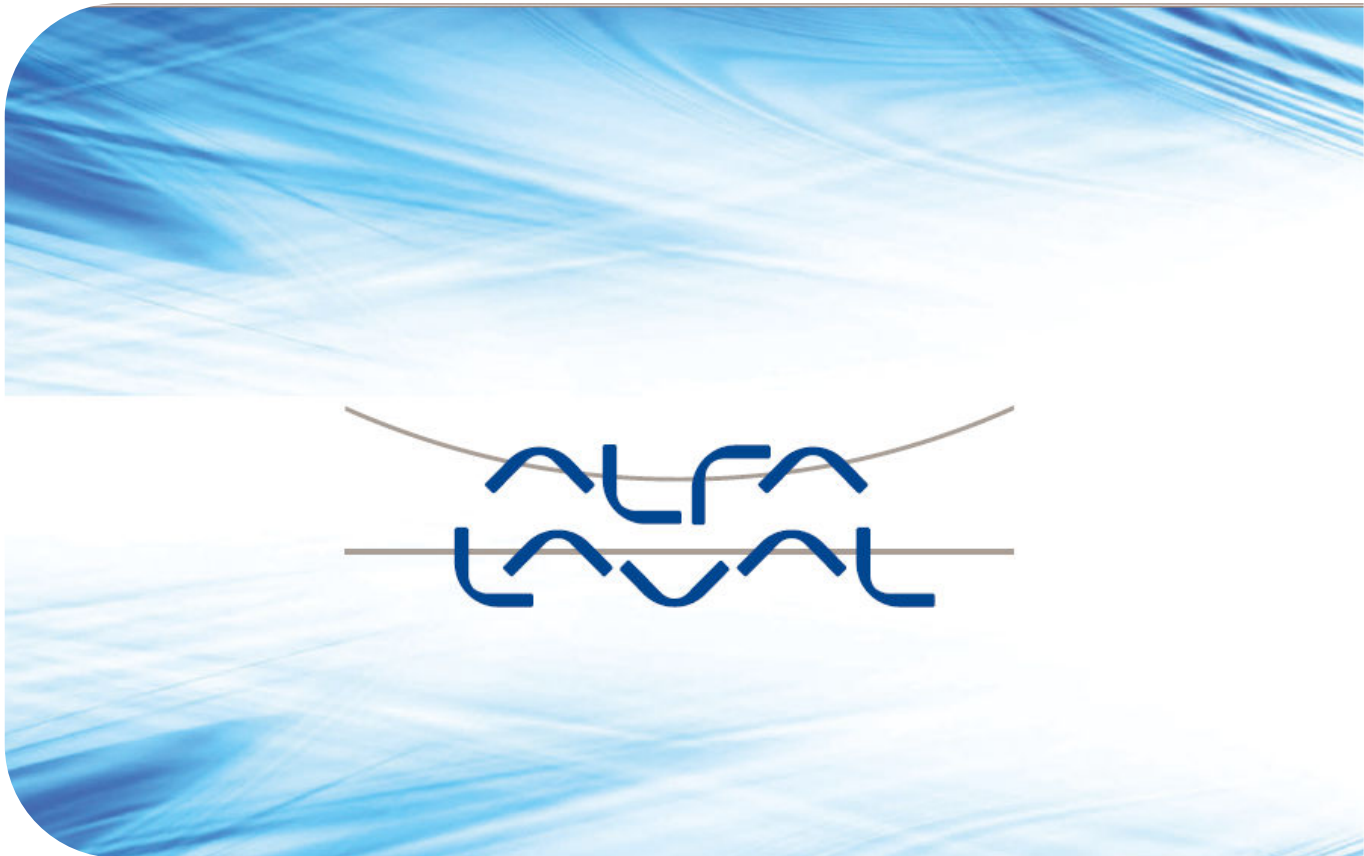




# Alfa Laval Separation System

MBPX404

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Installation and Operating  
instructions

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# 1 Introduction and General Information

## 1.1 Scope of this book

The Installation and Operating instructions given in this manual are designed for the Alfa Laval separation system with valve arrangement and Siemens PLC automation.

In this manual you will find:

- General aspects on safety instruction, lifting and installation instruction.
- Description of the system, including operator interface and functional descriptions for communication with external equipment, operating mode, alarm management, speed and VFD parameter settings and passwords of Alfa Laval Separator system.
- Operating routine which is organized according to the system's different operating conditions and can be used as running instruction directly at the machine.
- Description of various sequences run automatically by the control program, and how to use the complex functions available in the operator interface.
- Instructions on how to run the system safely and efficiently and help you to manage faults.

**NOTE** Certain references are underlined in the text. These refer to detailed descriptions of various sequences run automatically by the control program, and how to use the complex functions available in the operator interface. These descriptions are found in the The control system and Function description of this manual and in the SDS (Software Design Specification).


**NOTE** For default values and detailed descriptions of the mentioned parameters and timers, please refer to Parameter list and Activation diagram in the SDS.







**NOTE** Supervised system functions and alarm interlocks are described in detail in the Alarm activation diagram in the SDS.


**NOTE** For general information about the control system, please consult the Siemens User Manuals and SDS.

**NOTE** For general information about different system components, please consult the equipment manuals.






## 1.2 Safety Instructions

	<p>Operators must read and understand the <b>“Safety Instructions”</b>, <b>“Installation Instruction”</b> and <b>“Operating Instruction”</b> of the respective equipment before carrying out any work on the system or before you put the system into service!</p> <p>Alfa Laval will not be responsible for any breakdown of the equipment caused by the owner’s failure to follow the instructions given in this documentation. This documentation describes the authorized way to use the separator system. Alfa Laval will take no responsibility for injury or damage if the equipment is used in any other way.</p>
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Safety Sign	
	Always use protective foot wear - Safety Shoes
	Always use eye protection - Safety Glasses
	Always use protective hand wear - Safety Gloves
	Always wear protective equipment - Helmet
	Always wear protective equipment in case of noise load - Noise Protector
	Always use protective clothing
	Immediate STOP

	<p><b>FAILURE TO FOLLOW THESE RULES MAY RESULT IN SEVERE PERSONAL INJURY OR PROPERTY DAMAGE.</b></p>
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## General Safety Regulations

 	<p><b>ELECTRICAL RISK</b></p> <ul style="list-style-type: none"> <li>• All electrical installation work must be done by authorized personnel.</li> <li>• Ensure power is OFF before installation, inspection, assembling and disassembling.</li> <li>• Follow local regulations for electrical installation and grounding.</li> <li>• Never work on electrical equipment with the main power supply ON.</li> <li>• Before start-up it shall be checked that all connections are properly grounded (connected to the plant earth) and isolated in accordance with local regulations.</li> <li>• Dangerous voltage can occur on potential free terminals in control panel with main switch turned OFF.</li> <li>• To avoid accidental start, switch off and lock power supply before starting any dismantling work.</li> </ul>
	<p><b>INSTALLATION</b></p> <ul style="list-style-type: none"> <li>• If the local safety regulations prescribe that the installation has to be inspected and approved by responsible authorities before the separation system is put into service, consult with such authorities before installing the equipment and have the projected installation approved by them.</li> <li>• Ensure all pipe lines (product, air, and water) and vessels are depressurized and emptied before installation, inspection, assembling and disassembling.</li> <li>• Never work on mechanical equipment such as valves or pumps with the electric power or instrument air supply ON.</li> <li>• Assemble the separator completely before start. All covers, connections and guards must be in place and properly tightened.</li> </ul>
	<p><b>MAINTENANCE</b></p> <p>In order to optimise the operation of the system and to minimize the down time due repair activities, the system maintenance should consist of:</p> <ul style="list-style-type: none"> <li>• For inspection and maintenance of any component: strictly follow the corresponding technical documentation.</li> <li>• <b>Preventive maintenance</b> visual inspection of the equipment followed by necessary adjustments and planned periodic replacement of wear and tear parts.</li> <li>• <b>Repairs:</b> unscheduled break-down of a component, often causing the system to stop. Damaged components shall be replaced or repaired.</li> <li>• <b>Stock of recommended spare parts:</b> Alfa Laval recommends keeping a stock of spare parts facilitating preventive maintenance and reducing the system down time in case of unplanned bread downs.</li> <li>• When installing, assembling, disassembling and inspecting the machine, following protection must be worn: safety shoes, safety glasses, safety hand gloves.</li> </ul>
	<p><b>OPERATION</b></p> <ul style="list-style-type: none"> <li>• NEVER operate a separator unless it is properly mounted or installed.</li> <li>• When operating the machine, protective equipment must be worn: Safety shoes, Safety glasses, Ear protectors.</li> <li>• The operating time between discharges has a maximum limit determined by the compacting of the solids and a minimum limit for mechanical reasons or motor overload.</li> <li>• Before introducing the process liquid, check that the discharge interval time is set at a suitable rate and the discharge volume, if adjustable, is set at a suitable size.</li> </ul>



### Control System

- NEVER neglect an alarm. Find out what caused the alarm and remedy it before the alarm is reset.

### Safety Stop

- After a safety stop the cause of the fault must be identified. If all parts have been checked and the cause remains unclear, contact Alfa Laval for advice.



### Vibration

- If the separator begins to vibrate excessively during operation, stop it immediately by pushing the emergency stop button and evacuate the room.
- The separator should be stopped with flow through the process lines. This to ensure better balance of the bowl, in case of uneven solids built-up.
- Do not discharge an excessive vibrating separator. Out-of-balance vibration can become worse if only part of the sediment is discharged. Proceed as described above.



### Hot Surface / High Temperature

- When parts of the some equipment comes in contact with hot process liquid, can cause grave burns if touched.
- Be careful when working near pipes, valves and the separator.
- Hot machine parts occur during operation of the plant, and then the user must ensure that these cannot be touched by accident.
- Sterilizable separators are very hot on all surfaces during and immediately after sterilization.



### Transportation and Lifting




- For lifting and installation of the system, follow the instructions in this manual.
- For lifting and installation of the separator, please refer instructions from the separators "Installation manual" .
- The parts must be lifted using the lifting points indicated or as specified in the documents.
- Lifting operations must be carried out by personnel certified for operating forklifts and/or cranes.
- Use correct lifting tools with certified working load.
- Make sure that the vessels are empty before lifting the unit.

### Drain and Vents

- Liquids or vapours may emerge from ventilation outlets from vessels, or from other equipment. Install the outlets in such a way that personnel or environment could not be harmed.
- All aqueous liquids must be drained off carefully from all parts of the system if there is risk for freezing.
- Make sure that the outlets are not blocked and that condensate can drain away.



## Hazards

	<p><b>Hazardous Area</b></p> <ul style="list-style-type: none"> <li>• Cleaning, maintenance and repair work may be done only at nonexplosive atmosphere.</li> <li>• The separator may be hazardous when passing its critical speeds during the run-down.</li> <li>• For reasons of safety, only tools made of non-sparking material may be used when performing work in hazardous area. Note that the tools supplied by Alfa Laval with the equipment are sparking and may only be used in non-hazardous area!</li> <li>• Proper warning / ex-zone detection devices must be used when executing work in potentially hazardous environment, even when the area should be non-hazardous area due to the works. All work must be stopped on sensor alarm.</li> <li>• All general ex-zone safety rules for the different types of ex-protection must be applied, example, power to the equipment under work must be switched OFF and secured against accidentally switch ON.</li> </ul>
	<p><b>Disintegration Hazards</b></p> <ul style="list-style-type: none"> <li>• If power cables have been disconnected, always check direction of motor rotation. Incorrect direction of motor rotation can cause vital rotating parts to unscrew.</li> <li>• Check that the gear/pulley ratio is correct for power frequency used. If incorrect, subsequent overspeed may result in a serious break down.</li> <li>• If the separator is run by a variable frequency drive, it is extremely important that the frequency does not exceed the allowed maximum, to avoid serious break down by too high speed.</li> <li>• If the separator is equipped with a threaded lock ring, wear on the large lock ring thread must not exceed safety limit. <math>\Phi</math>-mark on lock ring must not pass opposite <math>\Phi</math>-mark by more than specified distance.</li> <li>• Welding or heating of parts that rotate can seriously affect material strength.</li> <li>• Inspect regularly for corrosion and erosion damage. Inspect frequently if process or cleaning liquid is corrosive or erosive.</li> </ul>
	<p><b>Entrapment Hazards</b></p> <ul style="list-style-type: none"> <li>• Make sure that rotating parts have come to a complete standstill before accessing parts inside the separator or starting any dismantling work. If there is no braking function the run down time can be very long.</li> <li>• To avoid accidental start, switch off and lock power supply before starting any dismantling work</li> <li>• Assemble the separator completely before start. All covers, connections and guards must be in place and properly tightened.</li> </ul>
	<p><b>Burn Hazard</b></p> <ul style="list-style-type: none"> <li>• Lubrication oil, machine parts and various machine surfaces can be hot and cause burns. Wear protective gloves.</li> <li>• Sterilizable separators are very hot on all surfaces during and immediately after sterilization.</li> </ul>

**Corrosion Hazard**

- Always handle cleaning liquids, lye and acid with great care and in accordance with separate instructions for those fluids.
- When using chemical cleaning agents and lubricants, make sure you follow the general rules and suppliers recommendation regarding ventilation, personnel protection etc.

**Cut Hazard**

- Sharp edges, especially on bowl discs and threads, can cause cuts. Wear protective gloves.
- Avoid placing hands into valve orifice pinch points.

### 1.3 General description of Alfa Laval Separation System

The separation system is designed for clarification purposes in biotech applications.

It is a system with product and utility line, valve arrangement, and automation with control panel.

### 1.4 MBPX404 System description

#### Separator

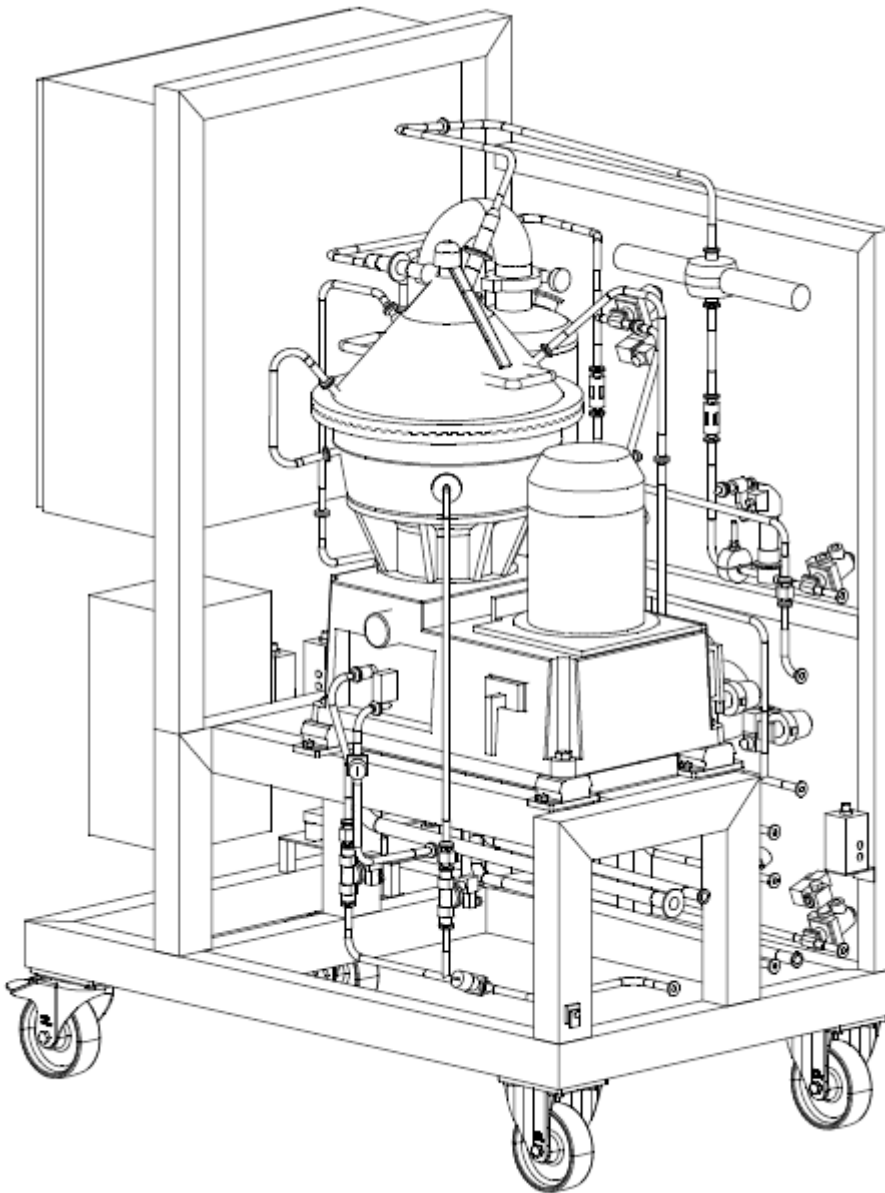
The separator is a high-speed separator with a solids discharge mechanism, discharging a part of the bowl content at certain intervals from the periphery of the bowl through the concentrate outlet (222).

The separator has a feed inlet (201) and an outlet for the clarified liquid (220).

The separator has an inlet for discharge liquid (372) and an inlet for supply of closing and make-up liquid (376).

There are several in- and outlets for flushing liquid (302, 304, 305), and cooling liquid (405, 406b). There are also some drain and ventilation outlets (462, 463).

The separator is equipped with vibration sensor, speed sensor and thermistors to provide motor overload protection



### Process/service liquid module

The process liquid components are used for flow control through the separator. There is an inlet for process liquid (201.1).

There is also an outlet for the clarified liquid (centrifugate) (220.1)

The concentrate is pumped out through the concentrate outlet (222.1).

The service liquid components supply service liquid to the separator.

There is an inlet for operating liquid (370) which maintains the bowl closed during operation and opens it during sediment discharge.

There are separate lines for supply of flushing liquid to the bowl casing and the concentrate tank (301) and for cooling water to the bowl cover (401). There are also outlets for cooling liquid return (406.1) and drain outlets (402, 460, 462.1, 463.1).

## Electrical and Control system

The system consists of the control panel with the pneumatic unit and a variable frequency drive (VFD) for the separator.

The pneumatic equipment distributes instrument air (502) to the pneumatic valves and for pressurizing purposes..

The control equipment controls and supervises the entire system and gives alarms and actions if anything goes wrong.



## 2 Installation, Maintenance and Lifting Instructions

**NOTE** For installation and maintenance of the separator, refer to the instructions in the separator documentation.

**NOTE** For installation and maintenance of equipment, refer to the supplier documentation provided in section 4 and 5 of the turnover package.

### 2.1 Unpacking and Initial Inspection of the Separator

	<p><b>THIS WAY UP</b> Position: Near left hand upper corner 4 Sides</p>
	<p><b>FRAGILE / HANDLE WITH CARE</b> Position: Near left hand upper corner 4 Sides</p>
	<p><b>KEEP DRY</b> Position: Near right hand upper corner 4 Sides</p>
	<p><b>CENTRE OF GRAVITY</b> Position: Relating to the real position of the centre of gravity 5 Sides (Top and 4 Sides)</p>
	<p><b>SLING HERE</b> Position: Where slings shall be placed for lifting 2 Sides minimum</p>
<b>A, B</b>	<p><b>OPEN THIS SIDE FIRST</b> Position: On the side that should be opened first</p>



**Reception on Site and Unpacking**

- To avoid the risk of damaging the equipment, the crates must be opened and unpacked carefully and if possible, in the presence of an Alfa Laval representative.
- If during the inspection of the delivered components there are found damaged or missing items, it shall be reported to Alfa Laval immediately after the delivery has taken place.
- Alfa Laval can instruct how to repair possible damages or how to replace missing items.
- Ensure that all packing materials have been removed from the wooden box before starting the installation.
- This manual includes unpacking and lifting instructions for separator which should be followed carefully to avoid damage or injuries.



**Recycling information**

**Unpacking**

Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.

- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licensed waste incineration plant.
- Metal straps should be sent for material recycling.

**Maintenance**


During maintenance oil and wear parts in the machine are replaced.



- Oil must be taken care of in agreement with local regulations.
- Rubber and plastics should be burnt at a licensed waste incineration plant. If not available they should be disposed to a suitable licensed land fill site.
- Bearings and other metal parts should be sent to a licensed handler for material recycling.
- Seal rings and friction linings should be disposed to a licensed land fill site. Check your local regulations.
- Worn out or defected electronic parts should be sent to a licensed handler for material recycling.

**Scrapping**

At the end of use, the equipment must be recycled according to relevant local regulations.



	<p><b>Storage</b></p> <p>Before storing a separator that has been in operation, make sure to drain any parts containing water, such as Operating water module (if any), Operating water system and Cooling jackets.</p> <p>Upon arrival to the store, check all components and keep them:</p> <ul style="list-style-type: none"> <li>• Well stored and protected from mechanical damage.</li> <li>• Dry and protected from rain and humidity.</li> <li>• Organized in the store in such a way that the goods will be easily accessible when installation is about to take place.</li> <li>• The storage area should be maintained at Temperature: +10C / +50C and Humidity: &lt; 85%</li> <li>• For long term storage always follow the maintenance instructions of individual components and separator.</li> </ul>
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	<p><b>Transportation</b></p> <ul style="list-style-type: none"> <li>• During transport of the separator, the frame hood and bowl must always be removed from the machine.</li> <li>• When lifting a separator it must always be hung securely.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"> <b>WARNING</b></p> <p style="text-align: center;">Use correct lifting tools and follow lifting instructions.</p> </div> <ul style="list-style-type: none"> <li>• During erection, all inlets and outlets to separators and accessories must be covered to be protected from dirt and dust.</li> </ul>
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 **NOTE**

It is recommended to prepare a suitable working platform for safe and comfortable work on the centrifuge during service and maintenance. The machine covers are not designed to be used as steps.

## 2.2 Lifting instructions

**NOTE** Always refer to the layout drawing and lifting drawing for overall dimensions, weight and connection points (as per scope of supply from Alfa Laval).

**NOTE** When lifting a separator, always follow the instructions from the separator's installation manual.

**NOTE** When lifting separate components, always follow the instructions from the supplier documentation.

### Transportation and lifting

- Always follow local regulations concerning lifting devices, electric or mechanical equipment, pressure vessels, inflammable, toxic or corrosive process liquids.
- When installing, assembling, disassembling and inspecting the machinery, always use safety equipment's such as helmet, safety shoes, safety glasses, safety hand gloves and appropriate protective clothing.
- Use correct lifting tools with certified working load.
- When lifting modules and units always use the lifting eyes provided. Complete modules standing on a skid with wheels must not be lifted.
- Make sure that the vessels are empty of liquid before lifting the unit.
- Lifting operations must be carried out by personnel certified for operating forklifts and/or cranes.

**WARNING** Mechanical hazard

Never work on mechanical equipment such as valves or pumps with the electric power or instrument air supply on.

**WARNING** Crush hazard

Do not work under hanging load.

### Lifting procedure

- Always check with an Alfa Laval representative that the installation is properly planned.
- A clear area around the equipment is required for servicing.
- A lifting device of sufficient capacity that can be positioned exactly over the centre of the bowl spindle is needed to remove the bowl assembly.
- The operator of the forklift must be trained and certified. The system must be lifted using a forklift, as illustrated in the lifting drawing, with sufficient load capacity. The forks must have a length of at least 1750 mm. The forks must be inserted from both side of module to cover width of the frame. The system must not be lifted in any other way.

## 2.3 Mechanical installation and maintenance

The separation system should be placed in such a way that suitable space for maintenance and repair is obtained. Always contact local Alfa Laval representative for a guidance on the installation details.

Mechanical installation work should always be performed by authorized personnel and according to local legislation.

- Plan your installation with enough room for the controls and operation so that instruments are easily visible. Valves and controls must be within convenient reach. Pay attention to space requirements for maintenance work, work benches, dismantled machine parts or for a service trolley
- Special adaptations or arrangements for support of piping and cables after skid battery limits could be necessary to manufacture during installation of the system. These arrangements are not included in the standard scope of supply.
- If the local safety regulations prescribe that the installation has to be inspected and approved by responsible authorities before the separation system is put into service, consult with such authorities before installing the equipment and have the projected installation approved by them.
- Pay attention to space requirements for maintenance work, work benches, dismantled machine parts or for a service trolley.

## 2.4 Electrical installation and maintenance

Always refer to the electrical drawings provided with the system before carrying out electrical installation.

Electrical installation work must always be performed by authorized electricians and personnel, and should be done according to local legislation.

The dimensions of the control cabinet and cables can be found in the electrical drawing for the system. Before start-up it must be checked whether the machine which is to be connected to the electric mains supply meets the conditions of the EU guidelines.

## 2.5 Cleaning

Cleaning of the separator and the skid can be done externally and internally.

Internal cleaning of the system is followed by CIP with recommended CIP liquids. CIP together with repeated discharges can be used whenever necessary.

External cleaning of the separator and skid can be done according to the guideline below. Afterwards, protect all cleaned carbon steel parts against corrosion by oiling.

Part	Procedure	Cleaning agent
Separator frame and motor	The external cleaning of the frame and motor should be restricted to brushing, sponging or wiping while the motor is running or still is hot	Water and de-greasing agent
Bowl inlet/outlet	Please refer to the separator manual for detailed procedure	A chemical cleaning agent must dissolve the deposits quickly without attacking the material of the separator parts
Driving device	Use a sponge or a soft brush	White spirit, cleaning-grade kerosene or diesel oil.
Skid pipes	External cleaning using a sponge or a soft cloth	White spirit, cleaning-grade kerosene or diesel oil.
System components (flow meters, valves, transmitters, pumps, steam traps, instruments)	External cleaning using a sponge or a soft cloth. Please follow recommended cleaning procedure from supplier maintenance guide of respective component.	White spirit, cleaning-grade kerosene or diesel oil.

Clean all parts of the remains of product and contamination. Do not scratch or damage parts during cleaning.

Use only Alfa Laval recommended CIP liquids.

The plant operator is responsible for selecting the cleaning material and performing the procedure.

 **WARNING Electrical hazard**

Never wash a separator with a direct water stream.

Never play a water jet on the motor.

Totally enclosed motors can be damaged by direct hosing to the same extent as open motors, resulting in short-circuit and internal corrosion.

 **NOTE Disintegration hazard:**

During cleaning, please observe that any pits and spots forming a line may indicate cracks beneath the surface. All forms of cracks are a potential danger and are not acceptable. Replace any part where corrosion can be suspected of affecting its strength or function.

## 2.6 Installation of Auxiliary Equipment

Below are the general check points of installation of auxiliary equipment such as valve modules and electric/pneumatic units.

- Fasten valve modules such as process liquid module or service liquid unit with bolts of high strength material to the foundation. Use the right number of bolts fitting the dimension of the provided installation holes in the module. Refer the layout drawing for the separation system.
- ALWAYS design the pipe-work to and from the separator in such a way that there will be sufficient flexibility. Possible vibration should not be allowed to be transmitted via the piping.
- Hazardous liquids or vapors may emerge from ventilation outlets in the separation system. Install the outlets in such a way that personnel or environment could not be harmed. Make sure that the outlets are not blocked and that the condensate can drain away.
- Parts of the equipment meeting hot process liquid can cause grave burns if touched. Be careful when working near pipes, valves and the separator.
- Fix warning signs in suitable places on the equipment.
- Check the adjustment of adjustable components such as flow switches, pressure switches, motor overload relay etc.
- It is essential for safety that all sensors work correctly. Therefore, check/inspect sensors regularly.
- Connect modules and units to earth in accordance with local regulations and if suitable. Use the earthing screws provided.
- If the starting equipment containing the main switch is placed in such a position that it cannot be seen from the separator, most local safety regulations require that a separate lockable safety switch must be installed in the power supply to the separator motor.
- If the separation system contains a level switch in a tank, do not forget to check in the technical documentation for special adjustment instructions concerning level control devices in the control unit. Suitable adjustment is important for the correct function of the level switch.

## 3 Start-Up and Commissioning

### 3.1 Before Start-Up and Commissioning

Before commissioning or start-up of the system can be initiated, the following two conditions should be fulfilled:

- OWMC service to be done before separator commissioning according to instructions in the “Service & maintenance manual” of separator.
- Before first start, check direction of rotation according to instructions in the Service & maintenance manual. The bowl should rotate clockwise seen from above.

#### **Mechanical Completion:**

- Mechanical Completion is the checking and testing of equipment and construction to confirm that the installation is in accordance with drawings and specifications and ready for commissioning in a safe manner and in compliance with project requirements.
- Mechanical Completion should be verified by verification of all points mentioned in SAT Installation.

#### **Pre-commissioning:**

- Pre-commissioning is the phase where a system or unit is prepared for the commissioning. The purpose of the pre-commissioning is to verify and check if all parameters necessary for the operation are in accordance with the specifications.
- The readiness for commissioning should be verified by verification of all points mentioned in SAT Installation.
- Check the documentation of the separation system before the commissioning.
- The completion of the installation of the centrifuge, piping and electrical system should be confirmed.
- Oil and other lubricants for the centrifuge and the solids pump must be available. Please refer to the Separator’s Service and maintenance manual and Solids pump manual for recommended lubricants.

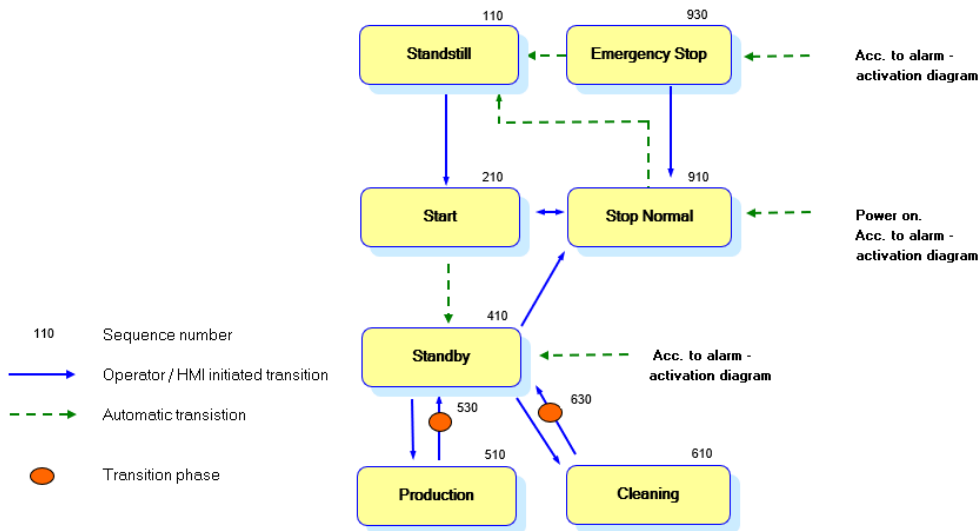
## 3.2 Completion and Start-Up

- For general start-up of the module please refer to the “Operation Instructions” of the documentation and check below points:
- Check that all pipe connections have been made according to the supplied drawings and documentation.
- Check that the grounding of the module is connected to the both earthing points according to the supplied drawings and documentation.
- Check that all electrical connections have been made according to the supplied electrical documentation.
- Check position of all valves.
- Check that the separator rotates freely and without any uncommon noises.
- Check that the power supply has the right voltage (V) according to motor label, hertz (Hz) according to separator label to the wiring diagram and the instruction manual.
- Check each pipe connection for leakages.
- Check that the pressure of the instrument air is according to the instruction manual.
- Check that the pressure of the operating water is according to the instruction manual.



## 4 Description of operating conditions

### 4.1 MAIN SEQUENCE



The software has been specially developed to operate the system to always provide the best possible performance, flexibility and a safe operation. The control program has many features and the main operating modes and options are described below.

### 4.2 Power On/ Stand Still

At **power on** the separation system enters the STOP mode or STAND STILL, depending on the system condition before power shut down. If the STOP mode is entered, the system passes on to STAND STILL if 0 RPM has been detected for 30 s.

Before **power on** all equipment is deactivated. In STAND STILL all inlet valves are deactivated which means that nothing is fed to the separator and the centrifugate outlet is closed. The solids outlet is closed. The separator bowl does not rotate. A Safety check is run through automatically. This test has to be passed successfully in order to receive start permission for the separator. See a detailed description in "Safety Check" in the technical documentation.

In STAND STILL it is possible to START (if no start blocking is active).

### 4.3 START

The power to separator motor is ON and separator motor begins to run when the START function is selected on the operator panel. STARTING is indicated.

The bowl is rotating and accelerating.

Nothing is fed to the separator. During START the operating water tank under the separator is filled with water: at detection of low level in the tank, water is filled until the water level is sufficient.

The start sequence includes a start discharge.

Stop the separator during START by selecting STOP. When the pre-selected bowl speed has been reached the system changes automatically over to STANDBY.

## 4.4 STANDBY

In STANDBY mode the separator is running at full selected speed. The separator is in waiting mode and there is no production.

Initially all valves are in the same position as during START.

In STANDBY discharge should be initiated only manually by selecting DISCHARGE (Refer to Discharge in sub sequence section of the SDS).

**NOTE** The system should not be left in STANDBY for too long time because of overheating risk due to air friction. When the time limit (P1023) for STANDBY has expired, alarm A37 is given. At the same time, if P1027 is elapsed, the system will go to STOP mode.

## 4.5 PRODUCTION

PRODUCTION means that the separator is running at full selected speed. Product is fed to the separator from product line, the centrifugate leaves through the centrifugate outlet.

In PRODUCTION the feed flow rate (see Flow control) and the backpressure in the centrifugate outlet (see Backpressure control) are regulated automatically.

In PRODUCTION it is possible to initiate a solid discharge manually by selecting DISCHARGE. It is also possible to initiate discharges automatically (Refer to Discharge in sub sequence section of the SDS).

## 4.6 CIP

CIP means that the separator is running at full selected speed. Product is fed to the separator from product line, the centrifugate leaves through the centrifugate outlet.

In CIP the feed flow rate (see Flow control) and the backpressure in the centrifugate outlet (see Backpressure control) are regulated automatically.

In CIP it is possible to initiate a solid discharge manually by selecting DISCHARGE. It is also possible to initiate discharges automatically (Refer to Discharge in sub sequence section of the SDS).

## 4.7 STOP

STOP means that the separator motor is turned off and the bowl speed decreases. Nothing is fed to the separator.

Nothing is fed to the separator and FCV201-1 is closed.

When the separator bowl has stopped rotating the system automatically switches over to STAND STILL.

The solids pump P222-1 will be running during the time set in P109 in order to empty the concentrate tank.

## 4.8 EMERGENCY STOP

If you push the emergency stop button the system will switch to EMERGENCY STOP mode. This means that the control power for all motor contactors is deactivated. All other equipment is controlled as in normal STOP mode. The alarm **A42 Emergency stop activated** is given.

The normal STOP sequence is reached at reset of the emergency stop button if all alarms are acknowledged.



## 5 Operating routine

**NOTE** Make sure that the separator is assembled correctly. Always consult the Installation manual of the separator.

**NOTE** Make sure that all electrical and liquid connections are made correctly according to the electrical drawing and the connection list, and that all couplings are tightened.

**NOTE** Make sure that the separator control system is activated.

### 5.1 POWER ON/STAND STILL

Before power on, open the manual valve V370-1, make sure that V401-2 is closed and open manual valve V401-1 in the cooling liquid inlet.

- 1 Set the main switch on the control panel to ON.
- 2 Open the instrument air supply and check on the pneumatic unit that the air pressure is sufficient as per Connection list.
- 3 Make sure that purified water is available.
- 4 Log in on the operator panel.  
The display indicates STOP or STAND STILL, depending on the system status before last power shut down. There should be no alarm message on the display. If the display shows any active alarm, try to reset it. If a fault persists, check for the reason in the Alarm diagram.
- 5 Make sure that the brake is released.

The following modes can be selected in STAND STILL:

- START

## 5.2 START

START can be selected from STAND STILL or STOP.

- 1 Make sure that cooling liquid and purified water is available.
  - 2 Check that no alarm override functions are activated.
  - 3 Select **START** on the operator panel.  
The system indicates STARTING and the power to the separator motor is on and it begins to run.
  - 4 If necessary, adjust the cooling water pressure.
  - 5 When the selected bowl speed set point has been reached, the system automatically changes to STANDBY .
- 

Stop the separator by selecting **STOP** on the operator panel.

## 5.3 STANDBY

In STANDBY it is possible to initiate a solids discharge manually:

- 1 Check that the sampling valves V201-1, V220-1 and V222-1 are closed.
- 2 Select **Discharge** on the operator panel.



### **NOTE** Overheating hazard

#### **Overheating hazard**

The system should not be left in STANDBY for too long time. Changeover to PRODUCTION as soon as possible.

The following modes can be selected in STANDBY:

- PRODUCTION
- CIP
- STOP

## 5.4 PRODUCTION

PRODUCTION can be selected from STANDBY.

The feed flow rate is regulated according to a pre-determined set point (see [Flow control](#)).

The back pressure in the centrifugate outlet is regulated according to a predetermined set point (see [Backpressure control](#)).

- 
- ① Select **PRODUCTION** on the operator panel.  
The separator is fed with product from the feed inlet line.

---

  - ② The accumulated concentrate in the bowl periphery is discharged at certain intervals.

---

  - ③ Manual discharge can be initiated by selecting **DISCHARGE** on the operator panel.
- 

The following modes can be selected in PRODUCTION:

- STANDBY



## 5.5 CIP

CIP can be selected from STANDBY.

The feed flow rate is regulated according to a pre-determined set point (see [Flow control](#)).

The back pressure in the centrifugate outlet is regulated according to a predetermined set point (see [Backpressure control](#)).

- 1 Select **CIP** on the operator panel.  
The separator is fed with product from the feed inlet line.
- 2 The accumulated concentrate in the bowl periphery is discharged at certain intervals.
- 3 Manual discharge can be initiated by selecting **DISCHARGE** on the operator panel.

The following modes can be selected in CIP:

- STANDBY

## 5.6 STOP

STOP can be selected from START or STANDBY.

---

- ① Select **STOP** on the operator panel.  
The display indicates STOP. The separator motor is turned off. When the separator bowl has come to stand still the system switches over to STAND STILL.
  - ② Apply the manual brake on the separator.
- 

### NOTE

**The STOP mode is automatically entered in case of certain system failures.**

## 5.7 EMERGENCY STOP

EMERGENCY STOP can be selected from all modes except SAFETY STOP.

---

- 1** Push the EMERGENCY STOP button.  
An alarm is given and is displayed on the alarm screen. The separator motor and pumps are turned off. All other equipment is activated as in normal STOP mode.

---

  - 2** Acknowledge the alarm.

---

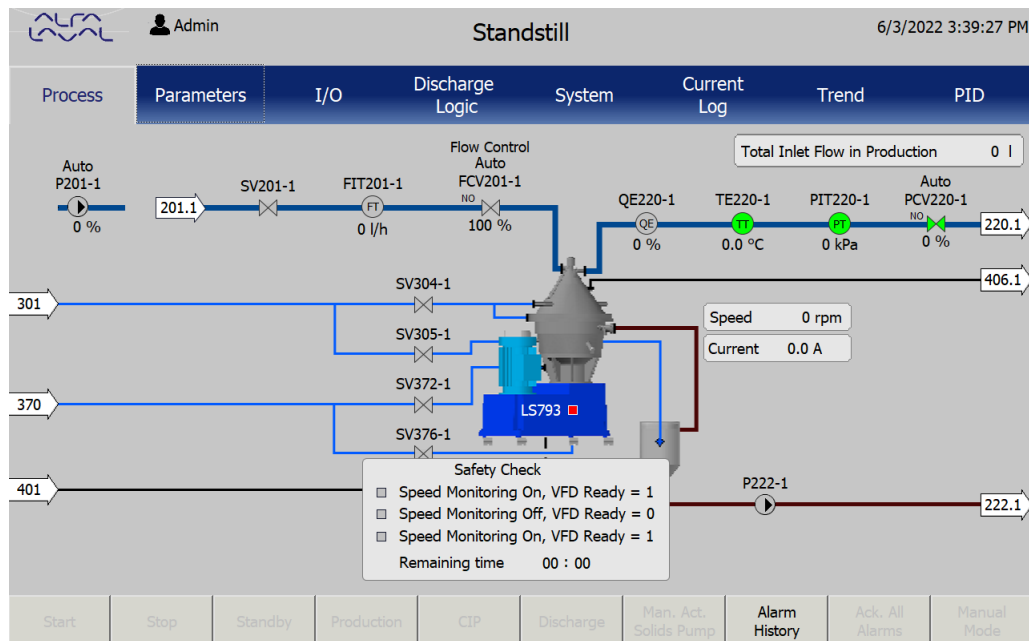
  - 3** When the separator has come to STAND STILL, reset the emergency stop button by turning it.  
The normal STOP mode is reached automatically from EMERGENCY STOP at reset of the emergency stop button and if all alarms are acknowledged.
-



## 6 The Control system and Function description

In the following section the operator interface and the control and supervision functions of the system are described.

### 6.1 Process screen



The top header of the screen contains:

- Alfa Laval logo
- Information about the logged in user
- Current operation mode
- Time/date

The second row contains:

- Functionality to change or select HMI screen according to the [Operating interface diagram](#).

The middle part of the screen contains:

- The actual condition of the process as a flow chart
- Speed, current of the separator
- Valve status
  - Automated valves status mode (green=open, grey=closed)
  - Control valve status mode and value (Auto, Manual or Open)
- Process values

The bottom part displays different function modes.

The function buttons on the bottom of the display can differ for the different operation modes. The function buttons which are operable in each mode have a black function denomination. Inoperable buttons are grey.

## 6.2 Parameters

The screenshot shows a control system interface with a top bar displaying 'Standby' and the date/time '5/4/2022 1:44:47 PM'. Below the top bar is a navigation menu with tabs: Process, Parameters (selected), I/O, Dch. Logic, System, Current Log, Trend, and PID. The main content area is divided into two sections: 'Process Parameters' and 'System Parameters'. Each section contains a dropdown menu for selecting a parameter, followed by a table with columns for Parameter, Value, Unit, Min, and Max. At the bottom of the interface is a row of control buttons: Start, Stop, Standby, Production, CIP, Discharge, Man. Act. Solids Pump, Free Steaming, Ack. All Alarms, and a checkbox for Manual Mode.

Parameter	Value	Unit	Min	Max
P 101	300	s	60	3600

Parameter	Value	Unit	Min	Max
P 1000	10000	rpm	0	10000

Parameter settings gives functionality to set different set points within minimum and maximum allowed values for each parameter.

The process parameters shows all process parameters including unit, minimum and maximum values.

The system parameters shows all system parameters including unit, minimum and maximum values

Some of the parameter settings are system specific and should not be changed unconditionally. Therefore the parameter adjustment is protected.

To adjust the parameters:

1. Log in on sufficient authority level.
2. Touch the value field for the selected parameter.
3. Enter the new value on the pop-up numeric keypad and press **ENTER**.

If a parameter has assigned value limits, change in the parameter settings won't be accepted if it is outside the allowed limits.

## 6.3 I/O

Standby 5/4/2022 1:45:11 PM

Process	Parameters	I/O	Dch. Logic	System	Current Log	Trend	PID																									
		<b>Digital In</b> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> I0.0 Emergency Stop</li> <li><input checked="" type="checkbox"/> I0.1 Sep cont. 1 resp.</li> <li><input checked="" type="checkbox"/> I0.2 Sep cont. 2 resp.</li> <li><input type="checkbox"/> I0.3 SolidPContResp</li> <li><input type="checkbox"/> I0.4 Spare</li> <li><input type="checkbox"/> I0.5 Spare</li> <li><input checked="" type="checkbox"/> I0.6 LS793</li> <li><input checked="" type="checkbox"/> I0.7 Flow pulses</li>   <li><input checked="" type="checkbox"/> I1.0 Over speed</li> <li><input type="checkbox"/> I1.1 Speed pulses</li> <li><input checked="" type="checkbox"/> I1.2 Turbidity_Ok</li> <li><input type="checkbox"/> I1.3 Spare</li> <li><input type="checkbox"/> I1.4 Spare</li> <li><input type="checkbox"/> I1.5 Spare</li> <li><input checked="" type="checkbox"/> I1.6 Ext. Prod. block</li> <li><input checked="" type="checkbox"/> I1.7 Ext. CIP block</li> </ul>	<b>Digital Out</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Q0.0 Alarm lamp</li> <li><input type="checkbox"/> Q0.1 New alarm</li> <li><input checked="" type="checkbox"/> Q0.2 Sep. cont. on/off</li> <li><input checked="" type="checkbox"/> Q0.3 Sep start/stop</li> <li><input type="checkbox"/> Q0.4 Sep. VFD reset</li> <li><input checked="" type="checkbox"/> Q0.5 Speed ctrl</li> <li><input type="checkbox"/> Q0.6 Spare</li> <li><input type="checkbox"/> Q0.7 P222-1</li>   <li><input type="checkbox"/> Q1.0 AV201-1</li> <li><input type="checkbox"/> Q1.1 AV301a-1</li> <li><input type="checkbox"/> Q1.2 AV304-1</li> <li><input type="checkbox"/> Q1.3 AV305-1</li> <li><input type="checkbox"/> Q1.4 SV372-1</li> <li><input type="checkbox"/> Q1.5 SV376-1</li> <li><input type="checkbox"/> Q1.6 Spare</li> <li><input type="checkbox"/> Q1.7 Spare</li> </ul>	<b>Analog In</b> <table border="1"> <tr><td>IW256 Current</td><td>7.5 mA</td></tr> <tr><td>IW258 Sep. speed</td><td>18.7 mA</td></tr> <tr><td>IW260 Turbidity</td><td>11.5 mA</td></tr> <tr><td>IW262 Inlet flow</td><td>5.4 mA</td></tr> <tr><td>IW264 Outlet pressure</td><td>5.8 mA</td></tr> <tr><td>IW266 TE220-1</td><td>7.2 mA</td></tr> <tr><td>IW268 Spare</td><td>0.0 mA</td></tr> <tr><td>IW270 Spare</td><td>0.0 mA</td></tr> </table>		IW256 Current	7.5 mA	IW258 Sep. speed	18.7 mA	IW260 Turbidity	11.5 mA	IW262 Inlet flow	5.4 mA	IW264 Outlet pressure	5.8 mA	IW266 TE220-1	7.2 mA	IW268 Spare	0.0 mA	IW270 Spare	0.0 mA	<b>Analog Out</b> <table border="1"> <tr><td>QW256: Sep. Speed VFD</td><td>19.8 mA</td><td><input type="text" value="19.8 mA"/></td></tr> <tr><td>QW260: PCV220-1</td><td>4.0 mA</td><td><input type="text" value="4.0 mA"/></td></tr> <tr><td>QW262: FCV201-1</td><td>20.0 mA</td><td><input type="text" value="20.0 mA"/></td></tr> </table>		QW256: Sep. Speed VFD	19.8 mA	<input type="text" value="19.8 mA"/>	QW260: PCV220-1	4.0 mA	<input type="text" value="4.0 mA"/>	QW262: FCV201-1	20.0 mA	<input type="text" value="20.0 mA"/>
IW256 Current	7.5 mA																															
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IW270 Spare	0.0 mA																															
QW256: Sep. Speed VFD	19.8 mA	<input type="text" value="19.8 mA"/>																														
QW260: PCV220-1	4.0 mA	<input type="text" value="4.0 mA"/>																														
QW262: FCV201-1	20.0 mA	<input type="text" value="20.0 mA"/>																														
Start	Stop	Standby	Production	CIP	Discharge	Man. Act. Solids Pump	Free Steaming	Ack. All Alarms	<input type="checkbox"/> Manual Mode																							

On the I/O screen it is possible to see the status of all digital in/out and analog in/out addresses in the system (refer to the I/O-list in the technical documentation).

## 6.4 Discharge logic

The screenshot displays the 'Discharge Logic' configuration screen for the 'Production' mode. The interface includes a top navigation bar with tabs for Process, Parameters, I/O, Dch. Logic (selected), System, Current Log, Trend, and PID. The main content area is divided into three sections: 'Discharge Interval in Production, CIP' with a time input of 5:00 mm:ss; 'Discharge Initiation Logic for Production' with a dropdown menu set to 'Time + Turbidity'; and 'Turbidity Discharge Settings' with a 'Calculate Discharge Turbidity Setpoint' of 150%. Below the setpoint is a progress bar showing a Process Variable (PV) of 47.0% and a Setpoint (SP) of 0.0%. The bottom of the screen features a row of control buttons: Start, Stop, Standby, Production, CIP, Discharge, Man. Act. Solids Pump, Free Steaming, Ack. All Alarms, and Manual Mode.

This screen is used to set the discharge time interval and volume discharge set point.

In operation modes with discharge initiation by time, only the field with discharge interval time is displayed.

The discharge time intervals are set by P101 and P176.

In PRODUCTION, a field for the discharge initiation logic is displayed as well.

To select discharge initiation logic in PRODUCTION, set P150=0 for Time or P150=1 for Volume + Time or P150=2 Turbidity + Time.

The volume set point is set by P172.

The turbidity set point is set by P151.

If Volume + Time is selected, the remaining volume to next discharge and the volume set point for next discharge are displayed.



## 6.5 System

The screenshot shows the 'Production' system interface. At the top, it displays 'Admin' and the date/time '5/4/2022 1:46:22 PM'. Below this is a navigation bar with tabs: Process, Parameters, I/O, Dch. Logic, System (selected), Current Log, Trend, and PID. The main content area is titled 'System Information' and contains the following data:

PLC Prog. No:	9661965495	Running Hours:	00000000	Clear hours
Application Ver:	1.0	Discharge Counter:	00000002	Clear Counter
Application Date:	2022-04-27			

Below the system information is a table of users:

User	Password	Group	Logoff...
Admin	*****	Administ...	5
PLC User	*****	Unautho...	5
Process	*****	Process	5
System	*****	System	5

At the bottom of the screen, there is a row of control buttons: Log On, Log Off, Stop Runtime, Clear Screen, Alarm List, Alarm History, and Clear Alarm History...

The system screen displays system information such as PLC program number, version and date.

On system access level it is possible to define or change new users and the passwords on the different levels.

In this screen it is possible to access the Alarm list and Alarm history, to clear the Alarm history.

From this screen it is possible to stop the runtime application and to perform system administration.

The Clear Screen function allows wiping the HMI screen clean for 30 seconds. The panel is not sensitive to touch during this time.

## 6.6 Current log

Production 5/4/2022 1:46:45 PM

Process Parameters I/O Dch. Logic System **Current Log** Trend PID

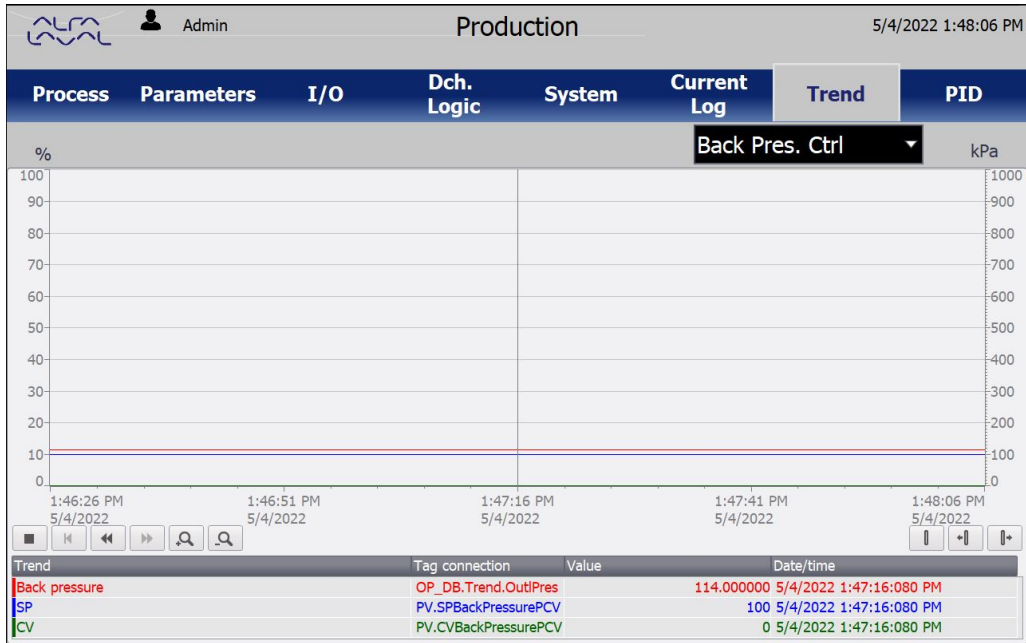
Current Increase at Discharge

Latest	0.7 A
2:nd	1.5 A
3:rd	0.0 A
4:th	0.0 A
5:th	0.0 A
6:th	0.0 A
7:th	0.0 A
8:th	0.0 A
9:th	0.0 A
10:th	0.0 A

Start Stop Standby Production CIP Discharge Man. Act. Solids Pump Free Steaming Ack. All Alarms  Manual Mode

This screen indicates the ten last current peaks during a discharge cycle. The size of current increase after the latest discharge can be inspected.

## 6.7 Trend

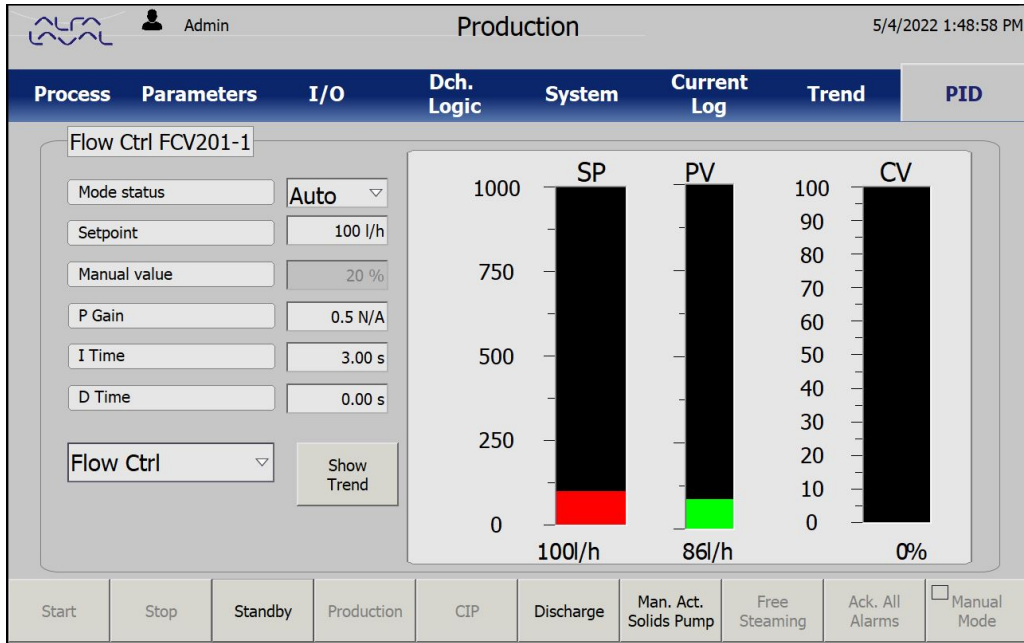


On the Trend screen, and on certain screens the where the **Show Trend** button is available and clicked, diagrams like the following will be displayed:

Diagrams can be displayed for:

- Current / Speed trend
- Backpressure control trend
- Flow control trend

## 6.8 Flow control



The controller screens display the control function for the feed flow rate and allow the adjustment of some values. They can be accessed via the PID tab.

The flow can be controlled by either valve FCV201–1 or feed pump, by changing the value of P125.

The actual flow rate set point in auto-mode (SP), the actual feed flow rate received from FIT201-1 (PV) and the actual valve opening degree in % (CV) are displayed both as bar-graphs and numerical values. .

The flow set point has pre-set values for PRODUCTION and CIP (see P112), which can be adjusted as described for parameter adjustment. After changing operation mode the set point is always reset to the appropriate pre-set value.

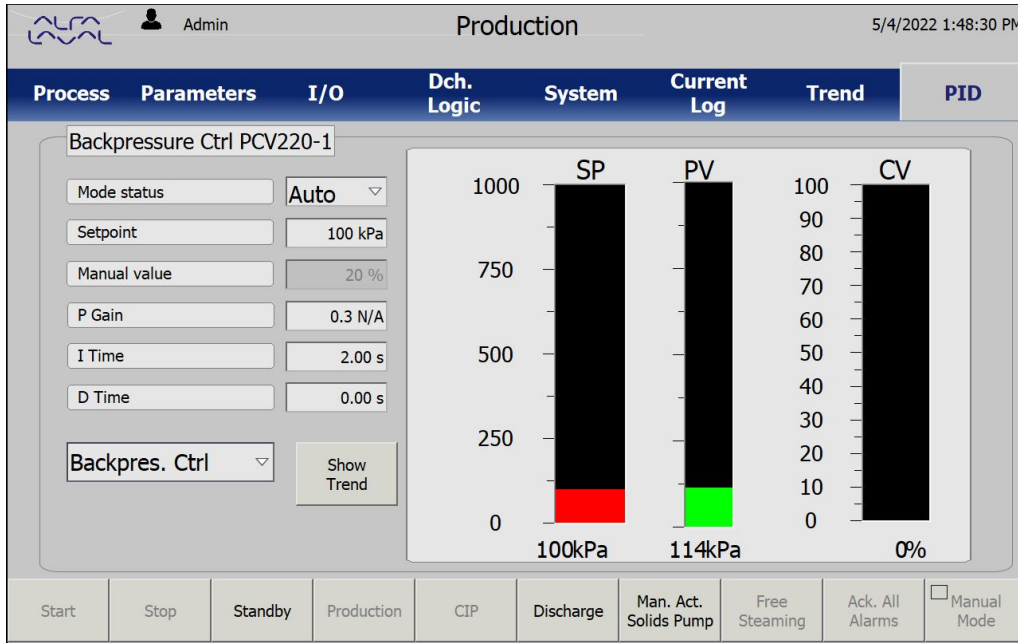
It is possible to select control mode (see P142):

- AUTO mode, where the equipment is regulating according to the set point
- Manual mode, where the output is manually adjusted (P143)
- OPEN, where the output is 100%

It is also possible to adjust the PID-parameters for the controller function (P144 - P146).

By selecting **Show Trend**, the flow trend diagram for the feed flow rate can be displayed.

## 6.9 Backpressure control



This screen displays the controller function for the backpressure in the centrifugate outlet and allows the adjustment of some values. It can be accessed via the PID tab.

The actual backpressure set point in auto-mode (SP), the actual pressure received from PIT220-1 (PV) and the actual valve opening degree for PCV220-1 in % (CV) are displayed both as bar-graphs and numerical values. .

The set point has preset values for PRODUCTION and CIP (see P111), which can be adjusted as described for parameter adjustment. After changing operation mode the set point is always reset to the appropriate preset value.

It is possible to select control mode (see P163):

- AUTO mode, where the equipment is regulating according to the set point
- Manual mode, where the output is manually adjusted (P164)
- OPEN, where the output is 100%

It is also possible to adjust the PID-parameters for the controller function (P165 - P167).

By selecting **Show Trend**, the flow trend diagram for the backpressure can be displayed.

## 6.10 Output test

The output test makes it possible to change the status of most of the system output signals one at a time for testing purpose (see the I/O-list in technical documentation).

Select manual mode on the screen. Equipment can be checked by manual command which is provided on faceplate. The faceplate will appear on screen when you click on an object.

## 6.11 Discharge performance and Bowl closing supervision

A current monitor for supervision of the discharge performance and that the bowl is not leaking is included in the control equipment. The power consumption characteristics of the separator motor changes when sediment is discharged from the bowl periphery.

Increased current consumption during normal operation may be an indication that sediment leaves the bowl continuously (bowl is leaking). In such a case one discharge is triggered automatically.

If this does not help, an alarm is triggered and the system enters STANDBY.

Bowl retardation caused by other faults will of course also result in an alarm.

At discharge the sludge content of the bowl is emptied, and the ejected matter is replaced by new product.

A certain amount of energy is required to accelerate the new product to bowl peripheral speed, thus the power consumption of the separator motor will increase temporarily in relation to the discharge size.

If there is no or a too small current increase following the bowl opening in a discharge cycle, the discharge is regarded as unsatisfactory. The expected size of the current and number of discharges at unsatisfactory discharge, are set in the parameter setup.

If the following discharge(s) is/are unsatisfactory as well, and alarm is triggered and the system enters STANDBY.



### **NOTE Breakdown hazard**

Sediment accumulated in the bowl at discharge failure could cause severe vibrations and machine breakdown.

Do not use this function for long time. The machine must be discharged with regular intervals.

## 6.12 Bowl speed control

**NOTE** For detailed information about the speed control, please refer to the Speed control section in the SDS.

The control system uses the parameter for the bowl speed to be reached (see below for different operation modes) to calculate a control value which is transmitted to the VFD.

Start	P115
Standby	P115
Production	P115
CIP	P115

**NOTE** Normal maximum bowl speed set by P1002.



## 7 Alarm Management

The separator and the auxiliary equipment are supervised by the control system. If one of the system components does not function as assigned, an alarm is given and in some cases action is required.

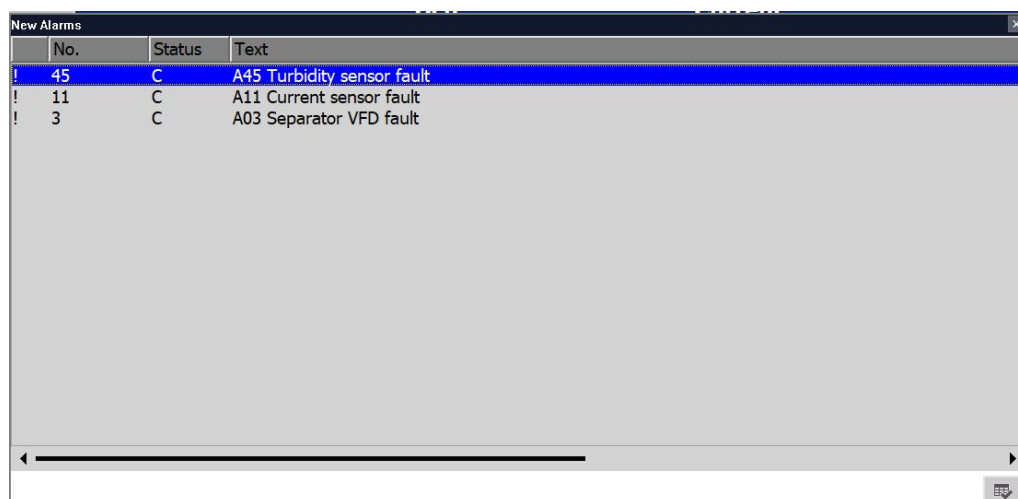
### 7.1 Alarm acknowledgement

#### New alarm

You are alerted to the new alarm by the alarm lamp flashing on the control panel, and an optical or acoustical signal (if connected, normally supplied by the customer).

The alarm icon is displayed on the screen. The icon is flashing as long as there are unacknowledged alarms in the system. If the alarm icon is selected, a pop-up menu containing the messages belonging to the alarm(s) is displayed.

To reset the new alarm, press the ACK button once. This will reset the optical or acoustical signal and also acknowledge the first alarm.



No.	Status	Text
! 45	C	A45 Turbidity sensor fault
! 11	C	A11 Current sensor fault
! 3	C	A03 Separator VFD fault

#### Other alarm(s)

To acknowledge any other alarm(s), press ACK again. The alarm icon becomes stable when all alarms are acknowledged. Now you are responsible for taking remedial measures against the fault(s).

If the faulty condition no longer exists when the corresponding alarm is acknowledged, the alarm lamp goes out and the alarm icon disappears.

If any of the acknowledged alarms are still active, the alarm lamp is steadily lit. The indications will disappear automatically when the faults are corrected.

Select the Alarm list on the System tab to display a list containing the alarms still active.

No.	Time	Date	Status	Text
42	1:52:11 PM	5/4/2022	(CA)D	A42 Emergency Stop activated
42	1:52:11 PM	5/4/2022	(C)A	A42 Emergency Stop activated
42	1:52:02 PM	5/4/2022	C	A42 Emergency Stop activated
45	1:51:42 PM	5/4/2022	(CA)D	A45 Turbidity sensor fault
3	1:51:13 PM	5/4/2022	(CA)D	A03 Separator VFD fault
3	1:51:13 PM	5/4/2022	(C)A	A03 Separator VFD fault
11	1:51:12 PM	5/4/2022	(CA)D	A11 Current sensor fault
11	1:51:12 PM	5/4/2022	(C)A	A11 Current sensor fault
45	1:51:12 PM	5/4/2022	(C)A	A45 Turbidity sensor fault
45	1:50:19 PM	5/4/2022	C	A45 Turbidity sensor fault
11	1:49:53 PM	5/4/2022	C	A11 Current sensor fault
3	1:49:48 PM	5/4/2022	C	A03 Separator VFD fault

## Alarm history

Alarm history screen displays the latest 100 alarms. Selecting the Alarm history on the System tab gives access to the alarm history list.

## 7.2 Alarm activation diagram

### How to read the Alarm activation diagram

The Alarm activation diagram in the SDS of technical documentation lists all supervised functions in the system and gives an explanation of the different alarm codes used.

Furthermore, for each supervised function the appropriate alarm interlock in each operation mode is shown.

- A blank field means no supervision in this mode
- "Alarm" means just alarm and no automatic action
- "Stop" or "St Dry" means the system will give alarm and change automatically to STOP or STANDBY DRY mode

### Start blocking

Several faults listed in the Alarm activation diagram have the comment "Start blocking".

This means that, with this fault present, the START command will not be accepted by the control system, even if the faulty condition might be allowed in the mode from which start is attempted.

At start blocking, the corresponding alarm showing the reason for the start refusal will be displayed on the alarm display proceed as described above.

### Alarm override

It is possible to override interlocks for certain alarms in some operation modes (see Alarm activation diagram).

The alarms will be given as usual, but you can e.g. perform a PRODUCTION run with a faulty flow meter.

---

The override-function can only be set ON, if the correct process password is given.



## 8 Installation and Setup information

### 8.1 VFD Parameters

#### Separator VFD

Table 1: DANFOSS VLT FC302

Number	Parameter name	Default value from Danfoss	Used value	Notes
3-00	REFERENCE RANGE	(1)-MIN-+MAX	(0) MIN-MAX	
3.03	MAXIMUM REFERENCE	1500	3827	
3.04	REFERENCE FUNCTION	SUM	EXTERNAL/ PRESET	
3.41	ramp 1 ramp up time	3	200	
3.42	ramp 1 ramp down time	3	480	
4.13	motor speed high limit	3600	3900	
4.19	max output frequency	132	65	
4.52	warning speed low	1800	3900	rpm
4.53	warning speed high	1800	not used	
5.19	safe stop alarm	safe stop alarm	safe stop warn- ing	
5.40	function relay 1	no operation	Running	
5.40	function relay 2	no operation	below speed low	
6.12	analog input terminal 53 low current	0,14	4	mA
6.15	analog input terminal 53 high	1500	3827	
6.50	analog output terminal 42 output	no operation	motor current 4-20 mA	
6.52	analog output 1 terminal 42 max scale	100	65	
1.90	motor thermal protection	no protection	not used	
1.93	thermistor resource	none	not used	
5.02	terminal 29 mode	input	output	
5.11	Terminal 19 digital input	Reversing	Reset	
5.12	terminal 27 digital input	no operation	coast inverse	
5.31	terminal 29 digital output	no operation	Safe Stop active	
1.73	flying start	disabled	enabled always	
1.62	slip compensation	100	0	%
1.20	MOTOR NOM POWER		3,7	kW
1.22	MOTOR NOM VOLTAGE		380	V
1.23	MOTOR NOM FREQ		60	Hz
1.24	MOTOR NOM CURRENT		7,3	A
1.25	MOTOR NOM SPEED		3490	rpm

Other settings:

- switch A53 set to on
- switch A54 set to on

## How to perform "AMA" automated motor adaption

1. Set parameter 5.12 to "no operation".
2. Set parameter 1.29 to "AMA complete" and follow instructions on the screen.
3. When "AMA" is finished, set parameter 5.12 to "Coast inverse".

## 8.2 Speed converter settings

Parameter	Adjusted value
OUTPUT	
Relay (1)	
Min/Max	Max
Trip	9600 rpm
Hysteresis	100 rpm
Relay (2)	
Min/Max	Max
Trip	9600 rpm
Hysteresis	100 rpm
Iout	
End Value	10000 rpm

## 8.3 Passwords

User	Password
admin	112
system	2760
process	592

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## 9 Ordering Spare parts

### 9.1 Spare parts

When ordering spare parts, please always state:

1. Machine number (see name plate).
2. Designation (type of component, supplier and serial number).
3. Article number / Spare part number (if available).
4. Capacity or other relevant identification.

Also, please refer to the specific manuals for the component to identify the spare parts.

### 9.2 Alfa Laval Service

Alfa Laval is represented in all major ports of the world.

Do not hesitate to contact your local Alfa Laval representative with any questions, problems or requirement of spare parts for Alfa Laval equipment.

When asking for assistance, always state installation reference and year (see name plate on electrical panels).