Manual Touch Screen

Basic Operation

Content

1 General

This manual attempts to explain the basic operation of the **BatchXpert®** process management system and the **BatchXpert® Compact and BatchXpert® Micro** systems. It was developed for Siemens S7-300 compatible PLCs such as Vipa Speed 7 or Simatic S7-300.

The **BatchXpert®** system is a process management system, developed by the company Mlogics (www.MLogics-Automation.com), that incorporates standardized modules to form the images of the processes. These modules always incorporate certain features that are available to the user. The modules and their functions will be described later in the item Control Modules.

The **BatchXpert®** system also incorporates a process configuration and management system with its respective historical data. The functions of the configuration editor and the historical data viewer are described in the respective manuals. This manual is focused on the general handling of the HMI, the process images and its control modules.

For more information on the **"BatchXpert®" workflow,** please refer to the page www.Mlogics-Automation.com

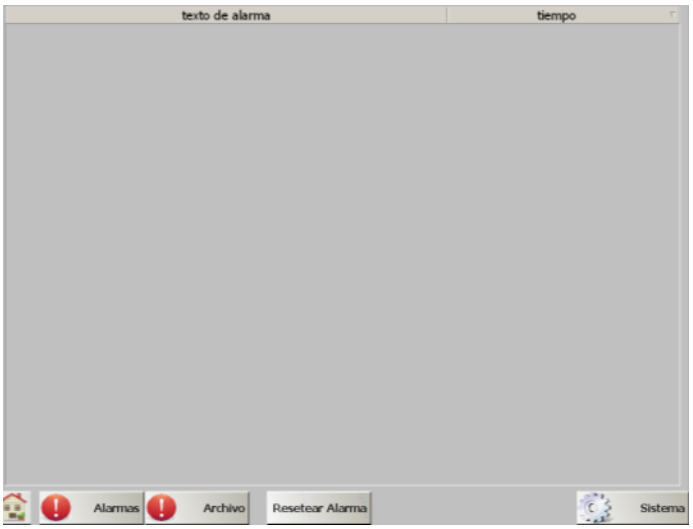
This specific manual will explain the user interface of touch screens connected to the BatchXpert system.

2 Alarms

This screen shows the current system alarms that are active and also a history of the alarms that were active in the system. In addition, it allows you to confirm alarms that need to be reset specifically by the operator.

1. **Current Alarms**

This screen shows the alarms currently active in the system. These are the alarms that the operator must pay attention to in relation to the processes that are running or that cannot be executed due to the existence of these alarms.



Each active alarm in the system displays the time when it was triggered and the alarm message.

2. **Reset Alarm**

This button allows you to confirm and reset each active alarm in the system, thus removing those from the current alarm list. Only alarms that are not currently active can be reset. Active alarms remain in the alarm list even after these alarms are reset.

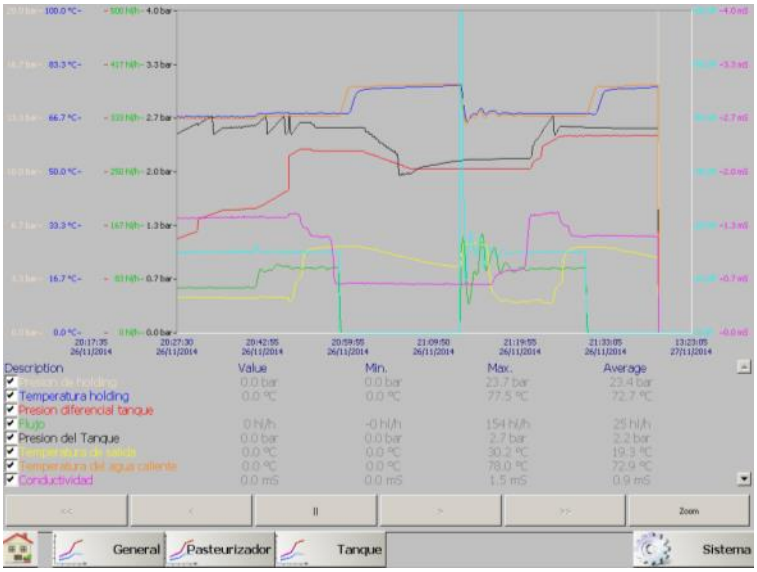
3. **Historical Alarms (Archive)**

This screen allows you to view the historical record of the alarms generated by the system, indicating the time and date of the moment the alarm was generated. This log allows you to track failures that have occurred in the past, and thus gives a more complete picture of a problem that may occur on the machine.

3 Trending

This display allows you to view the trend files of the system's analogue values (Measurements), which are remembered by the HMI display. These trends are stored in the HMI's internal memory for up to 7 days. After 7 days the data will be rewritten into new trends.

At the bottom of the screen, you can select one of several trending views available in the system. The buttons open more detailed views of trend charts.



With a click of the "Pause" button, you can pause the current view refresh (the data keeps being remembered!), and enable the "<<" and ">>" buttons to view trending data further back in time. With the "Zoom" button you can enlarge or decrease the time of the visible trends, for more details.

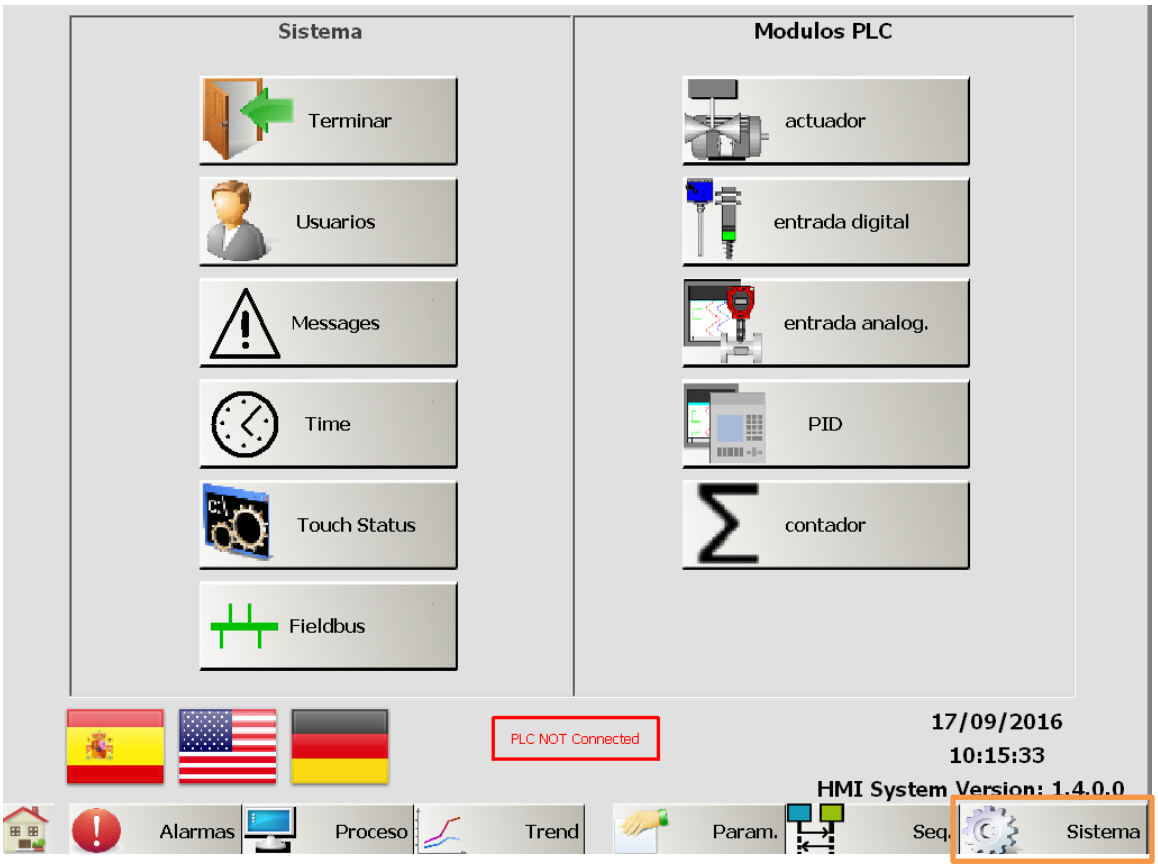
4 System

The configuration of the HMI system and the control modules are designed with "**BatchXpert®**", which belongs to the "BatchXpert" family of working systems for process control**, developed by the company** MLogics**.®**

Several Criteria were considered in this Program, from short cycle times to the preparation of the program with several prepared and standardized processes.

For more information on the "**BatchXpert®" workflow,** please refer to the page www.Mlogics-Automation.com

From the parameters screen you can access the system settings screen via the "System" button. On this screen, you can make the system settings with the corresponding authorization level. Adjustments can be made to the control modules, HMI settings can be changed, and various diagnostic screens can also be accessed.



4.1 Finish

This button allows you to end the display of the program on the screen. There you can change the basic settings of the HMI such as: IP address, brightness and contrast, files, ...

4.2 Users

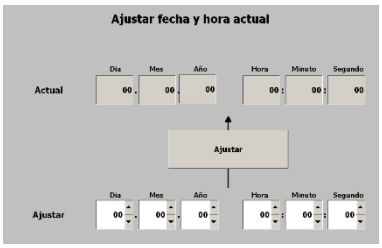
This button opens the user configuration console of the HMI operating system, from this button you can give administrator rights, change the password and username, as well as being able to make backups of the system data.

4.3 Messages / Trace

The messages represent information from the internal HMI system. A message acts as guidelines for the maintenance of the display system. These messages are only of interest to the maintenance staff. For more information about the images, please refer to the display manuals.

4.4 Time

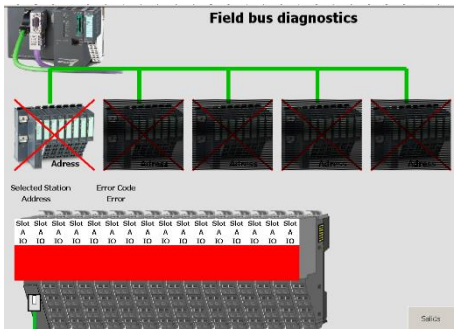
This button displays to the current date and time setting of the PLC and display. The time is set on the controller and on the display to the same values. The display additionally runs a synchronization at startup and every hour to adjust the time from the PLC. The time saved in the controller (PLC) is always taken as a reference



4.5 Touch Status

This button displays to a view with internal details of the Movicon display system and the Touch screen. The vast majority of values are only important to programmers, and therefore can be ignored by O&M personnel. As an important value you can take the "IP address" in the "Network" section to get the IP address of the screen. **WARNING! This chart shows the value of the first Ethernet gateway. The second door may have a different value!**

4.6 Fieldbus



This button drops down to the fieldbus diagnostic screen (Profibus or ProfiNet), depending on your installation. This screen only shows the stations configured in the system, and if a station is failing, it is displayed with a red "X" above it. This makes it possible to diagnose problems in a station or in the fieldbus wiring. Below the station symbol, the station number is displayed. This number corresponds to a fieldbus station in the field, and depends on the configuration and installation in the field. This number must be reviewed in the electrical documentation.

4.7 Language Selection

These buttons allow you to change the interface language of the HMI

4.8 PLC Connection Status

Displays whether the Controller is connected to the PLC correctly or not. If the controller is not connected, all the values are not up to date, and the display cannot function properly.

4.9 HMI Version and Current Time

Displays the current version and time of the display.

5 General Operation in Process Images

5.1 Symbols in process images

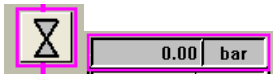
All modules are represented by symbols in the process images. These symbols indicate the current status of the module with different colors. Although some modules have certain states that are represented by other colors in images, all images follow a basic scheme. Generally, states are represented by the color of the symbol box and the symbol within the box.

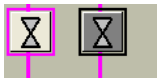
The colors of the standard modules are:

- **Active Alarm (Red)**
  An active alarm is represented by tango red in the symbol, as well as in the box
  

- **Alarm Not Active (Orange)**
  This state is represented by red in the box. The symbol color may show a different state.
  

- **Simulate and Ignore (Yellow)**
  The simulation mode and the ignore mode are represented in the frame colors of the box and the symbol.
  

- **Warning Situation (Pink)**
  Situations that require the operator's attention, but are not outright faults, are represented with pink color in the symbol box. These situations can be warnings, status notices, ...
  

- **Status: Automatic or Manual (Gloss Grey/Dark Grey)**
  If a module is in a manual or automatic state, it is represented by different background colors of the models
  

5.2 Enter Nominal Values

Each numeric value that can be adjusted by the operator is entered through numeric input boxes 

. Nominal values (values that can be adjusted) are usually represented with a white or very bright background color. The current values (those that cannot be adjusted, that represent some system value) are instead represented with darker background color, so that you can easily distinguish the nominal values from the current values.

A click on the nominal values opens a value entry dialog that allows you to enter the desired value within the permitted limits.

6 Modules

The parameters of the control modules are accessible via the system window. Each module parameter sale allows you to select the module to adjust the data via a dynamic selection bar at the top of the screen.

From this bar you can select the modules, in the left sector it shows the current module number, which can be changed using the + and - buttons, on the right there is a bar that allows you to select the actuator by name or function.

At the bottom right is the button 

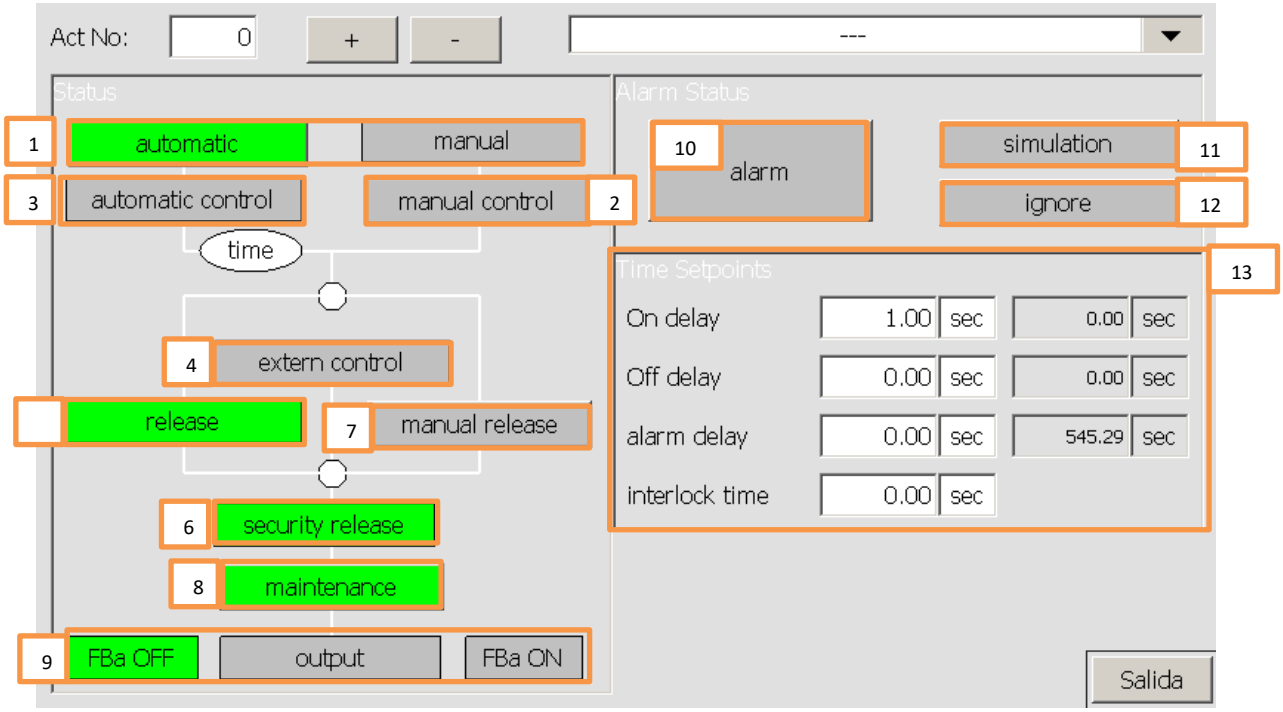
that allows you to exit the module configuration and return to the system menu.

6.1 Actuators

Actuators represent all the elements that can be controlled in the field from the System. Usually this includes valves, motors, pumps, lamps, etc.

Actuators have several different representations in the process images, usually representing valves, motors, pumps, or the like.

Here are some examples: 



In this window you can examine the current status of an actuator, also from this window you can change the configuration of the actuator. This window is only accessible with a high user level, and is not accessible to operators. Delay times, alarm times can be set and the periphery of the actuator can be configured

Actuator states:

1. **Auto/Manual (Green/Blue)**
   This displays the actuator control mode. In "Automatic" mode, the actuator acts according to the control of the "Auto Control" signal. In "Manual" mode, the operator can activate "Manual Control" to control the actuator manually.
2. **Automatic Control (Green/Grey)**
   This indicates the status of the PLC's internal control. If the process requires that actuator to be activated, this signal will be on. This signal only takes effect if the actuator is in "Auto" mode.
3. **Manual Control (Blue/Grey)**

The signal status to control the actuator in "Manual" mode. If the actuator is on, it will act if it is in "Manual" mode. In "Automatic" mode this signal has no effect.

4. **External Control (Green/Grey)**
   This represents control that comes from a third "external" source. Generally this signal comes from a form of local control in the field such as keypads or similar. This signal operates independently of the "Automatic" signal status, and also ignores the "Production Interlock".
5. **Interlocking Production (Green/Red)**
   This displays the status of the production interlock of this actuator. Generally this interlock includes locks to prevent damage to the product produced, or start sequences, when the process has to follow a power-on sequence to avoid problems in the process. This interlock can be disabled with the "Manual Release" option.
6. **Safety Interlock (Green/Red)**
   This interlock only includes blocks that have to do with safety for people and with the safety of the equipment. It generally includes blocks such as buffers, absolute limits, emergency stops, etc. This interlock cannot be ignored with any option. This interlock is always active.
7. **Manual Release (Blue/Grey)**
   This option allows the program to ignore the "production interlock", this is a function for maintenance. In this way, actuators can be tested without the entire process being in motion. However, this function should not be activated permanently, as the production interlocks that are supposed to secure the product are not active, so the process is not safe! If this mode is activated, the actuator turns blue in the process images.
8. **Maintenance (Red/Grey)**
   This mode allows you to lock an actuator so that it cannot be activated with any form of control. This mode is intended to lock a piece of equipment when it is undergoing maintenance. When this mode is activated, the actuator turns black in the process images.
   THIS ACTION DOES NOT REPLACE OR FREE THE OPERATOR FROM THE ELECTRICAL AND/OR MECHANICAL LOCKOUTS NECESSARY FOR THE EQUIPMENT!
9. **State of the Periphery (Green/Grey)**
   This shows the current status of the actuator. There you can see if the actuator has its On Confirmation, the Off Confirmation and if it tries to activate the actuator with its "Output".
10. **Alarm (Red/Grey)**
    This indicates whether the actuator has the alarm status or if the alarm is not confirmed. Each actuator always monitors the status of its acknowledgments and drops an alarm if the acknowledgments are not as expected.
    If the alarm still persists on the actuator, the circle to the left of the indicator is red; This means that the actuator is still in a faulty state, and the problem still persists. Thus the actuator alarm could not be confirmed.
    If the circle is gray, it means that there was an alarm, which is already resolved but not confirmed. The alarm can be confirmed with a click on the alarm indicator.
11. **Simulation**

This function allows the entire periphery of the actuator to be simulated. That means that the actuator completely ignores the status of its feedbacks and always assumes that the feedbacks are in the correct state. This mode is used if a feedback is lost, but the process has to continue to work. Thus the process can operate regardless of the condition of this actuator. The output of the Actuator is not affected by the simulation. If activated, the actuator turns yellow in the process image.

12. **Ignore Alarm**

    If this function is activated, the module will not trigger any alarms. The module continues to work with all its functions activated, but without triggering alarms. If ignore mode is enabled, the module turns yellow in the process image.

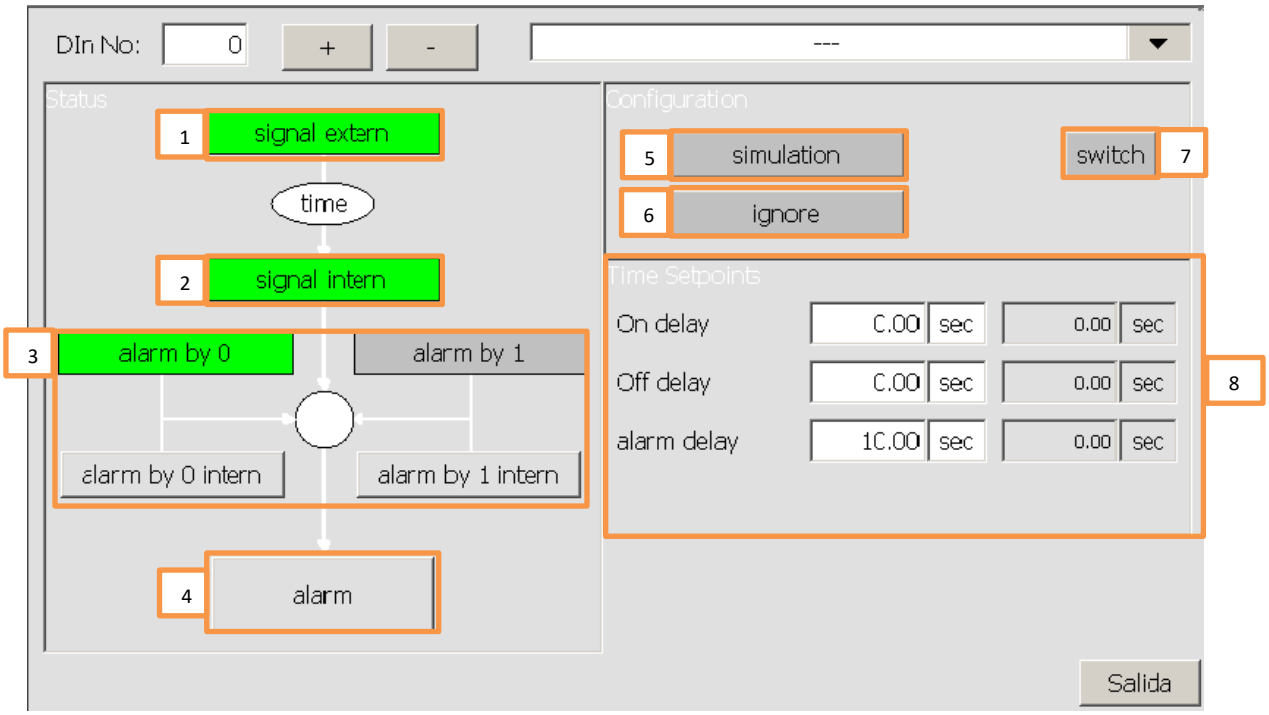
13. **Actuator Timers**

    The actuator has three internal timers that can be adjusted by the user.
    The "Off Delay" is the time that the actuator is still activated, even though the program no longer gives it the activation signal.
    The "Delay On" is the time the actuator waits to activate when it receives the control signal.
    The "Alarm Delay" is the time that the actuator waits until its feedbacks are in the expected state, before triggering an alarm.

6.2 Digital Inputs

A digital entry represents all inputs that can have only two states. Sensors such as level sensors, proximity sensors, buttons, etc. fall into this category.

In the process images, the digital input is represented by the following symbol:



This window represents the status and basic settings of the digital input, also in this window you can change the configuration of the digital input. This window is only accessible with a high level of user, not being accessible to operators. You can adjust delay times, times and types of alarms.

1. **Periphery/Outer Signal(Green/Gray)**
   This directly indicates, without considering delays or simulations, the signal status of the periphery of the digital input. This value is used for maintenance purposes only. If the operator wants to know the status of the digital input, he should refer to the "Signal" indicator
2. **Internal Signal (Green/Grey)**
   This represents the state of the signal with which the internal program works. Usually this signal depends directly on the signal from the periphery, but there too delays that can be adjusted at the input are applied, and the mode of the simulation is also considered.

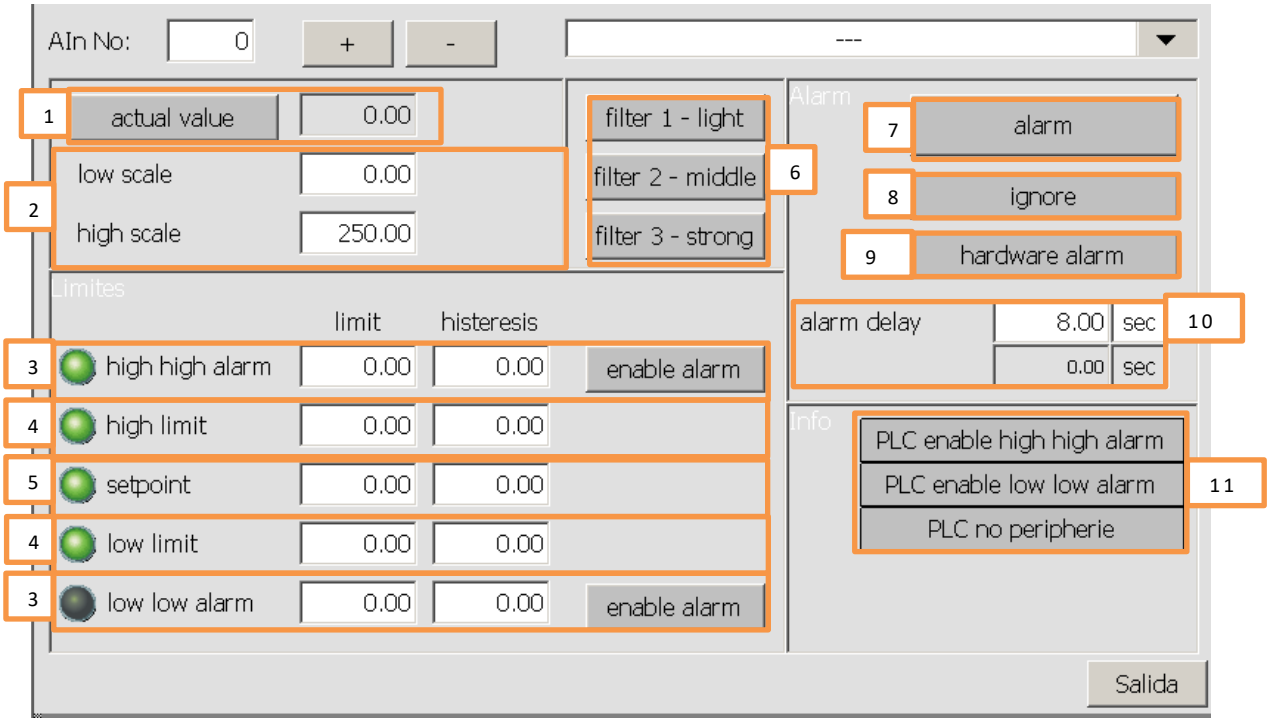
3. **Alarm at 0 or 1 (Green/Grey)**
   This is an adjustment that can be made on the digital input. This setting is only available to system administrators. The operator could see that the setting is on, but I couldn't turn it off, or turn this setting on.
   These two settings indicate when the entry enters the Alarm state. Depending on the setting, the input has an Alarm if the "Signal" is off or on, or both; Of course, the alarm delay is applied before the module alarm is triggered.
4. **Alarm (Red/Grey)**
   This indicates whether the entry has the alarm status or if the alarm is not confirmed. Each digital input triggers its alarm based on the "Alarm at 0" and "Alarm at 1" setting.
   If the alarm still persists on the entry, the circle to the left of the indicator is red. This means that the input is still in a failed state, and the problem still persists. Thus the entrance alarm could not be confirmed.
   If the circle is gray, it means that there was an alarm, which is already resolved but not confirmed. The alarm can be confirmed with a click on the alarm indicator.
5. **Simulation (Yellow/Grey)**
   This function allows the entire periphery of the module to be fully simulated. This means that the "Signal" used by the program to react to the state of the digital input no longer depends on the "Periphery Signal", but can be adjusted by the operator according to the requirements of the process. This allows the process to continue working, even though a sensor is failing.
6. **Ignore Alarm (Yellow/Grey)**
   If this function is activated, the module will not trigger any alarms. The module continues to work with all its functions activated, but without triggering alarms. If ignore mode is enabled, the module turns yellow in the process image.
7. **Switch (Green/Grey)**
   This is an adjustment that can be made on the digital input. This setting is only available to system administrators. The operator could see that the setting is on, but I couldn't turn it off, or turn this setting on.
   The setting makes the digital input a retained "Switch", this means that, if the peripheral input is turned on, the input is set its "Signal" to the on state (Green). The digital input will maintain this state, even though the signal from the periphery has already been turned off, until the second pulse of the signal from the periphery is detected. The signal is retained (stays on, even if the signal from the periphery is off)
   This function can be used, for example, for button panels that operate pumps with a single button. When the operator pushes the button, a pump ignites until the operator pushes the button again.
8. **Timers**
   The module has three internal timers that can be adjusted by the user.
   "Delay Off" is the time the sensor is still activated, even though the periphery is no longer on.

The "Delay On" is the time the module waits to activate its internal "Signal" when the "Periphery Signal" is on.
The "Alarm Delay" is the time that the module waits to trigger the alarm when the module meets its "Alarm at 1" or "Alarm at 0" alarm condition.

6.3 Analog Inputs

An analog input represents all measurements that are connected to the system. An analog input represents this measurement and displays the value of this measurement. You can also set various warning limits and alarms that trigger certain functions and alarms.

In the process images, the analog input is represented by the following symbol:



In this window you can change the settings of the analog input. This window is only accessible with a high user level, and is not accessible to operators. You can set delay times, times and process value limits.

> **The hysteresis** of the values generates a "dead band" to prevent the corresponding signal from fluctuating too much. The hysteresis function with all limit values and always above and below the set value. If the process value becomes less than the value set at the minus hysteresis limit, the corresponding limit signal is deactivated. The limit signal is lit again, if the process value becomes more than the limit value plus hysteresis.
> **For example**: If the limit value is set to 90 with a hysteresis of 30.
> The Limit Signal is turned off when the process value is below 90 -30 = 60.
> If the process value goes up again, the Limit Signal turns back on when the value reaches 90 + 30 = 120.

The current status of the boundary signals can be observed on the left side of each boundary in the circles. If this circle is green, the module detected that the process value is above the set limit value, also considering hysteresis. If it is gray, the process value is below the limit, also considering hysteresis.

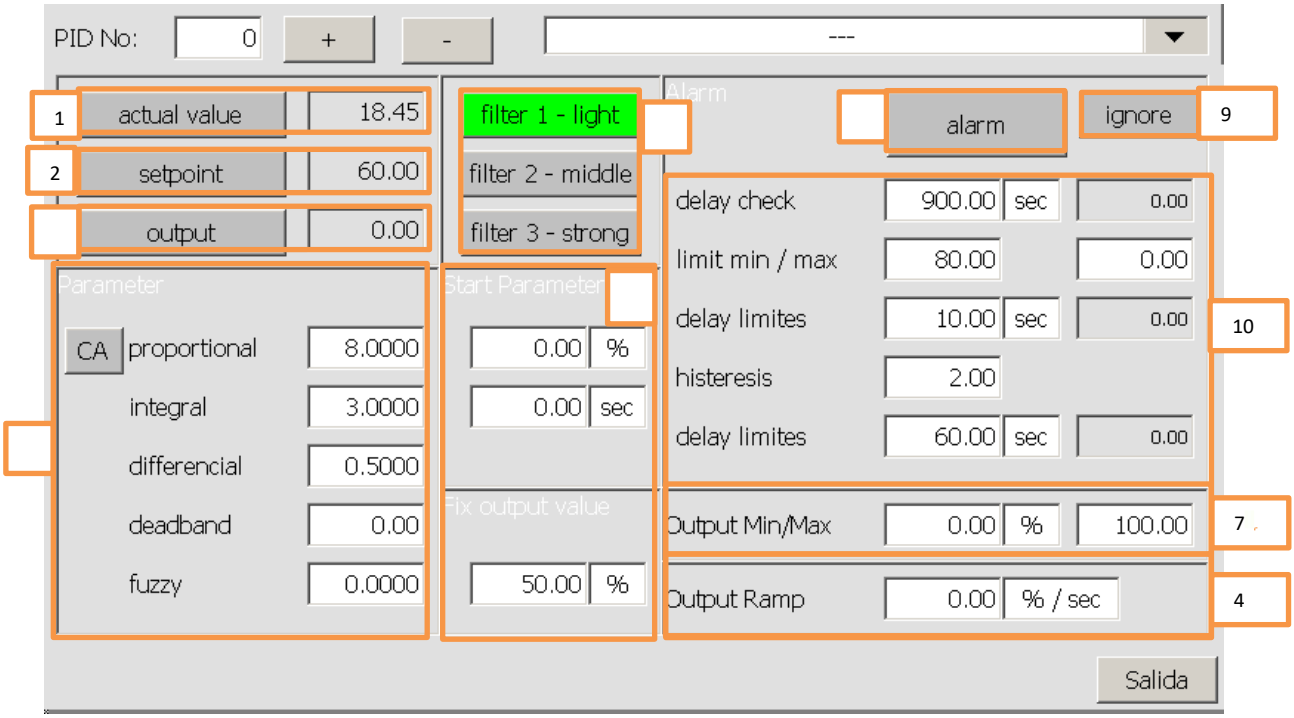
1. **Process Value (Gray/White/Yellow)**
   In this chart, the module shows its current process value and its engineering unit. This value represents the instantaneous value of this measurement, incorporating all scalings and filters.
2. **Scaling**
   These values adjust the scaling of this analog input. Since almost all analog measurements are connected with some standardized interface such as 0-20mA, 4-20mA, 0-10V, ...
   In order to evaluate these values, the system must know the value of the minimum value of the interface and the maximum value of the interface. These values depend entirely on the measuring equipment that is connected to the analog input card of the PLC. The scaling value of the interface of the connected computer, and the scaling value of the module interface should always be the same.
   For example:
   If a temperature sensor emitting a 4-20mA signal is connected, where 4mA corresponds to 20°C and 20mA corresponds to 120°C, the scaling should be adjusted in the module to 20°C-120°C.
3. **High/Low Alarm**
   If the process value exceeds or lowers these limits, no matter how much hysteresis triggers, the "High Value" or "Low Value" signal in the program. The status of these signals is indicated by the circles on the left side of the setting.
   If the option to trigger an alarm is enabled, these signals initiate the alarm delay. If this delay ends, the module triggers its general alarm, indicated by the color red.
4. **High/Low Limit**
   These two values are available for use by the user. The operation of these values depends only on the implementation in the project. By default, these two values have no effect.
5. **Face value**
   This value is available for use by the user. The operation of this value depends only on the implementation in the project. By default, this value has no effect.
6. **Filters**
   If you try to measure values with a lot of fluctuation, such as currents or flows with a peristaltic pump, the measurement value will be very unstable and can affect regulators in a negative way. If these filters are activated, the process value is "smoothed" with an algorithm built into the system. To get more "smoothing" of the system, you can activate several filters at the same time.
7. **Alarm**

This indicates whether the module is currently in the alarm state or if the alarm is not confirmed. Each module triggers its alarm based on the setting of its high and low alarm limits.

8. **Ignore Alarm (Yellow/Grey)**
   If this function is activated, the module will not trigger any alarms. The module continues to work with all its functions activated, but without triggering alarms. If ignore mode is enabled, the module turns yellow in the process image.
9. **Alarm Hardware**
   If this setting is activated, the system monitors the status of the peripheral signal. If the module detects a fault in the interface, such as a cut cable or a dead sensor, the module activates its Alarm state and indicates the periphery fault in the "Status" periphery box.
10. **Alarm Delay**
    If the "High Value" or "Low Value" signal has been activated and the corresponding alarm position is activated, this delay begins to count. If the timer runs out, the module enters Alarm mode.
11. **Periphery State**
    This indicates the status of the periphery interface that is connected to the PLC. If the "Hardware Alarm" setting is enabled in the module, and the module detects a fault in the interface, this box indicates that the fault is active.

6.4 Analog Output (PID Regulator)

An analog output represents all equipment that can be controlled with an analog output signal. This module also implements the full operation of a PID regulator, with all its settings and limit values. If the operation of a regulator is not required, the operation of the regulator can be disabled and the analog output can be operated directly as a value to an external computer. This module is used for all types of regulations, such as throttle valves, flow regulations, ... It is also used directly, without regulation, as nominal values to variable frequency drives, or other equipment.



In this window you can change the settings of the slider. This window is only accessible with a high user level, and is not accessible to operators. Values of the control algorithm, alarm values and other functions can be adjusted.

1. **Current Value of the Process**
   This represents the current value of the process that the regulator uses for its regulation algorithm. This value usually comes from an analog input. This value can be simulated when the "Simulation" mode is activated.
2. **Nominal Value/Setpoint**
   This represents the nominal value of the regulator. The throttling algorithm will try to adjust its output in such a way that the process value comes as close as possible, as quickly as possible to the nominal value. Generally, this value comes from processes and their sequences. If the "Manual Nominal Value" mode is activated, the value can be adjusted

without the process intervening. In this mode, the nominal value can be adjusted directly to the regulator. This is the operation corresponding to the manual control of an actuator.

3. **Output Value**
   This represents the current output value of the slider. Depending on the regulated equipment that corresponds to an opening angle, a speed, ...
   If the "Manual Output" mode is activated, this value can be adjusted directly, without the control algorithm intervening in this value.
4. **Parameters of the PID algorithm**
   This table sets all the parameters required for the PID algorithm.
   - The **Proportional, Integral, and Differential** values indicate the basic parameters of the regulation algorithm. These values directly affect the behavior of the regulator and should only be adjusted by regulatory experts. For more information, please review the "http://en.wikipedia.org/wiki/PID_controller" articles on PID control.
   - **Fuzzy Logic**
     When required, the programmer can supply up to two "Fuzzy Logic" values to the control algorithm. A factor can be set in the parameters, which indicates how much this value affects the output of the regulator.
   - "**Banda Muerte**". This sets a dimming range where the regulator does not change its output value.
   - **"Output Rampa".** This value limits the modification of the output to a value in %/sec. If the slider modifies its output value faster than this value, the algorithm limits this and only modifies the output with the maximum ramp set. This value can be used for valves or pumps, to avoid damage from abrupt regulation. With the value 0.0, the ramp is disabled and allows instant changes of the output.
5. **Filters**
   The "Filters" work in the same way as the filters on the analog inputs and allow you to "smooth" the process value before entering it into the PID.
6. **Start & Exit**
   In this box, you can adjust the start behavior of the slider. There are mainly two ways to start the regulator:
   - **Start with fixed value per time**
     With this option, the slider starts with a fixed value for a certain amount of time. The start value can be set to the "Start Value" and the time you keep this value without adjusting the regulation can be set to the "Start Time" value
   - **Immediate Start with Proportional Value (Kp)**
     If the start time value is set to a value of 0 or negative, the slider starts with a starting value corresponding to the proportional factor.

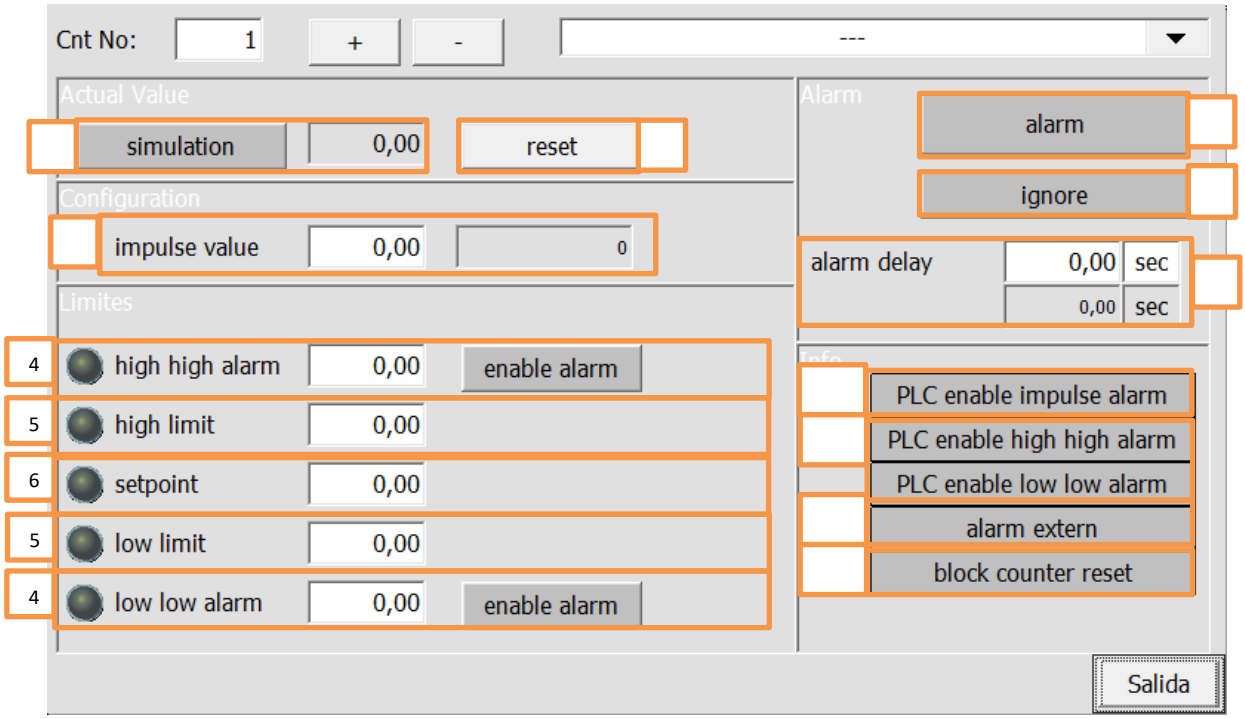
7. **Scaling**

After the PID algorithm the output can be scaled to the required value. With this function you can also limit the output to a certain maximum or minimum. The "Input" value corresponds to the internal output value of the slider which corresponds to a value between 0-100% and the "Output" value corresponds to the output value for the user.

8. **Alarm**
   This indicates whether the module is currently in alarm status or if the alarm is not confirmed. Each module triggers its alarm based on the setting of its high and low alarm limits.
9. **Ignore Alarm**
   This button allows you to ignore an alarm and continue with the process.
10. **Alarms & Limits**
    Alarm limits can be set for the controller. The "Check Delay" value indicates a length of time for which boundary monitoring is delayed. This time starts when the regulator starts. In this way, a time can be set within which the regulator must have regulated its process value.
    In the first category, you can set the absolute limits, which the process value cannot exceed. When the process value exceeds these values after the "Backlog Check" was met, the regulator generates a failure.
    In addition, a **hysteresis can be set**, which indicates the maximum allowable deviation from the process value to its nominal value. This value will only be activated when the "Checkup Delay" time has expired.

6.5 Counters

A counter represents a module that counts the pulses of a digital input. Generally, this module is used for (for example), counting the quantity of a meter flow through a quantity pulse.



In this window you can change the counter settings. This window is only accessible with a high user level, and is not accessible to operators. You can adjust limit values, and the values that each pulse has.

1. **Simulation (Yellow/Grey)**
   This function allows the entire periphery of the module to be fully simulated. This means that the "Process Value" used by the program no longer depends on the "Periphery Value", but can be adjusted by the operator according to the requirement of the process. This allows the process to continue working, even if a sensor is failing.
   If this mode is enabled, the process value turns yellow, indicating the simulation mode.
2. **Reset**
   This button resets the current value of the counter to zero. This button is only released if the counter does not have its "Reset Lock" option enabled
3. **Pulse Value and Pulse Counter**
   These two values indicate the value that each pulse has to the process value, and the counter shows the number of pulses that have been recorded on the counter since the last reboot

4. **High/Low Alarm**

If the process value exceeds or lowers this limit, even if hysteresis, the "High Value" or "Low Value" signal is activated in the program. The status of these signals is indicated by the circles on the left side of the setting.
If the option to trigger an alarm is enabled, these signals initiate the alarm delay. If this delay ends, the module triggers its general alarm, indicated by the color red.

5. **High/Low Limit**
   These two values are available for use by the user. The operation of these values depends only on the implementation in the project. By default, these two values have no effect.
6. **Face value**
   This value is available for use by the user. The operation of this value depends only on the implementation in the project. By default, this value has no effect.
7. **Alarm**
   This indicates whether the module is currently in alarm status or if the alarm is not confirmed. Each module triggers its alarm based on the setting of its high and low alarm limits.
   The alarm can be confirmed with a click on the alarm indicator.
8. **Ignore Alarm (Yellow/Grey)**
   If this function is activated, the module will not trigger any alarms. The module continues to work with all its functions activated, but without triggering alarms. If ignore mode is enabled, the module turns yellow in the process image.
9. **Alarm Delay**
   If the "High Value" or "Low Value" signal has been activated and the corresponding alarm potion is activated, this delay starts counting. If the timer runs out, the module enters Alarm mode.
10. **Hardware Alarm (Red/Grey)**
    This alarm indicates if the signal from the "Boost" counter did not arrive within your backlog of pulse alarms. If no impulse has arrived within this time period, the alarm is triggered.
11. **Minimum & Maximum Alarms (Green/Grey)**
    These indications indicate whether the minimum and maximum alarms are activated for these modules.
12. **External Alarm (Red/Grey)**
    This signal indicates an alarm coming from outside the module (external). Generally, this is used to represent alarms from external equipment that emit pulses that the meter is counting.
13. **Lock Reset (Green/Grey)**
    If this option is initiated, the counter cannot be manually reset. This signal cannot be activated by the operator, as it is a signal that is used during the process. This feature prevents you from manually resetting the counter by accident.

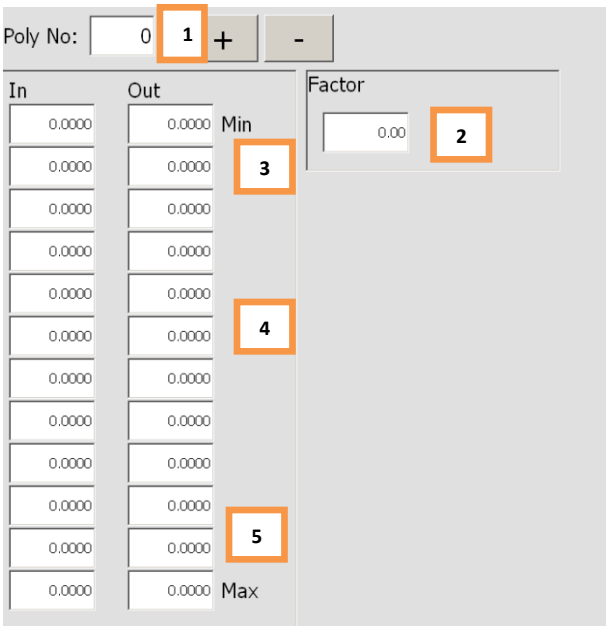
6.6 Polygonal table

If the dependence of the analog value and the process value is not linear, a polygon table can be activated to linearize the value. Setting polygonal tables is available from the Analog Inputs window with the Traverse Table button.

This system is used, for example, when trying to measure the volumetric content in a non-cylindrical tank, through a water column measurement (pressure measurement). In this case, the pressure value (the measurement value) must be linearized, so that it corresponds to the volumetric content of the tank (the process value).

Example tank level with a pressure probe:

- 11.2 mbar 10.0 liters
- 20.0 mbar 100.0 liters
- ....



1. **Polygonal Table No.**
   This number indicates the number of the polygon table being edited in the current window. To change the table, you can use the two "+" and –" buttons to change the table you edit.
2. **Factor**
   This factor is applied to all output values at the end of the polygon calculation. With this value it is possible, for example, to correct the error that is introduced if a polygonal table is configured with water, but the product medium has another density (e.g. syrup, wort, ...), which would result in a false measurement.
3. **Minimum Value**
   This represents the minimum value that can be calculated by the polygon table. It is recommended that this value corresponds to the Minimum Scaling of the analog input, where the polygon table is used. In the example above, if a measurement of 0-1 bar is

used to measure the volume of a tank, the minimum value in the table should be 0 bar. If it is not possible to make the actual adjustment, this value must be calculated according to a linear formula.

4. **Table Values**
   These values represent the values in the polygonal table. The input values correspond to the actual measurement of the measurement, and the output values correspond to the corresponding process values of these values. The traverse calculates the values continuously between the values entered into the traverse.
5. **Maximum Value**
   This represents the maximum value that can be calculated by the polygonal table. It is recommended that this value corresponds to the Maximum Scaling of the analog input, where the polygon table is used. In the example above, if a measurement of 0-1 bar is used to measure the volume of a tank, the maximum value in the table should be 1 bar. If it is not possible to make the actual adjustment, this value must be calculated according to a linear formula.

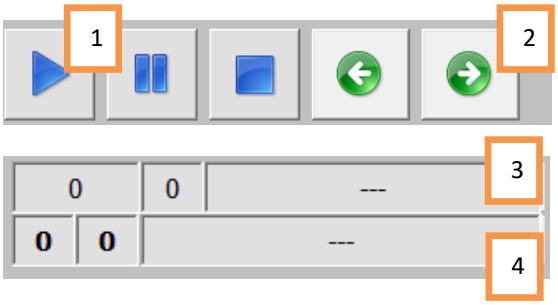
7 Units (Unit)

Units form the integral part of process management and represent process cells that can execute a process. A Unit can execute a recipe, which represents the technological procedure for producing a product or for fulfilling a certain function of the machinery.

Each unit can execute a sequence of steps, which is defined by recipes. A recipe represents the order of the steps to be executed and their respective nominal values. Each Unit can run one recipe at a time. A recipe can define the sequence of steps for several sequences that work together during the process. These sequences that work together during the process are called "BatchArea" or "Área de Batch" in Spanish. Each recipe belongs to a Batch area, and thus defines the sequence of steps and their nominal values for all sequences in a Batch area.

7.1 Symbol in the process images

A unit is represented by the following symbol in the process images



1. **Sequence Operation Status**
   The current operating state of the sequence. More details in the chapter "Operating Status"
2. **Move forward or backward one step in the sequence**
   These buttons allow you to skip or rewind one step in the unit's current step sequence. These buttons are only available if the unit is not set to "Automatic" and if a recipe is running. WARNING! Using this feature can have unintended effects on the process, and should only be used by trained and skilled personnel.
3. **Recipe Name (and Number) and Batch Number**
   This box shows the name of the recipe that is currently running. In order to identify the process, each process also has a batch number. This number also appears in this chart. Clicking on this box opens the window where you can start a new recipe on the respective unit.
4. **Sequence Step**
   This indicates the step that the drive is currently running. The step number indicates the step within the recipe configured, and the action number indicates the type of action that is configured for this step in the recipe.

7.2 Operating Status

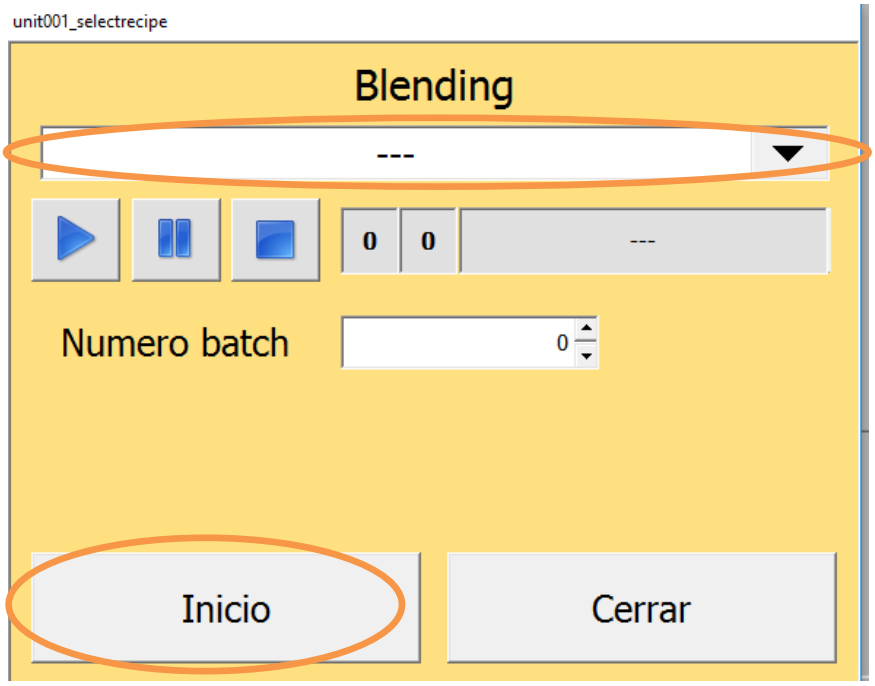
Each sequence has a state of operation. A sequence can have three general states of operation. These states have an effect on the execution of the processes (the steps that are defined in the recipe) and the control modules that belong to this process. The status of the sequence can be manipulated by the operator with a click on the respective status button.

1. **"Automatic"** 
   The execution of the process steps works completely automatically. If a step ends, the sequence automatically continues to the next step that is set up in the recipe. Manual operations are not possible on the unit's control modules. It is generally not possible to operate valves or actuators manually when the sequence is in this state.
2. **"Pause"** 
   The execution of the current step works completely automatically, but if the current step ends, the sequence changes the status to "Stop". In this state, it is possible to activate control modules manually. It is possible to open valves and actuators manually. Warning! Since the sequence continues to execute the process, the process will also activate actuators according to the logic of your process! That can lead to potentially dangerous situations!
3. **"Stop"** 
   In this state, the unit stops its automatic execution of the configured processes and leaves all control modules fully available to the operator. Warning! Depending on the type of process, it may be possible to produce non-optimal situations for the product if the process does not follow automatically!

In general, all modules are assigned to one or more process units. This assignment is made in the PLC programming and is usually not manipulable by the operator. Depending on the status of the unit, the control modules of the respective unit are either released or locked for manual manipulation.

7.3 Start a program

To start a recipe or program on a unit, click on the "Recipe Selection" button in the corresponding sequence. This opens the recipe start window, where you can choose the recipe you want to start. In order for a prescription to be initiated, the unit must be in the "Automatic" state.



When the program is loaded, the sequence can be started. "Start" is only available if the sequence is in automatic mode. With a click on the "start" button, the sequence starts booting and running the selected program.

8 Hardware (PLC)

The BatchXpert Control System typically runs on SIMATIC S7 compatible PLCs such as the "Vipa Speed 7" series, the Siemens S7-300 series or the Siemens S7-400 series. All of these automatons are generally similar, but they have some differences. For more details, see the manuals for the corresponding CPU installed in the Project. However, there are some general considerations common to all S7 compatible CPUs.

8.3 Switch Operation

The default mode of operation for BatchXpert is "Run" or "RUN-P" (where available). "Stop" can only be active for specific maintenance tasks where a trained Technician is required.

- With the operating mode switch you can switch the CPU between STOP and RUN.
- During the transition from STOP to RUN, the START-UP mode of operation is initiated by the CPU.
- By setting the switch to MRES (Clear), it requests a full CPU wipe with the next MMC load, if a project exists.

8.4 Memory Reset (Factory Reset)

A "Memory Reset" of the PLC will delete all the data stored in the PLC's memory! This includes all data, such as process logic and parameters. **After a complete deletion, a subsequent download of the program to the PLC is always necessary!** For guidance on how to restore a PLC backup, please read the manual "PLC Restore Manual".

It is NOT recommended to perform "Memory Reset" without prior clarification from a trained technician. Please note the following:

- All logic will be cleared until you download it back into the controller, which must be done by a trained technician! This means that there won't be any logic at all running on the controller. No Valve or Motor functionality, not even Manual; No HMI will be able to connect.
- The parameters and settings of all control modules (such as: regulators, valves, etc.) will be reset to the values that the cases indicated at the time the backup was taken.
- When uploading a backup to the PLC, ALL data and processes are reset to the moment the backup was made. This means that ALL sequences of ALL Processes lose their state and are reset, making it impossible to continue with a process that was running!
- After loading, the statuses of the processes must be reset, when the corresponding recipes are started, and the steps of the Units must be advanced to the corresponding Steps.

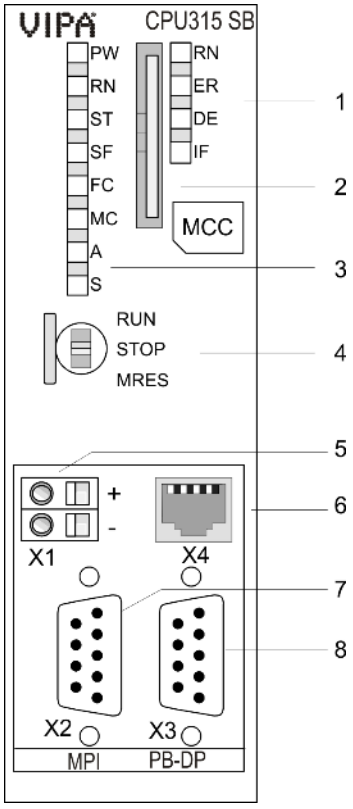
8.5 Battery backup for RAM and clock in a "Vipa Speed 7"

A rechargeable battery is installed in each 31xS CPU to protect the contents of the RAM when the power is disconnected. This battery is also used to buffer the internal clock. The rechargeable battery is maintained by a charging circuit that receives its power from the internal power supply and which holds the clock and RAM for a maximum period of 30 days.

Warning!

Please connect the CPU for at least 24 hours to the power supply, so that the internal accumulator/battery is charged accordingly. After a power reset and with an empty battery, the CPU starts with a BAT error and executes a hard wipe. The loading procedure is not influenced by the BAT error. The BAT error can be cleared again, if once during an on cycle the time between turning on and off the power supply is at least 30 sec. and the battery is fully charged. Otherwise, with a short power cycle the MTD error still exists and a hard wipe is executed.

8.6 Hardware of a "VIPA Speed 7"



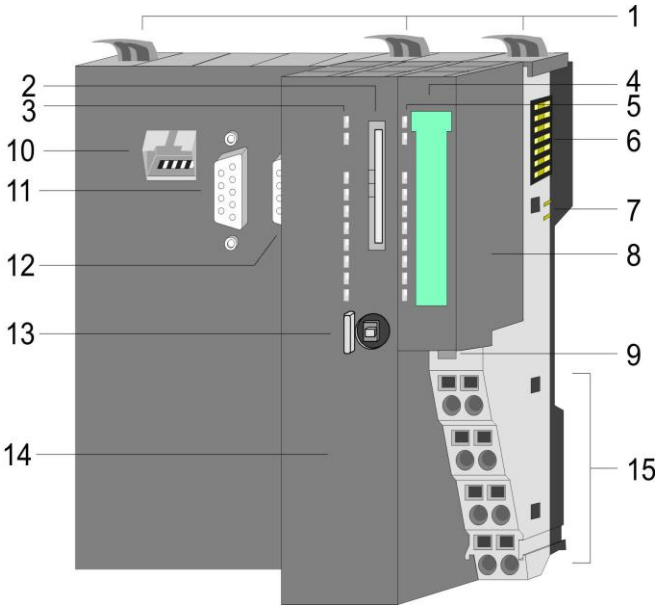
The following shows the hardware and LEDs of a Vipa Speed 7 CPU

1	Integrated PROFIBUS DP master LED
2	Storage: Media slot (keyed)
3	CPU Part LED
4	CPU Operating Mode Switch
5	Slot for DC 24V power supply
6	twisted-pair interface for Ethernet PG/OP channel
7	MPI Interface
8	PROFIBUS DP/PtP Interface

Components 5 - 8 are under the front flap!

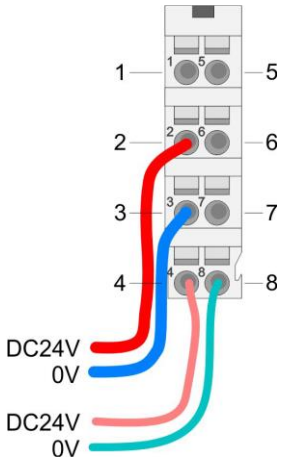
8.7 Hardware of a "VIPA Speed 7 SLIO"

The following shows the hardware and LEDs of a Vipa Speed 7 SLIO CPU



1 Rail Bindings
2 Memory Card Slot
3 CPU Status LED
4 Power Module Label
5 Power Module Status LED
6 Rear Bus
7 DC 24V Power Section
8 Power Module
9 Fixing for Power Module Rail
10 X1: PG/OP Ethernet interface
11 X2: PtP Interface(MPI)
12 X3: MPI(PB) Interface
13 CPU Operation Mode Switch
14 CPU
15 Power Module Terminals

Power Module



1 Not Connected
2 DC 24V for power section
3 GND for Power Section
4 DC 24V for electronics section
5 Not Connected
6 DC 24V for power section
7 GND for Power Section
8 GND for Electronics Section

8.8 General LED of a "Vipa Speed 7"

The following table shows the LED statuses of a Vipa speed 7 CPU. The default status is marked in green.

**** Flashes at 10 Hz: Settings are loaded.***

RN (RUN)	ST (STOP)	SF (SFAIL)	FC (FRCE)	MC (MMC)	Meaning
verde	amarillo	rojo	amarillo	amarillo	
Iniciando después de PowerON					
●	BB*	●	●	●	* Parpadea con 10 Hz: El firmware es cargado.
●	●	●	●	●	Inicialización: Fase 1
●	●	●	●	○	Inicialización: Fase 2
●	●	●	○	○	Inicialización: Fase 3
○	●	●	○	○	Inicialización: Fase 4
Operación					
○	●	X	X	X	CPU en modo “Stop”. CPU detenido
BB	○	X	X	X	CPU se encuentra en estado de puesta en marcha, el RUN parpadea durante operativo del OB100 al menos durante 3 segundos.
●	○	○	X	X	CPU en modo “Run” sin error.
X	X	●	X	X	Hay un fallo en el sistema. Más información se puede encontrar en el búfer de diagnóstico de la CPU.
X	X	X	●	X	Un variable esta forcada
X	X	X	X	●	Acceso a la tarjeta “memory card”.
X	BB*	○	○	○	* Parpadea con 10 Hz: La configuración está cargado.

on: ● | Off: ○ | blinking (2Hz): BB | not relevant: X

8.9 Ethernet LED of an "Vipa Speed 7"

Green L/A-LED (Link/Activity) indicates the physical connection of the PG/OP Ethernet to Ethernet channel. Irregular flashing of the L/A-LED indicates PG/OP Ethernet channel communication via Ethernet.

If the green S-LED (speed) is enabled, the Ethernet PG/OP has a communication rate of 100 Mbit/s otherwise 10 MBit/s.

8.10 Profibus LED of an "Vipa Speed 7"

Waiting for the CPU

RN (RUN)	ER (ERR)	DE	IF	Meaning
verde	rojo	verde	rojo	
○	○	○	○	El Maestro tiene ningún proyecto, esto significa que la interfaz se desactiva respectivamente PtP está activo.
●	○	○	○	Maestro tiene parámetros de bus y está en RUN sin esclavos.
●	○	B B	○	Maestro está en "clear" estado (estado de seguridad). Las entradas de los esclavos pueden ser leídos. Las salidas están desactivadas.
●	○	●	○	Maestro está en estado de "operar", esto significa que el intercambio de datos entre el maestro y los esclavos. Se puede acceder a las salidas.
●	●	●	○	CPU en “run” pero al menos un esclavo está faltando
●	●	B B	○	CPU en “stop” pero al menos un esclavo está faltando
○	○	○	●	Falla de inicialización. Parámetros inválidos
○	●	○	●	Esperando al CPU

on: ● | Off: ○ | blinking (2Hz): BB

9 Touch Screen (Movicon)

The HMI screen is manufactured by the company VIPA, which has the Windows CE operating system and the MoviconCE display software incorporated, so we must differentiate that the operating system of the screen is for the general operation of this screen (it is not advisable to intervene in this system) and the MoviconCE software which executes the display project.
The programming of the project for visualization is done with the Movicon V11.4 software (Current as of 01.2016). All Movicon software is developed by the company Progea.
Whenever you need to modify the project or upload the project to the HMI, you need to install the Movicon V11.4 on a computer, The Movicon software is the HMI system that you can download from the web screen of the company Progea (www.progea.com) in Downloads Software. This download requires free registration and the download weighs 900 MB.

Note: The following items contain information that can be performed by electrical or computer personnel who have advanced control at the computer level.
The PC should usually have an IP configuration of 192.168.0.70 or higher than 70. (The PLC usually has the address 192.168.0.11 (.12 or .13) and the HMI display 192.168.0.41 (or .42). Without this configuration, they will have no communication with these devices. To connect the PLC or HMI to the PC, you must use an Ethernet cable.

The backup of each HMI is delivered at the end of the project, a link to Google Drive is also given where the backups are also located. If you do not have the backups, request them only from MLogics.

9.1 When to Restore Project to the Screen

It is important to determine when it is necessary to restore the project to the HMI display, as confusion can occur as to when the display is operating normally or is having problems. Uploading a project to the HMI will not resolve issues caused by the operating system or Movicon software. To restore an HMI screen, the last backup of the project must be uploaded, this backup is delivered by the company MLogics at the time of completion of the project or when the client deems it necessary to have it.

When the project should be uploaded to the HMI display:

1. When the HMI display is new, this occurs when the previous HMI display suffered irreparable damage (screen breakage, liquid submersion, etc.) which resulted in purchasing a new screen in its replacement.
2. When the customer requests a modification to the images on the screen, and for reasons of expensive trips to the plant, the customer decides to carry out the loading of the project to the screen with plant personnel.

When the project should NOT be uploaded to the HMI display:

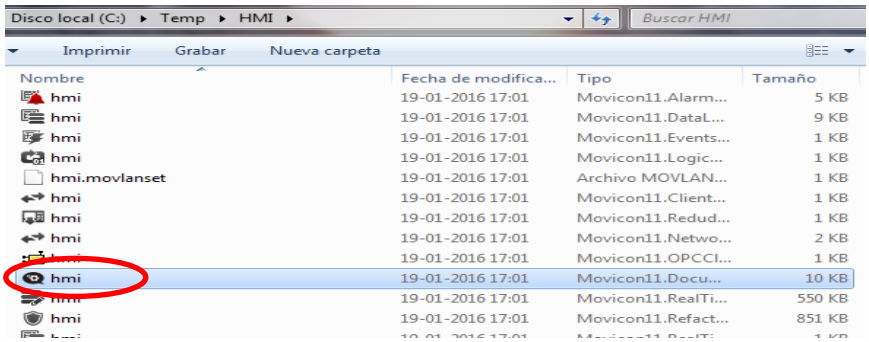
1. When the HMI stops communicating with the PLC.
2. When you don't run the start operations of a recipe, motor, valve, switch (this occurs when a recipe is already running or you don't start a motor or valve due to process or safety blockages).

9.2 Upload project to HMI

This item describes the procedure that must be performed to upload a project to the HMI.

It is important to consider IP addresses of the computer and the HMI.

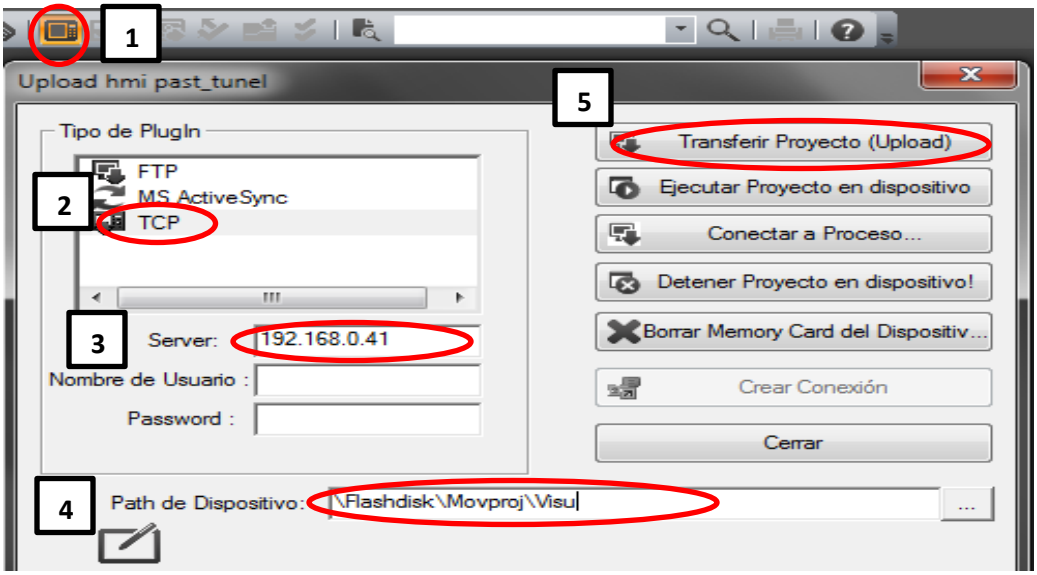
We start in the backup folder by opening the " .movprj" file which runs the Movicon software starting the project.



A message will appear where the product key must be entered, this can be ignored by clicking cancel.

Once the Movicon with the project has been opened, the upload to the Project HMI can be started by following the steps below:

1. To transfer the project we must click on "Upload the project to the device/FTP", where a window will open where we enter IP address, communication interface, and the path where we will save the project.
2. In this case the interface is via Ethernet so we must select "TCP"
3. Enter the IP address of the HMI Display in "Server".
4. The directory where we will save the project on the HMI screen in "Device Patch" is "\Flashdisk\Movproj\Visu".
5. Once this data has been adjusted, click on "Upload Project"
6. A "Transfer Speed" message will appear in which "Low Speed" should be selected

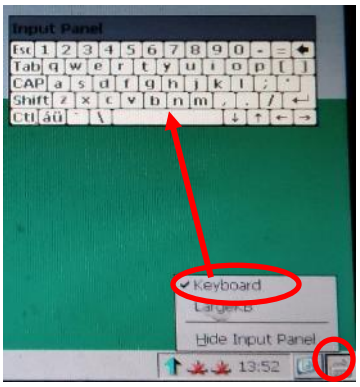


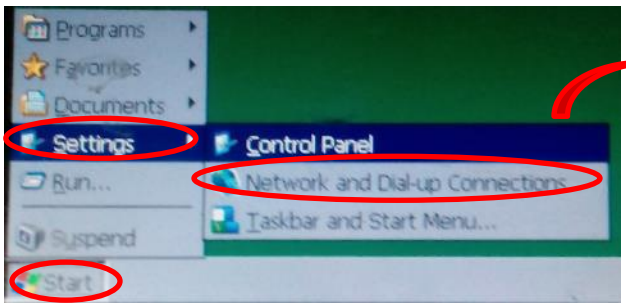
9.3 New HMI Configuration

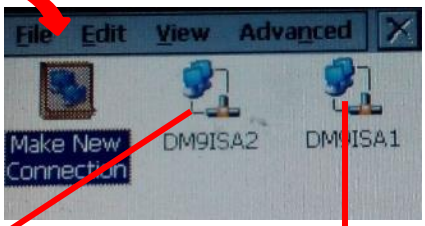
If the HMI is replaced with a new one, the following modifications must be made to the computer.

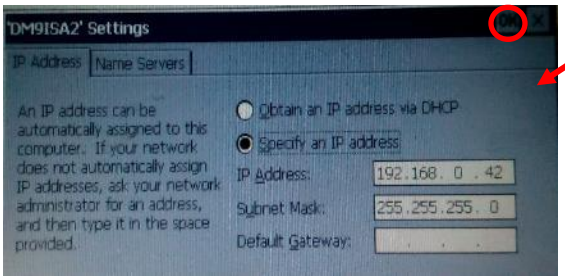
1. IP Address Configuration

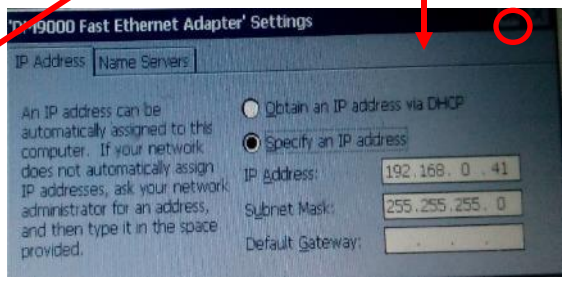
IP addresses typically correspond to 192.168.0.41 for the first port and 192.168.0.42 for the second port. (check the IP addresses in the "Project Information" file). To adjust the IP address we must activate the touch keyboard, then go to start/settings/network where the two network adapters are located, with a double click on the adapter it will open the properties and once the address is configured click on "ok" to finish.







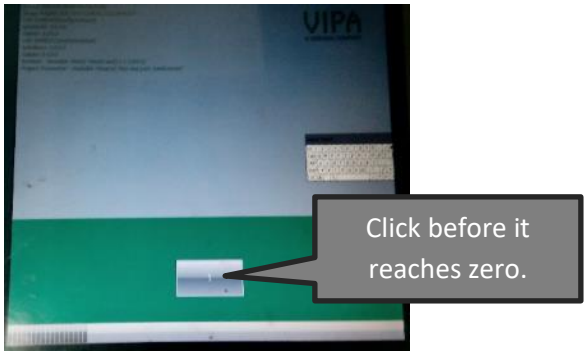




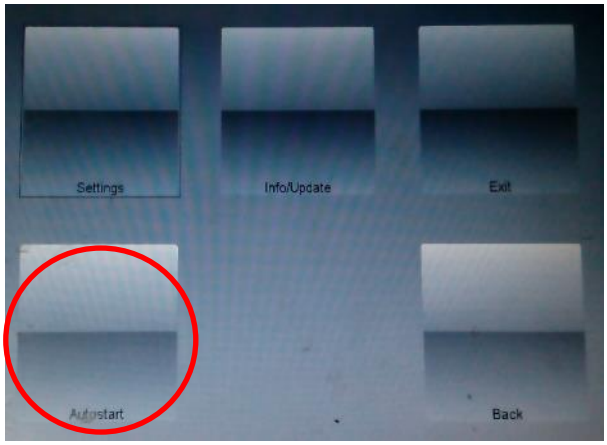
2. Settings for automatic project start.

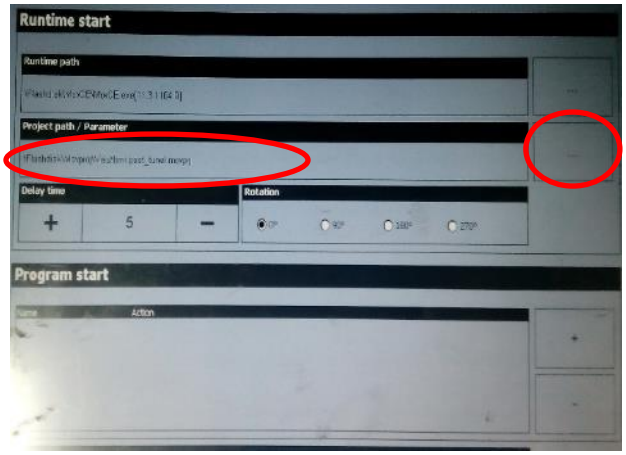
Always, when the HMI is turned on, it automatically runs the MoviconCE application for the execution of the project, but you must select the project you want to view.

When turning on the HMI screen it will start, it will open a screen with a green background where a button appears with a countdown, this button must be clicked before the countdown ends to enter the settings.



Then a screen will open where we select the Autostart/"Project Patch/Parameter" and select the project that should be in "\Flashdisk\Movproj\Visu\...".





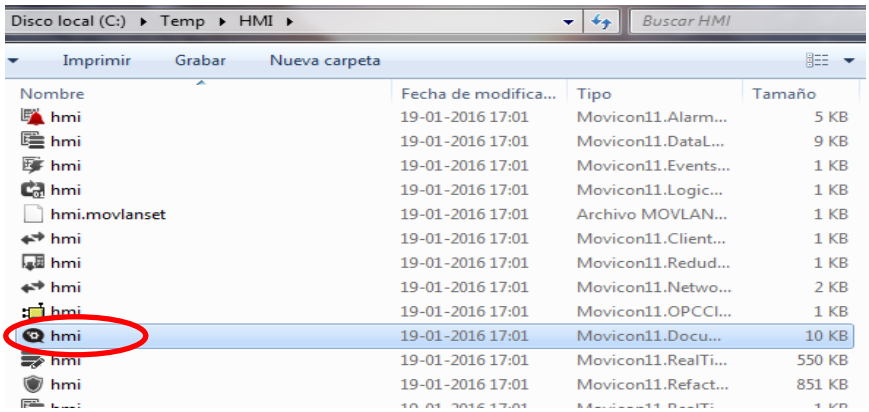
Once the changes are finished, just click on "back" until you reach the screen where the countdown begins, but this time a "start" button will appear that we must click and with that the project will be executed.

9.4 Run on computer (in case of screen failure)

When an HMI display notices or has a problem, suffered some damage and a similar display is not in stock, the HMI project can be run on a computer temporarily until the HMI display is operational again, this can be done to continue with the normal production of the process. Tomorrow

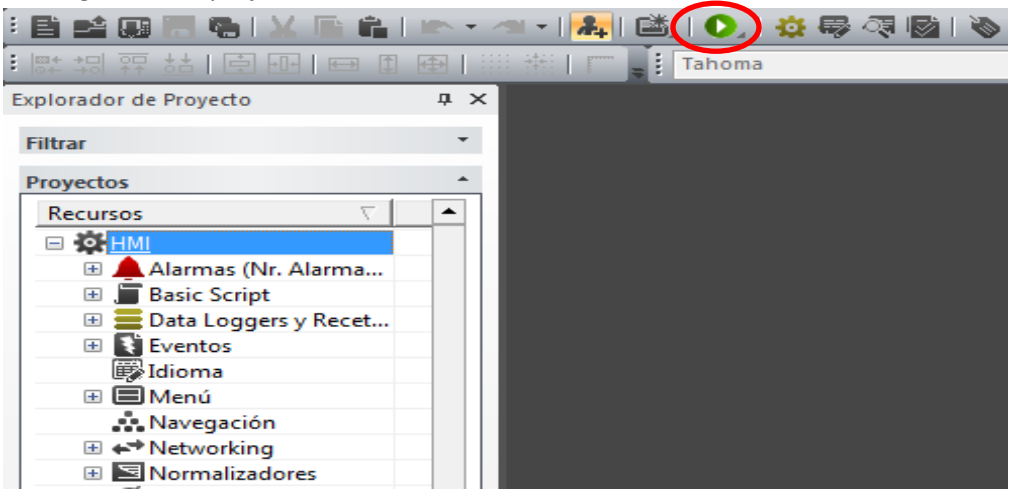
When executing the project on the computer, the data of recipes, setpoint, PID regulators, etc. are stored in the PLC so it is not necessary to intervene in parameters or recipes, only the trends and alarms that were recorded before the execution in the computer are lost, which does not affect anything in terms of production.

We start in the backup folder by opening the " .movprj" file which runs the Movicon software starting the project.



Note: A message will appear where the product key must be entered, this can be ignored by clicking "cancel".

Once the Movicon with the project is opened, you can start the simulation of the project's HMI by clicking on "start project".



The simulation has a maximum duration of 2 continuous hours, so we must click on simulation every 2 hours, this is because the program does not have a license and is only a demo, however it does not affect the normal operation of the simulation.

10Legal

The BatchXpert® work system is duly registered in accordance with Law 17.336 of Chilean Intellectual Property and other regulations in force in this area.

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This point of the manual may be removed, and the manual adjusted to the specific needs of the client, or incorporated into other documentation, as long as the main structure and origin of the work carried out are respected.