of the EVO having a total control of the movement. The user can extend or retract the cylinders by pushing and holding the start cycle button (Figure 2, item 2) and stop the movement just releasing the button. This work mode is used to make small positioning movements in the application.

The user can find the following elements in this screen (refer to Figure 55 for reference numbers):

1. Total load value: This value shows the load being withstood by all cylinders. This will be the sum of loads of the complete system.
2. HPU selection buttons: The user must select the HPUs which will be involved in the movement or operation.
3. Manual button: The user must select this button to activate the manual mode. When this button is selected, the background colour of the button will become green.
4. Extend/Retract buttons: When the manual button is selected the user must also choose a direction of motion. This can be extend to get the plunger out of the cylinder, or retract to get the plunger into the cylinder. The user must set what direction of movement is going to be executed.
5. Reset relative position button: When this button is pushed, the relative position of the cylinder is reset to zero. Refer to point 8 of this section for further details about the relative position.
6. Flow button: The user can type the flow of the HPU and control the speed of the movement. This value is a percentage and can be typed between 30 and 100% of the total flow. It corresponds to the speed of the motor.
7. Cylinder selection buttons: The user must select the cylinders which will be involved in the movement or operation.
8. Movement values: There are some values that the system can show during the movement. These are:

- A (Absolute position): The absolute position is the position of the sensor taken from the initial zero. This initial zero can be adjusted to match the cylinder plunger position in the calibration screen (refer to paragraph 9.8 for further details).
- R (Relative position): The relative position is the position of the plunger of the cylinder taken from the last zero set point. This is the reference value that the system uses to maintain synchronization between lifting points. Refer to point 5 of this section to reset position r.
- L (Load withstood by cylinder): This value shows the load withstood by the cylinder in the current moment.

9. Selected Load value: This value shows the load being withstood by the selected cylinders.

Load values are obtained through the calculation of the pressure in the pressure line of the cylinder and the effective area typed in the spans screen (paragraph 9.6). These values therefore will be approximated with some error margin.

Some points are common elements in the movements screens. This elements will not be explained again in the following paragraphs.

9.11 EVO Preload Screen

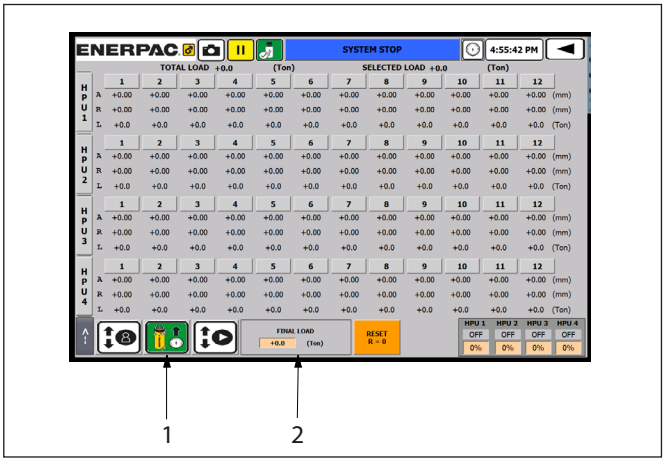


Figure 56: EVO Preload Screen

Preload screen contains similar elements to the Manual screen (Figure 55). The only changes are elements shown in Figure 56.

In this work mode, the operator has to define a target load that the cylinder must sustain. Cylinder piston will automatically move until it comes to support the specified load.

There are two important elements in this screen:

1. Preload button: Select this button to set the preload movement in the system. When this button is selected, the background colour of the button will become green.
2. Final Load parameter: The user must type the final load that the cylinder must reach to finish the cycle.

NOTICE

Enerpac recommends setting the final load value to less than 10% of the expected load.

NOTICE

In this work mode, cylinders will not perform synchronous movements. In this case, due to all cylinders are pumped from one only powerpack, all cylinders are likely to reach Final Load value at the same time.

9.12 EVO Automatic Screen

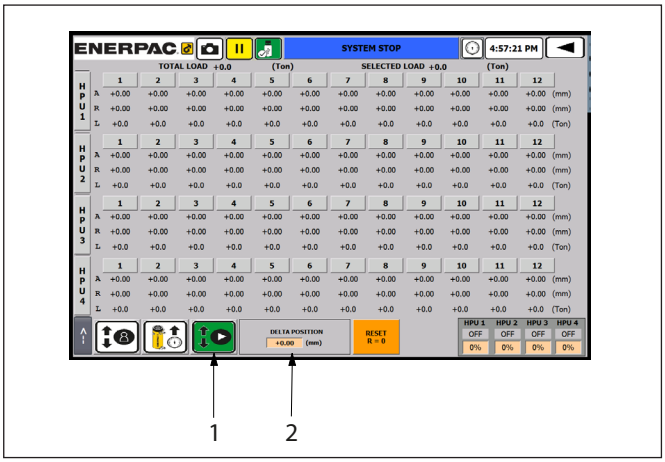


Figure 57: EVO Automatic Screen

Automatic screen contains similar elements to the Manual screen (Figure 55). The only changes are elements shown in Figure 57.

In this work mode the user inputs a distance increment towards which the cylinder moves.

In this screen there are the following elements:

1. Automatic button: Select this button to activate the automatic mode in the movement. When this button is selected, the background colour of the button will become green.
2. Delta Position value: The user must type in this box the increment of the current position which the cylinder must reach in the next cycle. This increment can be positive (if extending cylinders) or negative (if retracting cylinders).

NOTICE

When the cylinder calibration has been performed, the system will not let the user type a value higher than the stroke capacity of the cylinder. It is important the parameter of the cylinder stroke is correctly entered into the Spans screen (paragraph 9.6) to avoid cylinder damage.

When the cylinder calibration is not performed the system will use as the limit of stroke the stroke sensor maximum range, to avoid stroke sensor damage.

9.13 EVO Tilting Screen

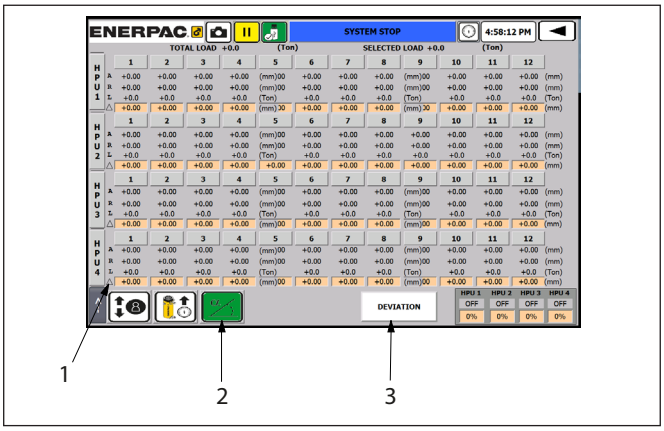


Figure 58: EVO Tilting Screen

This movement allows making movements with load inclination purposes. This movement allows setting a different delta for each cylinder and make a synchronous movement of every cylinder in such a way that all the cylinders finish at the same time.

Tilting screen contains similar elements to the Manual screen (Figure 55). The only changes are elements shown in Figure 58:

1. Delta Final Position: The user must type in this box the increment of the current position which the cylinders must reach in the next cycle. This target can be positive (if extending cylinders) or negative (if retracting cylinders). This value can be set individually for each cylinder.
2. Tilting mode button: Select this button to set the tilting movement in the system. When this button is selected, the background colour of the button will become green.
3. Deviation button: This button shows the deviation screen. In this screen the user can check the details of the current tilting movement.

CAUTION

At the end of each cycle, all the cylinders will finish at the same time. The cylinders with smaller delta will have more stops and waiting time than those with bigger delta. Consider this features to avoid uncontrolled movements.

CAUTION

In the case of EVO´s, all cylinders will follow one direction when extending or retracting. There can´t be cylinders retracting while others are extending.

9.13.1 EVO Deviation Screen

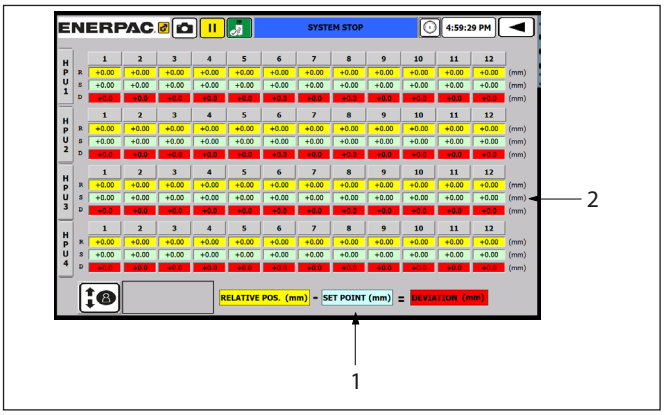


Figure 59: EVO Deviation Screen

In this screen the user can check the details of the current tilting movement.

There are two important elements in this screen:

1. Key formula: This area shows the formula used to make the calculations of tilting movement.

   Relative Position — Set Point = Deviations

2. Values of each cylinder to make the tilting movement:
   - R (Relative Position): This value shows the current position of the plunger of the cylinder.
   - S (Set Point): This value is the theoretical position which should have the plunger in the current moment, according to the internal calculations made by the system in order to all the cylinders reach the final delta target at the same time.
   - D (Deviation): This value is the difference between the theoretical position that should have the plunger according to the internal calculations of the software (set point), and the real position of the plunger in the current movement (Relative position).

This screen is for information only. The user cannot type or select any value.

9.14 EVO Stage Lift Screen

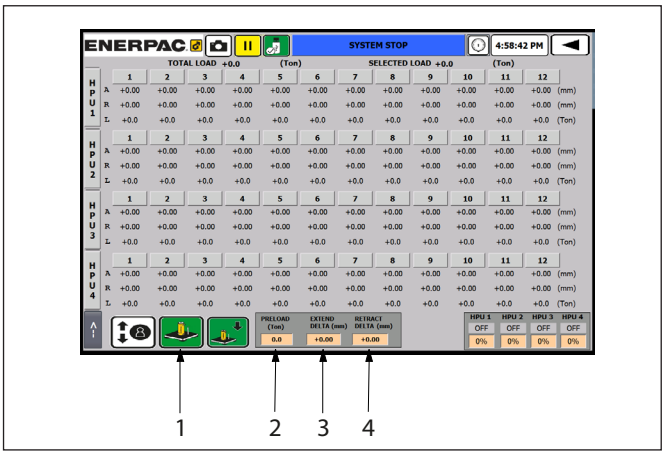


Figure 60: EVO Stage Lift Screen

Stage Lift screen contains similar elements to the Manual screen (Figure 55). The only changes are elements shown in Figure 60.

There are four important elements in this screen:

1. Stage Lift button: Select this button to set the stage lift movement in the system. When this button is selected, the background colour of the button will become green.
2. Preload value: The user must type the load that every cylinder must reach before starting a new cycle. This value is typically used to make contact with the load.
3. Extend Delta value: The user must type the distance cylinders should extend to create a space where operators could insert two outer blocks under the spreading plate. These outer blocks will support the load for the next extension.
4. Retract Delta value: The user must type the distance cylinders should retract to create a space where operators could insert a central block. This central block will support the load for the next movement.

Refer to the paragraph 11.8 for further details on how to use this work mode.

9.15 EVO Fast Retract Screen

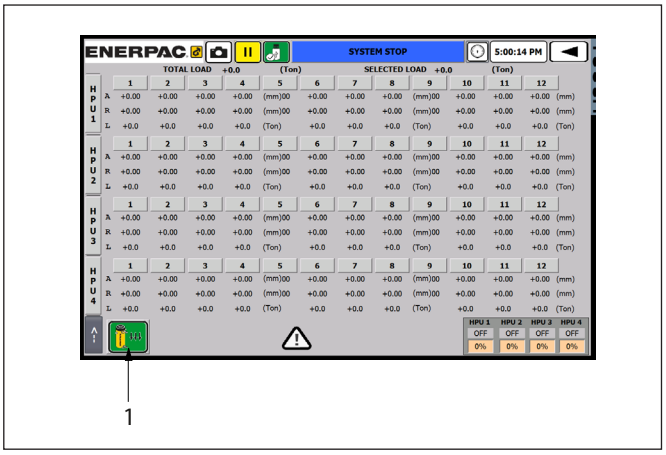


Figure 61: EVO Fast Retract Screen

Through this mode the operator can retract the cylinder faster after the load has been secured by another mechanical means. Pushing the button and start cycle in the CLNC12 (Figure 2, item 2), oil will be redirected to tank through the shortest and fastest way to reduce the time for retracting the plunger of the cylinder.

In this screen there is the following element:

1. Fast Retract mode button: Select this button to set the fast retract movement in the system. When this button is selected, the background colour of the button will become green.

WARNING

Never select this work mode if the cylinder still holds load. The retraction with this method can cause an uncontrolled retraction and uneven lowering will result.

Refer to paragraph 11.9 for further details on how to use this work mode.

9.16 EVO Weighing Screen

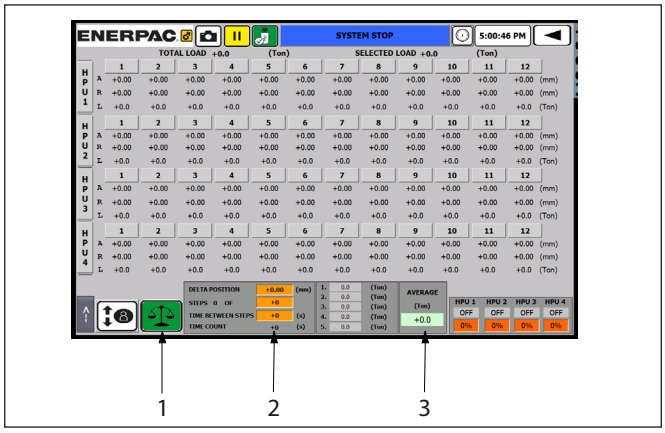


Figure 62: EVO Weighing Screen

The EVO system has been designed to weigh the load. This movement is executed automatically.

In this screen there are the following elements:

1. Weighing button: Select this button to set the weighing movement in the system. When this button is selected, the background colour of the button will become green.
2. Weighing values: The user must type these values to proceed with the weighing process. This values are:
   - Delta position: The delta position is the increment of position cylinders must reach to make the weighing. This value can be positive (if load goes up) or negative (if load drops).
   - Number of steps: Weighing movement is performed in 5 steps to get the maximum weighing accuracy. The weight value of each step is shown in the table on the right.
   - Time between steps: To keep the load stable, the system will obtain the weight data in the time interval entered by the operator (seconds). When cylinders reach the delta position, the system will wait the time introduced to read the weight of the load.
3. Average weigh: This box shows the average weigh of the previous 5 readings (refer to point 2 in this section).

9.17 EVO COG Screen

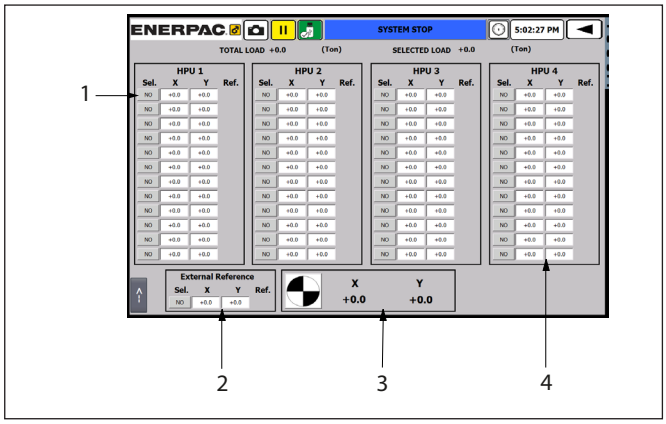


Figure 63: EVO COG Screen

In this screen the operator can type the values related to the gravity center.

Through the selection button the operator can decide what cylinders are included in the gravity center calculation.

When the cylinders have been selected, the operator must choose which is going to be the main cylinder. The origin reference (0,0) will be assigned to this cylinder (reference cylinder), so the other cyilinders will take its position as the origin point. The gravity center will be calculated automatically.

In this screen there are the following elements:

1. Cylinder selection buttons: The user must select which cylinders are included in the calculation of the gravity center.
2. Reference cylinder button: The user must select a cylinder to work as the reference point for the gravity center calculation. All cylinders included in the calculation will have the position of this reference cylinder as their origin point (0,0).
3. Gravity center coordinates: This box shows the calculation of the load's gravity center.
4. X and Y axis position: In this box, the user must type the real position on the X and Y axis of the selected cylinder taking the reference cylinder as the origin point.

9.18 EVO Load Graph Screen

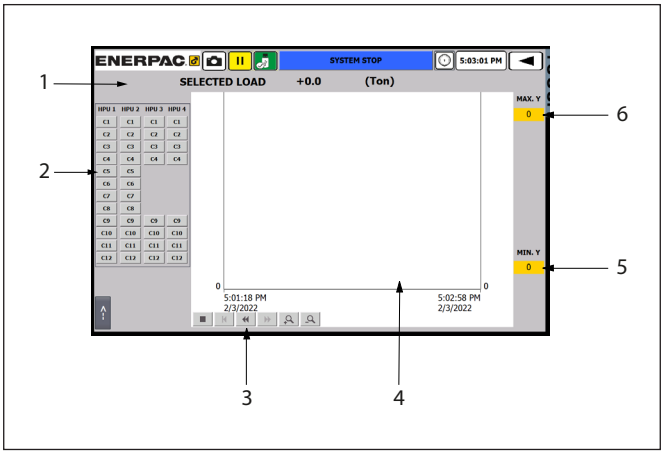


Figure 64: EVO Load Graph Screen

This graph shows the trend of the load supported by the most loaded cylinder and the least loaded cylinder.

In this screen there are the following elements:

1. Selected load: Total load supported by the selected cylinders.
2. Cylinder selection buttons: The user must select which cylinders are included in the calculation of the selected load.
3. Graph buttons: These buttons allow the operator to move across the graph (stop graph, move forward, rewind, zoom in, zoom out, etc.).
4. Canvas: It shows a graph with the value of the selected load. This graph is updated every 2 seconds.
5. Min Y Value: Y axis minimum value in the graph.
6. Max Y Value: Y axis maximum value in the graph.

9.19 EVO Data Recording Screen

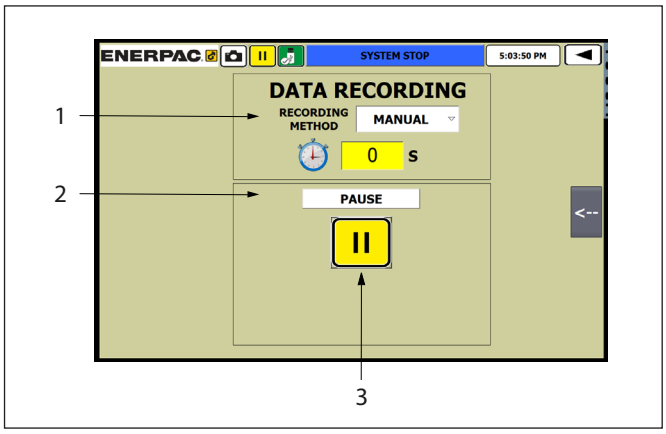


Figure 65: EVO Data Recording Screen

Through this screen the operator can record the movement data into an external drive. In this screen the following elements are shown (refer to Figure 65):

1. Recording method: Select the recording method (manual or automatic) for recording movement data purpose. When manual option is selected, the system will record only when the user pushes the record button. When automatic mode is selected, the system will automatically record the data when the system is moving.
2. Time period: The user must type the frequency of the data recording. The units used are seconds.
3. Recording button: Push this button to start/ pause recording the movements' data in the drive selected. When the button is yellow, the recording is paused and when it is green, the recording is running. If the system detecs any recording failure, icon will be red.

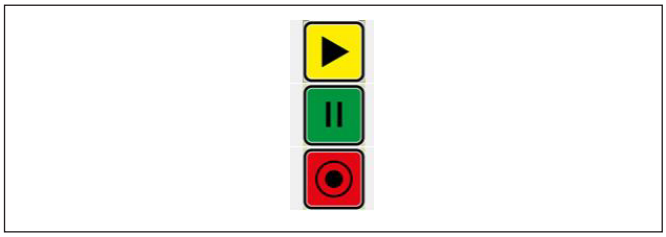


Figure 66: Recording Buttons

9.20 EVO Language Screen

Figure 67: EVO Language Screen

The user can choose the alarms language in this screen. Select the language desired and tap the back button to go to the main screen.

9.21 EVO Users Screen

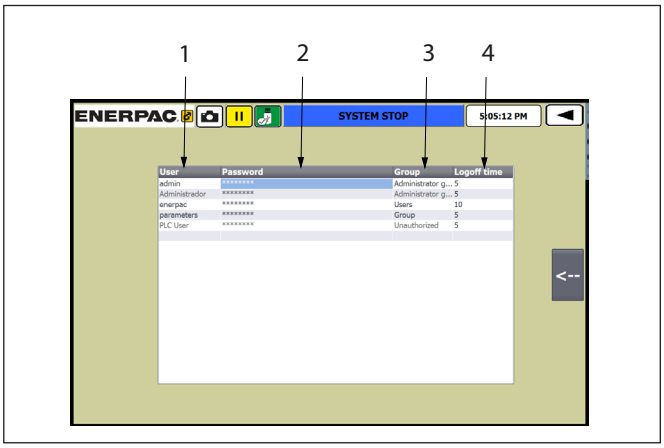


Figure 68: EVO Users Screen

In this screen the user can create and set several users to manage the system. The following elements are shown:

1. User: The operator must tap the cell of the table and type a new user. The system will inquire an ID and Password to log into each user profile.
   - Operator: This user has general access to operate the system. To access this user, it is required to enter the ID “enerpac” and password “100”.
   - Expert: The expert has same access rights as the operator but can also access and operate the special parameters within the Work Parameters screen (see paragraph 8.5.1). This actions require a more advanced user because they are parameters that can completely affect the functionality of the equipment. To access this user, it is required to enter the ID “parameter” and password “200”.
   - Administrator: This user is for use by factory authorized technicians only.
2. Password: In this column the operator must tap and type the password of each user (refer to point 1 of this section).
3. Group: The operator must tap and choose a group name for that user.
4. Logoff time: The operator must tap and type the number of minutes to log off the system with that user.

9.22 EVO Inverter Speed Screen

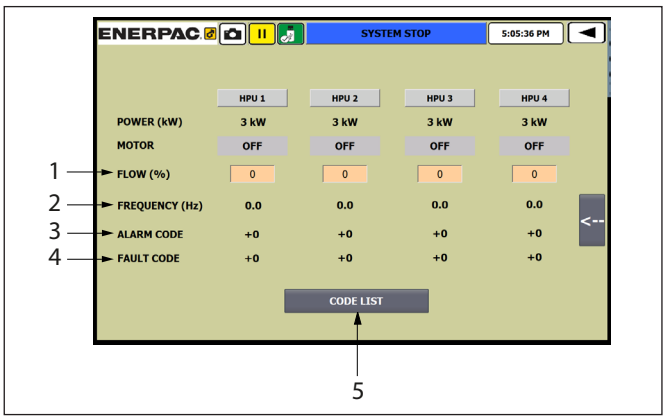


Figure 69: EVO Inverter Speed Screen

This screen shows the status of the inverter speed in the current moment. This screen notifies important information for experimented operators.

In this screen the following elements are shown:

1. Flow: The system allows selecting the movement speed of the cylinders. This value is a percentage and can be typed between 30 and 100% of the total flow. It corresponds to the speed of the motor.
2. Frequency: This parameter shows the real momentary frequency of the motor. This parameter is given in Hertz.
3. Alarm code: This section shows if there is any alarm in the system.
4. Fault Code: This section shows if there is any fault in the system.
5. Code list: This button gives access to the list of faults and alarms of the system.

9.23 EVO Instruction Manual Screen

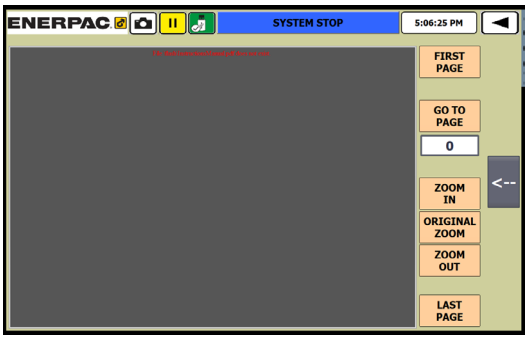


Figure 70: EVO Instruction Manual Screen

In this screen the operator can access to the Instruction Manual of the CLNC12 controller.

9.24 EVO Control Panel Screen

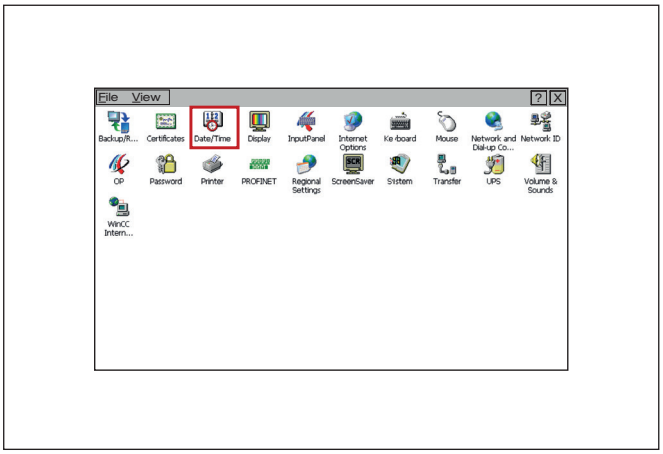


Figure 71: EVO Control Panel Screen

In this screen the user can set the date and time of the system.

10. EVOP Screens

Before using this mode, ensure the Local/Remote switch on the front panel is set to “Remote”.

10.1 EVOP Initial Screen

Figure 72: EVOP Remote Mode Initial Screen

This is the first screen shown by the system in remote mode. From this screen the operator can access to the rest of screens in the system and set the features for the movements.

When the Start icon on the screen is pushed, the system will inquire the ID and Password to log into the user profile.

NOTICE

The system is submitted with the default user profile which is recorded with the user name: enerpac and password: 100.

10.2 EVOP Selection Screen

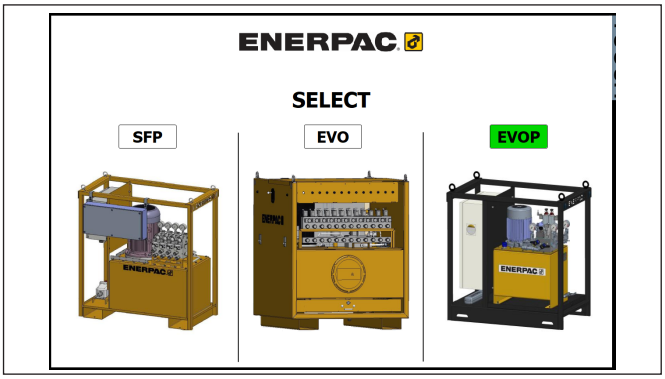


Figure 73: EVOP Selection Screen

CLNC12 controller can be connected to different hydraulic equipments from Enerpac. In this screen, the operator can select the system to work with (in this case, EVOP). When the system being used is selected, it turns green.

10.3 EVOP Main Screen

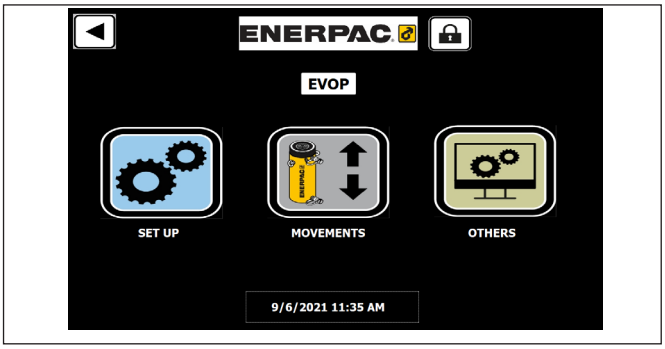


Figure 74: EVOP Main Screen

This is the main menu screen of the software in remote mode.

From this screen, the user can access the screens to set up EVOP’s parameters. These screens are the screens to arrange cylinder’s movements and the screens where the operator can adjust other parameters of the software not related with the movements.

10.3.1 EVOP Setup Pop Up

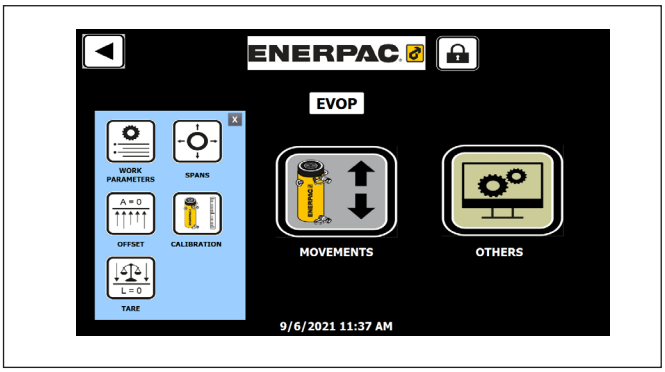


Figure 75: EVOP Setup Pop Up

In this pop up the user can access Work Parameters, Spans, Offset, Calibration and Tare screens.

Tapping on each button the user can access the screens of Set Up section.

The background colour of this section is blue. Every screen of this section will have a blue background.

10.3.2 EVOP Movements Pop Up

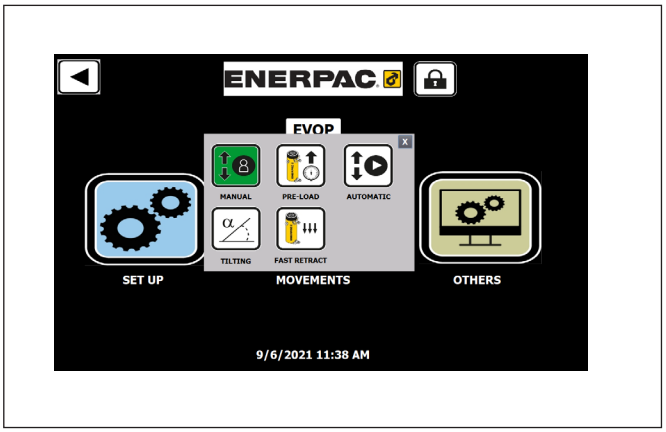


Figure 76: EVOP Movements Pop Up

In this pop up the user can access Manual, Preload, Automatic, Tilting and Fast Retract screens. Tapping on each button the user can access the screens of movements section. The background colour of this section is gray. Every screen of this section will have a gray background.

10.3.3 EVOP Others Pop Up

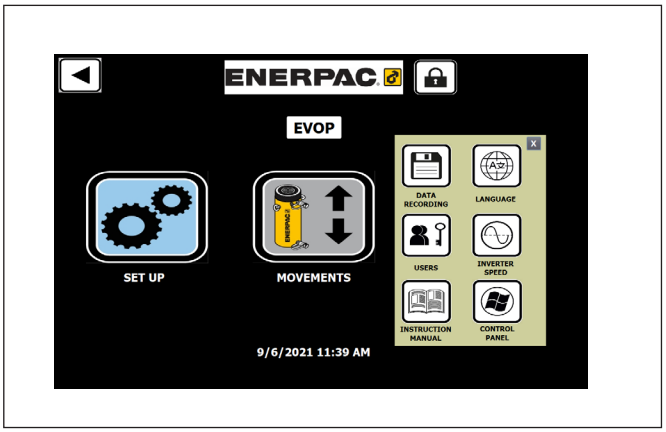


Figure 77: EVOP Others Pop Up

In this pop up the user can access Data Recording, Language, Users, Inverter Speed, Instruction Manual and Control Panel screens. Tapping on each button the user can access the screens of Others section. The background colour of this section is yellow. Every screen of this section will have a yellow background.

10.3.4 EVOP Screen Slides

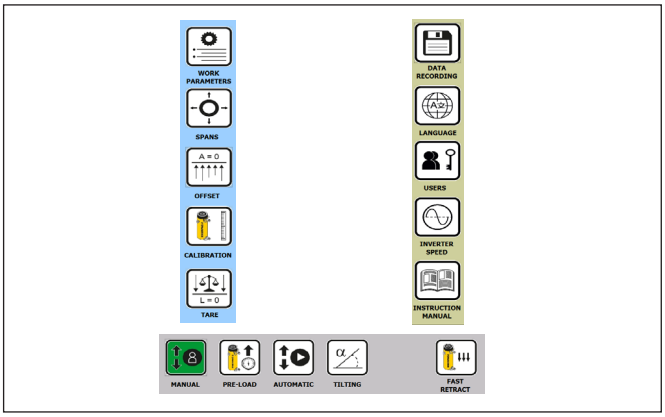


Figure 78: EVOP Screen Slides

In the screens of each section there is an arrow which allows to merge a slide with the shortcuts to the screens of the section. Through these slides, the user can easily navigate between the screens.

In order to see the slides of that section, the user must tap the arrow placed in the screen. This arrow is set in a different place in each section. For Set up section the arrow is placed on the left of the screen, for the Movements section the arrow is placed on the lower right corner of the screen and for the Others section the arrow is on the right of the screen. Refer to Figure 78 to see the slides of every section.

10.4 EVOP Screen's Header

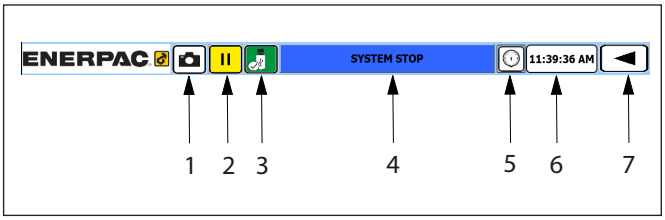


Figure 79: EVOP Common Header of Screens

The software has a common header for all EVOP screens. This header has the following buttons (refer to Figure 79):

1. Snapshot: This button makes a snapshot of the current screen and saves it in USB memory.
2. Recording button: Pushing this button the user can start, pause and stop the data recording of the current movement. These values will be saved in the USB memory.
3. USB button: This button shows the status of the USB recording.
4. System status indicator: In this section the software displays the status of the system.
5. Pressure button: This button shows the pressure details of the HPU.
6. Time section: This section shows the current time. The local time can be adjusted in the control panel of the system. Refer to the paragraph 10.19 for further details.
7. Back button: The user can go through this button to the previous screen.

10.5 EVOP Work Parameters Screen

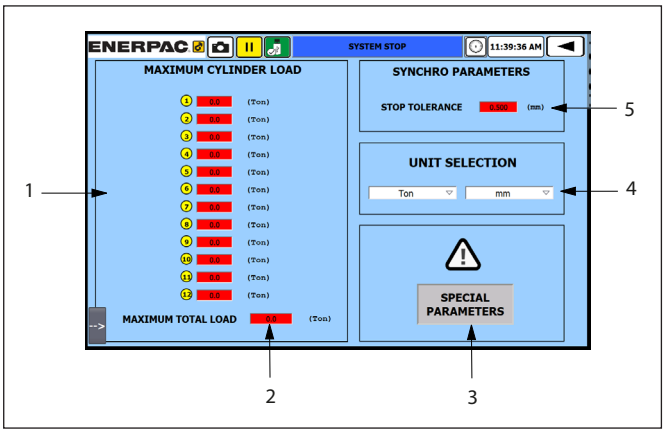


Figure 80: EVOP Work Parameters Screen (double acting cylinders)

In this screen the user must define some features and security parameters of the system. In this screen there are the following components:

1. Maximum cylinder load: The user must type the maximum load expected for each cylinder. When this value is exceeded a warning alarm will be shown by the system but the movement will not be stopped.
2. Maximum total load: The user must type the maximum load expected of the cylinders involved in the current application. When this value is exceeded the movement will be stopped by the system.
3. Special Parameters button: Pushing this button, the user can access to the special parameters screen (refer to paragraph 10.5.1 for further details). The system will require an user name (parameters) and password (200).
4. Units Selection: The user can select the units whereby the system will show the values. This values can be:
   - Load units: lbs/1000, Ton (1000 kg), s Ton (2000 lbs) and kN.
   - Distance units: mm or inches.
5. Stop tolerance: When multiple cylinders work in a synchronized application, there is a range of desynchronization between the most extended and the most retracted cylinder. The user must type in this box which is the maximum admissible value between the most extended and the most retracted cylinder. If this value is exceed the system will stop the movement through a stop alarm.

When working with single acting cylinders, this screen will also show the value “work tolerance” due to the fact that the synchronous movement is controlled by the solenoid valves instead of frequency inverters, only in lowering movements (see Figure 81):

1. Work tolerance: The user must type in this box which is the synchronization value between the most extended and the most retracted cylinder. If this value is exceed the system will stop the movement of the most extended cylinder until the most retracted cylinder reaches the range typed.

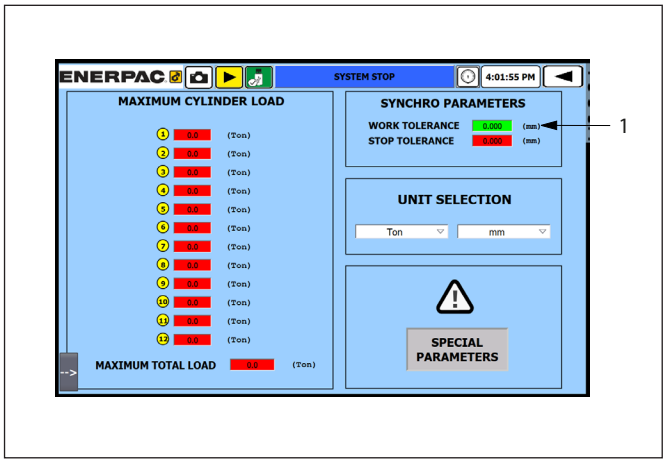


Figure 81: EVOP Work Parameters Screen (single acting cylinders)

10.5.1 EVOP Special Parameters Screen

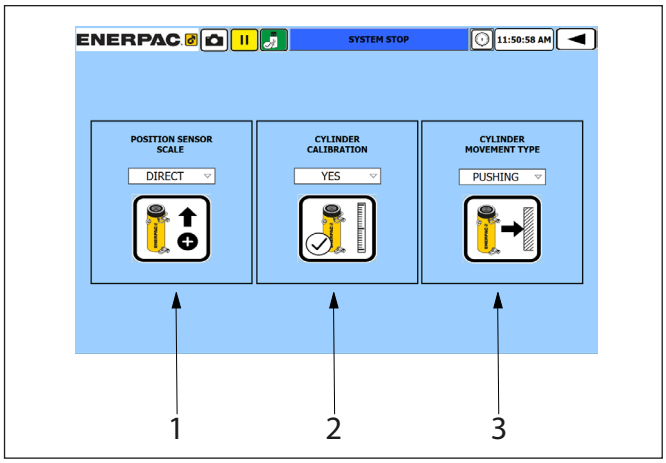


Figure 82: EVOP Special Parameters Screen

The access to this screen is locked by an ID (parameters) and password (200). The user can access to this screen from the Parameters screen (refer to paragraph 10.5).

These are the buttons shown in this screen:

1. Position sensor scale: Depending on where the stroke sensor is placed, the user must select between direct or indirect movement. When the cylinder’s plunger movement and the stroke sensor’s wire are extending (positive movement), the movement is called direct. When the cylinder is extending but the stroke sensor wire is retracting (negative movement) the movement is called indirect. Refer to Figure 83 for further details.

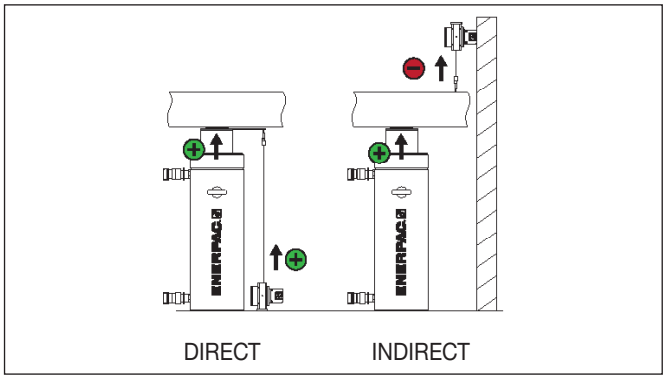


Figure 83: Direct and Indirect Layout

2. Cylinder calibration selection: The user must set if the calibration is going to be carried out or not, depending on the type of cylinder used. Refer to Figure 84 for details.

NOTICE

Calibration operation must be carried out depending on how the hook of the stroke sensor is attached. If the hook is attached to the cylinder rod, or if an internal stroke sensor is used, the calibration must be done. If the hook is attached directly to the load to be moved, then the calibration must be avoided.

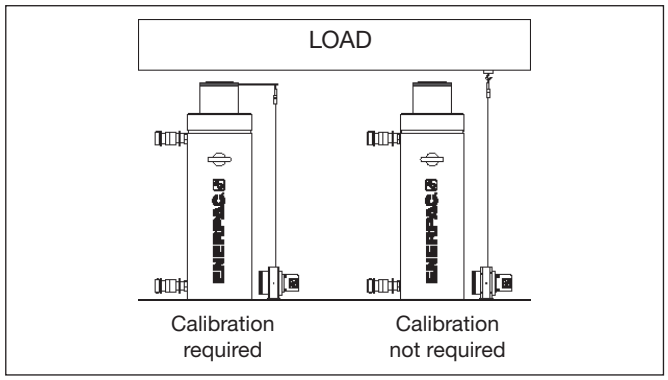


Figure 84: Calibration Conditions

3. Cylinder movement type: This button allows the operator to choose between pushing and pulling applications.

10.6 EVOP Spans Screen

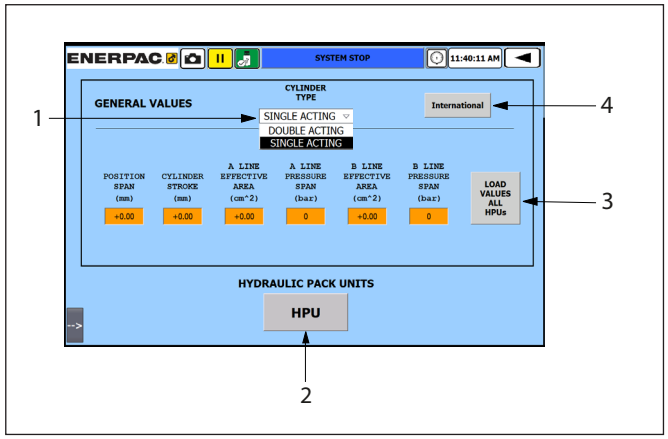


Figure 85: EVOP Spans Screen

In this screen the user can enter the parameters of the elements used in the EVOP movements, such as the cylinder installed for the application, the stroke sensors and the pressure transducers used to set the calculations of the movement.

These are the buttons shown in this screen:

1. Cylinder type: This button allows the operator to choose between single acting and double acting cylinders. When the operator chooses single acting cylinders, the value “work tolerance” will appear in work parameters screen (Figure 81).
2. Hydraulic power unit: The user can select the HPU to apply the parameters (see Figure 86).
3. Load values button: With this button the user can copy identical spans values to all HPUs working in the synchronization.
4. Units button: The user can switch a different units system pushing this button. The units can be international for the International System of Units, or Imperial for the Imperial System of Units.

The user can access to the Spans Parameters screen pressing on the HPU icon. In the boxes the user can type the following data (refer to Figure 86):

1. Position span: The user must type the maximum range of the stroke sensor which monitors the cylinder.

NOTICE

The standard stroke sensors position spans are 100, 125, 375, 500 ,750, 1000, 1250 and 2000 mm.

2. Cylinder stroke: The user must type the maximum stroke of the cylinder.
3. A line effective area: The user must type the surface area of the pushing side of the cylinder conected to A line.
4. A line pressure span: The user must type the maximum range of the A line pressure transducer.
5. B line effective area: The user must type the surface area of the pulling side of the cylinder conected to B line.
6. B line pressure span: The user must type the maximum range of the B line pressure transducer.

NOTICE

Stardard pressure transducers have a maximum reading of 11,600 psi (800 bar).

NOTICE

Information of sensors and cylinders is available either on the product label or online at www.enerpac.com.

For single acting cylinders, B line parameters are blocked and appear shaded.

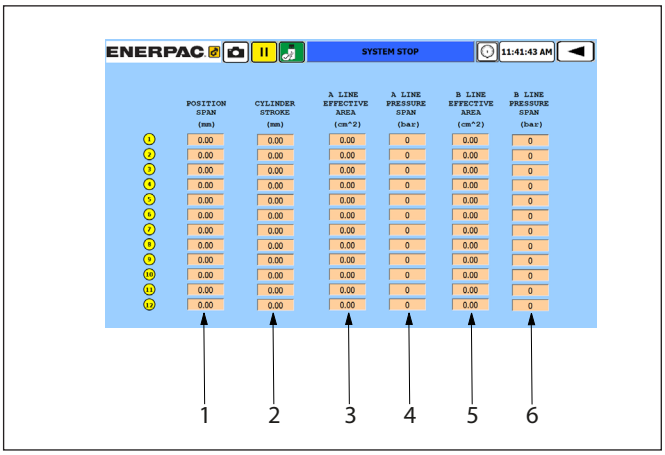


Figure 86: EVOP Spans Parameters

10.7 EVOP Offset Screen

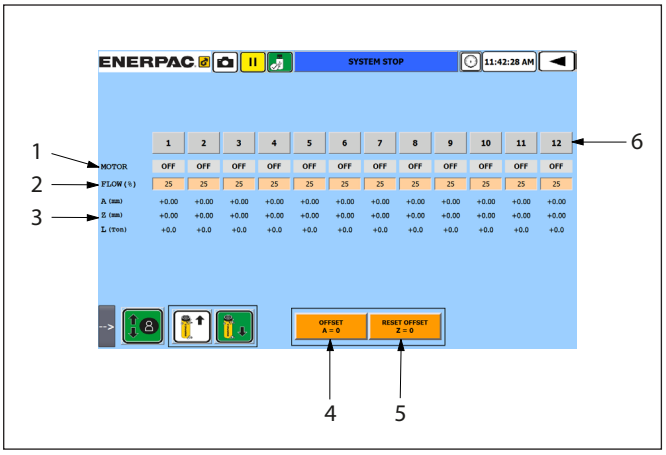


Figure 87: EVOP Offset Screen

Offset is generally used to have a dimension reference when a load is going to be lifted to an unknown dimension and that load is subsequently lowered to the same location. Since the wire of the stroke sensor will normally need to be extended a short distance to engage the bottom of the load, the offset screen can save that value so the user can reference that starting point after the lift is completed. By assigning an offset value prior to start lifting the load, the user will have a reference point where the lift started.

"A" value normally represents the absolute extension of the stroke sensor between 0 and full extension. When the user presses and holds the Offset button (A=0), the current "A" value is stored in the memory as "Z", and "A" is reset to zero. "A" now becomes the reference value for the starting point of the lift. When the lift is complete, the user can press Reset button (Z=0) to reset "A" back to normal value.

In this screen the following elements are shown:

1. Motor status: This section shows if the motor of each HPU is on/off.
2. Flow button: The user can type the flow of each HPU.
3. Movement values: There are some values that the system can show during the movement. These are:
   - A (Absolute position): The absolute position is the position of the cylinder's stroke sensor taken from the initial zero. This initial zero is the zero set in the calibration screen (refer to paragraph 10.8 for further details).
   - Z (Offset variable): Memory variable for a movement reference.
   - L (Load withstood by cylinder): This value shows the load being withstood by the cylinder.
4. Offset button: Push and hold this button for 3 seconds to convert value A into 0 and Z will keep the current value of A.

NOTICE

The offset value does not disappear when the equipment is turned off or there is a power failure. This value is maintained until the operator performs a reset of the Offset value.

5. Reset Offset button: Push and hold this button for 3 seconds to convert value Z into 0 and A will take the current value of Z and will add it to the current value.

$$A_f = A_i + Z$$

6. HPU selection buttons: The user must select the HPUs which will be involved in the movement or operation.

10.8 EVOP Calibration Screen

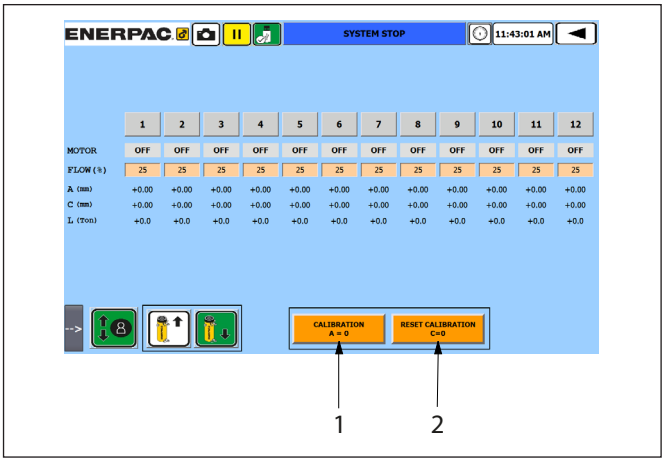


Figure 88: EVOP Calibration Screen

When the stroke sensor wire is connected to the cylinder's rod, or if an internal stroke sensor is used, the system reads the extended length of the sensor (A value). In that moment, A has a real reading of the sensor. Refer to Figure 88 for details.

To equalize the stroke sensor position with the rod position, the user must carry on the calibration of the cylinder. When the calibration work is performed, the cylinder will have value A = 0 when retracted.

This screen has similar elements to the Offset screen.

Two buttons are different:

1. Calibration: If the calibration is allowed, based on the location of the stroke sensor (refer to paragraph 10.5.1 for further details), this button allows calibrating (equalize the cylinder and the stroke sensor) and will set the Absolute position of the cylinder (A = 0).

The user must push and hold for 3 seconds this button to make the value effective.

CAUTION

This step should only be performed with the sensor connected to the cylinder's rod fully retracted to ensure the sensor will be properly calibrated.

2. Reset Calibration button: If something goes wrong during calibration work, this button allows the operator to get back to the previous value of the Absolute position and reset the calibration done.

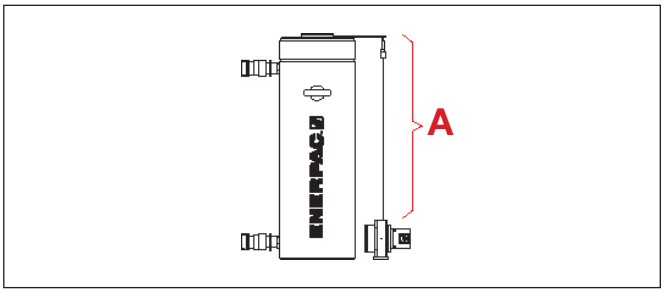


Figure 89: A value in a general purpose cylinder

10.9 EVOP Tare Screen

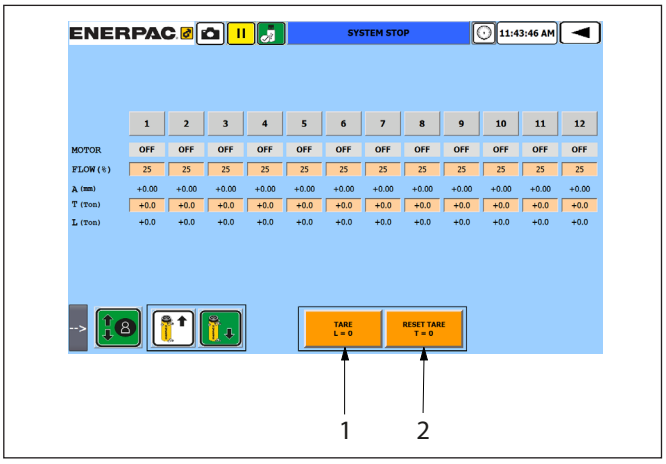


Figure 90: EVOP Tare Screen

This screen has similar elements to the Offset screen.

Two buttons are different:

1. Tare: This button allows taring (reducing the displayed load to zero in order to remove the effect of lifting beams or other support structures). This will set the displayed load, L=0. The user must push and hold for 3 seconds this button to make the value effective.
2. Reset Tare button: If something goes wrong during tare work, this button allows the operator to get back to the previous value of load and reset the tare done.

10.10 EVOP Manual Screen

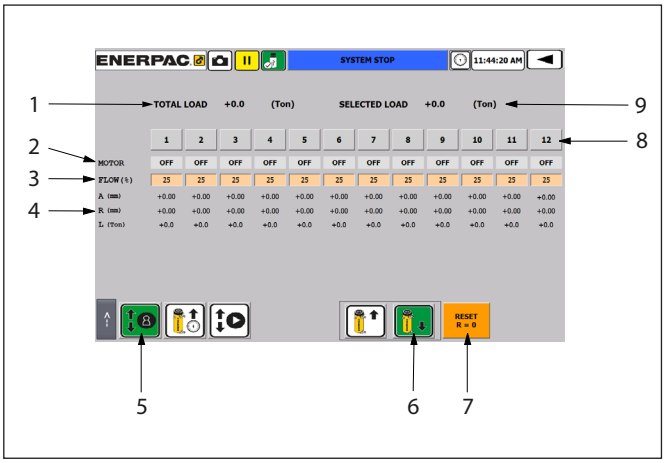


Figure 91: EVOP Manual Screen

This screen belongs to the movements section. In this section the user must select the type of movement which is going to be executed.

In the case of the manual movements, the user can move the cylinder of each EVOP having a total control of the movement. The user can extend or retract the cylinder by pushing and holding the start cycle button (Figure 2, item 2) and stop the movement just releasing the button. This work mode is used to make small positioning movements in the application.

The user can find the following elements in this screen (refer to Figure 91 for reference numbers):

1. Total load value: This value shows the load being withstood by all EVOPs. This will be the sum of loads of the complete system.
2. Motor status: This section shows if the motor of each EVOP is on/off.
3. Flow button: The user can type the flow of the EVOP and control the speed of the movement. This value is a percentage and can be typed between 25 and 100% of the total flow. It corresponds to the speed of the motor.
4. Movement values: There are some values that the system can show during the movement. These are:
   - A (Absolute position): The absolute position is the position of the sensor taken from the initial zero. This initial zero can be adjusted to match the cylinder plunger position in the calibration screen (refer to paragraph 10.8 for further details).
   - R (Relative position): The relative position is the position of the plunger of the cylinder taken from the last zero set point. This is the reference value that the system uses to maintain synchronization between lifting points.
     Refer to point 7 of this section to reset position r.
   - L (Load withstood by cylinder): This value shows the load withstood by the cylinder in the current moment.
5. Manual button: Select this button to activate the manual mode. When this button is selected, the background colour of the button will become green.
6. Extend/Retract buttons: When the manual button is selected the user must also choose a direction of motion. This can be extend to get the plunger out of the cylinder, or retract to get the plunger into the cylinder. The user must set what direction of movement is going to be executed.
7. Reset relative position button: This button resets the relative position of the cylinder to zero. Push this button to reset this value. For further details about the relative position, refer to the point 4 of this section.
8. EVOP selection buttons: The user must select the EVOPs which will be involved in the movement or operation.
9. Selected load value: This value shows the load being withstood by the selected EVOPs.

Load values are obtained through the calculation of the pressure in the pressure line of the cylinder and the effective area typed in the spans screen (paragraph 10.6). These values therefore will be approximated with some error margin.

Some points are common elements in the movements screens. This elements will not be explained again in the following paragraphs.

10.11 EVOP Preload Screen

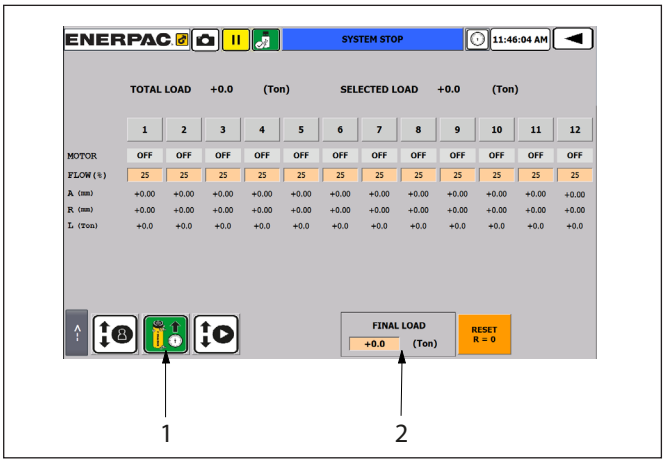


Figure 92: EVOP Preload Screen

Preload screen contains similar elements to the Manual screen (Figure 91). The only changes are elements shown in Figure 92.

In this work mode, the operator has to define a target load that the cylinder must sustain. Cylinder piston will automatically move until it comes to support the specified load.

There are two important elements in this screen:

1. Preload button: Select this button to set the preload movement in the system. When this button is selected, the background colour of the button will become green.
2. Final Load parameter: The user must type the final load that the cylinder must reach to finish the cycle.

NOTICE

Enerpac recommends setting the final load value to less than 10% of the expected load.

NOTICE

In the EVOP system, cylinders will not reach Final Load value at the same time due to each cylinder is pumped with it´s own powerpack.

10.12 EVOP Automatic Screen

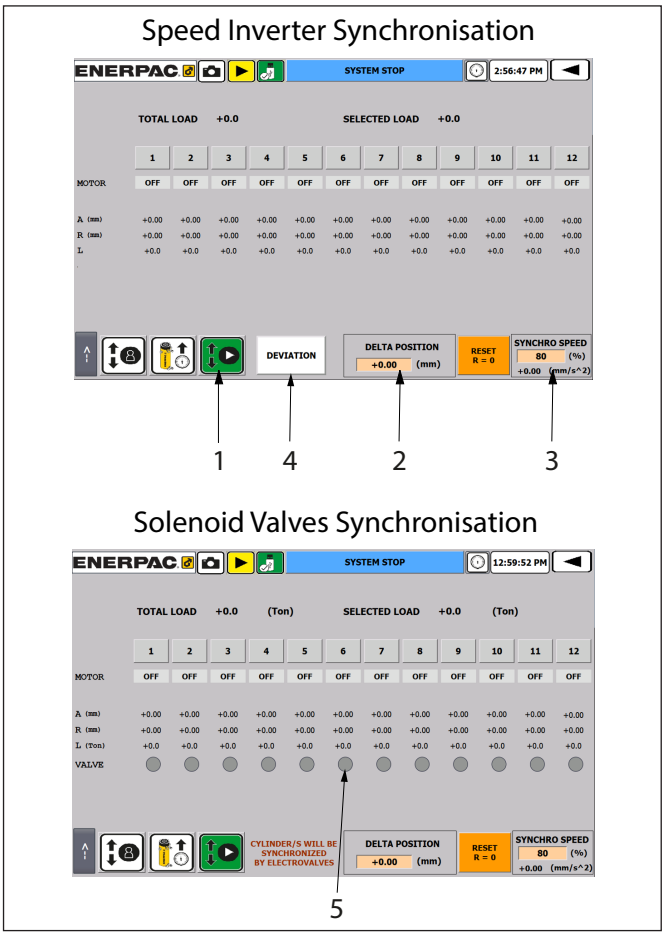


Figure 93: EVOP Automatic Screen

Automatic screen contains similar elements to the Manual screen (Figure 91). The only changes are elements shown in Figure 93.

In this work mode the user inputs a distance increment towards which the cylinder moves. Cylinders can have two types of synchronised movement, by frecuency inverter or with electrovalves.

In this screen there are the following elements:

1. Automatic button: Select this button to activate the automatic mode in the movement. When this button is selected, the background colour of the button will become green.
2. Delta position value: The user must type in this box the increment of the current position which the cylinder must reach in the next cycle. This increment can be positive (if extending cylinders) or negative (if retracting cylinders).
3. Synchro speed: The system allows the user to select the movement speed. This value is a percentage and can be typed between 50% and 100% of the total flow. It corresponds to the speed of the motor.
4. Deviation button: This button shows the deviation screen. In this screen the user can check the details of the current tilting movement.
5. Solenoid Valve Open / Close indicator: When the valves are activated, the indicators will turn green.

When the cylinder calibration has been performed, the system will not let the user type a value higher than the stroke capacity of the cylinder. It is important the parameter of the cylinder stroke is correctly entered into the Spans screen (paragraph 10.6) to avoid cylinder damage.

When the cylinder calibration is not performed the system will use as the limit of stroke the stroke sensor maximum range, to avoid stroke sensor damage.

In this work mode, cylinders will not perform synchronous movements. Each cylinder will not reach Final Load value at the same time.

10.13 EVOP Tilting Screen

Tilting screen contains similar elements to the Manual and Automatic screen (Figures 91 and 93). The only changes are elements shown in Figure 94.

This movement allows the user to make movements with load inclination purposes. The user sets a different delta for each cylinder and makes a synchronous movement of every cylinder in such a way that all the cylinders finish at the same time.

Cylinders can have two types of synchronised movement, by frecuency inverter or with electrovalves.

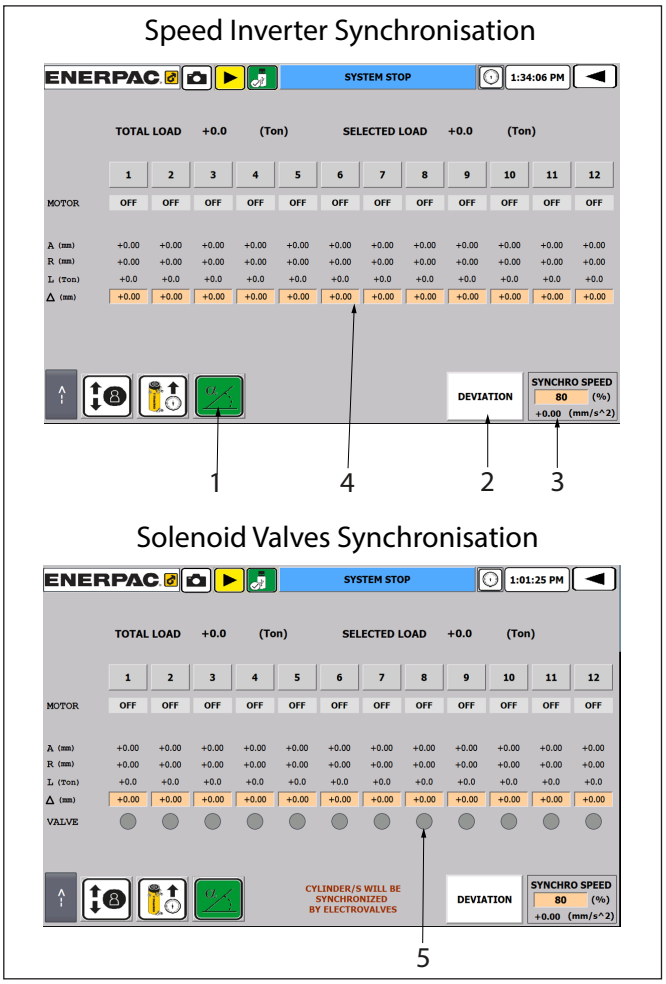


Figure 94: EVOP Tilting Screens

In this screen there are the following elements:

1. Tilting mode button: Select this button to set the tilting movement in the system. When this button is selected, the background colour of the button will become green.
2. Deviation button: This button shows the deviation screen. In this screen the user can check the details of the current tilting movement.
3. Synchro speed: The system allows the user to select the movement speed. This value is a percentage and can be typed between 50% and 100% of the total flow. It corresponds to the speed of the motor.
4. Delta Final Position: The user must type in this box the increment of the current position which the cylinders must reach in the next cycle. This target can be positive (if extending cylinders) or negative (if retracting cylinders). This value can be set individually for each cylinder.
5. Solenoid Valve Open / Close indicator: When the valves are activated, the indicators will turn green.

CAUTION

At the end of each cycle, all the cylinders will finish at the same time. The cylinders with smaller delta will have more stops and waiting time than those with bigger delta. Consider this features to avoid uncontrolled movements.

CAUTION

In the case of EVOP´s, cylinders will be able to follow different directions when extending or retracting. There can be cylinders retracting while others are extending.

10.14 EVOP Deviation Screen

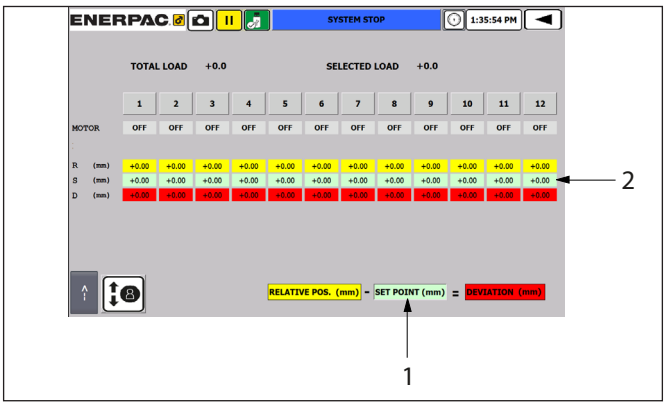


Figure 95: EVOP Deviation Screen

In this screen the user can check the details of the current tilting movement.

There are two important elements in this screen:

1. Key formula: This area shows the formula used to make the calculations of tilting movement.

   Relative Position — Set Point = Deviations

2. Values of each cylinder to make the tilting movement:

   - R (Relative Position): This value shows the current position of the plunger of the cylinder.

- S (Set Point): This value is the theoretical position which should have the plunger in the current moment, according to the internal calculations made by the system in order to all the cylinders reach the final delta target at the same time.
- D (Deviation): This value is the difference between the theoretical position that should have the plunger according to the internal calculations of the software (set point), and the real position of the plunger in the current movement (Relative position).

This screen is for information only. The user cannot type or select any value.

10.15 EVOP Fast Retract Screen

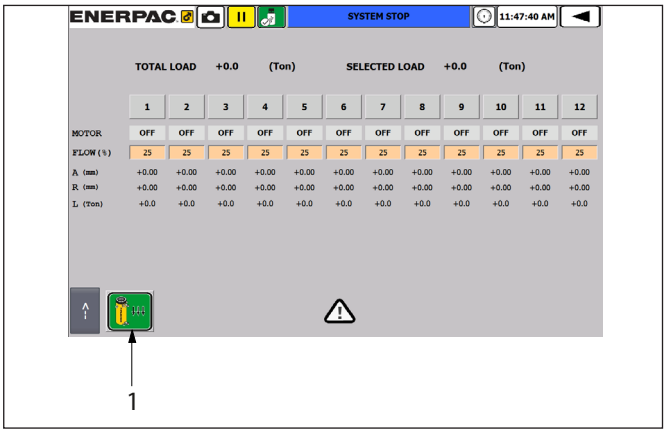


Figure 96: EVOP Fast Retract Screen

Through this mode the operator can retract the cylinder faster after the load has been secured by another mechanical means. Pushing the button and start cycle in the CLNC12, oil will be redirected to tank through the shortest and fastest way to reduce the time for retracting the plunger of the cylinder.

In this screen there is the following element:

1. Fast Retract mode button: Select this button to set the fast retract movement in the system. When this button is selected, the background colour of the button will become green.

WARNING

Never select this work mode if the cylinder still holds load. The retraction with this method can cause an uncontrolled retraction and uneven lowering will result.

Refer to paragraph 11.9 for further details on how to use this work mode.

10.16 EVOP Data Recording Screen

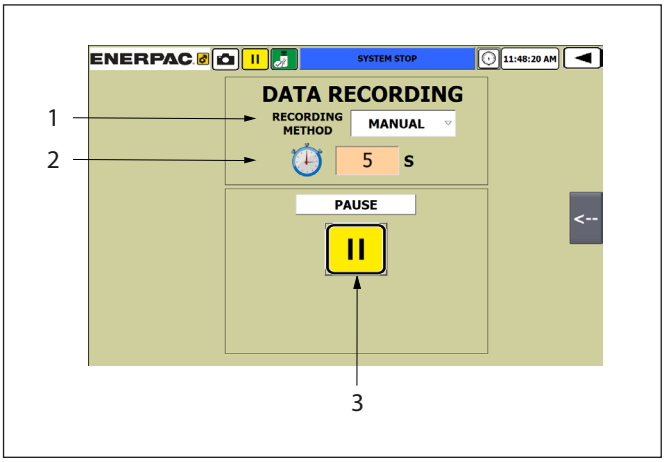


Figure 97: EVOP Data Recording Screen

Through this screen the operator can record the movement data of local mode into an external drive.

In this screen the following elements are shown (refer to Figure 97):

1. Recording method: Select the recording method (manual or automatic) for recording movement data purpose. When manual option is selected, the system will record only when the user pushes the record button. When automatic mode is selected, the system will automatically record the data when the system is moving.
2. Time period: The user must type the frequency of the data recording. The units used are seconds.
3. Recording button: Push this button to start/ pause recording the movements' data in the drive selected. When the button is yellow, the recording is paused and when it is green, the recording is running. If the system detecs any recording failure, icon will be red.

10.17 EVOP Language Screen

Figure 98: EVOP Language Screen

The user can choose the alarms language in this screen. Select the language desired and tap the back button to go to the main screen.

10.18 EVOP Users Screen

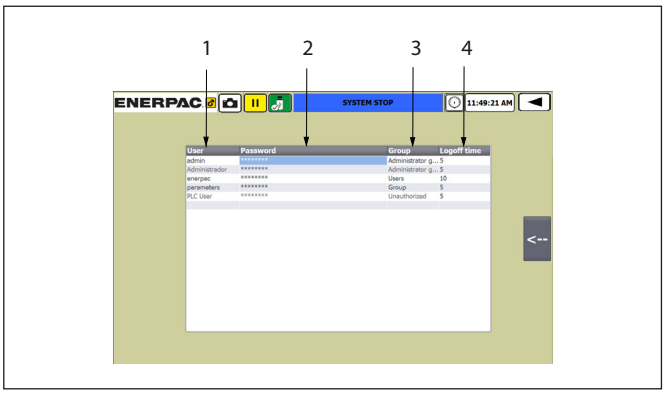


Figure 99: EVOP Users Screen

In this screen the user can create and set several users to manage the system. The following elements are shown:

1. User: The operator must tap the cell of the table and type a new user. The system will inquire an ID and Password to log into each user profile.
   - Operator: This user has general access to operate the system. To access this user, it is required to enter the ID “enerpac” and password “100”.
   - Expert: The expert has same access rights as the operator but can also access and operate the special parameters within the Work Parameters screen (see paragraph 8.3.1). This action require a more advanced user because they are parameters that can completely affect the functionality of the equipment. To access this user, it is required to enter the ID “parameter” and password “200”.
   - Administrator: This user is for use by factory authorized technicians only.
2. Password: In this column the operator must tap and type the password of each user (refer to point 1 of this section).
3. Group: The operator must tap and choose a group name for that user.
4. Logoff time: The operator must tap and type the number of minutes to log off the system with that user.

10.19 EVOP Inverter Speed Screen

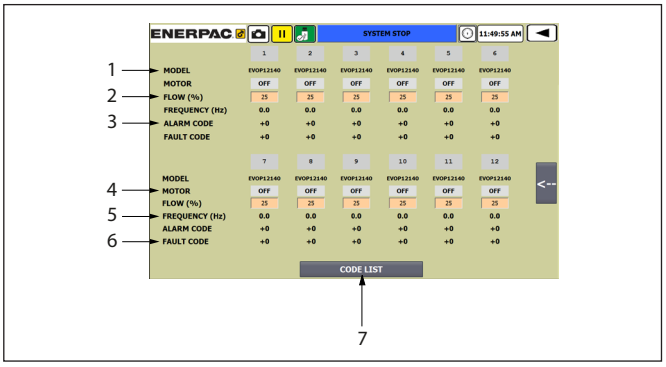


Figure 100: EVOP Inverter Speed Screen

This screen shows the status of the inverter speed in the current moment. This screen notifies important information for experimented operators.

In this screen the following elements are shown:

1. EVOP Model: this Sections shows the EVOP model of each HPU connected.
2. Flow: The system allows selecting the movement speed of the cylinders. This value is a percentage and can be typed between 30 and 100% of the total flow. It corresponds to the speed of the motor.
3. Alarm code: This section shows if there is any alarm in the system.
4. Motor status: This section shows if the motor of each EVOP is on/off.
5. Motor Frequency: This parameter shows the real momentary frequency of the motor. This parameter is given in Hertz.
6. Fault Code: This section shows if there is any fault in the system.
7. Code List: This button gives access to the list of faults and alarms of the system.

10.20 EVOP Control Panel Screen

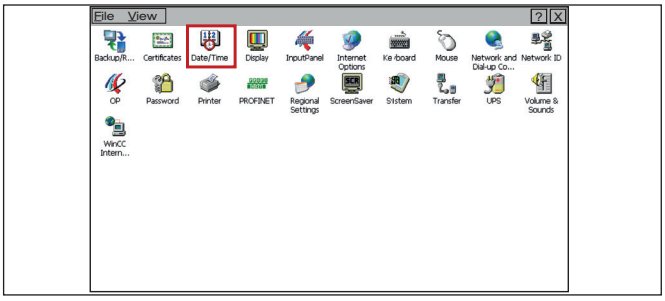


Figure 101: EVOP Control Panel Screen

In this screen the user can set the date and time of the system.

11. Operation

Operation procedures will vary depending on hydraulic power unit type, valve configuration and other factors. For detailed operating instructions and related information, refer to the instruction sheet included with your hydraulic power unit.

11.1 Switching ON the system.

Follow the next steps to switch on the system:

1. Be sure every safety stop button is not activated.
2. Turn ON the main switch of the HPUs connected to the CLNC12.
3. Check if the green light of the “power ok light” is on (Figure 2, item 1). If so, the connection with the system is correct.
4. Check for alarms in the CLNC12. If any alarm has came up, check and solve the root cause and push the reset alarm button (Figure 2, item 5).
5. Switch ON the motor in the HPU’s electric cabinet.

11.2 Switching OFF the system

Swich off the hydraulic power unit from its electric cabinet (refer to the HPU's instruction sheet for more information).

11.3 Cylinder calibration

Calibration operation must be carried out depending on how the hook of the stroke sensor is attached. If the hook is attached to the plunger, the calibration must be done. If the hook is attached directly to the load to be moved, then the calibration must be avoided. A cylinder with an internal stroke sensor must be calibrated too. Refer to Figures 18, 47 and 84 for details.

WARNING

Enerpac recomends to always set the layout of the cylinders in such a way that the calibration is allowed. Malfunctioning or cylinder damage can occur if cylinders are not calibrated or are wronly calibrated.

In order to calibrate correctly the cylinder, follow the steps below:

1. Go to Special Parameters screen and enable the calibration capacity. Refer to paragraphs 8.5.1, 9.5.1 and 10.5.1.
2. Go to Calibration screen. Refer to paragraphs 8.8, 9.8 and 10.8.
3. Select Manual mode.
4. Select downward button.
5. Switch on the motor on the HPU's electric cabinet.
6. Press and hold Start Cycle button (Figure 2, item 2) until the cylinders are completely retracted.
7. Press and hold for 3 seconds the calibration button in the calibration screen. The Absolute position value will become zero when the calibration has been performed.

NOTICE

Sometimes some error can be performed during the calibration works. Push reset calibration button for 3 seconds and the last configuration will be set. Restart again the previous steps to restart the calibration.

11.4 Manual Mode

Manual mode is used to move cylinders in a free way. This mode is mainly used for cylinders prework checks and cylinders positioning.

NOTICE

Be informed that with this mode the cylinders do not make a synchronized movement between them.

In order to work with this mode, follow the steps below:

1. Ensure that all elements are correctly plugged and there are no active alarms.
2. Go to manual screen. Refer to paragraphs 8.9, 9.10 and 10.10 for further details.
3. Select manual button.
4. Select the cylinder movement outward or inward.
5. Start motor in the HPU's electric cabinet.
6. Press and hold down the Start Cycle button (Figure 2, item 2). Cylinders will move until the button is released.
7. Once the cylinder's plunger is placed in the desired position, release the cycle button and the movement will be stopped.

11.5 Preload Mode

Enerpac recommends carrying out this step prior to lifting a structure in Automatic mode to ensure cylinders are in full contact with the structure prior to lifting. The operator should enter a small load value, for example 20 kN (2 ton), to ensure the cylinders withstand that load value.

This mode allows to have a real reference of the position of the load, and avoid unladen work.

Follow the steps below to work with this mode:

1. Ensure that all elements are correctly plugged and there are no active alarms.
2. Go to Preload screen. Refer to paragraphs 8.10, 9.11 and 10.11 for screen details.
3. Select the Load mode button.
4. Type the final load that cylinders must reach.
5. Switch on the motor in the HPU's electric cabinet.
6. Press the Start Cycle button (Figure 2, item 2).
7. The system will stop the cycle when cylinders reach the final load.

NOTICE

When this movement has been finished the system has a real reference of the position of the load. When cylinders are touching the load, the operator must press reset button to have a new zero for the relative position.

Enerpac also recommends to perform an Offset when the cylinders have reached the final load after performing the Preload mode. Using this step, the user will have a provisional zero if necessary.

11.6 Automatic Mode

In this work mode the user types a Delta value (an increment in distance) for the cylinders.

Follow the steps below to work with this mode:

1. Ensure that all elements are correctly plugged and there are no active alarms.
2. Go to Automatic screen. Refer to paragraphs 8.11, 9.12 and 10.12 for further details.
3. Select the automatic mode button.
4. Type Delta Position parameter. Delta Position is the distance that the cylinders' plugers must be moved. This distance can be positive or negative, depending on the movement sense (extending or retracting).

CAUTION

Ensure that the cylinder is in contact with the load and that the R=0 reset button has set all relative values to zero.

NOTICE

The system will not allow the operator to enter a value higher than the stroke capacity of the cylinder. It is important that the parameter of the cylinder stroke is correctly entered into the Spans screen (paragraphs 8.6, 9.6 and 10.6) to avoid cylinders damage (only for cylinders calibrated).

5. Start motor in the HPU's electric cabinet.
6. Press Start Cycle button (Figure 2, item 2).
7. When the cylinders reach the delta position, the system will stop the movement and go to "System Stop". The system keeps the current values so the user can make a new cycle with the same parameters.

11.7 Tilting Mode

This movement allows the user to make movements with load inclination purposes. The user sets a different target for each cylinder and makes a synchronous movement of each cylinder in such a way that all the cylinders finish at the same time.

Follow the steps below to work with this mode:

1. Ensure that all elements are correctly plugged and there are no active alarms.
2. Go to Tilting screen. Refer to paragraphs 8.12, 9.13 and 10.13 for screen details.
3. Select the cylinders which are going to be involved in the movement tapping on the cylinders buttons. When the cylinder is selected, the button background becomes green.
4. Type the delta position (the increment of the current position) of every cylinders selected. Delta Position can be negative or positive.
5. Select Tilting button.
6. Switch on the motor in the HPU's electric cabinet.
7. Press the Start Cycle button (Figure 2, item 2).
8. The system will stop the cycle when cylinders reach the delta position and keep in "waiting state". In this waiting state the system keeps the current values so the user can make a new cycle with the same parameters.

11.8 Stage Lift Mode

This work mode allows lifting or lowering a load incrementally in steps.

Combined with cribbing blocks and climbing jacks, this mode can overcome the lift height limitations of a cylinder's plunger stroke length. Refer to paragraphs 8.13 and 9.14 for further information.

There are two kind of procedures, lifting and lowering a load.

11.8.1 Lifting a Load:

1. Ensure that all elements are correctly plugged and there are no active alarms.
2. When working with climbing jacks, bear in mind that stroke sensors give a negative reading when the plunger goes out. Select indirect reading in the special parameters screen (paragraphs 8.5.1 and 9.5.1).
3. Go to Stage Lift screen. Refer to paragraphs 8.13 and 9.14 for further information.
4. Select Stage Lift button.
5. Select lifting button.
6. Type Positive Delta parameter. This parameter is the stroke that plungers extend per step, creating a space where operators can insert two outer blocks under the spreading plate.
7. Type Negative Delta parameter. This is the distance cylinders retract to create a space where operators can insert a central block. This central block will support the plunger plate for next extension.
8. Type Preload Value. Preload must be typed to ensure cylinders are completely in contact with the load.
9. Switch on the motor in the HPU's electric cabinet.
10. Press the Start Cycle button (Figure 2, item 2).
11. In stage 1, all cylinders will extend until reaching the preload value typed. After finishing step 1, the system will require operator's confirmation to start next step.
12. Press the Start Cycle button (Figure 2, item 2).
13. In stage 2, all cylinders will extend the positive delta value typed. After finishing step 2, the system will require operator's confirmation to start next step.
14. Place two outer blocks under the spreading plate.
15. Press the Start Cycle button (Figure 2, item 2).
16. In stage 3, all cylinders will retract the negative delta value typed and the cylinder's spreading plate will be supported by the outer blocks. After finishing step 3, the system will require operator's confirmation to start next step.
17. Press the Start Cycle button (Figure 2, item 2).
18. In stage 4, all cylinders retract to the initial position.
19. Place the central blocks under the plungers to start again the 4 stages sequence.
20. Repeat points 10 to 18 as needed to lift the load to the desired position.

NOTICE

Blocks must be placed crosswise when a new level of stacking is started.

11.8.2 Lowering a Load:

1. Ensure that all elements are correctly plugged and does not exist any alarm.
2. When working with climbing jacks, bear in mind that stroke sensors give a negative reading when the plunger goes out. Select indirect reading in the special parameters screen (paragraphs 8.5.1 and 9.5.1).
3. Go to Stage Lift screen. Refer to paragraphs 8.13 and 9.14 for further information.
4. Select Stage Lift button
5. Select lifting button.
6. Type Positive Delta parameter. This parameter is

the stroke that plungers extend per step, creating a space to remove the two outer blocks under the spreading plate.

7. Type Negative Delta parameter. This is the distance cylinders retract to remove the central block that will support the plunger plate for next extension.
8. Type Preload Value. Preload must be typed to ensure cylinders are completely in contact with the load.
9. Remove the central block if it is at the same level than the outer blocks. Plungers must be retracted for this step.
10. Switch on the motor in the HPU's electric cabinet.
11. Press the Start Cycle button (Figure 2, item 2).
12. In stage 1, all cylinders will extend until reaching the preload value typed. After finishing step 1, the system will require operator's confirmation to start next step.
13. Press the Start Cycle button (Figure 2, item 2).
14. In stage 2, all cylinders will extend the positive delta value typed. After finishing step 2, the system will require operator's confirmation to start next step.
15. Remove the two outer blocks under the spreading plate.
16. Press the Start Cycle button (Figure 2, item 2).
17. In stage 3, all cylinders will retract the negative delta value typed and the cylinder's spreading plate will be supported by the outer blocks. After finishing step 3, the system will require operator's confirmation to start next step.
18. Press the Start Cycle button (Figure 2, item 2).
19. In stage 4, all cylinders retract to the initial position.
20. Remove the central blocks under the plunger to start again the 4 stages sequence.
21. Repeat points 11 to 19 as needed to lower the load to the desired position.

11.9 Fast Retract Mode

This mode has been designed for applications with single acting cylinders. When the retraction is due to gravity weight or spring, the cylinder needs more time to retract the plunger.

CAUTION

Bear in mind that with this work mode the valves will be completely opened, so oil flows to tank free of opposition. Depending on the type of configuration of the application (cylinder, load, hoses, etc.), the load may move at an incorrect speed and may cause an incident.

Follow the steps below to work with this mode:

1. Go to Fast Retract screen. Refer to paragraphs 9.15 and 10.14 for further details.
2. Select fast retract mode button in the screen.
3. Press the Start Cycle button (Figure 2, item 2). Hydraulic valves will be opened allowing free return of oil.
4. Once cylinders are retracted, push stop cycle button (Figure 2, item 4).

11.10 Weighing Mode

In this work mode, the EVO system can calculate the load's weight through the load cells or pressure transducers' readings.

Since load can be unestable during procedure, this work mode makes up to 5 weight readings and calculates the average weight.

NOTICE

To use this work mode with load cells, EVOLCK Weighing Kit must be installed. Follow the steps below to work with this mode:

1. Ensure that all elements are correctly plugged and does not exist any alarm.
2. Go to Weighing screen.
3. Press Weighing button.
4. Type Delta Weighing parameter: This is the increment of position cylinders must reach. This step is performed to move the load from the original status and avoid not desired forces.
5. Type Weighing Time: Since load can get unstable during movement, the operator can give a few seconds for the load to become stable an immobile to get an accurate reading. The system will wait the time introduced to read the load's weight.

11.11 COG Mode

In this work mode, the system calculates de load's gravity center.Refer to paragraph 9.17 for further information.

Follow the steps below to work with this mode:

1. Go to COG Screen.
2. Select the cylinders which will be lifting the load.
3. Select the reference cylinder.
4. Take the length of the position of the cylinder from the main cylinder chosen and type the position in the suitable box.
5. Type the real position on the X and Y axis of the selected cylinders taking the reference cylinder as the origin point
6. The system will make the calculation automatically and will show the position of all cylinders and the location of the theoretical gravity center.

12. Maintenance

There is a small inline fuse of 10A inside the main power connection switch. If a short circuit occurs, this fuse will need to be replaced. The HMI screen requires some basic care including the following:

- Keep the screen clean of dirt and other debris at all times. These materials may get embedded in the screen and cause irregular function.
- Keep the screen dry at all times. Immediately clean any liquid off the screen.
- Keep the screen clean using a soft cloth with a mild screen cleaning solution if necessary.
- Keep the cover of the protective case closed when not using the controller to prevent damage and to keep the screen clean.

13. ALARM GUIDE

Only qualified technicians should service the CLNC12 or system components. To determine the cause of the problem, the complete system must be included in any diagnostic procedure.

Refer to the alarm chart for a list of alarms and possible causes. The alarm chart is not all-inclusive, and should be considered only as an aid to help diagnose the most common problems. For repair service, contact your local Authorized Enerpac Service Center.

The following alarm charts are divided depending on the kind of the equipment is connected with the CLNC12 controller, Split Flow Pump (SFP), EVO system or EVOP system.

13.1 SFP Alarms

ALARMS CHART for SFP SYSTEM		
ALARM	**POSSIBLE CAUSE**	**SOLUTION**
Safety Stop: Control Cabinet	• Safety Stop is activated.	• Deactivate Safety Stop button. • Reset alarm.
Stop Tolerance Exceeded. Reset Relative Positions	• The difference between Relative Positions of selected cylinders is bigger than “Work Tolerance” parameter.	• Review the Relative Positions of selected cylinders. • Reset the Relative Positions. • Reset alarm.
HPU Communication Failure	• The SFP does not communicate correctly with the SFPKSS4/ SFPKSS8.	• Check the connected cables between SFPKSS4/ SFPKSS8 and the electric cabinet of SFP. • Reset alarm.
Maximum Total Load	• The system has reached to the parameter typed Maximum Total Load.	• Check if the Maximum Total Load parameter is set correctly. • Check if the Load is blocked in the motion. • When the root cause has been checked and solved, reset alarm.
Synchronization Alarm	• In “Synchronization” Mode, the difference between the positions of the fastest and the slowest cylinder is bigger than “Stop Tolerance” parameter.	• Check the parameter, considering that “Stop Tolerance” must be at least 3 times the “Work Tolerance”. If it is incorrect, change it. • If the “Tolerance” parameters are correct, reset alarm and continue the cycle. • If the alarm is activated again, visually check the state of the stroke sensor and the cylinder.
Motor OFF.	• The motor is switched off when is trying to carry on a movement.	• Switch On the motor on the SFP electric cabinet. • Reset alarm.
Impossible To Start Tilting. All Values Must Be Others Than 0	• The value typed in the delta position of each cylinder is zero.	• Type a delta position different than zero or deselect the cylinder to be moved. • Reset alarm.
Maximum Cylinder (#) Load	• The pressure of the cylinder (#) has exceeded the value entered in the “Maximum working pressure” parameter.	• Check the parameter, considering the load weight and the cylinder characteristics. If it is incorrect, change it. • Check “Effective Area” and “Pressure” spans. If one of them is incorrect, change it. • Reset alarm. The alarm only can be reset, entering a parameter bigger than the cylinder pressure.
Cylinder (#) Stroke Signal Failure	• The position transducer signal of the indicated (#) cylinder is not reaching to the PLC.	• Visually check the position transducer and the cable. • Reset alarm.

ALARMS CHART for SFP SYSTEM		
ALARM	**POSSIBLE CAUSE**	**SOLUTION**
Cylinder (#) Absolute Sensor Position Value Below Lowest Admissible Limit	• The stroke sensor associated to (#) cylinder has the wire no extended/ connected to the load or the plug of the cylinder	• Extend the stroke sensor wire and connect it to the element to be moved. • Reset alarm
Cylinder (#) Pressure Signal Failure	• The pressure transducer signal of the indicated (#) cylinder is not reaching to the PLC	• Visually check the pressure transducer and the cable. • Reset alarm
Safety Stop: Single Control	• Safety Stop is activated	• Deactivate Safety Stop button • Reset alarm

13.2 EVO Alarms

ALARMS CHART for EVO SYSTEM		
ALARM	**POSSIBLE CAUSE**	**SOLUTION**
Controller Safety Stop	• Safety Stop button in the CLNC12 is activated	• Deactivate Safety Stop button • Reset alarm
HPU #: Safety Stop	• Safety Stop button in the HPU # is activated	• Deactivate Safety Stop button • Reset alarm
Safety Line Alarm	• In remote mode, the safety line is not correct	• Check the safety button in all the equipments • Reset Alarm
Safety Device OFF	• The safety output is off upon start up	• Reset Alarm
Controller 24V DC Protection Failure	• The CLNC12 DC protection has been tripped, due to an excessive consumption, overheating, short circuit.	• Open the CLNC12 and reactivate the DC protection channel. • Reset alarm
HPU #: 24V DC Protection Failure	• The HPU DC protection has been tripped, due to an excessive consumption, overheating, short circuit	• Open the HPU # cabinet and reactivate the DC protection channel. • Reset alarm
Impossible To Start Weighing	• The sum of the Weighing increments exceeds the stroke cylinders	• Reduce the increments weighing values
Impossible To Start Tilting. All Values Must Be Positives or Negatives	• There are negative and positive tilting values. The movement only can be in one direction	• Adjust Deltas Positions • Reset Alarm
Stop Tolerance Exceeded. Reset Relative Positions	• The difference between Relative Positions of selected cylinders is bigger than “Stop Tolerance” parameter.	• Review the Relative Positions of selected cylinders. • Reset the Relative Positions. • Reset alarm.
Synchronization Tilting Alarm	• In “Synchronization” Mode, the difference between the positions of the fastest and the slowest cylinder is bigger than “Stop Tolerance” parameter	• Check the parameter, considering that “Stop Tolerance” must be at least 3 times the “Work Tolerance”. If it is incorrect, change it • If the “Tolerance” parameters are correct, reset alarm and continue the cycle • If the alarm is activated again, visually check the state of the stroke senor and the cylinder

ALARMS CHART for EVO SYSTEM		
ALARM	**POSSIBLE CAUSE**	**SOLUTION**
Maximum Total Load	• The total sum of cylinder loads (selected and non-selected) has exceeded the value entered in the “Maximum Total Load” parameter.	• Check the parameter, considering the load weight and the cylinder characteristics. If it is incorrect, change it. • Check “Effective Area” and “Pressure” spans. If one of them is incorrect, change it. • Check there is no residual pressure in points that have no cylinder installed. If there is, depressurize these points or alter “Effective Area” span, putting it to “zero”. • If “Maximum Total Load” parameter is correct, the load weight is bigger than the theoretical value expected in the application. Ask to the engineer about it. • Reset alarm. The alarm only can be reset, entering a parameter bigger than the cylinder load.
Synchronization Alarm	• In “Synchronization” Mode, the difference between the positions of the fastest and the slowest cylinder is bigger than “Stop Tolerance” parameter.	• Check the parameter, considering that “Stop Tolerance” must be at least 3 times the “Work Tolerance”. If it is incorrect, change it. • If the “Tolerance” parameters are correct, reset alarm and continue the cycle. • If the alarm is activated again, visually check the state of the stroke sensor and the cylinder.
HPU #: Wrong Position Local/Remote Selector	• Local/Remote selector in HPU# set to the wrong position.	• Go to the HPU and set the Local/Remote selector to remote mode.
Safety Stop: Control Cabinet	• Safety Stop is activated.	• Deactivate Safety Stop button. • Reset alarm.
Stop Tolerance Exceeded. Reset Relative Positions	• The difference between Relative Positions of selected cylinders is bigger than “Work Tolerance” parameter.	• Review the Relative Positions of selected cylinders. • Reset the Relative Positions. • Reset alarm.
HPU Communication Failure	• The SFP does not communicate correctly with the SFPSSC.	• Check the connected cables between SFPSSC and the electric cabinet of SFP. • Reset alarm.
Maximum Total Load	• The system has reached to the parameter typed Maximum Total Load.	• Check if the Maximum Total Load parameter is set correctly. • Check if the Load is blocked in the motion. • When the root cause has been checked and solved, reset alarm.
Synchronization Alarm	• In “Synchronization” Mode, the difference between the positions of the fastest and the slowest cylinder is bigger than “Stop Tolerance” parameter.	• Check the parameter, considering that “Stop Tolerance” must be at least 3 times the “Work Tolerance”. If it is incorrect, change it. • If the “Tolerance” parameters are correct, reset alarm and continue the cycle. • If the alarm is activated again, visually check the state of the stroke senor and the cylinder.
Motor OFF	• The motor is switched off when is trying to carry on a movement.	• Switch On the motor on the SFP electric cabinet. • Reset alarm.
Impossible To Start Tilting. All Values Must Be Others Than 0	• The value typed in the delta position of each cylinder is zero.	• Type a delta position different than zero or deselect the cylinder to be moved. • Reset alarm.

ALARMS CHART for EVO SYSTEM		
ALARM	**POSSIBLE CAUSE**	**SOLUTION**
HPU #: Motor OFF	• A start cycle operation has been attempted with the motor off.	• Reset alarm. • Start the motor.
HPU #: Frequency Inverter Failure	• Frequency Inverter error.	• Push reset button in the console.
HPU #: Clogged Return Oil Filter	• The filtering element of the return filter is clogged.	• Do not work in this state for very long periods. The oil is contaminated and the working life of the pump decreases. Replace the filtering element. • Sometimes an instant depressurization of several cylinders at the same time may cause an overpressure of the return filter and activate the alarm. Check if this is a temporary event, reset the alarm and continue working. • Reset alarm.

13.3 EVOP Alarms

ALARMS CHART for EVOP SYSTEM		
ALARM	**POSSIBLE CAUSE**	**SOLUTION**
Safety Stop: Control Cabinet	• Safety Stop is activated.	• Deactivate Safety Stop button. • Reset alarm.
Stop Tolerance Exceeded. Reset Relative Positions	• The difference between Relative Positions of selected cylinders is bigger than “Work Tolerance” parameter.	• Review the Relative Positions of selected cylinders. • Reset the Relative Positions. • Reset alarm.
Maximum Total Load	• The system has reached to the parameter typed Maximum Total Load.	• Check if the Maximum Total Load parameter is set correctly. • Check if the Load is blocked in the motion. • When the root cause has been checked and solved, reset alarm.
Motor OFF.	• The motor is switched off when is trying to carry on a movement.	• Switch On the motor on the EVOP electric cabinet. • Reset alarm.
Impossible To Start Tilting. All Values Must Be Others Than 0	• The value typed in the delta position of each cylinder is zero.	• Type a delta position different than zero or deselect the cylinder to be moved. • Reset alarm.
Maximum Cylinder Load	• The pressure of the cylinder has exceeded the value entered in the “Maximum Cylinder Load” parameter.	• Check the parameter, considering the load weight and the cylinder characteristics. If it is incorrect, change it. • Check “Effective Area” and “Pressure” spans. If one of them is incorrect, change it. • Reset alarm. The alarm can only be reset by adjusting the load alarm parameter or by reducing the actual load on the cylinder using manual mode. Take care when using manual mode to avoid injury or death.
Cylinder Stroke Signal Failure	• The stroke sensor signal of the cylinder is not reaching to the PLC.	• Visually check the position transducer and the cable. • Reset alarm.
Cylinder Absolute Sensor Position Value Below Lowest Admissible Limit	• The stroke sensor associated to the cylinder is not extended or connected to the load or the plunger.	• Extend the stroke sensor wire and connect it to the element to be moved. • Reset alarm.
Cylinder Pressure Signal Failure	• The pressure transducer signal of the cylinder is not reaching the PLC.	• Visually check the pressure transducer and cable. • Reset alarm.
Safety Stop: Single Synchro Control	• Safety Stop is activated.	• Deactivate Safety Stop button. • Reset alarm.

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