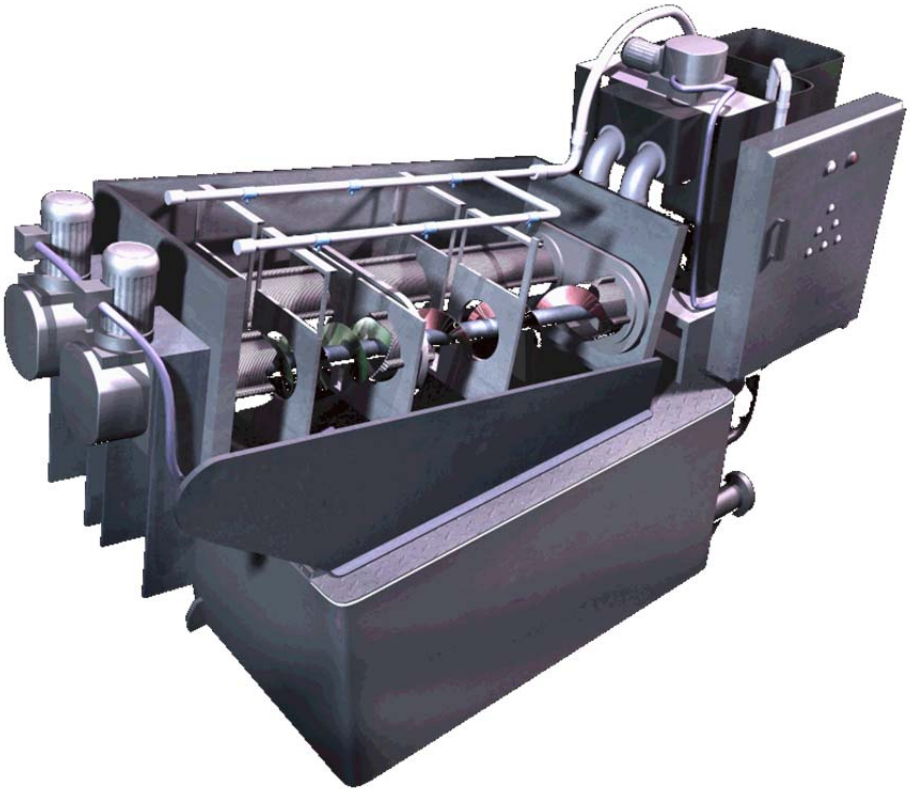
Volute Dewatering Press Model ES131
Operation and Maintenance Manual for

Concannon Winery Project

Arroyo Grande, CA



PROCESS WASTEWATER TECHNOLOGIES LLC

Process Wastewater Technologies, LLC.
9004 Yellow Brick Road, Suite D, Rosedale, MD 21237
Phone: 410-238-7977, Fax: 410-238-7559

Project and Main Components Information

Section 1: Volute Dewatering Press O&M

Section 2: Physical Drawings

Section 3: Main Electrical Components

- Control Panel Data Sheet
- Electrical Drawings
- Altivar Adjustable Speed Drives
- ASCO Solenoid Valve
- GTR Drum & Mixing Tank Gearmotor
- Programmable Logic Controller
- Ametek Level Sensor

Section 4: Polymer Preparation System

Project Data and Main Component Information

PROJECT DATA

The following information regarding this project should be referenced when contacting PWT about replacement parts.

Project name:	Concannon Winery Project
Project address:	Cloacina Package Treatment Solutions 2385 Precision Drive Arroyo Grande, CA 93420
Customer:	Fluid Resource Management 2385 Precision Drive Arroyo Grande, CA 93420
Customer PO number:	CL16-005-003
Customer PO date:	21 November 2016
PWT Project number:	VDPCA16116
Local Sales Representative:	JBI Water - Brent Cromar
PWT Supply:	One (1) PWT Volute Dewatering Press Model ES 131 unit w/2 foot taller skid One (1) Velodyne Polymer Preparation System One (1) Control system for the above

MAIN COMPONENTS AND CONTACT INFORMATION

The following are the main components supplied on this project along with the project specific data for this system and the contacts for supplying parts and equipment for this system. While PWT may be contacted for any parts supplied, particularly following the expiration of the warranty period, contacting the manufacturer directly may expedite the supply of parts.

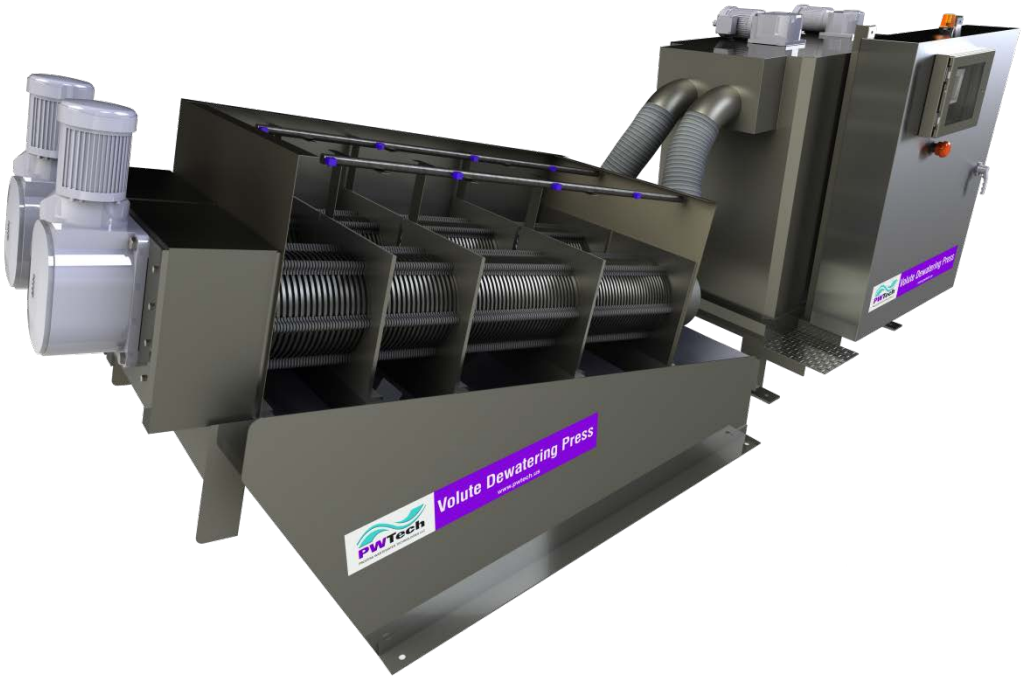
Component:	Volute Dewatering System
Manufacturer:	Process Wastewater Technologies LLC (PWTech)
Model Designation:	ES131
Serial Number:	D13104A123
Job Number:	VDPCA16116
O&M Manual location:	TAB 1, TAB 2, TAB 3
Contact name:	Bill Love
Phone:	410 238 7977
Fax:	410 238 7559
Email:	volute@PWTech.us
Address:	9004 Yellow Brick Road, Suite D Rosedale, MD 21237
Website:	www.pwtech.us

Component:	Control Panel
Manufacturer:	Control Interface Inc.
Job Number:	J-978
O&M Manual location:	TAB 3
Phone:	888 874 2062
Email:	engineering@controlinterface.com
Address:	4835 Business Center Way, Cincinnati, OH 45246
Website:	www.controlinterface.com

Component:	Liquid Polymer Preparation System
Manufacturer:	Velocity Dynamics, Inc. (Velodyne)
Model Designation:	VMN-0.5D-120-X0D-O-A-X
Serial Number:	1216-3461-2161
Sales Order Number:	3461
O&M Manual location:	TAB 4
Phone:	303 530 3298
Email:	bdunkerson@polymersolution.com
Address:	543 S. Pierce Ave. Louisville, CO 80027
Website:	www.polymersolution.com

Tab 1: Volute Dewatering Press O&M

Volute Dewatering Press



Operation and Maintenance Manual

PWTech
PROCESS WASTEWATER TECHNOLOGIES

Revision:	B
Date:	July 2014
For Models	ES Series – ES101 - 353

Process Wastewater Technologies, LLC.
9004 Yellow Brick Road, Suite D, Baltimore, MD 21237
Phone: 410 238 7977, Fax: 410 238 7559,
Email: volute@PWTech.us

This Manual is for the day to day operation of the PWTech Volute Dewatering press – ES Series from model ES101-353.

It does not contain information on Design, Installation, Overhaul procedures, or other system component information. These items are covered in separate documents.

Contents

1. Introduction

1.1. Process Wastewater Technologies, LLC

Process Wastewater Technologies, LLC (PWT) has been established to provide clients with unique technologies to achieve cost-effective best management practice in water quality. The company is committed to its clients and the environment. Its focus is on development, manufacturing, installation, and operation of innovative technologies for water, wastewater and wet weather flow treatment.

1.2. The Volute Dewatering Press

The Volute Dewatering Press is designed to dewater sludge in a compact, automated and self-contained operation. The basis of this process is the "Dewatering Drum" designed by Amcon Inc. of Japan. It is a type of screw press that utilizes a screw inside a moving casing. At the time of printing, there are around 1800 units in operation around the world.

The scope of operations includes:

- Municipal Water (Alum, Ferric, Lime and PACL sludges)
- Wastewater plants (WAS, anaerobic and aerobic digested, MBR WAS, primary, fixed-film sludges, Lagoon sludges)
- Dairy processing
- Meat packing (DAF and Lagoon sludge)
- Processed food production (biological process waste sludge and DAF sludge)
- Tanker wash-down
- Winery, aquaculture, metal plating

1.3. Use of this manual

This operation and maintenance manual is written to act as a reference for operators to assist in the trouble free operation of the Volute Dewatering Press unit. It contains:

1.3.1. Detailed information on the setup and operation of the system

1.3.2. Suggested operation procedures for the ES Series Volute Dewatering Press.

1.3.3. Detailed descriptions of the PLC operation of the unit

1.3.4. Tips and techniques for optimization of the Dewatering Press operation

1.3.5. Inspection and maintenance schedules

This manual covers the information required for the most likely scenarios encountered during the service life of the Volute Dewatering Press unit. However, it does not cover all possible scenarios, and further information may be sought from PWT if required.

1.4. Exclusions From This Manual

Things that are not in this manual are:

1.4.1. Information on design or manufacture of PWT Volute Dewatering Press units.

1.4.2. Design and Installation instructions – these are available in a separate document.

1.4.3. Detailed operating instructions for other components of the dewatering system. These documents will be appended to this manual should they be required.

1.4.4. Information on the overhaul of the dewatering drums. This is a major procedure and is best undertaken by qualified technicians.

1.5. Velodyne Polymer system instructions

This manual includes information on the operation of the Velodyne Polymer systems that are commonly supplied with the Volute Dewatering Press. If a different polymer system is used, but it is still a liquid polymer preparation system, much of the information in this manual will still be pertinent, even if there are small differences in the design of the equipment.

1.6. Additional information

PWT endeavors to provide its clients and partners with the best possible technical support. If there are questions relating to the Volute Dewatering Press, its use, this manual, or variations in setup and operating conditions that are not covered by this manual, please contact PWT for assistance.

2. Health and Safety

2.1. Warnings

The following warning symbols are used throughout this manual to describe the type of hazard that may be encountered during the installation, operation or maintenance of this equipment. All personnel should pay special attention to the procedures indicated.

Immediate hazard which WILL result in severe personal injury or death.

Hazard or unsafe practices which COULD result in severe personal injury or death.

Hazards or unsafe practices which COULD result in personal injury or product or property damage.

2.2. Introduction

This Operating and Maintenance Manual is provided to fulfill the responsibilities of PWT to supply sufficient documentation and instructions to enable the users of the equipment supplied under this contract to operate and maintain the equipment in a safe and reliable manner.

This Section of the Manual is designed to make the reader aware of general safety regulations that may impact on operation and maintenance of the unit. In addition, some specific safety measures for certain aspects of the Volute Dewatering Press are outlined.

The operation and maintenance of this plant and equipment must be carried out in compliance with all current and relevant federal Occupational Safety and Health Administration rules and regulations, the relevant state counterparts, any local or regional ordinances that regulate such matters, and any OH&S policies and procedures in effect by the equipment's owner.

The safety regulations applying in the State or Territory are to be strictly adhered to at all times.

Any party performing cleaning, inspections or maintenance on the unit is to be fully aware of all applicable safety regulations and ensure that all staff is adequately trained in safe working practices.

These safety regulations include but are not limited to:

2.2.1. Occupational Health and Safety Legislation

2.2.2. Confined Spaces Legislation

2.2.3. Motor Traffic Legislation

2.2.4. Scaffolding and Lifts Regulations

2.2.5. Health Regulations dealing with handling of hazardous substances

2.2.6. Hazardous Substances Legislation

2.2.7. Manual Handling Regulations

2.2.8. Plant Operating Instructions

2.2.9. Traffic and Pedestrian Safety Standards.

Adequate insurance should be carried to cover Public Liability and Worker Injury.

2.3. Health and Safety during Operation and Maintenance

Equipment sub-suppliers documentation is contained within this manual that is specific to the individual piece of equipment or sub-system. The instructions in this introduction are offered as a general guideline and should be strictly observed but not be regarded as complete and exhaustive:

All work shall be carried out by appropriately trained and qualified personnel.

All equipment shall be made safe prior to any maintenance being undertaken. This will require isolation from electrical power and/or process liquid flows. Electrical switches and isolation valves or temporary dams shall be selected and locked in the 'OFF' position.

All work on electrical equipment must be completed in strict accordance with local electrical codes and the manufacturer's instructions.

Safe access must be provided to relevant parts of the plant and all lifting equipment shall be covered by a current safety inspection certificate.

Appropriate protective clothing and equipment shall be worn at all times.

When working in confined spaces, gas detection equipment, and breathing apparatus in accordance with safety procedures shall be used.

2.4. General Warnings

The following general WARNINGS must be observed before any maintenance work is carried out:

HIGH VOLTAGES CAN KILL!

BEFORE WORKING ON ANY COMPONENT THAT HAS ELECTRICAL CONNECTIONS:

MAKE SURE THAT THE ELECTRICAL SUPPLY IS ISOLATED.

MAKE SURE THE CIRCUIT BREAKERS ARE TRIPPED AND TAGGED.

MOVING MACHINERY AND PINCH HAZZARDS!

KEEP HANDS CLEAR OF ANY MOVING PARTS WHILE THE UNIT IS IN OPERATION:

MAKE SURE THAT THE ELECTRICAL SUPPLY IS ISOLATED.

MAKE SURE THE CIRCUIT BREAKERS ARE TRIPPED AND TAGGED.

SLIPPERY SURFACE!

CARE MUST BE TAKEN TO MINIMIZE POLYMER, SOLIDS CAKE, AND FILTRATE SPILLED IN THE AREA SURROUNDING THE VOLUTE DEWATERING PRESS.

CLEAN FLOORS IMMEDIATELY FOLLOWING ANY SPILLAGE OF POLYMER OR OTHER LIQUIDS CONTAINING POLYMER.

OPERATE UNIT WITH SIDE PANELS IN PLACE TO MINIMIZE FILTRATE SPILLAGE.

3. Volute Dewatering Press Main Components

The following diagrams show the main components of the Volute Dewatering Press.

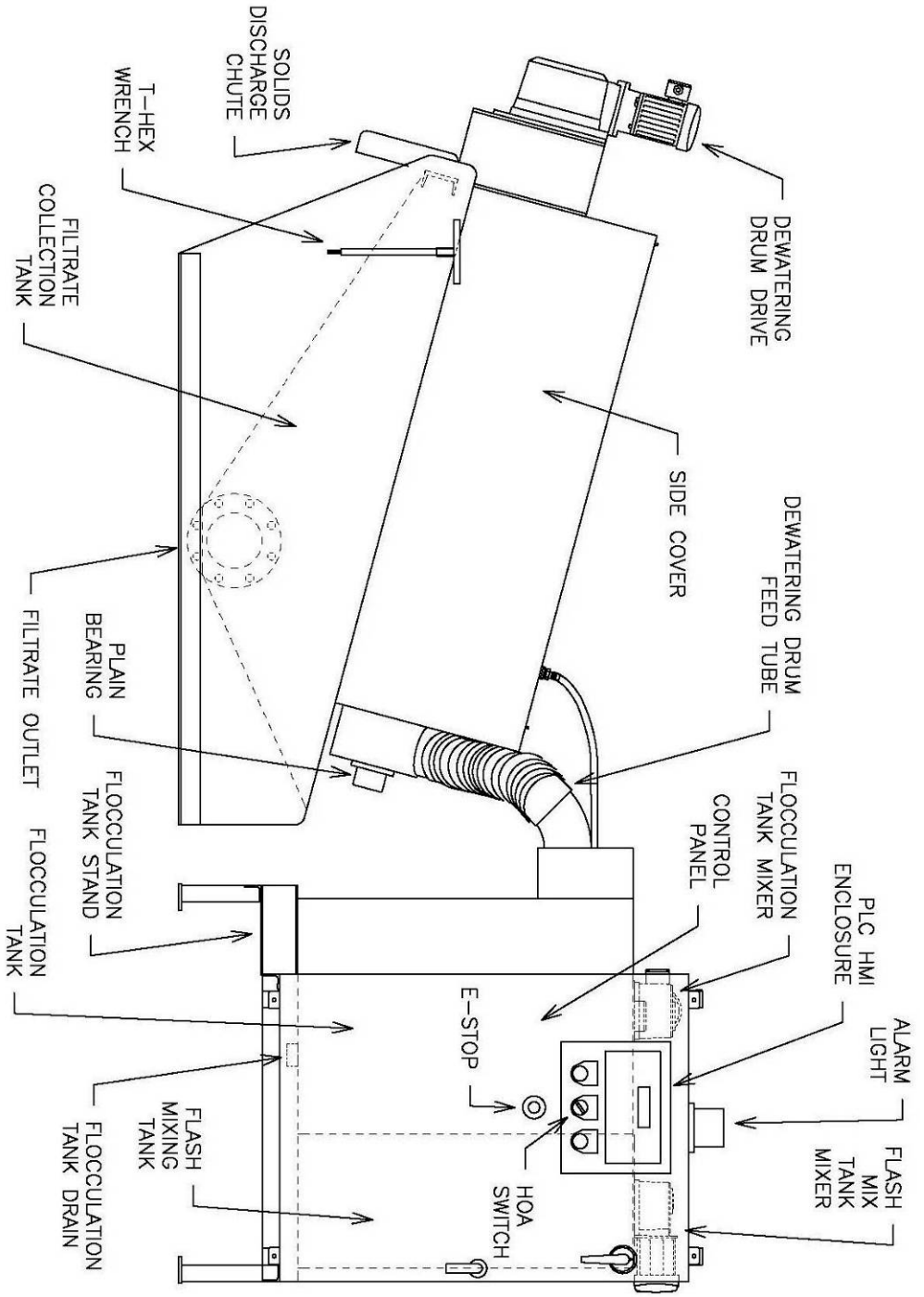


Figure 3.1 – Control panel side elevation component drawing

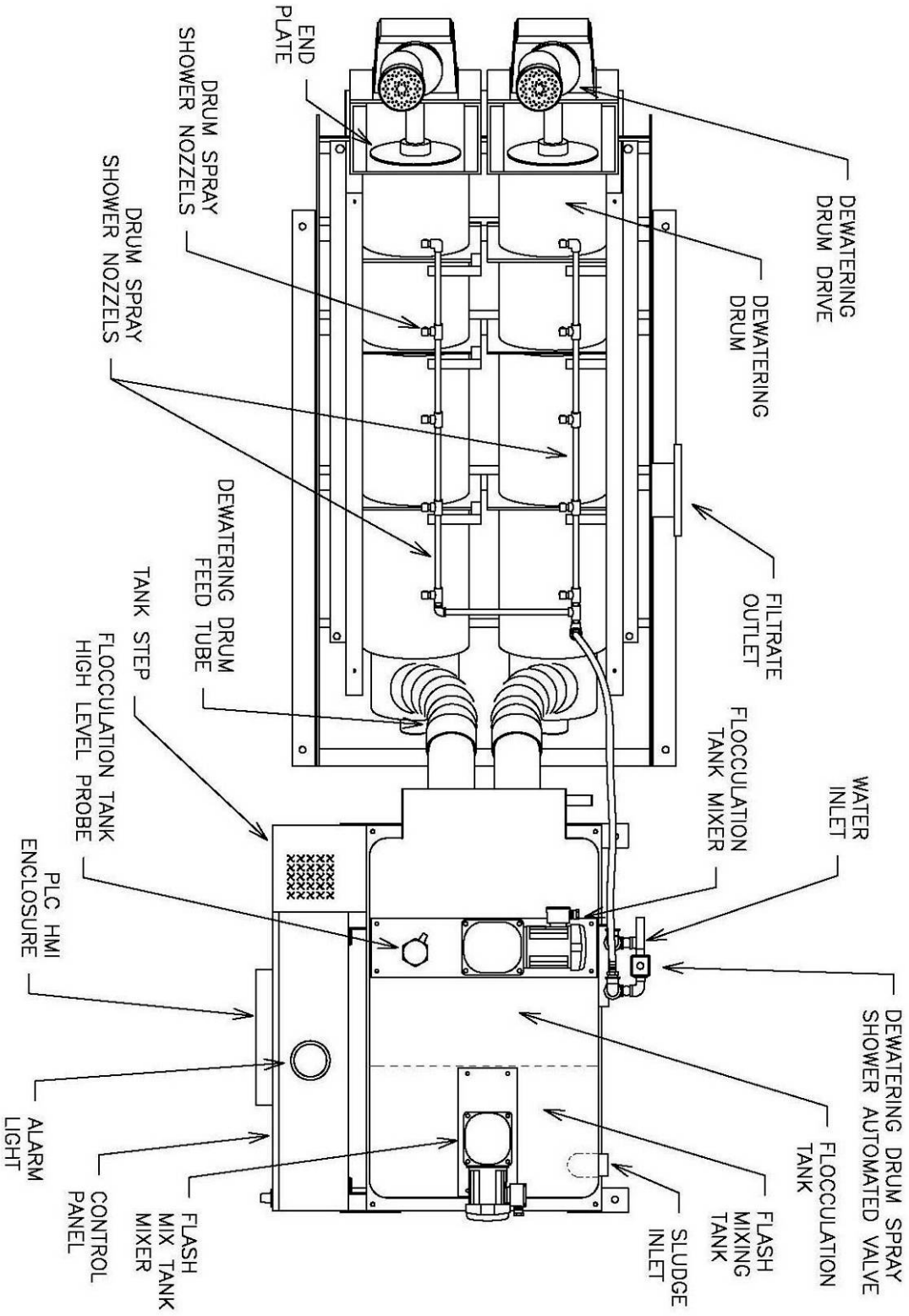


Figure 3.2 – Plan view component drawing

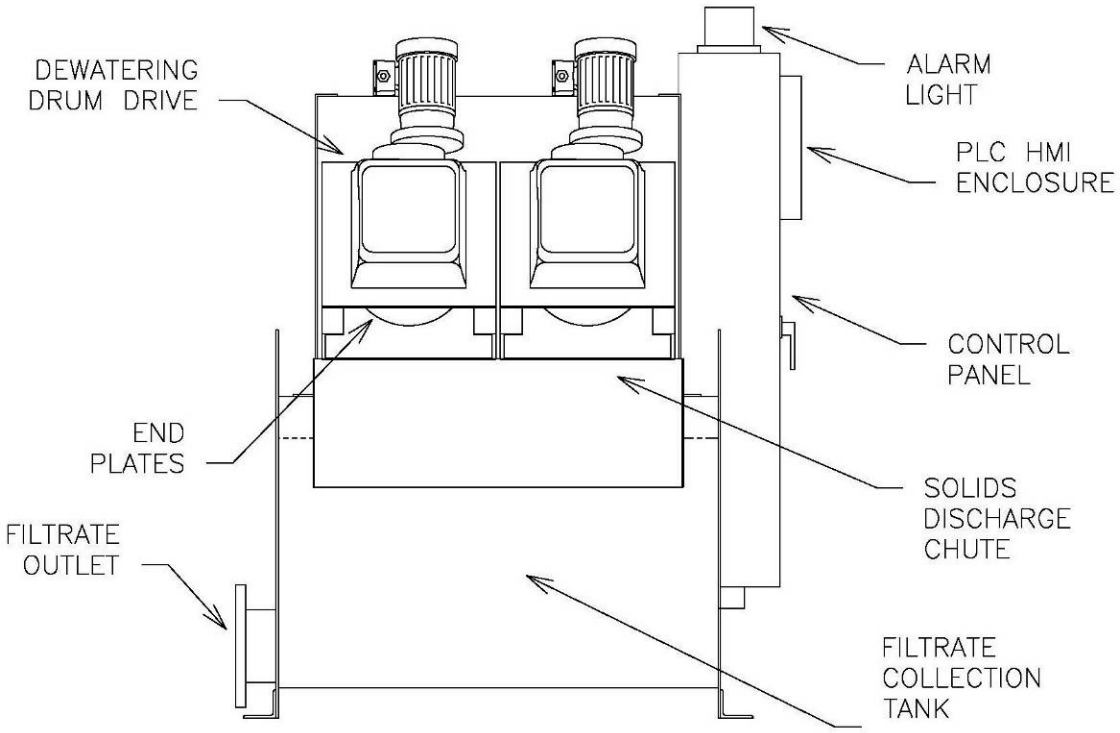


Figure 3.3 – Solids discharge end elevation view component drawing

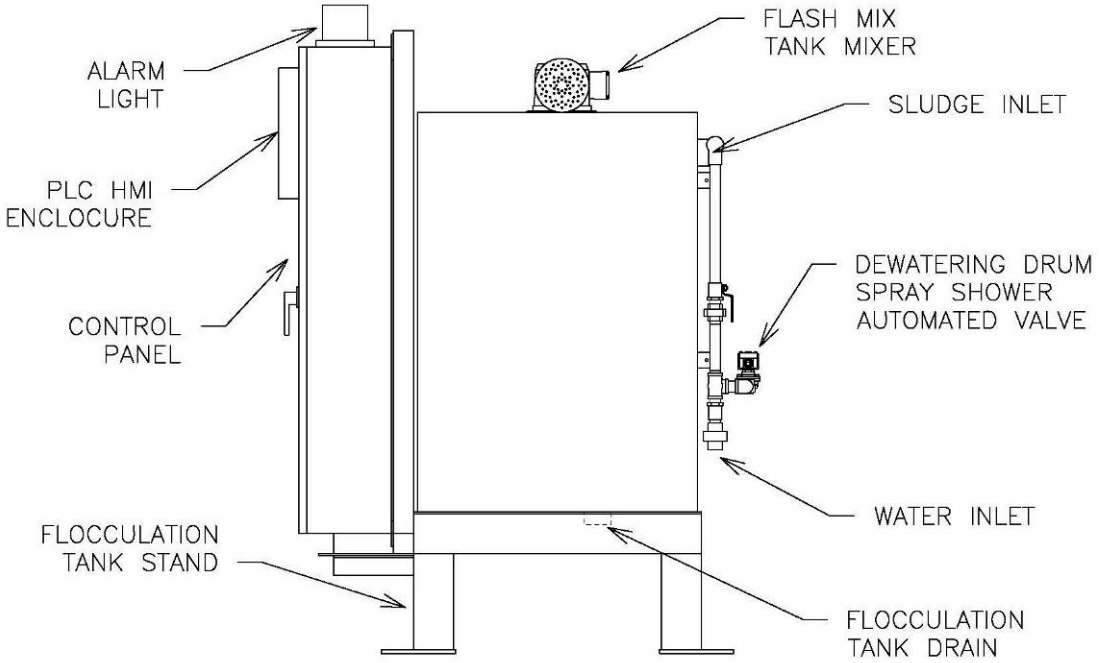


Figure 3.4 – Flocculation tank end elevation view component drawing

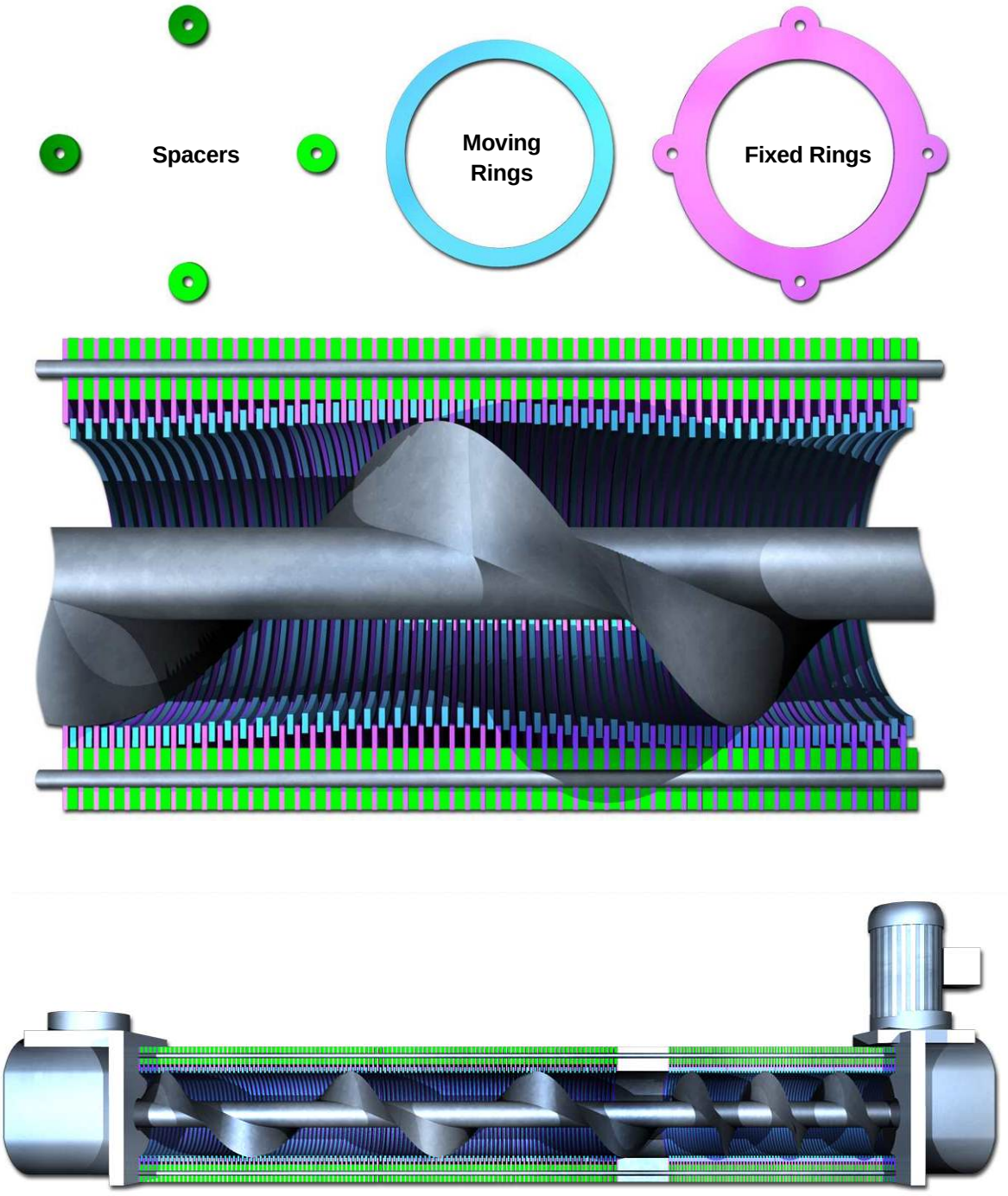


Figure 3.5 – Dewatering Drum Assembly

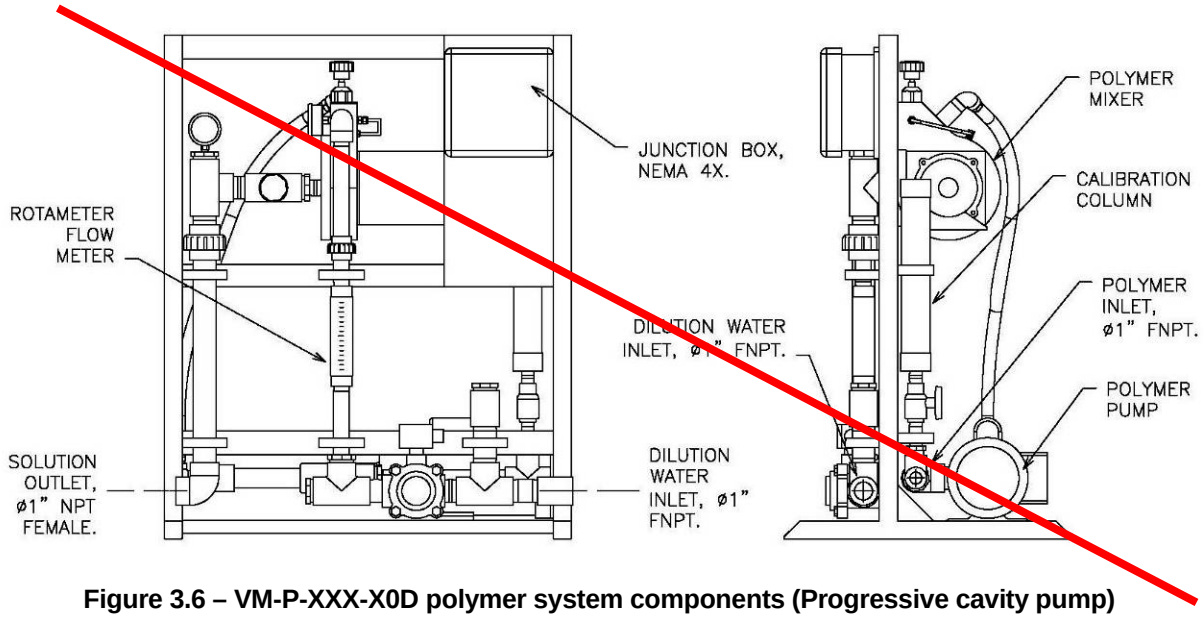


Figure 3.6 – VM-P-XXX-X0D polymer system components (Progressive cavity pump)

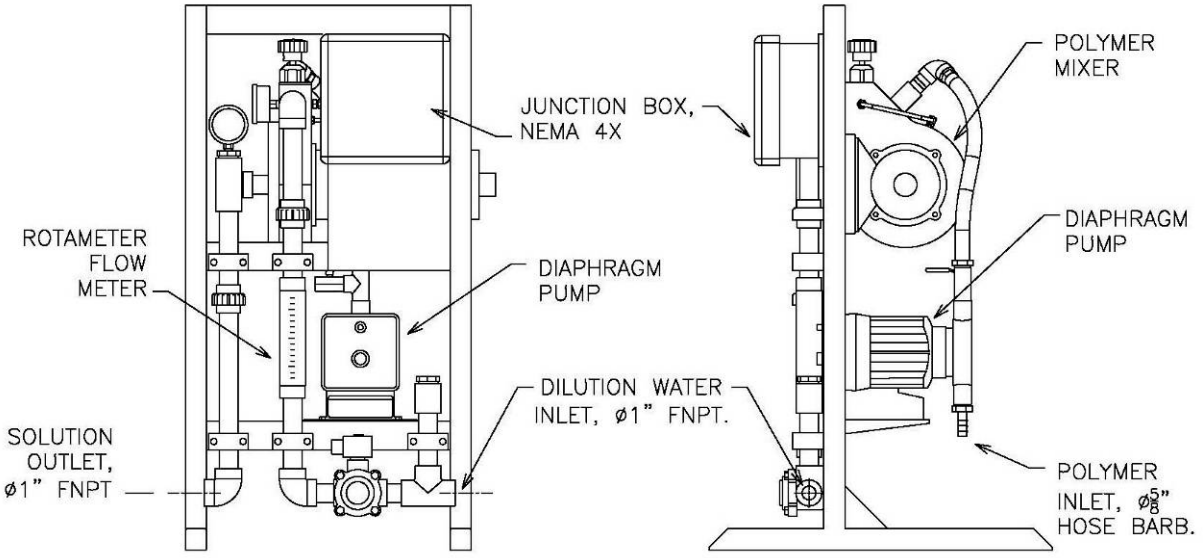


Figure 3.7 – VMN-D-XXX-X0D polymer system components (Diaphragm pump)

4. General Operation Description

4.1. Introduction

This section describes the overall operation of the Volute Dewatering Press system and the functions and operation of each major component of the Volute Dewatering Press.

4.2. Main Process Functions

Sludge is fed via a pump to the unit. This pump is typically controlled by the control panel of the Volute Dewatering Press.

Polymer solution is injected into the flow of sludge just prior to the sludge entering the flash mixing tank that thoroughly mixes polymer and sludge together. The sludge mixture then flows into the base of a flocculation tank. The sludge and polymer flow up through the flocculation tank where it is gently mixed by a rotating impeller.

Flocculated sludge flows through tubing from the flocculation tank into the base of the dewatering drum. The screw inside the dewatering drum rotates, moving solids up the drum while filtrate flows from the dewatering drum into the effluent drain.

Dewatered cake is discharged from the end of the dewatering drum. In some cases, this is carried away by a conveyor that is also controlled by the unit.

4.3. Polymer Feed System

Polymer solution is made up and dosed continuously in an automated process that is separate from but controlled by the Volute Dewatering Press. Typically the process consists of a neat polymer feed pump and a mixing/activation chamber where the neat polymer is mixed with dilution water. Activated polymer solution is then injected into the sludge feed line to the Volute Dewatering Press.

4.4. Flash-Mixing and Flocculation Tank

The flash-mixing tank is where polymer and sludge are mixed rapidly to achieve thorough mixing of the polymer throughout the sludge to optimize polymer usage. This tank is equipped with a single or twin 3 blade aerofoil impellers driven by a 4-pole gear motor with a 5 or 10 to 1 gear ratio.

The flocculation tank is designed to achieve gentle continuous mixing of the sludge, allowing flocs to form. The tank is approximately square in layout and has a large cross-sectional area impeller driven by a 4 pole gear-motor with a 60:1 ratio.

The impeller speeds on both tanks are controlled by variable frequency drives (VFD) and are adjustable at the programmable logic controller (PLC). The design of this system allows for enough mixing energy and time for flocs to form under most operating circumstances. It also gives the operator significant scope to alter and optimize the mixing energy profile to optimize unit performance.

4.5. Dewatering Drums

The dewatering drums are the key to the Volute Dewatering Press operation and performance. The unique dewatering drum comprises of a variable pitch Archimedes screw within a casing of fixed and moving rings. The casing is assembled on a number of support rods which hold the fixed rings in place. Between each fixed ring on the support rods is a spacer which holds the fixed rings apart. Between each fixed ring is a smaller moving ring which has an inside diameter smaller than the outer diameter of the screw. In addition, the width of the moving rings is fractionally less than that of the spacers holding the fixed rings apart. The moving rings are then moved by the outside of the rotating screw

Flocculated sludge is fed in at the base of the dewatering drum and is transported up inside the drum by the screw. Initially, in the first part of the drum (the “Thickening Zone”), the pitch of the screw is about the same as its diameter and there is an average 0.5mm (1/50”) gap between the moving and fixed rings. Thickening of the sludge occurs in this section and the majority of the free water is released, mainly due to gravity.

The pitch of the screw and the gap between the moving and fixed rings decreases as the flocculated sludge is transported further up the dewatering drum. In the last part of the dewatering drum (the “Dewatering Zone”), the average gap between the moving and fixed rings is 0.075mm (3/1000”). An adjustable endplate sets the gap from where the solids exit at the end of the drum, providing the back pressure that forces interstitial water out of the cake.

4.6. Electrical Control Panel

The electrical panel controls and operates the entire Volute Dewatering Press system, including ancillary equipment such as feed pumps and conveyors, if connected. It is integrated with external components such as the polymer make-up system and feed pump to provide seamless operation for the whole process of sludge dewatering.

5. Operating the Volute Dewatering Press

This section covers the general operating conditions and procedures for the Volute Dewatering press. The actual operation and detailed instructions on monitoring and varying operating parameters is located in the next section that deals with the specific HMI/PLC operating procedures.

5.1. External Panel Controls

All regular activities associated with the operation of the press may be undertaken utilizing the controls on the external face of the unit control panel. Figure 5.1 shows the external panel design.

The external face of the panel includes the following items:

5.1.1. Main Circuit Breaker

5.1.2. System STOP button

5.1.3. HMI / PLC display and keypad*

5.1.4. Power On light*

5.1.5. System H-O-A switch*

5.1.6. System Running light*

* Within an enclosed switch compartment with:

The power-on light indicates that the unit is switched on and has power. The system running light indicates that the unit is set to “Auto” and is operating.

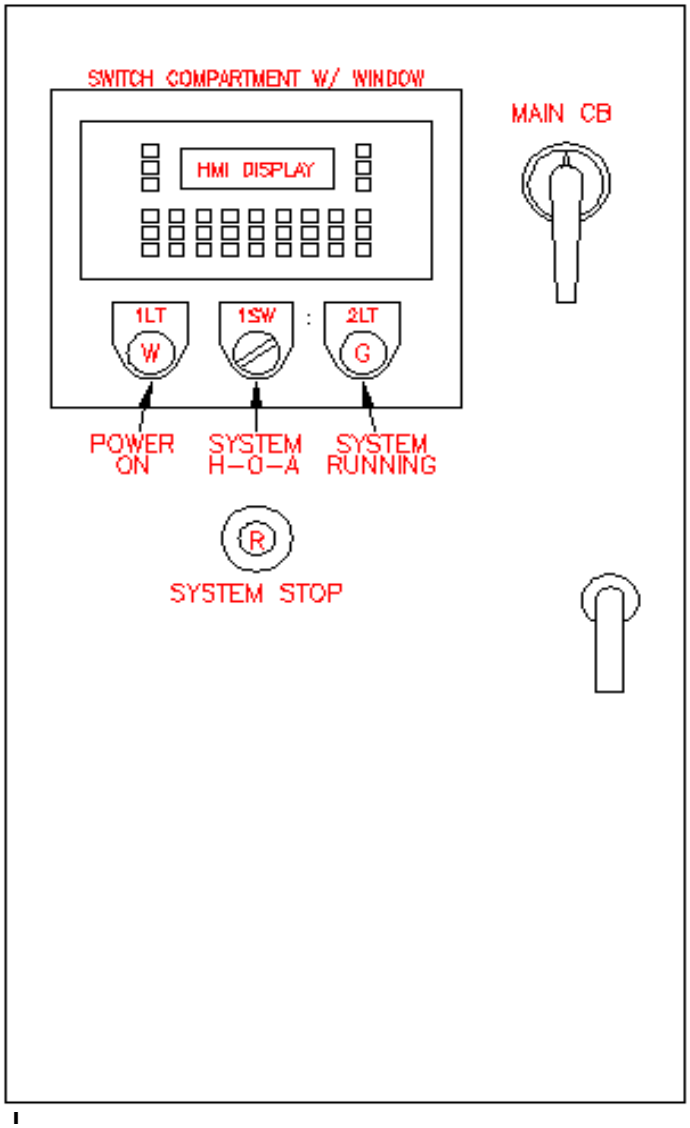


Figure 5.1 – External Panel Controls

(Layout might vary slightly for some installations)

5.2. Pre-Operation Checks

Prior to operating the unit, the following checks should be undertaken.

5.2.1. Check that the flash-mixing and flocculation tanks are free of any objects that may interfere with the rotation of the mixing impellers.

5.2.2. Check that power is on at the unit (indicated by the white light on the outside door of the control panel).

5.2.3. Check the endplates of the unit. Check that these are free of dried solids, that the gap is set correctly, and that the set screws are tightened (S7.5)

5.2.4. Check that the polymer preparation and storage system is ready to be used with the dosing pump primed and water supply to the dosing system on.

5.2.5. Check that all relevant valves are open, allowing the flow of sludge to the unit.

5.3. Starting the unit up

PLC Initialization - When the PLC is powered up it will go through a 10-15 second initialization sequence. During this sequence, the operation of the Volute system is inhibited. The PLC will restore communication with the VFDs, reset VFD faults, reset shutdown alarms and place the system in a “ready to operate” mode. The PLC will also execute this sequence when the Push/Pull E-stop button is pulled out or the user presses the reset button on the PLC menu.

5.4. E-Stop Button

E-stop - A “Push to Stop / Pull to Start” E-stop red mushroom type button is mounted on the enclosure door. When pushed in, the PLC will immediately stop or close all motors, pumps, and valves.

Note: This E-stop does not disconnect power to the control panel.

Some single phase 120V or 24VDC power also remains active to power the PLC, cooling fan, and spare 115V terminals. Use the main circuit breaker on the external door to completely disconnect all power.

5.5. System H-O-A Switch and modes of operation

There are two (2) modes of operation for the Volute Dewatering Press these being “Manual” and “Auto”. To go between these two modes and the “Off” mode, the System H-O-A (Hand-Off-Auto) switch must be used.

5.5.1. Manual Operation Mode - The manual mode is primarily designed for checking operation of individual pieces of equipment, and maintenance. In this mode, the main items of equipment can be switched on and off individually on the PLC. Any level or fault indicators will not stop the operation of the components running in this mode, thus the unit should not be left running unattended in manual for any length of time. In addition, the Elapsed Time Meter (ETM) for the whole system does not operate in this mode so extended operation in this mode will mean that the ETM significantly understates the real operating time of the system.

5.5.2. Auto Operation Mode - Under this mode of operation the unit will run itself and will shut itself down in the event of any problems detected by the control system. The unit should always be run in Auto mode. Once the unit is operating in Auto mode, it will run either continuously or be controlled by the clock settings.

5.6. Time Clock Operation

In auto operation mode, the unit may be set time clock operation (setup described in Section 6). Under time clock operation, the unit will start and stop according to a programmable timer that allows the days and hours of operation to be set. There are typically two (2) time clocks to allow different regimes to operate simultaneously.

5.7. Conditions for operation in Auto mode

The following conditions must be met for the unit to run in Auto mode:

5.7.1. E-Stop button must be “out” and any other E-stops in the system (such as the conveyor pull cord) must not be activated.

5.7.2. System H-O-A switch must be set to “Auto”

5.7.3. Flocculation Tank fluid level must be below the High-Level Probe

5.7.4. Circuit breakers must not be tripped

5.7.5. VFDs must not be faulted

5.7.6. Polymer dilution system must have sufficient water pressure (>20psi)

5.7.7. There must be polymer supply to the polymer preparation system.

Note that turning the main circuit breaker to the "On" position will start the unit if the H-O-A switch is set to Auto and the unit is set for continuous operation, or to be running at that time in Time Clock Mode.

5.8. Unit Shutdown and Clean-up

When operation of the unit is finished, there is no need to undertake any cleaning or shut down unless the unit is to sit unused for more than a few days, or is likely to be subjected to freezing conditions. Thus under a daily operating regime, the unit may simply be switched off or switched off by the time clocks with no further action required.

Should the unit need to be shut down for an extended period the following should be done:

5.8.1. Flash-mixing and flocculation tanks should be drained and cleaned out.

5.8.2. Dewatering drum should be run on its own for a minimum of thirty (30) minutes, the last ten (10) minutes of which the "Off" time on the Dewatering drum spray (Section 5.13) should be set to zero (0) so that the sprays operate constantly.

5.8.3. Polymer system should be cleaned out by running mineral oil or a dispersant through the raw polymer pump, check valve, mixer, and then leaving the system full.

5.8.4. Main circuit breaker and "H-O-A" switch should both be switched to the "Off" position.

6. PLC and HMI Operating Instructions

This section deals with the specific operating instructions for the Volute Dewatering Press system through the PLC that controls all of the functions of the operation.

6.1. General PLC operating instructions

The HMI is a touch screen design and all operation of the unit is done by pressing “buttons” on the screen. These buttons are visually shown as being “raised” on the screen with an outline and a shadow.

Once the PLC is on, moving between the various screens to operate the unit is easily done by pressing the gray buttons on the screen.

All operational adjustments made using the PLC are either:

- “on-off buttons” (or “select/deselect buttons”) which change the operating state of an item when pressed, or
- “Numerical value button” which when pressed brings up an on-screen numerical keypad to allow adjustments such as time, speed, or percentage input settings.

There are some “on-off” buttons that instantly change the operation of the equipment. These Buttons include:

- Manual on-off “switches” for operating individual devices while the H-O-A switch is set to manual operation
- Buttons that switch Conveyor direction and conveyor gate operation for systems that have reversible load-out conveyors.
- Buttons that switch between different devices such as feed pump selection if there are multiple feed pumps.

These buttons, that instantly make an operation change, require the operator to press the buttons down for at least two (2) seconds. This prevents accidental switching on and off of system components.

Buttons may be one of four (4) colors: Each color indicates the status of the button:

- A gray button indicates that the button is for moving to a different screen.
- There are also “grayed out” buttons that indicate a button is inactive. This means that the button will not operate because its function is not available. An example of this is the buttons for manually switching devices on and off will be gray when the H-O-A switch is

set to Auto as these buttons are only for operating when the H-O-A switch is set to Manual.

- A Blue button indicates that the button will be functional and pressing it will activate the buttons function
- A Green button indicates that an item has been selected. For example, if the system has two feed pumps, each one will have a button displaying its status. When the feed pump is able to be switched on, the button will be blue. Once it has been switched on and is in operation, the button will be green.
- A Red Button indicates that the button needs to be pressed, typically to either clear a fault or to stop a component of the system from operating.

6.2. Navigating around the PLC

The PLC program, while being generally the same for all installations, is customized to each installation. This is primary because different installations will feature different components being controlled by the PLC such as the type or number of conveyors or sludge feed pumps. In addition, there may be variations due to the operator's site specific requirements.

The position and range of options shown on the PLC screens herein may vary from this manual depending on the installation.

Upon power up, the first screen will be the Overview Display which shows the status of all systems.

From the Overview Display (or any other screen), accessing the Main Menu allows the operator to access each operation screen. From each of the operations screens, the operator can return to Main Menu screen.

The Automatic and Manual Control Screens and Alarm History Log Screen may also be accessed directly from the Overview screen as these are the most likely to be used to make system adjustments.

6.3. Basic Operating Screens

While there are a large number of screens, the operator should only be concerned with being familiar with the small number of screens that are likely to be required during day to day operation. These screens are:

6.3.1. **Automatic Control Screen** – where the system device parameters are set and adjusted for operation.

6.3.2. **Time Clock Setup Screen** – where the time clocks are set for unmanned start-up and shutdown of the system

6.3.3. **Manual Control Screen** – where individual system devices can be started and stopped

6.3.4. **Alarms & Alarm History Log Screens** – where information on active alarms that may have shut the system down are displayed.

The other screens fall into a couple of categories.

6.3.5. **Information screens** – an example of this is the Device screens which are primarily there so that an operator can look at data on the operation of that device such as the current it is drawing or its Elapsed Time Meter (ETM or time of operation). Most of the screens under the PLC submenu and all the screens under the Help submenu fall into this category. Some of these screens may also allow adjustments of the system of devices but they are primarily for information, mainly for O&M and troubleshooting purposes.

6.3.6. **Initial Setup Screens** – some screens such as the Flow-Feed Pump PID Screen or the Alarm setup screen should be set up by the commissioning staff and should not need to be adjusted in any way unless there is a significant change to the system (such as adding a new Device).

Anytime these screens need to be accessed, it is more than likely that it would involve a PWTech engineer helping to modify the operation or undertake some troubleshooting and as such familiarity with them is not important to the operation of the Dewatering system on a day to day basis.

6.4. Overview Display

This screen (See figure 6.1) is the main operating information screen. It gives the operator an overview of the main things that are happening with the system. Items that are typically displayed here are:

6.4.1. **Auto operating regime** – continuous operation or time clocks.

6.4.2. **Sludge Flow Rate**

6.4.3. **Devices selected** – if there are multiple options for components in the system, such as a duty/standby feed pump arrangement, the one that is in use will be indicated.

6.4.4. **Devices in operation** – any device that is operating will be highlighted green on the screen.

6.4.5. **Important device speeds** – such as Dewatering Drum speed and the polymer pump speed.

6.4.6. **Alarm conditions present** – any active alarms causing shut down of the system will be displayed.

6.4.7. **Spray wash time status** – displays the time till the next spray wash or end of the spray wash of the dewatering drums.

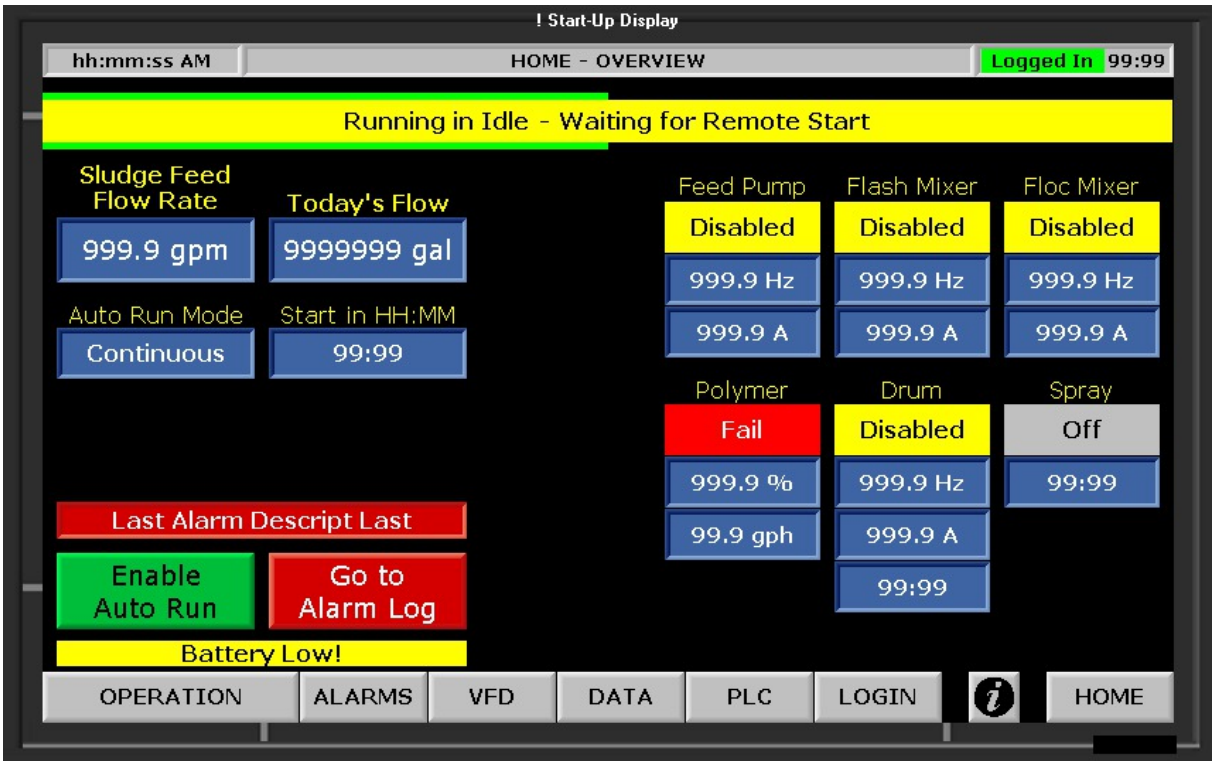


Figure 6.1 – Overview Display

It shows the alarm that is active and has a button to clear the alarm as well as one to go to the current alarm screen to view details on the alarm. For the unit to be restarted the conditions leading to the alarm must be cleared and the alarm cleared at this screen.

From the Overview Display, the Main menu is accessed as well as the Automatic Control Screen and the Manual Control Screen as these are the two main screens for making operational changes.

6.5. Control Screens

6.5.1. Automatic Control

This screen allows for the selection of equipment in operation, the nature of the operation and timer settings for the operation. (See figure 6.2)

Feed Pump Settings – the feed pump can either be run at a constant pump speed or if a flowmeter has been installed in the system and is set up correctly, it can be set to run at a constant flow rate using a feedback loop. Normally there is an on/off button to switch the type of control desired on. Then, there is the typical numerical value button to set either the pump speed or desired flow rate.

Other speed settings – the speeds for the Dewatering Drums, Mixers, and Polymer pump are also set on this screen.

Run Mode Select – Continuous or Time Clock. Pressing the Continuous button will mean that the unit runs in Auto mode whenever the H-O-A switch is set to Auto. When the Continuous button has been pressed it will be green indicating that the unit is operating in Continuous mode. When the Time Clock button is pressed the unit will run according to the time clock settings (Section 6.9) whenever the H-O-A switch is set to Auto.

Device Select – where there are options with different devices in the dewatering system such as duty/standby sludge feed pumps, multiple conveyors, or load out conveyors with gates, they are selected on this screen. Please note that not all devices can be changed while the system is operating. Feed pumps, for example, are typically set up in a way that does not allow them to be switched unless the system is not in operation.

Timers – several system timers can be set on this screen. Details on how to set the timers are found in Section 7.

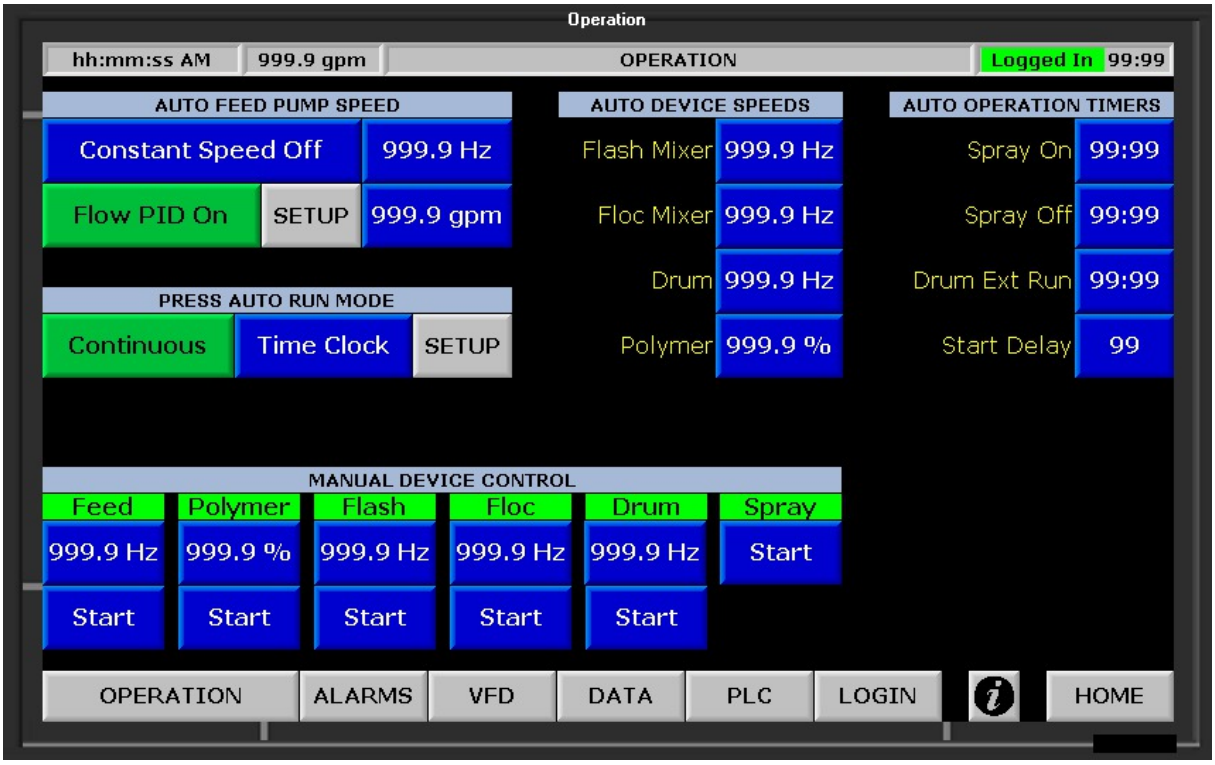


Figure 6.2 – Automatic Control Screen

6.5.2. Manual Control

When the H-O-A Switch is set to Hand or Manual, the Manual Control Screen (See figure 6.2) is where the various devices in the system can be switched on and off and adjusted to check their operation. As previously mentioned, the system should not be operated from this screen as it should always be run in Auto. However, for inspection and maintenance of individual devices, this is the only place items can be switched on and off individually.

Buttons must be pressed and held for two (2) seconds in order to switch any item off or on.

6.5.3. Time Clock

Typically Volute Dewatering Press systems are set up with two (2) time clocks and these are controlled from the Time Clock Setup screen (See figure 6.3). The time clocks are set by first selecting the day of the week they are to operate (press the button for that day and it will appear to be depressed), and then selecting the time to operate on that day.

Both time clocks can operate simultaneously. For example if you selected Monday only for time clock #1 and set the times from 08:00 to 16:00, and selected Tuesday only for time clock #2 and set the time from 00:00 to 08:00, the unit would switch on at 8am Monday and switch off at 4pm and then switch on again at midnight and run till 8am on Tuesday.

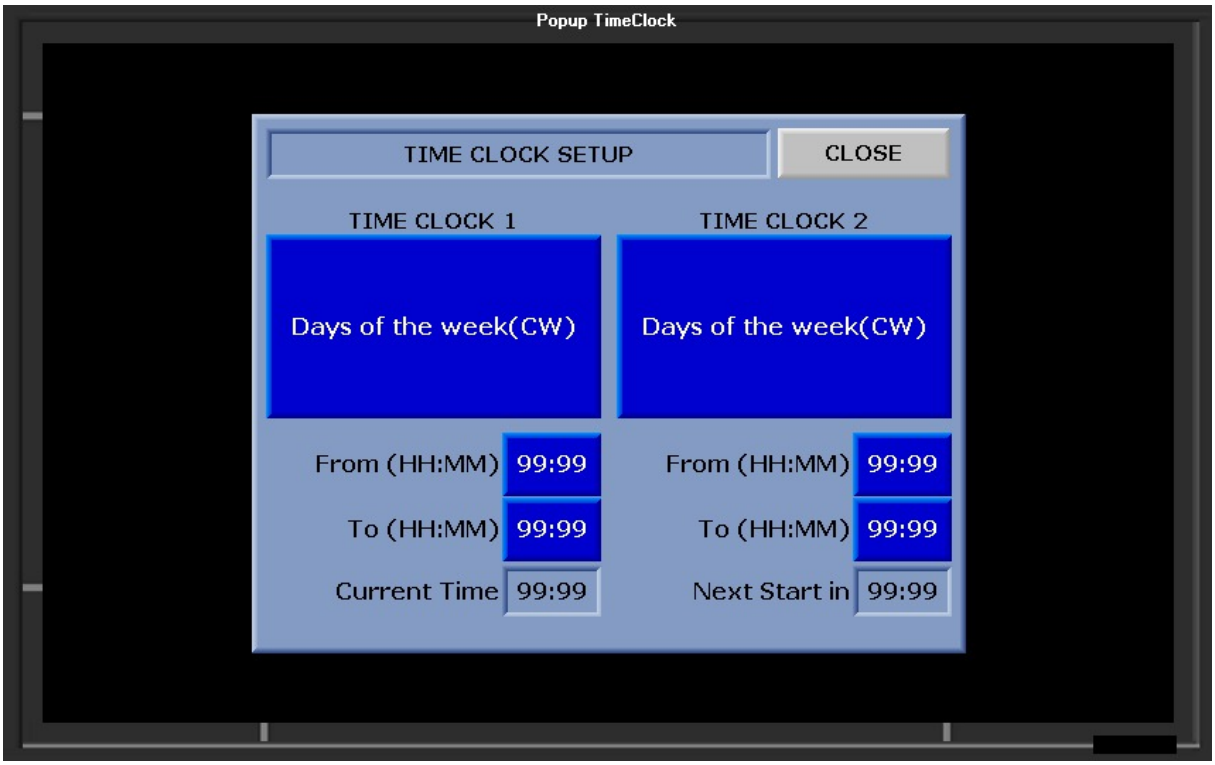


Figure 6.3 – Time Clock Screen

6.5.4. Flow Setup Screens

The Flow – Feed Pump PID Tuning Screens (See figures 6.4 – 6.6) is used to tune the PID loop for feedback control of the sludge feed pump(s) based on the flow meter output so that the operator can set a flow rate and the unit would operate at this flow.

Typically the operator should not actually need to use this screen as the tuning should be done during start-up and once done, should not need to be changed unless a new pump or flow meter is added to the system.

The tuning that is done on this screen is setting the relationship between the signal from the flow meter to the signal going to the VFD for the sludge feed pump so that it responds to changes in the input feed flow in a timely manner but does not become unstable in its operation. Separate documentation on

generalized tuning of PID loops should be sought should the operator wish to make adjustments to this screen.

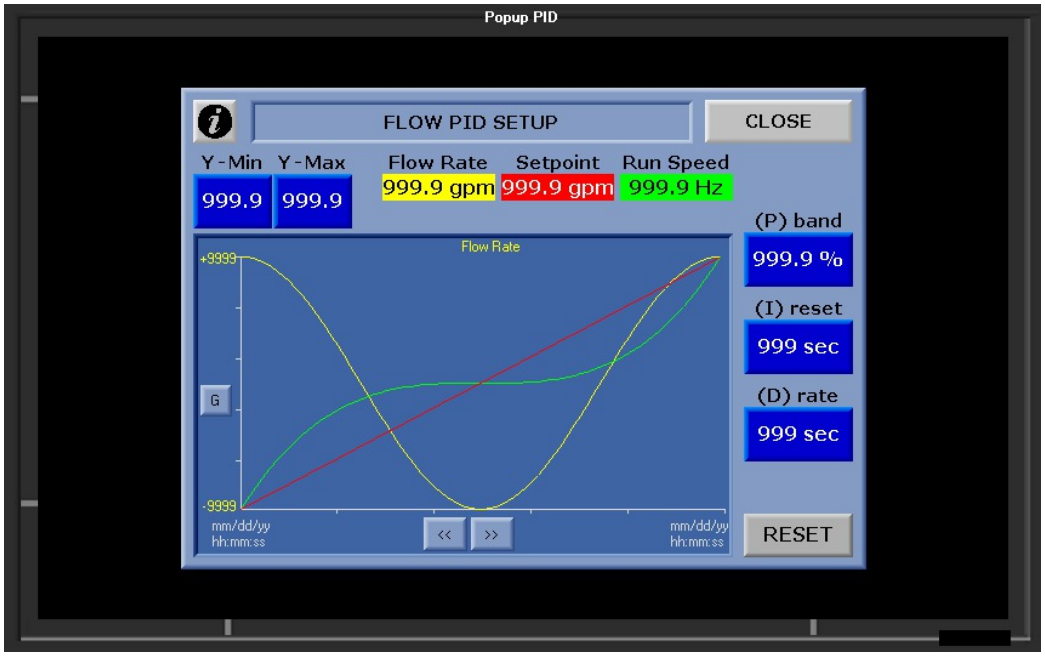


Figure 6.4 – PID Screen

Figure 6.5 – Flow Setup Screen

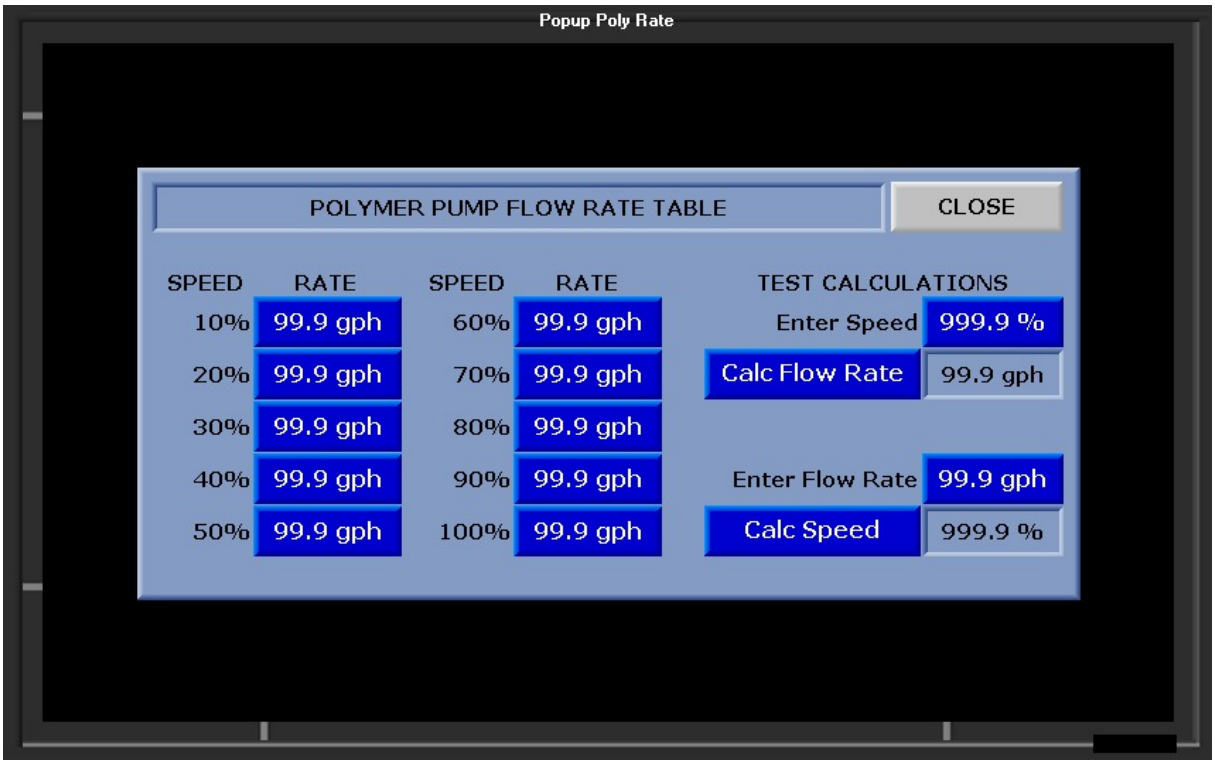


Figure 6.6 – Polymer Flow Rate Screen

6.5.5. Alarm Screens

These screens (See figures 6.7) allow for the initial set up and time delays for alarms, and for resetting an active alarm. To change setup parameter, and to override alarms, the user must be logged in as a supervisor. In addition, there is an alarm history screen (See figure 6.8) that displays all prior alarms.

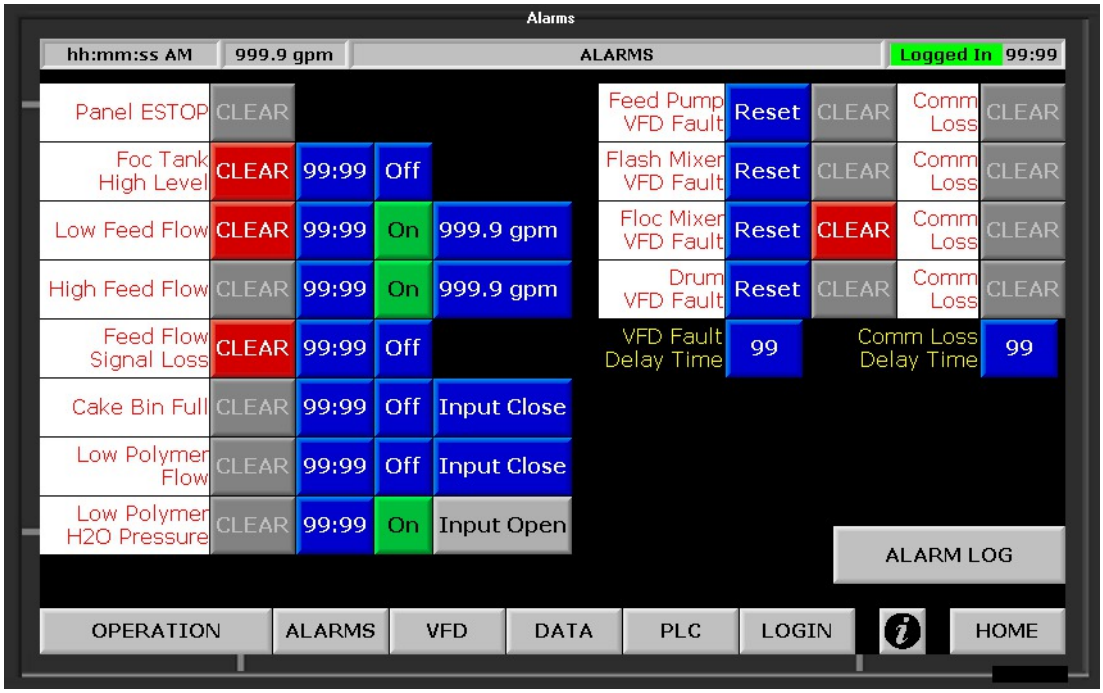


Figure 6.7 – Alarms Page

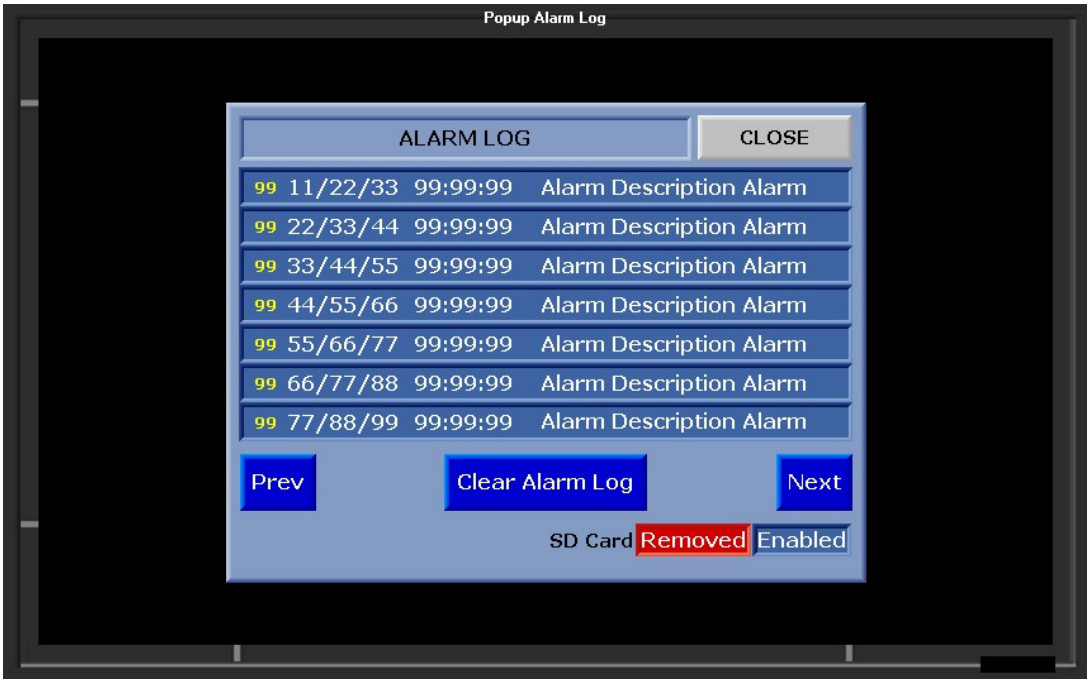


Figure 6.8 – Alarm History Screen

6.6. Equipment VFD Device Screens

The following device screen is for any component of the system that is run off a Variable Frequency Drive (VFD). These screens are primarily for information purposes for specific components of the dewatering system. Typically the screen allows for resetting of the VFD and also in some cases allows for the device to be taken out of service. (See figure 6.9 – 6.10)

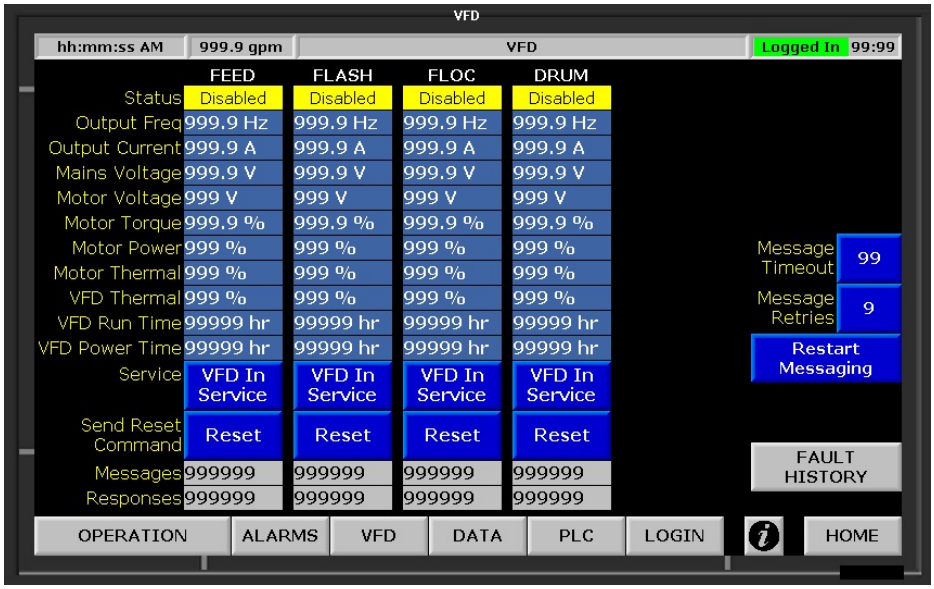


Figure 6.9 – VFD Screen

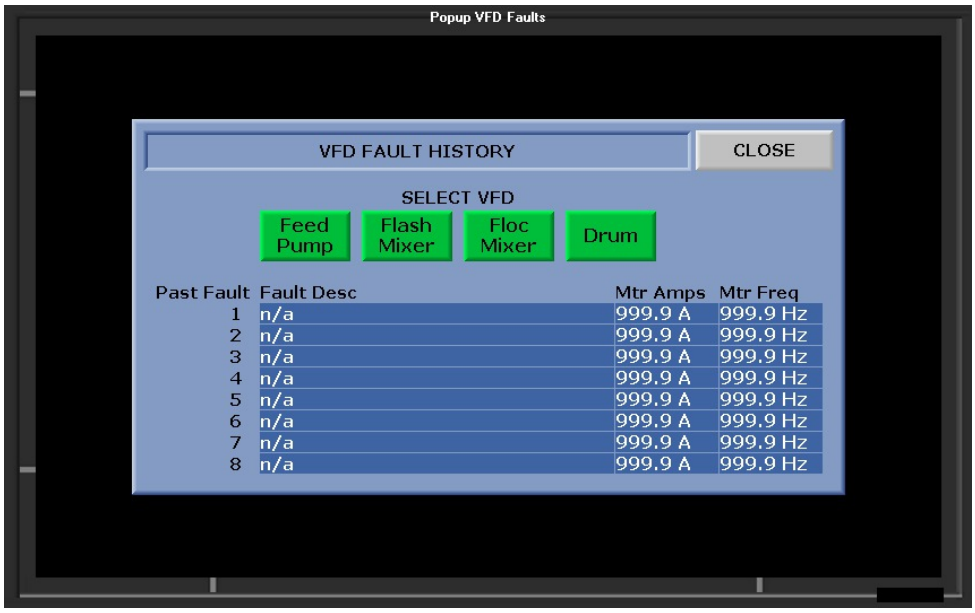


Figure 6.10 – VFD Fault Screen

6.7. Admin Screens

6.7.1. COMs Sceens

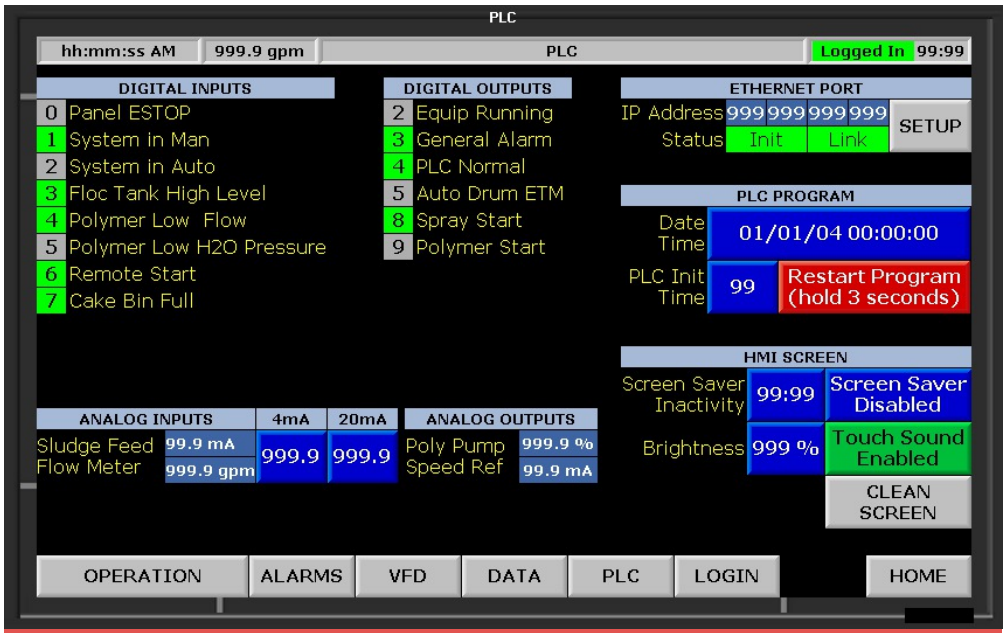


Figure 6.11 – I/O COMs Screen

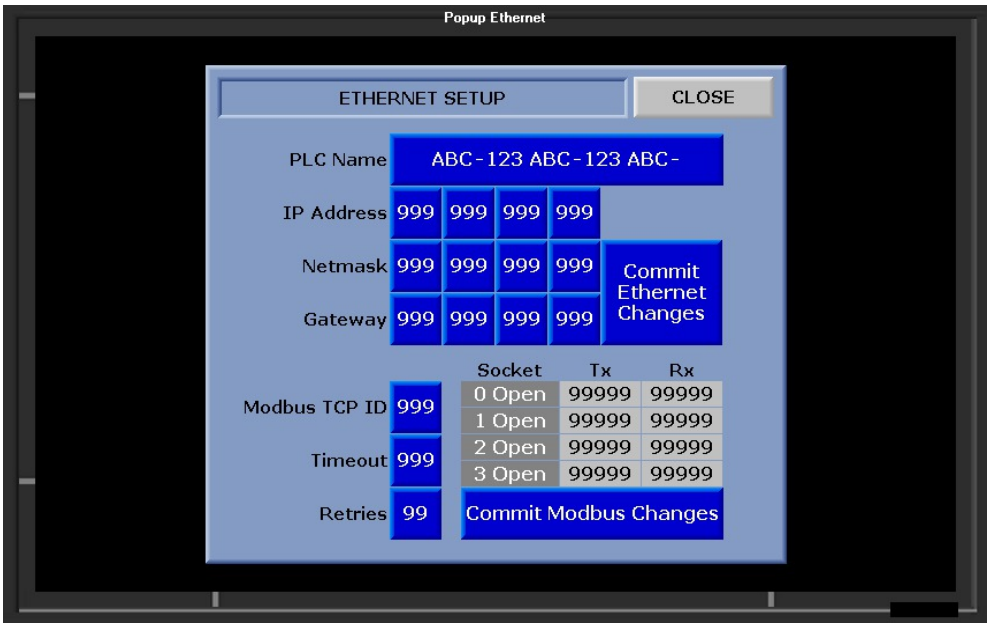


Figure 6.12 – Ethernet COMs Screen

6.7.2. Login Screen

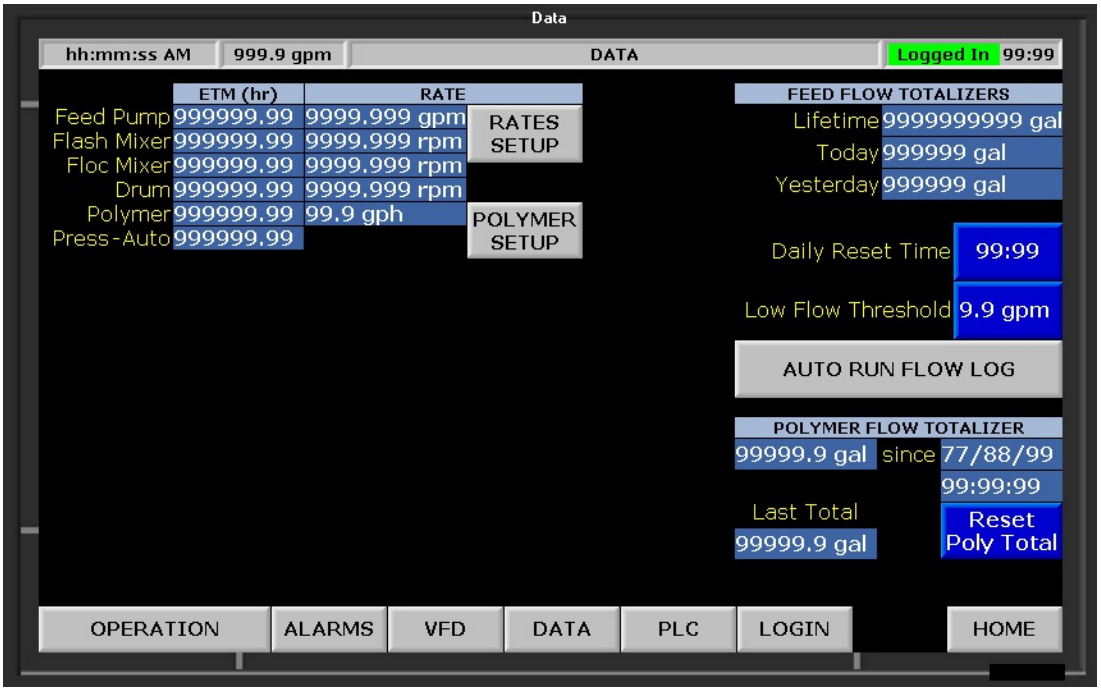


Figure 6.13 – Login Screen

6.7.3. Elapsed Time Monitors Screen

The Elapsed Time Meters (ETM) Screen (See figure 6.14) has all the ETMs for the different system components in a single place. As for the Rate Calculations screen, this screen should not need to be accessed under normal conditions. The primary reason for this screen is that it allows modification of the ETMs if required. This is primarily so that if a device is replaced, its ETM can be reset to zero.

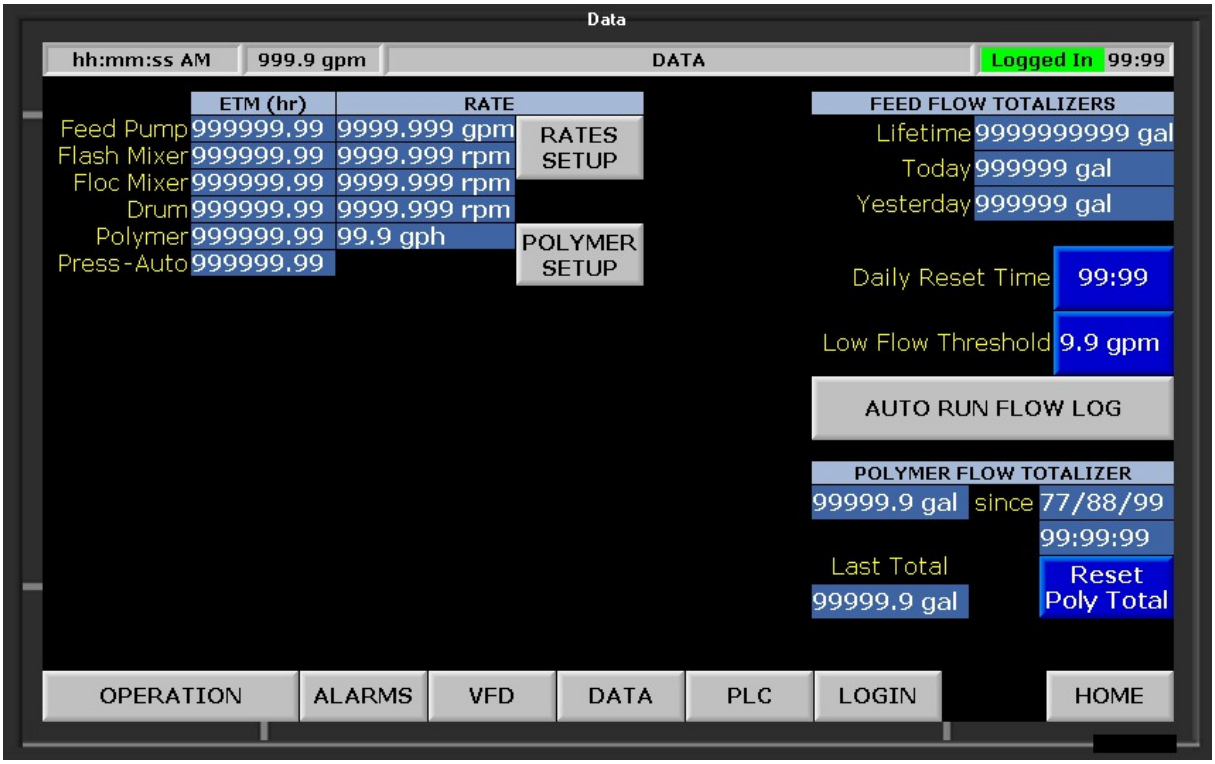


Figure 6.14 – Elapsed Timer Monitor Screen

7. Adjustments and Optimization

There are several places where adjustments and settings can be made on the Volute Dewatering Press. The following are the key ones and their effects on the operation:

7.1. Sludge Feed Rate

The maximum sludge feed rate depends on the solids concentration of the feed, the quality of the floc formed, the dewatering drum speed, and the end plate gap.

As a general rule, a lower sludge feed rate will result in drier solids cake.

When attempting to run the unit at or near its maximum flow rate, care must be taken not to feed sludge to the unit too fast as solids in the dewatering drum will build up and ultimately reduce the capacity of the unit by reducing the area available for water to escape the dewatering drum. In maximizing the sludge feed flow rate, incremental adjustments should be made, slowly increasing the rate up towards the maximum.

Sludge feed rate is adjusted either by setting the flow rate or the speed of the feed pump at the Automatic Control Screen on the PLC as per Section 6.8.

7.2. Dewatering Drum Speed

The dewatering drums should be set to run as slow as possible for the sludge feed rate set. Slower dewatering drum speeds typically result in drier cake. Ideally, the speed should be set so that the pipe out of the flocculation tank to the dewatering drums is half submerged. The dewatering drum drive speed is set by adjusting the Dewatering Drum VFD speed on the PLC as per Section 5 of this manual. The VFD may be adjusted from 15Hz up to 100Hz. If the unit has multiple Dewatering Drums, all Dewatering Drums should be set to run at the same speed all the time.

During calibration, the speed of all dewatering drums is verified, thus the calibration data below is valid for both all dewatering drums on the unit.

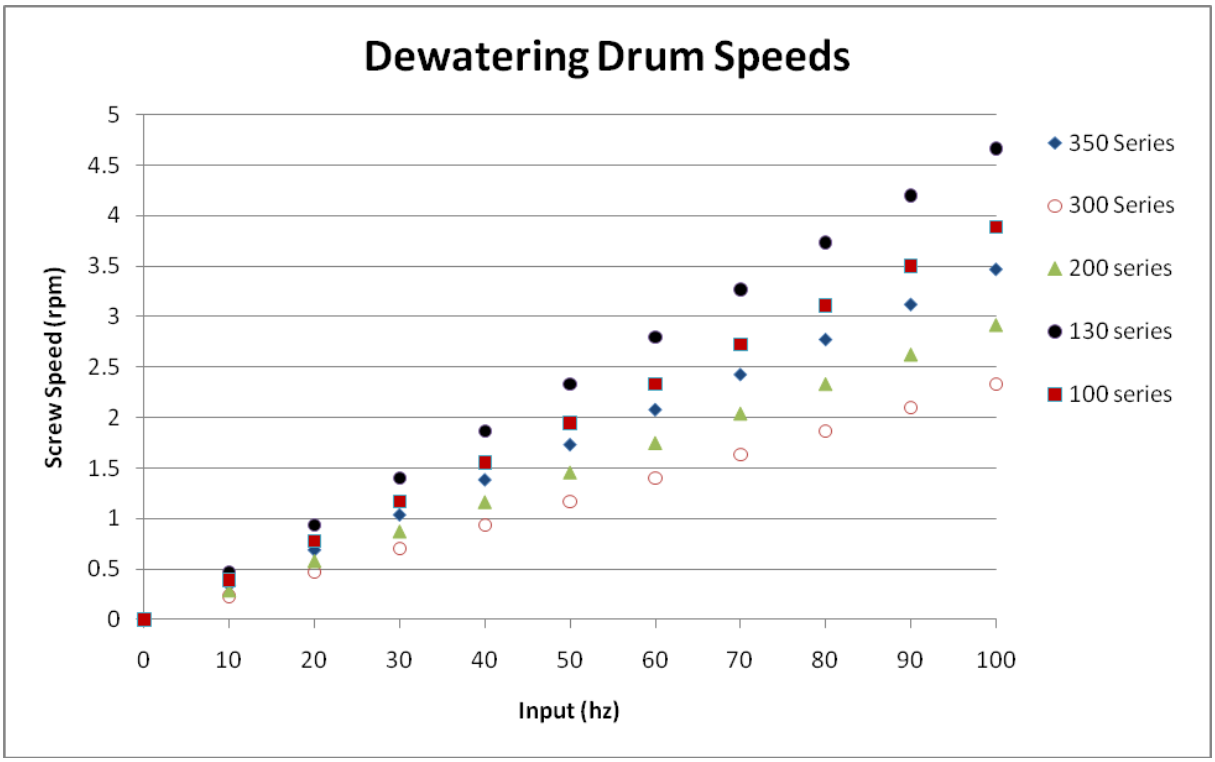


Figure 7.1 – Relationship between input frequency and Dewatering Drum Rotational Speed

7.3. Polymer Feed Rate

The polymer feed rate should be set such that the flocs appear to be well defined and large in the flocculation tank and filtrate is clear but not slippery to the touch. If the flocs in the flocculation tank are small (<⅛") and the filtrate is dirty, then more polymer needs to be added.

If altering the feed rate, and the polymer dose is correct at the initial sludge feed rate, the polymer dose should be adjusted proportionally.

The polymer feed rate is set on the PLC Device Screen as per section 6 of this manual.

If the polymer system uses a diaphragm pump, the stroke length can also be adjusted. To maintain the best operation and performance, the stroke length should be set to the highest setting that can be used across the range of doses required for successful operation. For example, it is better to have the frequency set to 10% and the stroke to 100% than to have the stroke at 50% and the frequency at 20%, even though it should achieve the same flow. This is done to prevent clogging in the pump.

7.4. Flash-mixer and flocculation tank mixer speed

The mixer speeds are adjustable in the same fashion as the dewatering drum drives and polymer dosing pump using the PLC as per Section 5 of this manual. The range of Adjustment is from 10 Hz up to 60 Hz. Typically the flash mixer should be left around 60Hz regardless of the sludge. The flocculation tank mixer will need to be adjusted based on the type of sludge.

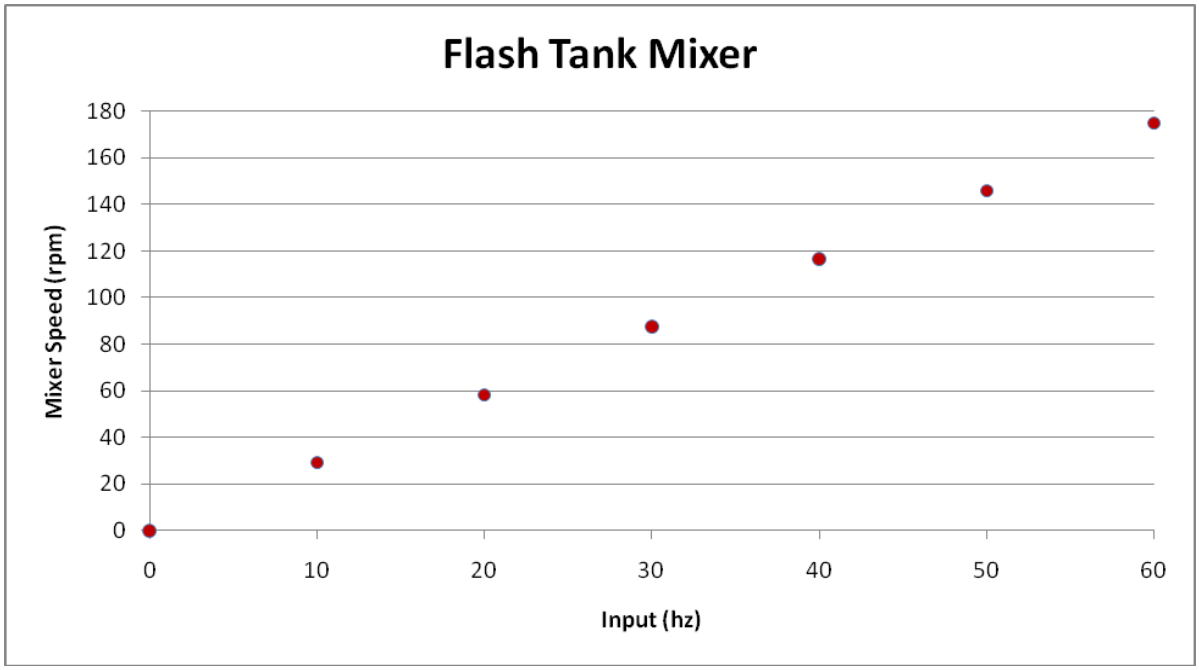


Figure 7.2 – Mixer Speeds for the Flash-mixing tank

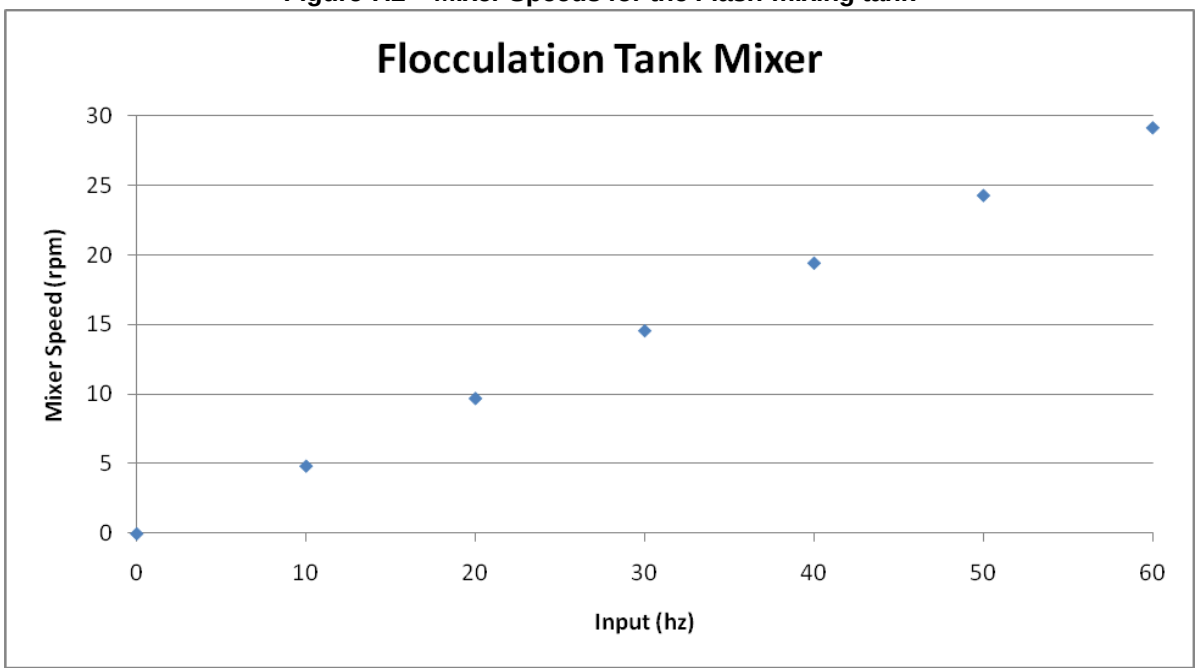


Figure 7.3 – Mixer Speeds for the Flocculation tank

7.5. End Plate Gap

The end plate gap should be set at the minimum gap that does not cause build-up of sludge inside the dewatering drums or excessive squeezing out of solids in the dewatering section of the drum for the set sludge feed speed and dewatering drum rotation speed.

Typically this gap will vary from unit to unit and application to application. For units up to the 200 series, the space should vary from $^{1}/_{16}$" to ½". For the 300 series units, the end plate gap should be between ¼" and ¾".

7.6. Spray Valve Timer Settings

Spray settings have minimal effect on performance of the unit. The times should be set such that the build-up of solids on the outside of the dewatering drum is controlled over several hours of operation.

7.7. Other Timer Settings

Most of the other timer settings will have little impact on the performance of the system but setting them correctly may assist in the smooth operation of the system. The following describe the timer settings and their functions:

7.7.1. Polymer Fault Delay – This is a delay from when the polymer system detects a fault till it shuts the system down. The benefit of adjusting this is that if there are short periods of time where the water pressure drops due to other demands on the water supply system, setting the delay to act over a longer period will allow the polymer preparation system to keep operating so that the unit doesn't switch off every time a momentary fault occurs.

7.7.2. Extended Drum Run – If the unit is not used regularly, setting the extended drum run time to a longer period (say 20 minutes or more) will clean out solids from the dewatering drum so they will not cake and harden in the Dewatering Drum. If used regularly, setting the extended run time to a shorter period (say 2-5 minutes) will allow the unit to resume steady state operation quickly when re-started.

7.7.3. Conveyor extended run – In the event that a conveyor is controlled by the system, a timer to control the additional time a conveyor runs is included. This timer begins at the point that the Extended Drum Run Timer stops. This allows for the conveyor to run a little longer in order to remove any solids present on the conveyor. The settings for this are totally dependent on the specific design of the conveyor and the need, if any, to remove solids from it at the end of operation.

7.7.4. Flocculation Tank High Level – This delay should be minimal since any event causing this to fault indicates an operational problem. The use of a short delay, however (~10 seconds) means that minor splashes of fluid or other items temporarily contacting the level sensor electrodes will not shut the system down.

7.7.5. Unit Start Up – This delay should normally be set to zero (0) seconds. The delay is used for installations with remote starting of the unit, or when there are other system components that need to be engaged prior to starting the press. It is there so that the unit will not start up if conditions leading to a fault are still active, or the system could be damaged by starting too soon. An example of its use would be if there were automated valves in the feed sludge lines that needed time to open prior to the feed pump and the press starting up.

7.8. Polymer Dilution Water Flow rate

The polymer dilution water flow rate is manually set on the polymer system. It should be set to achieve the recommended polymer concentration in solution as per the polymer manufacture's instruction.

7.9. Polymer System: VeloBlend Mixing Chamber

The operation of the polymer system can result in significant variations in performance and it is important that the optimal mixing and make-down conditions are set for the polymer being used. While this is covered in detail in the polymer manual, the following is a guide for setting up the mixing chamber.

The Hydro-Mechanical VM Series VeloBlend produces mixing energy by the pressure drop across its water control valve and or by the mechanical impeller. The recommended differential pressure range is from 30 to 100 psid. The pressure is not controlled, but rather is the result of the available water pressure and the pressure downstream of the system. Therefore, simply setting the desired rate of water flow then verifying that adequate differential pressure is available is all that is required to operate the mixing chamber. In the event inadequate pressure exists, the impeller can be utilized by turning on the Mixer and adjusting the speed. The mixer is turned on by turning the speed potentiometer for the mechanical mixer. The speed potentiometer is located inside the control panel.

The need and benefit of the impeller must be verified by trial and error. After the system is set up for desired water and polymer flow rate, turn the impeller and set at approximately 10% of the impeller speed by gradually turning the potentiometer on the inside of the control panel. Allow the system to run for enough time to adjust to the changed setting. If the polymer flow rate can be reduced then the impeller is enhancing performance. Continue to increase impeller speed 10% at a time until the performance begins to decline. Your polymer system is optimized.

8. Inspection & Maintenance Schedule

8.1. Introduction

This section outlines the inspections that should be periodically carried out on the Volute Dewatering Press as preventative maintenance. Table 8.1 shows the recommended frequency although this can be altered to suit the installation.

8.2. Cake discharge inspection

The flow of cake from the unit should be even and continuous in its nature as the end plate rotates once the unit has reached steady state operation. The existence of any segments of the endplate where no solids are discharged each time that section comes into view indicates a blockage inside the end plate. This may be some dried cake lodged in the end of the dewatering drum, or possibly a foreign object. It is unlikely that the presence of anything blocking the flow of solids will cause any damage, however, it will degrade the performance and reduce the throughput of the unit.

It is recommended that this inspection be undertaken at least once a day while the unit is operating. While the unit is operating and discharging cake, the discharge from the end of the dewatering drum should be observed for a few minutes for each drum. If there are short periods where solids are not discharged at the bottom of the endplate, this indicates a blockage. In this situation, the endplate should be fully opened by loosening the fix screws holding it in place and the dewatering drums run for a few minutes to remove the blockage.

8.3. Flocculation tank high-level probe

The high-level probe in the flocculation tank should be checked and cleaned daily to prevent a build-up of dried sludge and rag material that could cause it to set off a high-level alarm when no such condition exists.

8.4. Unit performance

It is recommended that performance parameters (Throughput, Influent Solids, Filtrate solids, Cake solids) be checked regularly (once per week) such that any trends in performance such as declining cake solids due to wear can be detected over time.

8.5. End-plate settings

The end plate gap should be checked once a week to ensure the plate has not slipped and opened up from the spacing they were originally set to.

8.6. High and low-level probe operation inspection.

The operation of the level probes used to shut down the unit in the event of high or low fluid levels should be checked periodically.

It is recommended that the operation of the level probes is checked once a week. For the High-level probe in the flocculation tank, this may be done by using a screwdriver to “bridge” between the probes while the unit is running – this should switch the unit off and signal an alarm. If a low-level probe is connected for the polymer tank, then this should also be checked by removing the probe from the fluid while the unit is operating, triggering the alarm.

8.7. Drive motors

Drive gear motors for the dewatering drums (except ES35X series) and the flocculation tanks are designed to run throughout their life with no regular maintenance.

However, it is recommended that the motors are inspected once a week during operation for vibration, noise or excessive heat that would indicate any damage to the motor. This inspection may simply consist of placing a hand on the drive during operation and feeling for excessive heat or vibration, and listening for any noises made by the drive.

The ES35X series drive gear motor gear box oil level should be checked once a month.

8.8. Tank mixers

If the sludge being dewatered contains rags and fibrous material then it is likely that the mixing and flocculation tank impellers will accumulate rags over time that will wrap around the central shaft and catch on the impeller blades. This will reduce the effectiveness of the mixing and decrease the life of the drive.

It is recommended initially that once per week the tanks are drained and washed out, the impeller inspected and de-ragged if required. This schedule can be adjusted as necessary.

8.9. Polymer preparation system

Regular checks should be made that the polymer preparation system has adequate polymer supply to keep the unit operating continuously as required. In addition, inspections including calibration checks and periodic cleaning of the polymer feed system should be undertaken as

per the manufacturer's instructions. It is very important that water is not used when cleaning polymer system components.

8.10. Lubrication Schedule

All gear motors on the ES101 - ES303 are sealed units and do not require lubrication. Also, the dewatering auger rotates in a self-lubricating bearing. No lubrication is required.

The ES35X series dewatering drum drive gear motor gear box oil level should be checked once a month. Change oil at 10,000 operating hours or approximately 2 - 4 years. Figure 8.1 below shows a sample gear box reducer nameplate which has the recommended gear oil. If you use synthetic lubricants, you can effectively double the maintenance cycle.

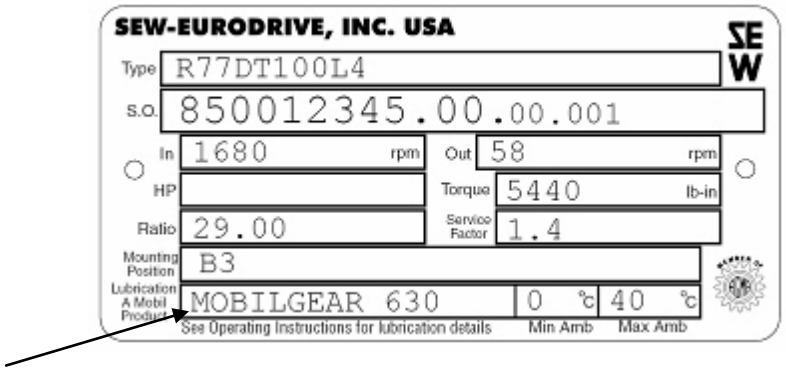


Figure 8.1 – ES35X Series Drum Drive Gear Motor Gear Box Name Plate

The mixing tank gear motors on the ES35X series dewatering press are sealed units and no not require lubrication. Also, the dewatering auger rotates in a self-lubricating bearing. No lubrication is required.

8.11. Maintenance Schedule

No regular maintenance is required for the dewatering press.

8.12. Inspection & Maintenance Schedule Table

Item	Frequency	Operation	Method
Overall performance	Daily	Inspection	With unit operating ensure cake solids concentrations and solids capture goals are being met using lab analysis methods such as TSS and TS tests
Solids discharge/endplate	Daily	Inspection	As unit is in operation visually inspect endplate to ensure solids are being discharged with no visible signs of rags or other clogging items
Tank high level probe	Daily	Inspection and clean	With unit not operating ensure that no rags of build up of debris are coating either of the probes
Flocculation and flash tanks	Daily	Inspection and clean	With unit not in operation make sure flocculated solids are not building up a crust with the mixing tanks that would limit the volume of the tanks. Drain tanks or wash down with hose as needed.
Raw polymer supply	Daily	Inspection	Ensure there is an adequate amount of polymer in pail/drum/tote
Raw polymer injection check valve (Velodyne)	Monthly	Inspection and clean	With unit not in operation remove pin from the white check valve on top of the Velodyne mixing chamber. Ensure internal spring is not clogged with polymer and replace. Do not use water to clean.
Polymer TFS probe	Monthly	Inspection and clean	With unit not operating loosen nuts on the silver TFS probe and remove from polymer line. Ensure probe is not coated in polymer and clean as necessary. Do not use water.
Raw polymer pump	Monthly	Calibration	With unit operating ensure that the raw polymer pump is calibrated by filing the calibration column with mineral oil, switching valves to ensure the column is being pumped down, and timing the draw down using the measurements on the column.

Table 8.1 – Inspection and Maintenance Schedule

9. Trouble-Shooting Guide

9.1. Unit operation troubleshooting chart

Problem	Possible causes	Actions
No Power to unit - Control Panel Power Light (External Door) will not come on	Main circuit breaker tripped External breakers are off/tripped Voltage at main circuit breaker does not match that shown on the drawing	Re-set unit and/or external breakers Switch external breakers on Check voltage at main circuit breaker*
Unit will not start in Auto (H-O-A switch is in "Auto" position)	E-Stop button must be "out" and any other E-stops in the system (such as the conveyor pull cord) must not be activated. Flocculation Tank fluid level must be below the High Level Probe Circuit breakers and fuses in the control panel must not be tripped or blown VFDs must not be faulted Polymer dilution system must have sufficient water pressure (>20psi) There must be polymer supply to the polymer preparation system. Time clock operation (if being used)	Rectify any conditions not met

No Sludge Entering Unit	Check feed pump drive is on and not faulted	Reset Feed Drive.
	Check feed pump is rotating	If not, Repair Pump
	Check for Pump Blockage	Clear Blockage
Unit continually trips Floc tank High level	Check Cleanliness of probes	Clean Probes
	Check fluid level flocculation tank	If too high, Reduce flow, Increase dewatering drum speed, open up end plate or adjust polymer dose as required.
Dewatering Drum VFDs Trip out	Check Current Drawn by VFD	Run screw backwards to clear potential blockage
		Remove screw from dewatering drum
No Polymer feed to unit	Check polymer pump is primed and feeding	Re-prime if required
	Check Water pressure is >20 psi	Locate other water use and shut off.
	Check for Blockage in line	Clear Blockage

Solenoid valve won't close	Hole in diaphragm designed to equalize pressure on up & down stream side of valve is plugged.	Disassemble valve according to instructions. Clean hole in diaphragm to allow equalization of pressure differential.
Metering pump won't pump	Check valve(s) Air leak in suction hose / pipe	Clean check valves Tighten hose clamps, check and fix leaks in piping. Progressive Cavity Pump: Prime pump by filling calibration column until solution drains through suction cavity plug.
Ineffective polymer mixing	Low water pressure Excessive solution concentration Too low of dilution water flow	Increase water pressure by opening valves upstream of system or increase available pressure by adjusting pressure regulating valve up stream of system. Verify there are no obstructions or closed valves down-stream of polymer system indicated by high mixing chamber pressure. Verify proper solution concentration (not to exceed 1% in most cases) Increase water flow. Utilize Mechanical Impeller to make up for low water pressure.

* This operation involves using extreme caution and should be done by a qualified electrician.

Table 9.1 – Troubleshooting chart for Volute Dewatering Press Unit Operation

9.2. Unit performance troubleshooting chart

Problem	Checks	Action
Poor cake solids	Check formation of flocs in flocculation tank Check Endplate is not too open or dewatering drum screw speed is not too fast.	Adjust polymer dose as necessary Adjust Endplate and screw setting as necessary
Poor throughput	Check that flocculation is good Check Endplate and Dewatering Drum Screw speed settings	Adjust polymer dose as necessary Adjust Endplate and screw setting as necessary
Poor filtrate quality	Check that flocculation is good Check not too many solids are being squeezed out of the thickening section of the dewatering drum.	Increase polymer dose to improve floc strength Open up end plate or lower feed rate.

Table 9.2 – Performance troubleshooting guide

10. Parts List & Spares

This is a list of parts that may from time to time need replacement. This is not a complete list of all components of the volute dewatering press.

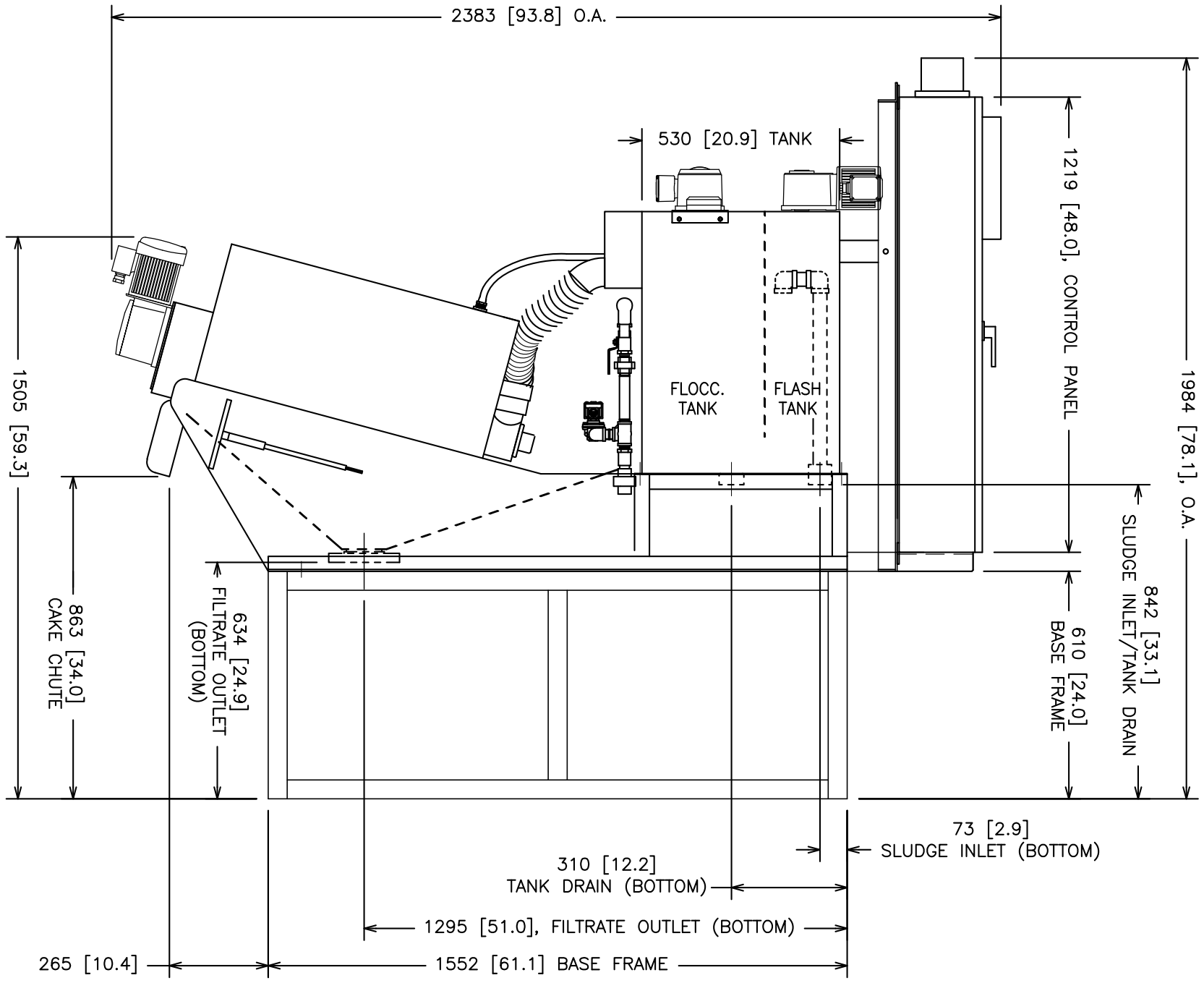
Item	#	Part # or Name	Contact
Volute Dewatering Press			
Dewatering Drum	1	ES131 Ring Set	PWT
Drum Gear Motor	1	FSW-30-375-T010 WEX	PWT
Drum Gear Plastic Cover	1	FSW-30-375 Cover	PWT
Drum Motor Fan Cover	1	T010 WEX Cover	PWT
End Plate Set Screw	1	ES131 Set Screw	PWT
Set Screw T-Wrench	1	ES131 T-Wrench	PWT
Flash Mixer Gear Motor	1	FSW-25-10-T010 WEXH3	PWT
Flash Mixer Gear Plastic Cover	1	FSW-25-10 Cover	PWT
Flash Mixer Motor Fan Cover	1	T010 WEXH3 Cover	PWT
Flocculation Tank Gear Motor	1	FSW-25-60-T010 WE	PWT
Floc. Mixer Gear Plastic Cover	1	FSW-25-60 Cover	PWT
Floc. Mixer Motor Fan Cover	1	T010 WE Fan Cover	PWT
Spray Valve	1	ASCO 8210G	Industrial supply Co

11. Dewatering Press Materials and Coatings Schedule

All materials utilized in the construction of the sludge dewatering equipment are entirely suitable in every respect for the service required. All metals in contact with polyelectrolyte or sludge, and all other components specified to be stainless steel are type 304 or 316 stainless steel. The following table indicates the materials and coatings that shall be provided for the Volute Dewatering Press. Materials and coating information for the drives are found in the motors and drives Section.

12. Item of Equipment	13. Material
All tanks and collection trays	Type 304 Stainless steel
Plumbing	Type 304 Stainless steel or Schedule 80 PVC
Dewatering Drums	Type 304 Stainless steel
Screw	Type 304 Stainless steel with Flame Coating 10Co-4Cr
Spray Bars	Type 304 Stainless steel
Spray Nozzles	Polypropylene
Junction Boxes	Fibreglass
Electrical wiring housing	Non-metallic, flexible liquid-tight conduit and Fittings
Tubing	PVC braid reinforced heavy duty hose
Frame / Skid mounting	Type 304 Stainless Steel
Spray Valves – Wetted Sections	Stainless Steel, EPDM Seating

Tab 2: Physical Drawings



SIDE ELEVATION

DIMENSIONS: MM [INCH]

REVISION AND ISSUE HISTORY

REV	DATE	DESCRIPTION	DR'N	CHK'D
A	02/28/17	AS BULIT	JS	BL

DRAWING APPROVAL

APPROVED:	DATE:	SIGNATURE:
A. DAVEY	02/28/17	

AS BULIT

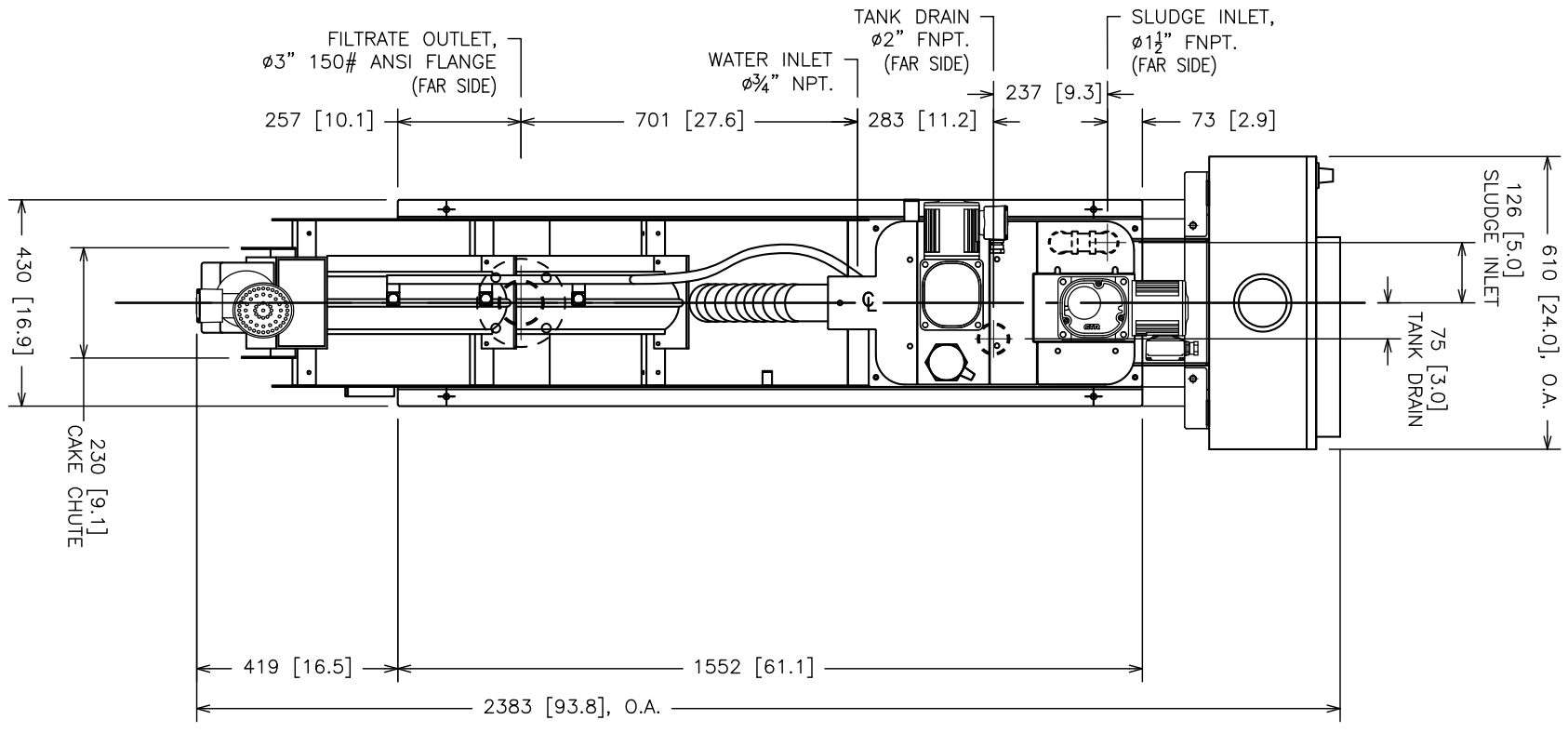
PWTech
PROCESS WASTEWATER TECHNOLOGIES
Process Wastewater Technologies, LLC
9004 Yellow Brick Road, Suite D
Rosedale, Maryland 21237
Tel. 410.238.7977
Fax 410.238.7559
www.PWTech.us

DRAWING TITLE:
VOLUTE ES131 DEWATERING PRESS
SIDE ELEVATION

PROJECT TITLE:
CONCANNON VINEYARD
LIVERMORE VALLEY, CA.

PWT PROJECT NO:	SCALE:	SHEET SIZE:
VDPCA16116	NTS	11 X 17

DRAWING NO:	SHEET:	REV:
20170228 VDPCA16116 ES131S AB	1 OF 5	A



PLAN VIEW

DIMENSIONS: MM [INCH]

REVISION AND ISSUE HISTORY

REV	DATE	DESCRIPTION	DR'N	CHK'D
A	02/28/17	AS BULIT	JS	BL

DRAWING APPROVAL

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A.DAVEY	02/28/17	

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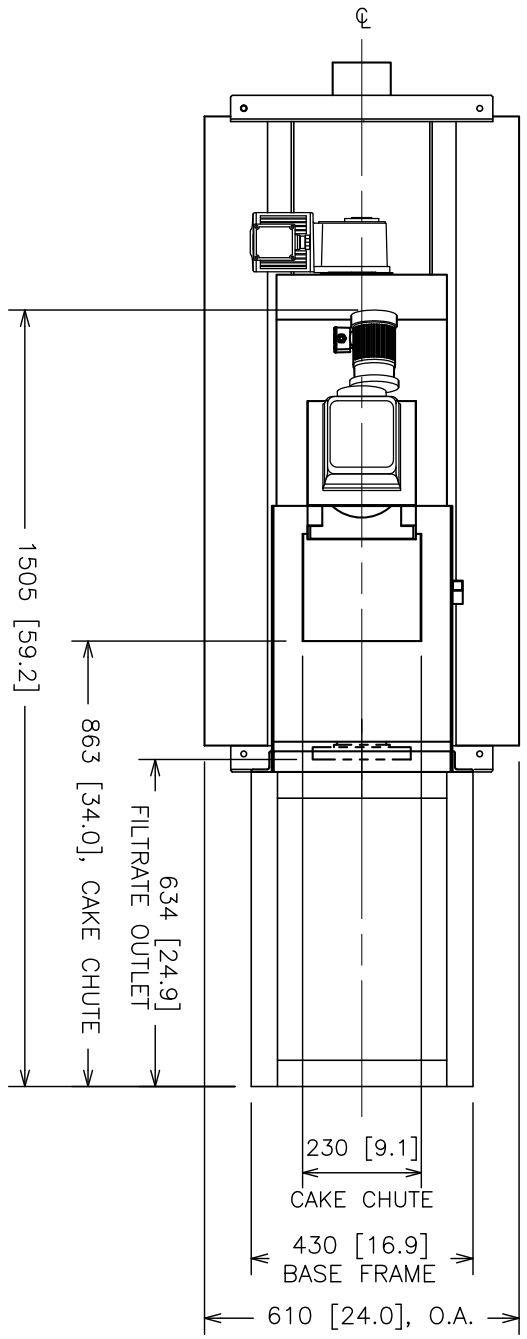
DRAWING TITLE:
VOLUTE ES131 DEWATERING PRESS
PLAN VIEW

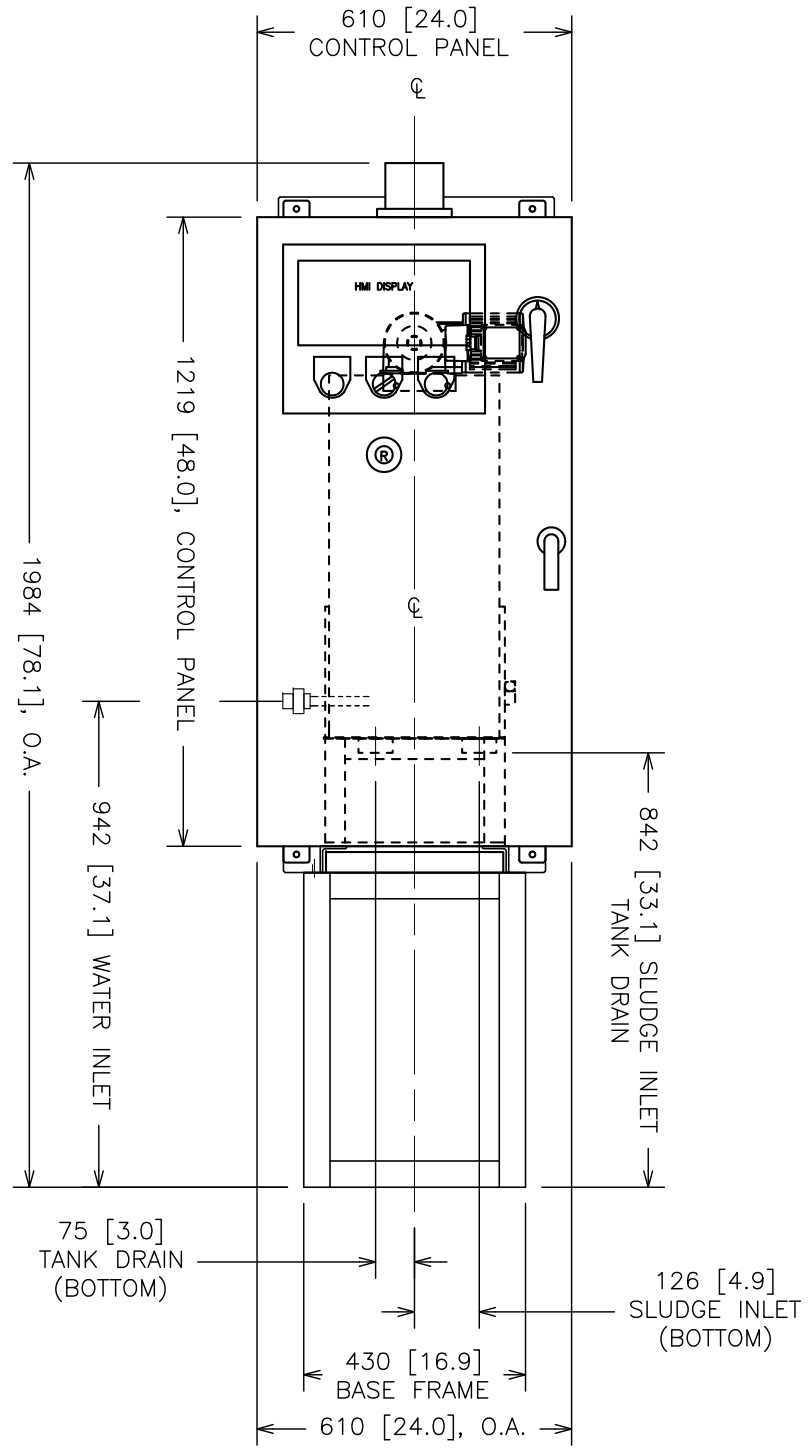
PROJECT TITLE:
CONCANNON VINEYARD
LIVERMORE VALLEY, CA.

PWT PROJECT NO:	SCALE:	SHEET SIZE:
VDPCA16116	NTS	11 X 17

DRAWING NO:	SHEET:	REV:
20170228 VDPCA16116 ES131S AB	2 OF 5	A



PRESS END ELEVATION



TANK END ELEVATION

DIMENSIONS: MM [INCH]

REVISION AND ISSUE HISTORY

REV	DATE	DESCRIPTION	DR'N	CHK'D
A	02/28/17	AS BULIT	JS	BL

DRAWING APPROVAL

APPROVED:	DATE:	SIGNATURE:
A. DAVEY	02/28/17	

AS BULIT

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Process Wastewater Technologies, LLC
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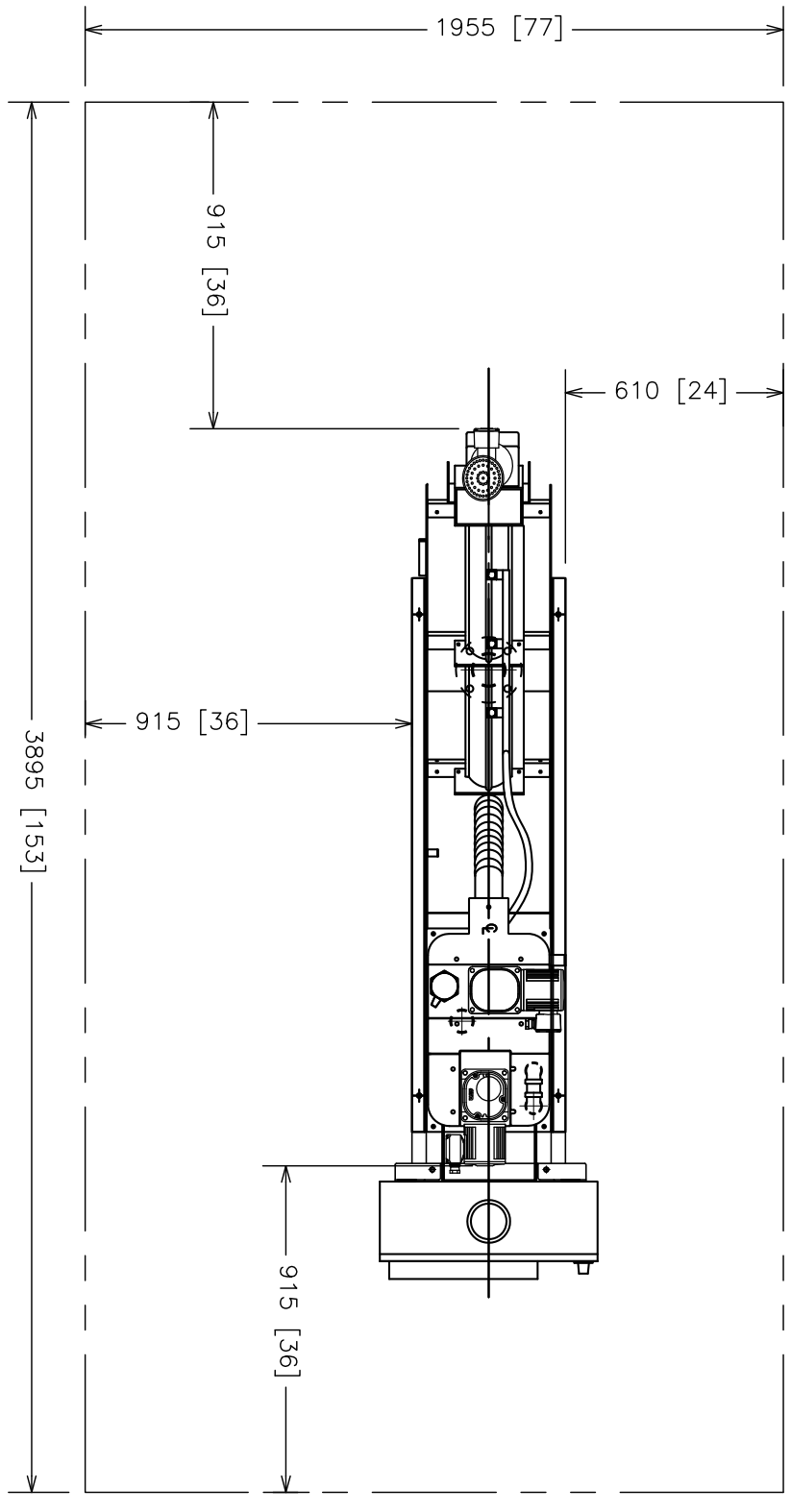
Rosedale, Maryland 21237
Tel. 410.238.7977
Fax 410.238.7559
www.PWTech.us

DRAWING TITLE:
VOLUTE ES131 DEWATERING PRESS
PRESS END & TANK END ELEVATION

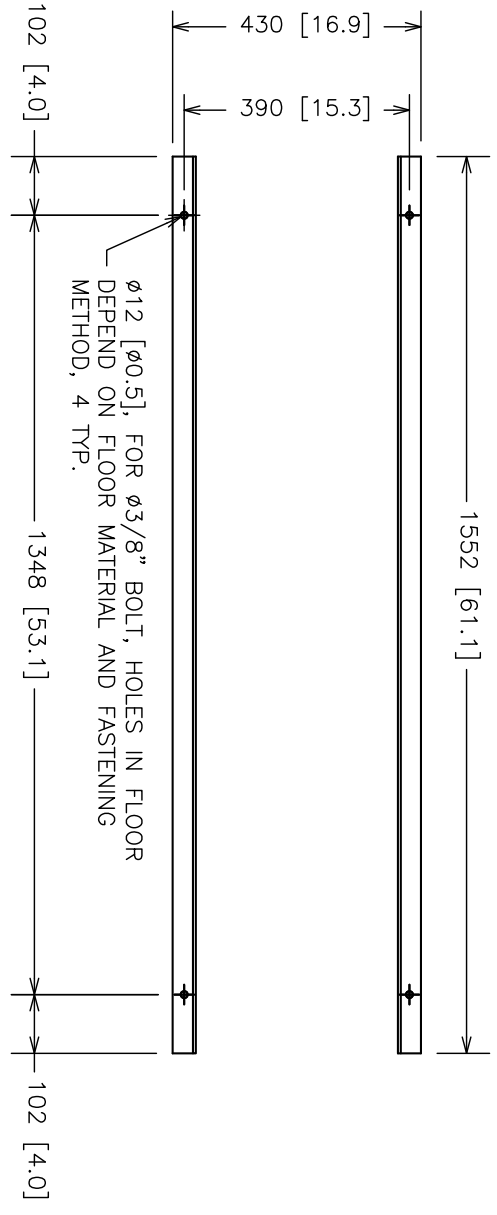
PROJECT TITLE:
CONCANNON VINEYARD
LIVERMORE VALLEY, CA.

PWT PROJECT NO:	SCALE:	SHEET SIZE:
VDPCA16116	NTS	11 X 17

DRAWING NO:	SHEET:	REV:
20170228 VDPCA16116 ES131S AB	3 OF 5	A



RECOMMENDED SPACE



FRAME FOOTPRINT AND
FLOOR ANCHOR POINTS

DIMENSIONS: MM [INCH]

REVISION AND ISSUE HISTORY

REV	DATE	DESCRIPTION	DR'N	CHK'D
A	02/28/17	AS BULIT	JS	BL

DRAWING APPROVAL

APPROVED:	DATE:	SIGNATURE:
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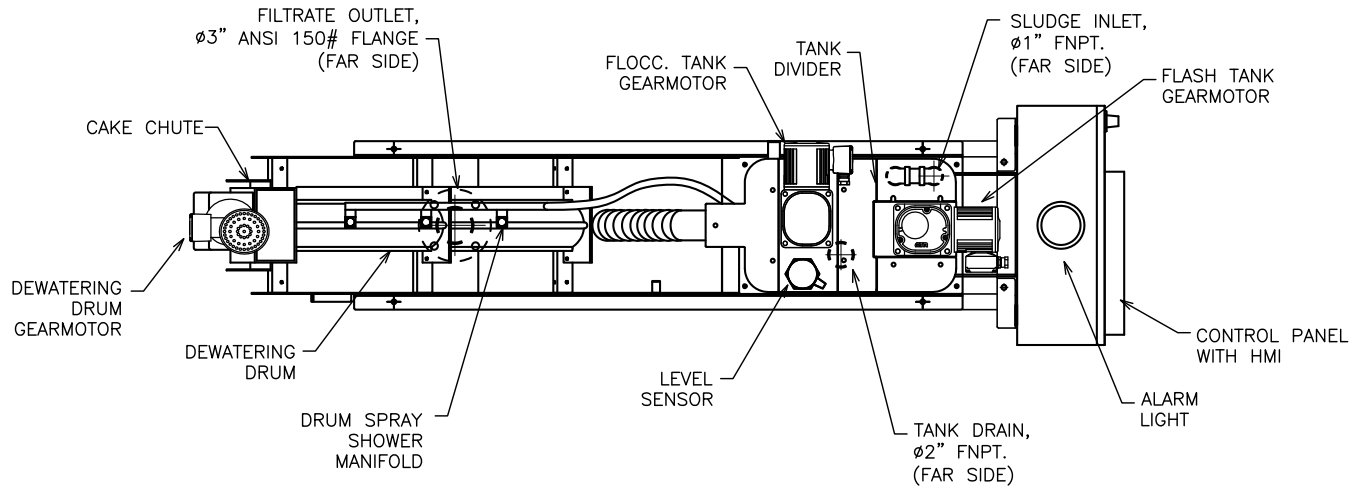
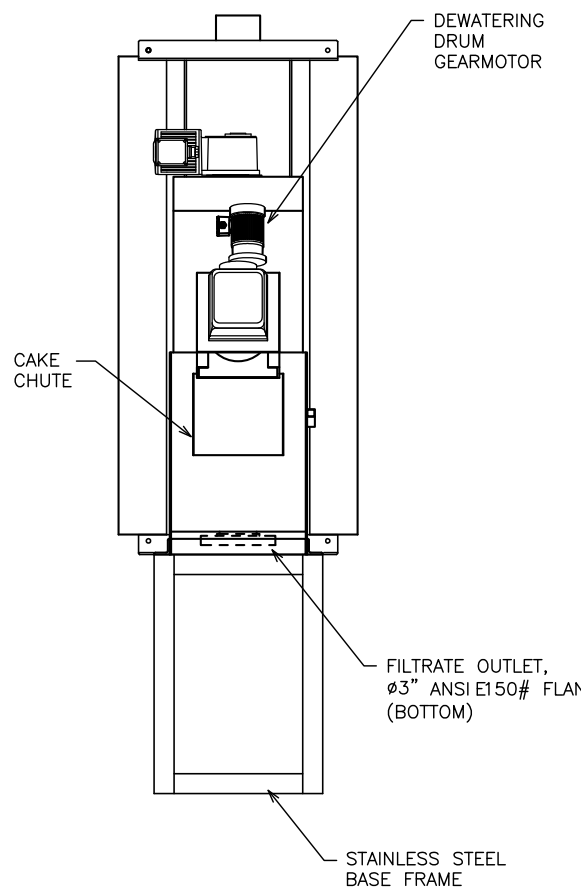
DRAWING TITLE:
VOLUTE ES131 DEWATERING PRESS
REC. SPACE AND ANCHOR POINTS

PROJECT TITLE:
CONCANNON VINEYARD
LIVERMORE VALLEY, CA.

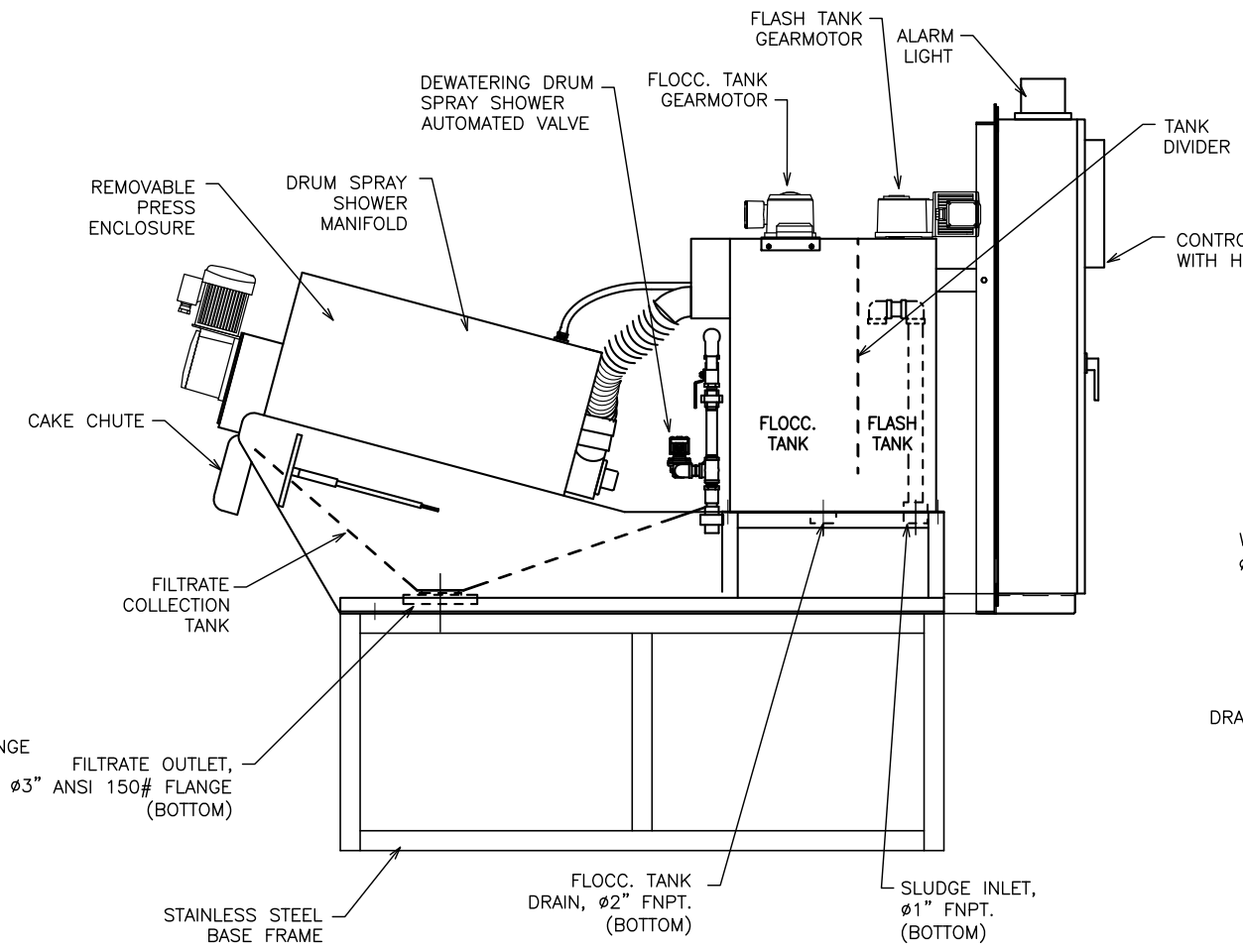
PWT PROJECT NO:	SCALE:	SHEET SIZE:
VDPCA16116	NTS	11 X 17

DRAWING NO:	SHEET:	REV:
20170228 VDPCA16116 ES131S AB	4 OF 5	A

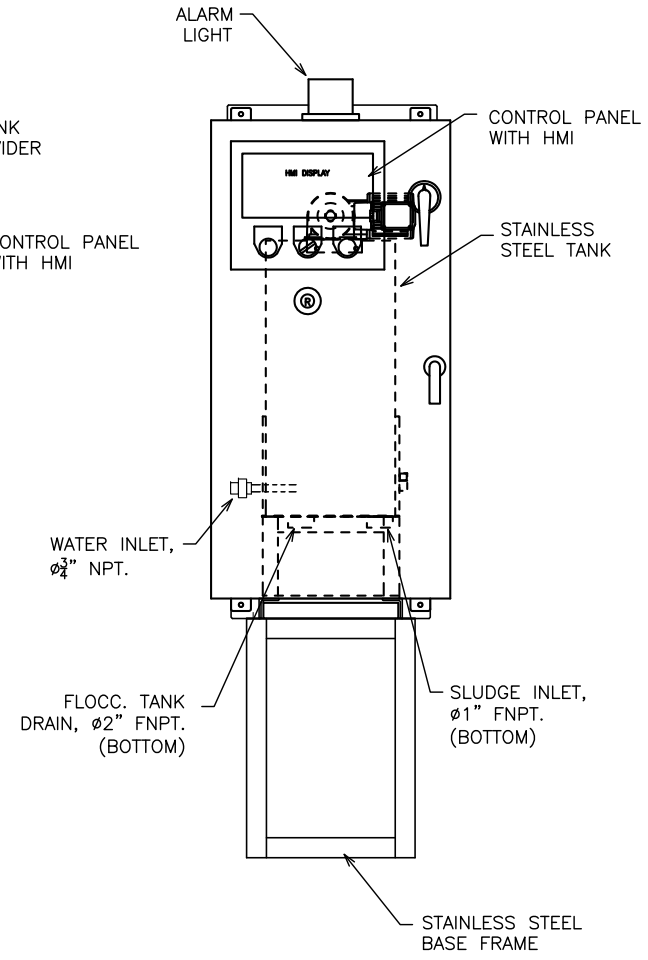




PRESS END



CONNECTIONS AND COMPONENTS



TANK END

DIMENSIONS: MM [INCH]

PW TECH NOTES

N-01	CONNECTIONS: 1. SLUDGE INLET, Ø1" FNPT. 2. WATER INLET, Ø¾" NPT. 3. FILTRATE OUTLET, Ø3" ANSI 150# FLANGE. 4. FLOCCULATION TANK DRAIN, Ø2" FNPT. MOTORS: 1. DEWATERING DRUM GEARMOTOR, 0.1kW. 2. FLASH TANK MIXER GEAR MOTOR, 0.1kW. 3. FLOOC. TANK MIXER GEAR MOTOR, 0.1kW.
N-02	DIMENSIONS SHOWN IN PLAN AND ELEVATION VIEWS.

REVISION AND ISSUE HISTORY

REV	DATE	DESCRIPTION	DR'N	CHK'D
A	02/28/17	AS BULIT	JS	BL

DRAWING APPROVAL

APPROVED:	DATE:	SIGNATURE:
A. DAVEY	02/28/17	

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Process Wastewater Technologies, LLC
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www.PWTech.us

DRAWING TITLE:
VOLUTE ES131 DEWATERING PRESS CONNECTIONS AND COMPONENTS

PROJECT TITLE:
CONCANNON VINEYARD LIVERMORE VALLEY, CA.

PWT PROJECT NO:	SCALE:	SHEET SIZE:
VDPCA16116	NTS	11 X 17

DRAWING NO:	SHEET:	REV:
20170228 VDPCA16116 ES131S AB	5 OF 5	A

Tab 3: Main Electrical Components

- Control Panel Data Sheet
- Electrical Drawings
- Altivar Adjustable Speed Drives
- ASCO Solenoid Valve
- GTR Drum & Mixing Tank Gearmotor
- Programmable Logic Controller
- Ametek Level Sensor

517 Commercial Drive
Fairfield, Ohio 45014
p/888.874.2062 f/513.874.2099
w/www.controlinterface.com

Panel J-978-1
Status As Builts - Ship
Date 22 Feb 2017

Data sheet

Panel Data

Name Press Control Panel
Desc
Supply 460/480V
Phase 3 Phase, 3 Wire, (No Ntrl)
Control Dual 24V-115/120V
FLA 7.50
SCCR 10k RMS Sym; 460/480V Max

Job Data

Name Concannon Winery
Desc
Created 09 Nov 2016
Loc CA
Loc #
Client Process Wastewater Technologies
Client # VDPCA16116

Motor Data

Name	Model	Qty	HP	Volt	Phase	FLA	AWG
Sludge Pump	STD	1	1	460	3	2.1	12
Dewatering Drum	STD	1	0.125	460	3	0.29	12
Flash Mixer	STD	1	0.125	460	3	0.29	12
Floc Mixer	STD	1	0.125	460	3	0.29	12

Control Panel

Qty	Name	Manufacturer	Number	Description
1	Breaker	Square D	HDL36015	600V 15A 3P 25k/18k/14k AIC
1	Breaker Lugs	Square D	PDC6HD6	6-#14-#6 AWG H Frame
1	Breaker Oper Shaft	Square D	9421LS8	6-8 IN
1	Breaker Operator	Square D	9421LC43	3" Handle NEMA 4X CHROME PLATED
1	Breaker Operator	Square D	9421LJ7	Mech H/J Frame
2	Contact	Square D	9001KA1	30MM NO/NC Fingersafe
1	Contact	Square D	9001KA3	30MM NC Fingersafe
1	Contact - Aux	Square D	LADN40	IEC 4 NO
1	DC Drive	Dart Controls	125DV-C	115/120V 0.5HP 90VDC 6.5A
1	Dist Block	Marathon	1422570	600V 175A 2P (1-4)
1	Enclosure	Hoffman	A48H248SSLP3PT	48X24X8 NEMA 4X ***CUSTOM Enclosure*** Hoffman Ref #573CC
1	Enclosure - Handle	Hoffman	CWHNL	Non-Locking
1	Fan	Hoffman	A4AXFN	115/120V 4 IN Panel Fan
1	Fan/Bracket	Hoffman	ABRKT4	4 IN Fan Bracket
1	Flasher	Ingram Products	SSF150W	115/120V 150WATT Inline
5	Fuse	Bussman	AGC-1	250V 1A Non-Time-Del Glass
1	Fuse	Bussman	AGC-1/2	250V 0.5A Non-Time-Del Glass
7	Fuse	Bussman	AGC-2	250V 2A Non-Time-Del Glass
1	Fuse	Bussman	AGC-8	250V 8A Non-Time-Del Glass
1	Fuse	Bussman	FNQ-20	500V 20A Time-Dly Midget
2	Fuse	Bussman	FNQ-R-10	600V 10A Time-Dly Class CC

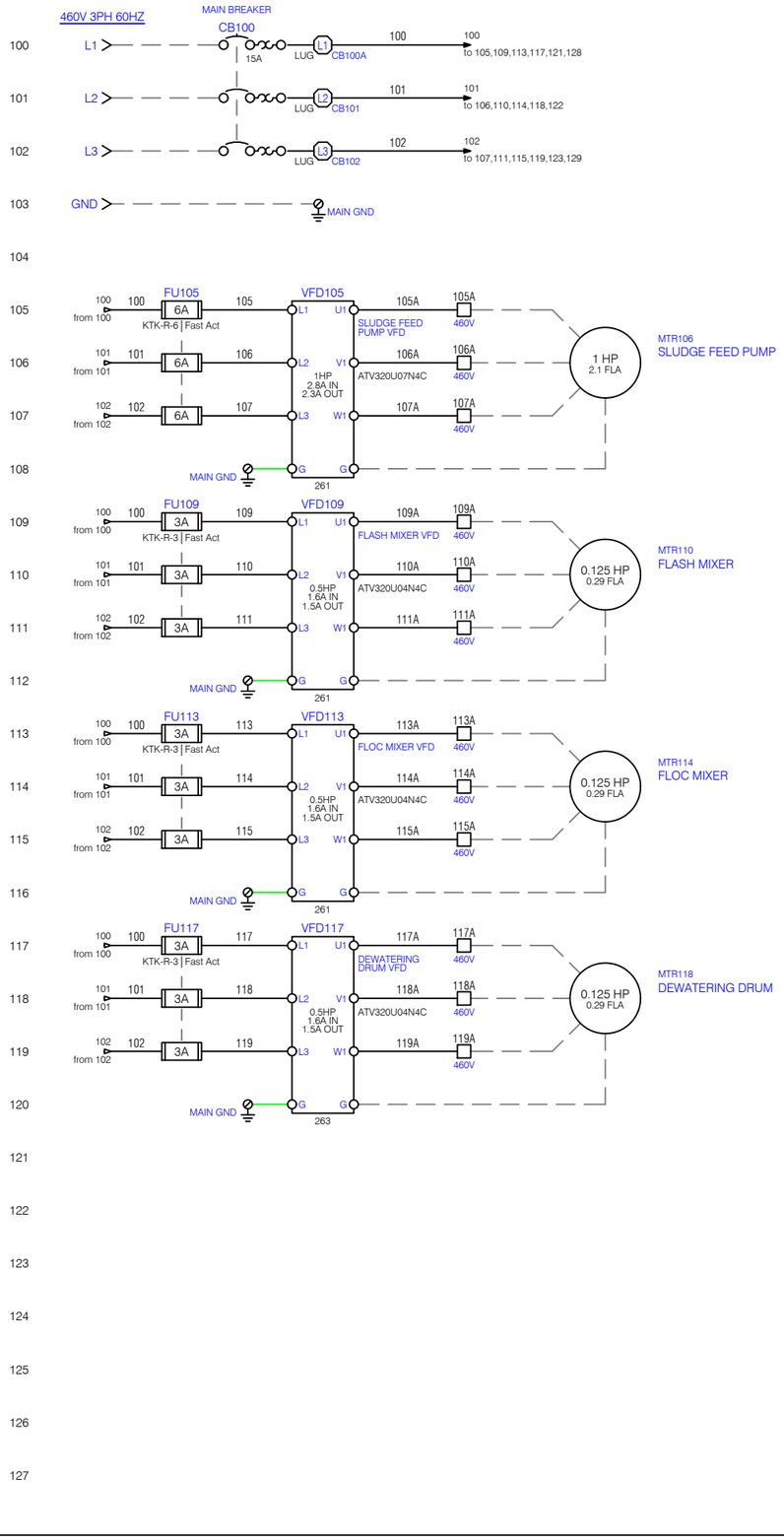
9	Fuse	Bussman	KTK-R-3	600V 3A Fast-Act Class CC
3	Fuse	Bussman	KTK-R-6	600V 6A Fast-Act Class CC
9	Fuse Block	Allen Bradley	1492-H4	115/120V 15A 1P Disconnect
5	Fuse Block	Allen Bradley	1492-H5	24V 12A 1P Disconnect
1	Fuse Block	Marathon	6SM30A1I	600V 30A 1P Midget Rail Mnt Trip Ind
1	Fuse Block	Marathon	6SM30A2I	600V 30A 2P Midget Rail Mnt Trip Ind
4	Fuse Block	Marathon	6SM30A3I	600V 30A 3P Midget Rail Mnt Trip Ind
2	Ground Lug	Square D	PK7GTA	#14-2/0 Ground Bar
1	Light	Ingram Products	LX40F	Top Mount With Flasher
1	Light - Pilot	Square D	9001SKP38LGG9	115/120V NEMA 4X LED Green
1	Light - Pilot	Square D	9001SKP38LWW9	115/120V NEMA 4X LED White
1	Operator - PB	Square D	9001SKR9P1R	30MM NEMA 4X Ill Push-Pull Red
1	Operator - SW	Misc Supply	7343K751	2 Pos SPDT 15A ON ON Toggle Quick Disconnect
1	Operator - SW	Square D	9001SKS46B	30MM NEMA 4X 3 POS Cam F
1	PLC - Base Unit	Unitronics	V700-T20BJ	24VDC 7 inch NEMA 4X Indoor Vision 700 800x480 Color HMI
1	PLC - I/O Module	Unitronics	V200-18-E3XB	24VDC 37 Dig/8 Alg Vision Snap-In Combo Block
1	PLC - Network	Square D	LU9GC3	Modbus Hub 10 Port
4	PLC - Network	Square D	VW3A8306R10	1M RS 485 Cable 2xRJ45 Connectors
1	PLC - Network	Square D	VW3A8306R30	3M RS 485 Cable 2xRJ45 Connectors
1	PLC - Network	Square D	VW3A8306RC	Modbus Terminator RJ45 120 ohm
1	PLC - Network	Unitronics	V100-17-RS4X	Vision 700 Isolated RS232/485 Port
1	PLC - SD Card	Standard	STD	Micro SD
1	Panel	Hoffman	A48P24	48X24 Steel
1	Power Supply	Puls	ML60.241	24VDC 2.5A (60W) Din Rail Mount
5	Relay	Idec	RH2B-ULAC120V	115/120V 2P 8 Mini Blade Light
2	Relay	Idec	RH3B-ULAC120V	115/120V 3P 11 Mini Blade Light
1	Relay - Industrial	Square D	CAD50G7	115/120V 5 NO IEC
1	Relay - Seal	Diversified Electronics	SPM-120-AAA-100K	115/120V 2P 11 Pin
5	Socket	Idec	SH2B-05	300V 2P 8 Mini Blade
2	Socket	Idec	SH3B-05	300V 3P 11 Mini Blade
1	Socket	Idec	SR3P-06	300V 3P 11 Pin
1	Tags	Pinnacle Industrial Engraving	W/B 4.5X4 LEGEND PLATE	4.5 X 4 Engraved Legend Plate 11 Lines
28	Term Block	Square D	NSYTRV42	600V 30A 26-10AWG Gray 6mm
18	Term Block	Square D	NSYTRV42BL	600V 30A 26-10AWG Blue 6mm
4	Term Block	Square D	NSYTRV62	600V 50A 24-8AWG Gray 8mm
3	Term End Anchor	Square D	NSYTRAABV35	Gray
6	Term End Barrier	Square D	NSYTRAP22	Gray Partition For 2.5-10mm Width TBs
1	Thermostat	Pfannenburg	17121000010	NO
1	Time Meter	Redington Counters	710-0002	115/120V 99,999.9 Hrs Non-Reset
3	Variable Frequency Drive	Square D	ATV320U04N4C	380-500V 3PH 1.6A in / 1.5A out 0.5HP (0.37kW) Altivar 320 Compact
1	Variable Frequency Drive	Square D	ATV320U07N4C	380-500V 3PH 2.8A in / 2.3A out 1HP (0.75kW) Altivar 320 Compact
1	Vent	Stahlin	BV4XKIT	NEMA 4X Breather
1	Window Kit	Hoffman	AWDH2016N4SS	20X16 316 Stainless Steel Deep Hinged

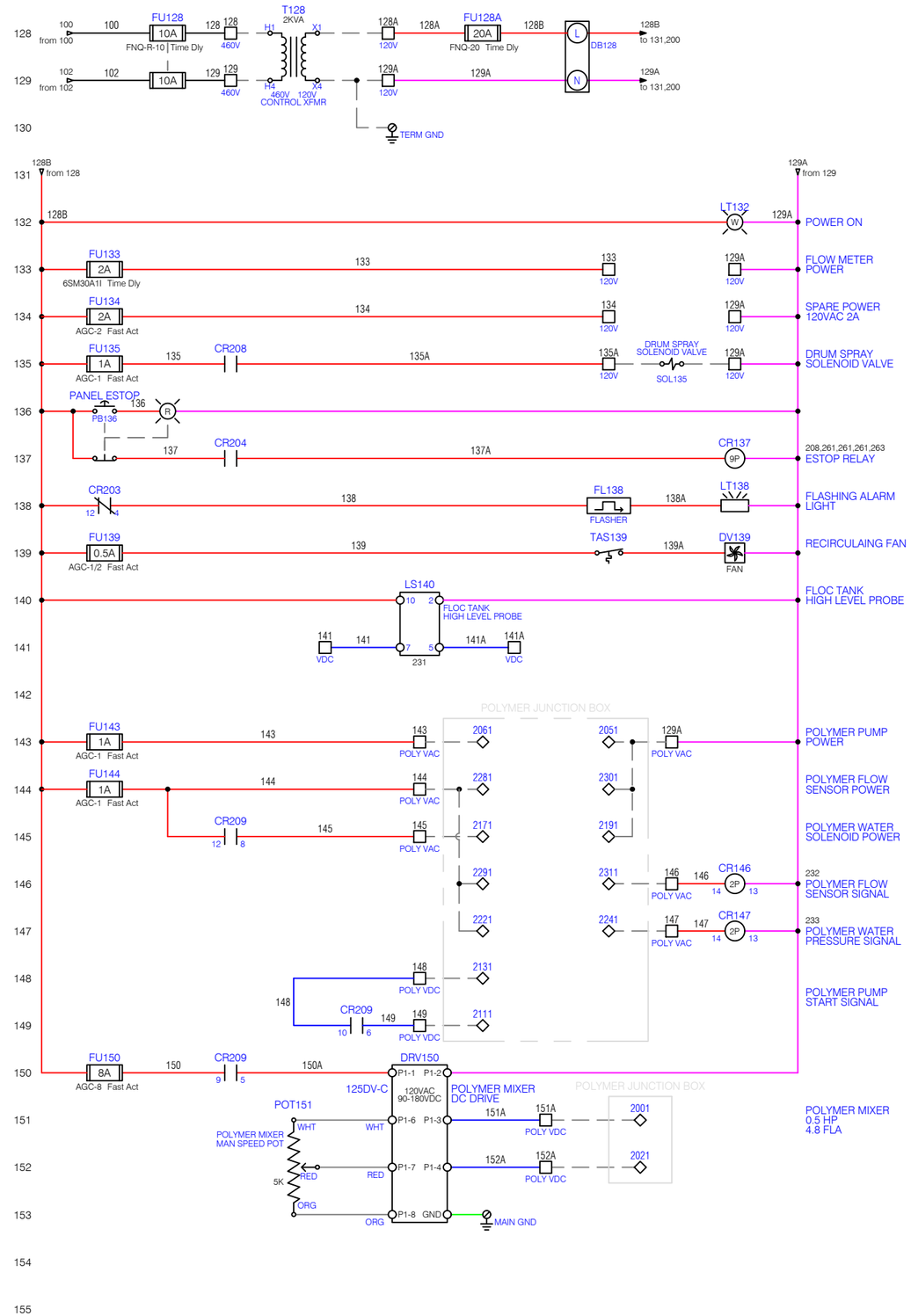
Remote Mounted

Qty	Name	Manufacturer	Number	Description
2	Electrode	Ametek	6013-SS-P-A-1	115/120V 1' Stainless Rod; PVC Insulated
1	Electrode Holder	Ametek	6012AE2	115/120V 2 Pole Electrode, w/ WaterProof Cover
1	Transformer	Square D	2S1FSS	240/480V 2 KVA 120V Sec SS Dry Type

Spare Parts

Qty	Name	Manufacturer	Number	Description
2	Fuse	Bussman	AGC-1	250V 1A Non-Time-Del Glass
2	Fuse	Bussman	AGC-1/2	250V 0.5A Non-Time-Del Glass
2	Fuse	Bussman	AGC-2	250V 2A Non-Time-Del Glass
2	Fuse	Bussman	AGC-8	250V 8A Non-Time-Del Glass
2	Fuse	Bussman	FNQ-20	500V 20A Time-Dly Midget
2	Fuse	Bussman	FNQ-R-10	600V 10A Time-Dly Class CC
3	Fuse	Bussman	KTK-R-3	600V 3A Fast-Act Class CC
3	Fuse	Bussman	KTK-R-6	600V 6A Fast-Act Class CC





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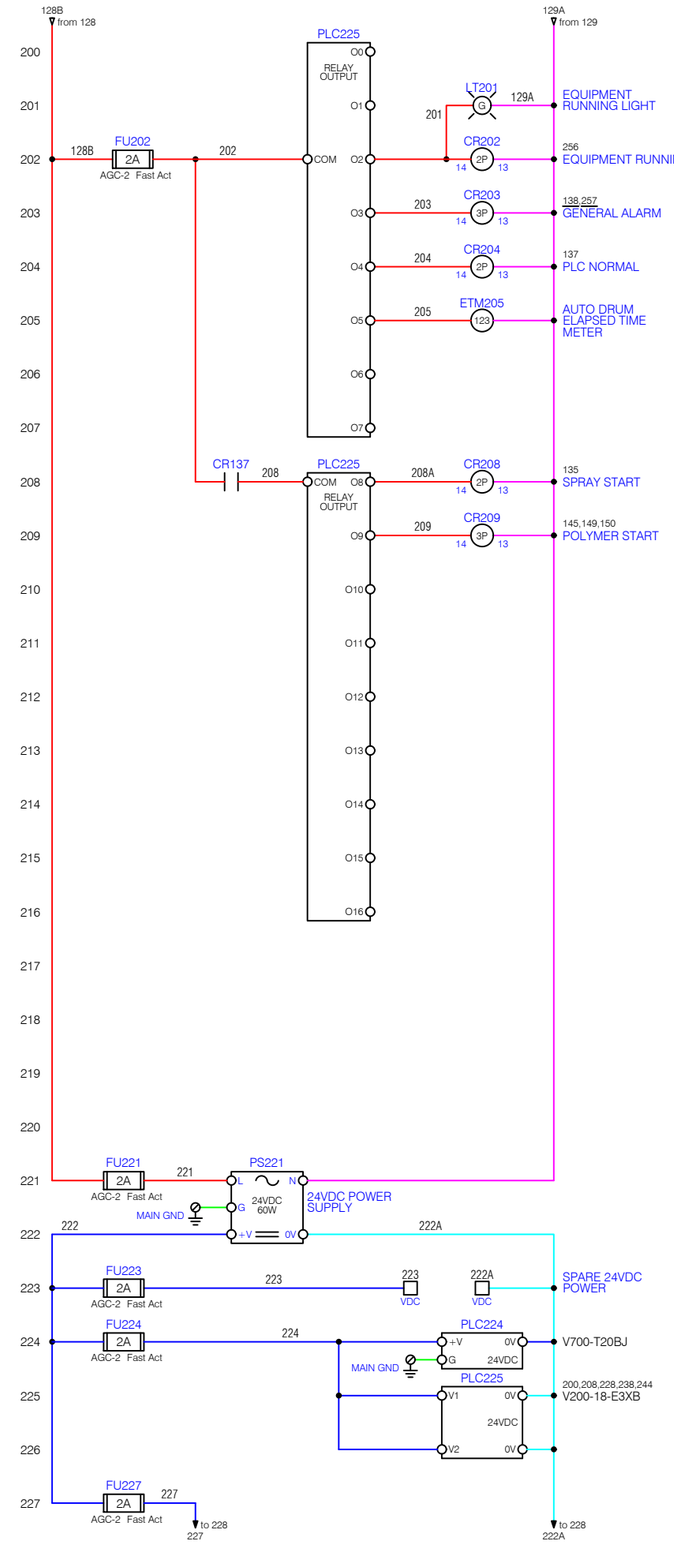
517 Commercial Drive
Fairfield, OH 45014
p/888.874.2062 f/513.874.2099
www.controlinterface.com

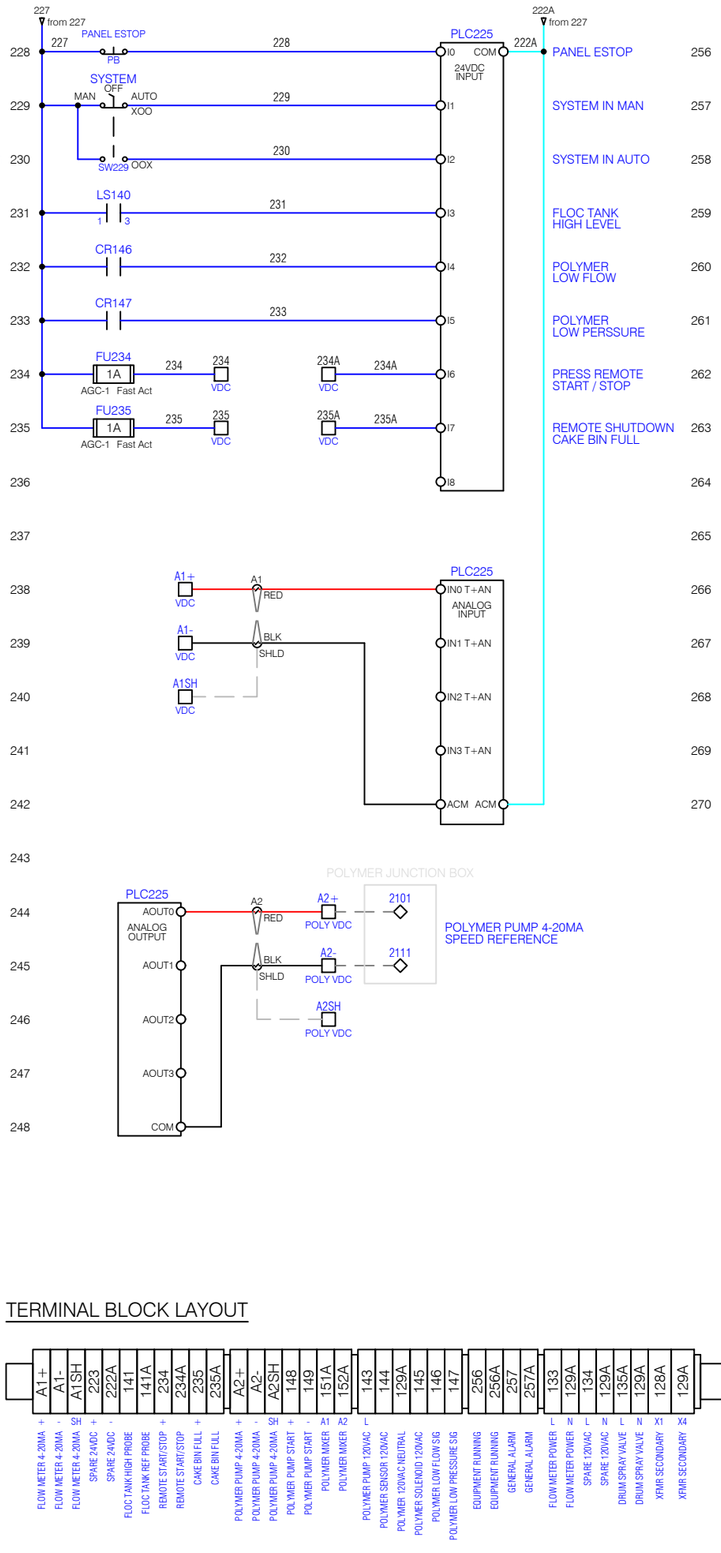
NOTES

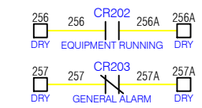
UL LISTED | 508A
ENCLOSED INDUSTRIAL CONTROL PANEL

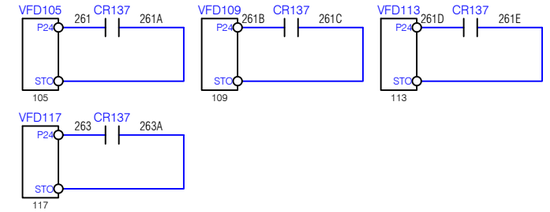
REVISIONS

CLIENT	Process Wastewater Technologies
CLIENT REF	VDPCA16116
LOCATION	CA
DRAWN BY	C Ingram
CHECKED BY	M Rolfert
JOB	Concannon Winery
PANEL	Press Control Panel
DWG	J-978-1A
STATUS	As Builts - Ship
DATE	22 Feb 2017

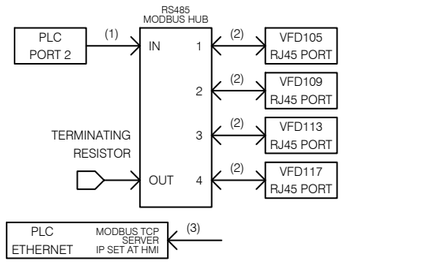






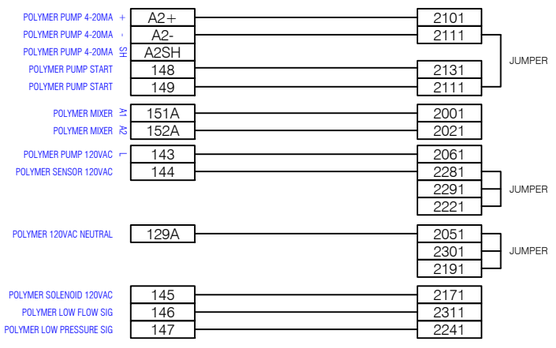


NETWORKING LAYOUT



(1) MODBUS SH-TP CABLE: RJ-11 PINS 1(+), 6(-) TO RJ-45 PINS 4(+), 5(-)
(2) MODBUS SH-TP CABLE: RJ-45 PINS 4(+), 5(-), 8(GND)
(3) CAT 5e CABLE - SUPPLIED BY OTHERS

POLYMER INTERCONNECTION



*** POLYMER TERMINALS SHOWN MAY NOT MATCH JUNCTION BOX LAYOUT

TERMINAL BLOCK LAYOUT

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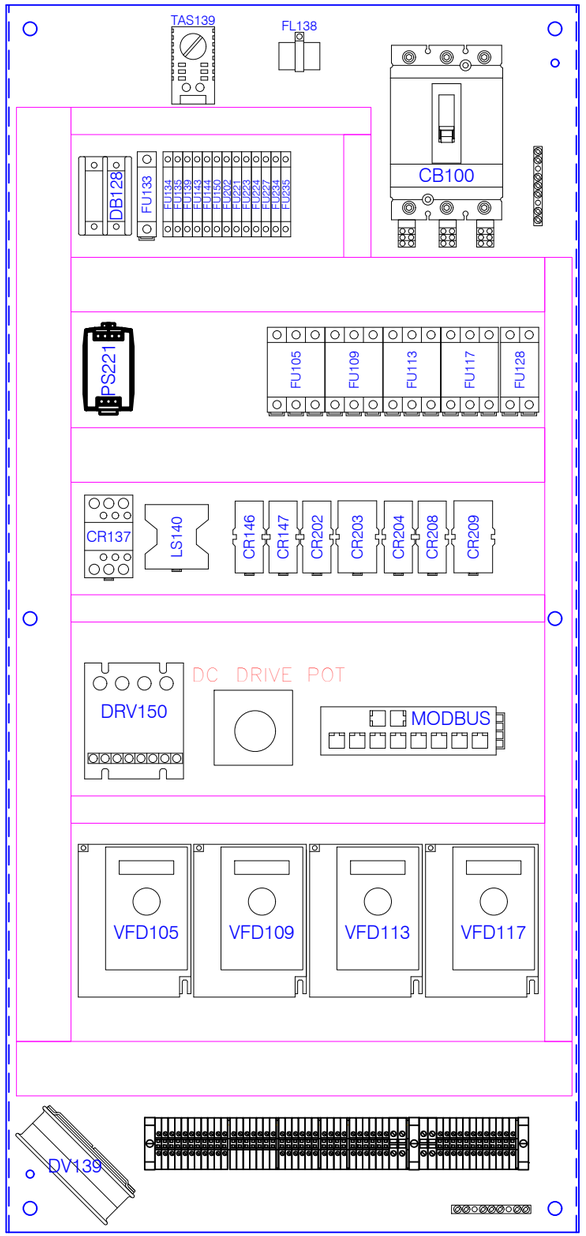
NOTES

UL LISTED | 508A
ENCLOSED INDUSTRIAL CONTROL PANEL

REVISIONS

CLIENT	Process Wastewater Technologies
CLIENT REF	VDPCA16116
LOCATION	CA
DRAWN BY	C Ingram
CHECKED BY	M Rolfert
JOB	Concannon Winery
PANEL	Press Control Panel
DWG	J-978-1B
STATUS	As Builts - Ship
DATE	22 Feb 2017

SUBPANEL LAYOUT



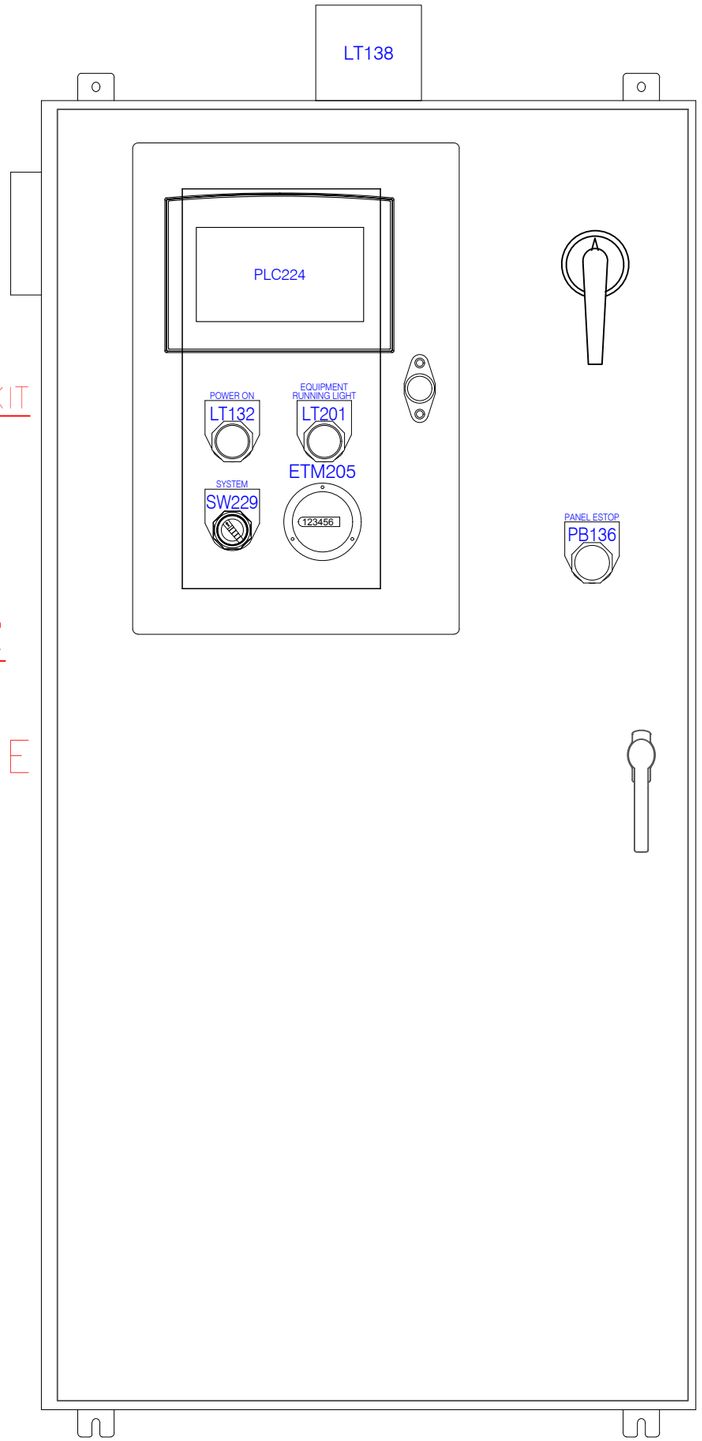
NEMA 4X 316SS WINDOW KIT
18.1" X 12.1" X 2.7"

NEMA 3RSS TRANSFORMER
9.56" x 8.68" x 6.56"
MOUNTED ON VOLUTE FRAME

2KVA
XFMR

NEMA 4XSS ENCLOSURE
48" H x 24" W x 8" D

ENCLOSURE DOOR LAYOUT



CONTROL INTERFACE, INC.
517 Commercial Drive
Fairfield, OH 45014
p/888.874.2062 f/513.874.2099
www.controlinterface.com

NOTES

UL LISTED | 508A
ENCLOSED INDUSTRIAL CONTROL PANEL

REVISIONS

CLIENT: Process Wastewater Technologies	
CLIENT REF: VDPCA16116	
LOCATION: CA	
DRAWN BY: C Ingram	CHECKED BY: M Rolfert

JOB: Concannon Winery	
PANEL: Press Control Panel	
DWG: J-978-1C	
STATUS: As Builts - Ship	DATE: 22 Feb 2017

Volute Dewatering Press – Concannon Winery – Modbus Registers

Modbus TCP available at the PLC for SCADA communication. IP address can be set from the HMI screen.

Memory Integers (16 bit) are addresses in the Unitronics PLC as MI 0 – 4095. SCADA software may need to add 40000 or 40001 to this address. Modbus function Read Holding Registers is supported.

2001 = Status Word 1
- bit 0: Panel ESTOP Switch
- bit 1: Panel Switch in Manual
- bit 2: Panel Switch in Auto
- bit 3: Running in Auto
- bit 4: Drums Running in Extended Run (Sludge Feed, Polymer and Mixers off)
- bit 5: Any Device Running in Manual
- bit 6: Press Auto Alarm Shutdown
- bit 7: Remote Start Signal Present
- bit 8: Cake Bin Full Signal Present

2002 = Status Word 2 (future)

2003 = Alarm Word 1
- bit 0: Panel ESTOP
- bit 1: Floc Tank High Level
- bit 2: Feed Low Flow
- bit 3: Feed High Flow
- bit 4: Flow Meter Signal Loss
- bit 5: Polymer Low Flow
- bit 6: Polymer Low Pressure
- bit 7: Cake Bin Full

2004 = Alarm Word 2
- bit 0: Feed Pump VFD Fault
- bit 1: F;ash Mixer VFD Fault
- bit 2: Floc Mixer VFD Fault
- bit 3: Drum VFD Fault
- bit 4: Feed Pump VFD Comm Loss
- bit 5: Flash Mixer VFD Comm Loss
- bit 6: Floc Mixer VFD Comm Loss
- bit 7: Drum VFD Comm Loss

2005 = 1 second tick (from PLC clock) – Use to verify communication
2006 = Sludge Flow Rate (1 = 0.1 gpm)
2007 = Sludge Feed Pump Speed (VFD Output; 1 = 0.1 Hz)
2008 = Polymer Speed (1 = 0.1 %)
2009 = Drum Speed in Auto (VFD Output; 1 = 0.1 Hz) (highest speed if the two drums are different)

2010 = This Auto Run ETM (double word; 1 = 0.01 hr)
2012 = This Auto Run Flow Total (double word ; 1 = 1 gal)
2014 = Today's Flow Total (double word ; 1 = 1 gal)
2016 = Yesterday's Flow Total (double word ; 1 = 1 gal)
2018 = Lifetime Flow Total (double word ; 1 = 1 gal)

Altivar Machine ATV320

Variable Speed Drives
for Asynchronous and Synchronous Motors

Programming Manual

03/2016

NVE41295

www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

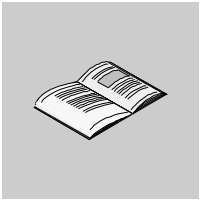
All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

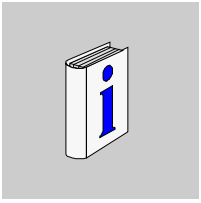
Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents



Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation, which, if not avoided, **will result** in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation, which, if not avoided, **could result** in death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **could result** in minor or moderate injury, or equipment damage.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Qualification Of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended Use

This product is a drive for three-phase synchronous and asynchronous motors and intended for industrial use according to this manual.The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data.Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented.Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design). Any use other than the use explicitly permitted is prohibited and can result in hazards. Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

Product related information

Read and understand these instructions before performing any procedure with this drive.

⚠ ⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation and who have received safety training to recognize and avoid hazards involved are authorized to work on and with this drive system. Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- The system integrator is responsible for compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Many components of the product, including the printed circuit boards, operate with mains voltage. Do not touch. Use only electrically insulated tools.
- Do not touch unshielded components or terminals with voltage present.
- Motors can generate voltage when the shaft is rotated. Prior to performing any type of work on the drive system, block the motor shaft to prevent rotation.
- AC voltage can couple voltage to unused conductors in the motor cable. Insulate both ends of unused conductors of the motor cable.
- Do not short across the DC bus terminals or the DC bus capacitors or the braking resistor terminals.
- Before performing work on the drive system:
  - Disconnect all power, including external control power that may be present.
  - Place a "Do Not Turn On" label on all power switches.
  - Lock all power switches in the open position.
  - Wait 15 minutes to allow the DC bus capacitors to discharge. The DC bus LED is not an indicator of the absence of DC bus voltage that can exceed 800 Vdc.
    Measure the voltage on the DC bus between the DC bus terminals (PA/+ and PC/-) using a properly rated voltmeter to verify that the voltage is <42 Vdc.
  - If the DC bus capacitors do not discharge properly, contact your local Schneider Electric representative. Do not repair or operate the product.
- Install and close all covers before applying voltage.

Failure to follow these instructions will result in death or serious injury.

Drive systems may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

⚠WARNING

UNEXPECTED EQUIPMENT OPERATION

- Carefully install the wiring in accordance with the EMC requirements.
- Do not operate the product with unknown or unsuitable settings or data.
- Perform a comprehensive commissioning test.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

⚠⚠DANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION

Do not use damaged products or accesssories.

Failure to follow these instructions will result in death or serious injury.

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

⚠WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

1. For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS 7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems”.

NOTICE

DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE

- Before switching on and configuring the product, verify that it is approved for the mains voltage.

Failure to follow these instructions can result in equipment damage.

⚠ WARNING

HOT SURFACES

- Ensure that any contact with hot surfaces is avoided.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the product has sufficiently cooled down before handling it.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions

Failure to follow these instructions can result in death, serious injury, or equipment damage.

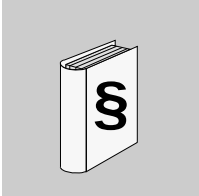
⚠ WARNING

EXPLOSION HAZARD

Only use this device outside of hazardous areas (explosive atmospheres).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

About the Book



At a Glance

Document scope

The purpose of this document is to:

- help you to set-up the drive,
- show you how to program the drive,
- show you the different menus, modes and parameters,
- help you in maintenance and diagnostics.

Validity note

NOTE: The products listed in the document are not all available at the time of publication of this document online. The data, illustrations and product specifications listed in the guide will be completed and updated as the product availabilities evolve. Updates to the guide will be available for download once products are released on the market.

This documentation is valid for the Altivar Machine drive.

The technical characteristics of the devices described in this document also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page www.schneider-electric.com.
2	In the Search box type the reference of a product or the name of a product range. • Do not include blank spaces in the reference or product range. • To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the **Product Datasheets** search results and click on the reference that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one reference appears in the **Products** search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download XXX** product datasheet.

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Related documents

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.schneider-electric.com.

The internet site provides the information you need for products and solutions

- The whole catalog for detailed characteristics and selection guides
- The CAD files to help design your installation, available in over 20 different file formats
- All software and firmware to maintain your installation up to date
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation
- And finally all the User Guides related to your drive, listed below:

Title of Documentation	Reference Number
ATV320 Getting Started	NVE21763 (English), NVE21771 (French), NVE21772 (German), NVE21773 (Spanish), NVE21774 (Italian), NVE21776 (Chinese)
ATV320 Getting Started Annex (SCCR)	NVE21777 (English)
ATV320 Installation manual	NVE41289 (English), NVE41290 (French), NVE41291 (German), NVE41292 (Spanish), NVE41293 (Italian), NVE41294 (Chinese)
ATV320 Programming manual	NVE41295 (English), NVE41296 (French), NVE41297 (German), NVE41298 (Spanish), NVE41299 (Italian), NVE41300 (Chinese)
ATV320 Modbus Serial Link manual	NVE41308 (English)
ATV320 Ethernet IP/Modbus TCP manual	NVE41313 (English)
ATV320 PROFIBUS DP manual (VW3A3607)	NVE41310 (English)
ATV320 DeviceNet manual (VW3A3609)	NVE41314 (English)
ATV320 CANopen manual (VW3A3608, 618, 628)	NVE41309 (English)
ATV320 EtherCAT manual (VW3A3601)	NVE41315 (English)
ATV320 Communication Parameters	NVE41316 (English)
ATV320 Safety Functions manual	NVE50467 (English), NVE50468 (French), NVE50469 (German), NVE50470 (Spanish), NVE50472 (Italian), NVE50473 (Chinese)

You can download these technical publications and other technical information from our website at http://download.schneider-electric.com

Terminology

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

In the area of drive systems this includes, but is not limited to, terms such as **error, error message, failure, fault, fault reset, protection, safe state, safety function, warning, warning message**, and so on.

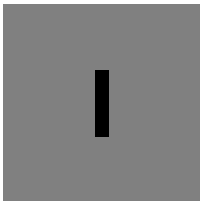
Among others, these standards include:

- IEC 61800 series: Adjustable speed electrical power drive systems
- IEC 61508 Ed.2 series: Functional safety of electrical/electronic/programmable electronic safety-related
- EN 954-1 Safety of machinery - Safety related parts of control systems
- EN ISO 13849-1 & 2 Safety of machinery - Safety related parts of control systems.
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC 61784 series: Industrial communication networks - Profiles
- IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements

In addition, the term **zone of operation** is used in conjunction with the description of specific hazards, and is defined as it is for a **hazard zone** or **danger zone** in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Also see the glossary at the end of this manual.

General Overview



What's in this Part?

This part contains the following chapters:

Overview

1

What's in this Chapter?

This chapter contains the following topics:

Factory configuration

Factory settings

The Altivar 320 is factory-set for common operating conditions:

- Display: drive ready **[Ready]** (rdY) when motor is ready to run and the output frequency when motor is running.
- The LI3 to LI6 logic inputs, AI2 and AI3 analog inputs, LO1 logic output, AO1 analog output, and R2 relay are unassigned.
- Stop mode if error is detected: freewheel.

Code	Description	Factory settings values	Page
bFr	**[Standard mot. freq]**	**[50Hz IEC]**	86
tCC	**[2/3 wire control]**	**[2 wire]** (2C): 2-wire control	85
Ctt	**[Motor control type]**	**[Standard]** (STd): standard motor law	105
ACC	**[Acceleration]**	3.0 seconds	87
dEC	**[Deceleration]**	3.0 seconds	87
LSP	**[Low speed]**	0 Hz	87
HSP	**[High speed]**	50 Hz	87
ItH	**[Mot. therm. current]**	Nominal motor current (value depending on drive rating)	87
SdC1	**[Auto DC inj. level 1]**	0.7 x nominal drive current, for 0.5 seconds	93
SFr	**[Switching freq.]**	4 kHz	94
Frd	**[Forward]**	**[LI1]** (LI1): Logic input LI1	126
rrS	**[Reverse assign.]**	**[LI2]** (LI2): Logic input LI2	126
Fr1	**[Ref.1 channel]**	**[AI1]** (AI1): Analog input AI1	154
r1	**[R1 Assignment]**	**[No drive flt]** (FLt): The contact opens when a fault is detected or when the drive has been switched off	138
brA	**[Dec ramp adapt.]**	**[Yes]** (YES): Function active (automatic adaptation of deceleration ramp)	172
Atr	**[Automatic restart]**	**[No]** (no): Function inactive	252
Stt	**[Type of stop]**	**[Ramp stop]** (rMP): On ramp	173
CFG	**[Macro configuration]**	**[Start/Stop]** (StS)	82

Note: If you want to keep the drive presettings to a minimum, select the macro configuration **[Macro configuration]** (CFG) = **[Start/stop]** (StS) followed by **[Restore config.]** (FCS) = **[Config. CFG]** (in1). For more information, see page 82.

Check whether the values above are compatible with the application.

Application functions

The tables on the following pages show the combinations of functions and applications, in order to guide your selection.

The applications in these tables relate to the following machines, in particular:

- **Hoisting**: cranes, overhead cranes, gantries (vertical hoisting, translation, slewing), lifting platforms
- **Handling**: palletizers/depalletizers, conveyors, roller tables
- **Packing**: carton packers, labeling machines
- **Textiles**: weaving looms, carding frames, washing machines, spinners, drawing frames
- **Wood**: automatic lathes, saws, milling
- **Process**

Each machine has its own special features, and the combinations listed here are neither mandatory nor exhaustive.

Some functions are designed specifically for a particular application. In this case, the application is identified by a tab in the margin on the relevant programming pages.

Motor control functions

Functions	Page	Applications					
		Hoisting	Handling	Packing	Textiles	Wood	Process
V/f ratio	105		■			■	
Sensorless flux vector control	105	■	■	■	■	■	■
2-point vector control	105	■			■		
Open-loop synchronous motor	105				■		
Output frequency up to 599 Hz	105				■	■	
Motor overvoltage limiting	120				■	■	
DC bus connection (see Installation manual)	-				■		■
Motor fluxing using a logic input	189	■	■	■			
Switching frequency of up to 16 kHz	94				■	■	
Auto-tuning	87	■	■	■	■	■	■

Functions on speed references

Functions	Page	Applications					
		Hoisting	Handling	Packing	Textiles	Wood	Process
Differential bipolar reference	129	■	■	■			
Reference delinearization (magnifying glass effect)	131	■	■				
Frequency control input	154				■		■
Reference switching	167			■			
Reference summing	168			■			
Reference subtraction	168			■			
Reference multiplication	168			■			
Adjustable profile ramp	170	■	■				
Jog operation	178		■		■		■
Preset speeds	180	■	■	■			
+ speed / - speed using single action pushbuttons (1 step)	184						■
+ speed / - speed using double action pushbuttons (2 steps)	184	■					
+/- speed around a reference	187				■		■
Save reference	188						■

Application-Specific functions

Functions	Page	Applications					
		Hoisting	Handling	Packing	Textiles	Wood	Process
Fast stop	173					■	
Brake control	191	■	■				
Load measurement	199	■					
High-speed hoisting	201	■					
Rope slack	204	■					
PID regulator	206						■
Motor/generator torque limit	215		■		■		■
Load sharing	122	■	■				
Line contactor control	220	■	■			■	
Output contactor control	223	■					
Positioning by limit switches or sensors	224	■	■	■			
Stop at distance calculated after deceleration limit switch	226		■	■			
Parameter switching	229	■	■	■	■	■	■
Motor or configuration switching	232	■	■	■			
Traverse control	237				■		
Stop configuration	173		■		■	■	

Safety functions/Fault management

Functions	Page	Applications					
		Hoisting	Handling	Packing	Textiles	Wood	Process
Safe Torque Off (STO) (Safety function, see dedicated document)	-	■	■	■	■	■	■
Deferred stop on thermal alarm	258	■					■
Alarm handling	145	■	■	■	■	■	■
Fault management	250	■	■	■	■	■	■
IGBT tests	260	■	■	■	■	■	■
Catch a spinning load	253				■	■	
Motor protection with PTC probes	250	■	■	■	■	■	■
Undervoltage management	259				■	■	
4-20 mA loss	260	■	■		■	■	■
Uncontrolled output cut (output phase loss)	256		■				
Automatic restart	252		■				
Use of the "Pulse input" input to measure the speed of rotation of the motor	265	■	■				
Load variation detection	267	■					
Underload detection	270						■
Overload detection	272						■
Safety Integrated functions (see related documents page 12)			■	■	■	■	■

Basic functions

Drive ventilation

The fan starts automatically when the drive thermal state reaches 70% of the maximum thermal state and if the **[Fan Mode]** (FFM) is set to **[Standard]** (Std).

Graphic display terminal option

Description of the graphic display terminal

With the graphic display terminal, which works with FLASH V1.1IE26 or higher, it is possible to display more detailed information than can be shown on the integrated display terminal.

1 Graphic display

2 Function keys F1, F2, F3, F4, see page 157

3 STOP/RESET key

4 RUN key

7 ESC key: Aborts a value, a parameter or a menu to return to the previous selection

6 Key for reversing the direction of rotation of the motor

5 Jog dial:

- Press (ENT):
  - To save the current value
  - To enter the selected menu or parameter
- Turn +/-:
  - To increment or decrement a value
  - To go to the next or previous line
  - To increase or decrease the reference if control via the graphic display terminal is activated

Note: Keys **3**, **4**, **5** and **6** can be used to control the drive directly, if control via the graphic display terminal is activated.

To activate the keys on the remote display terminal, you first have to configure **[Ref.1 channel]** (Fr 1) = **[HMI]** (LCC). For more information, see page 154.

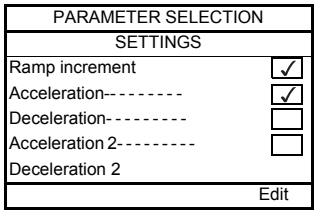
Example configuration windows:

Single selection

When powering up the graphic display terminal for the first time, the user has to select the required language.

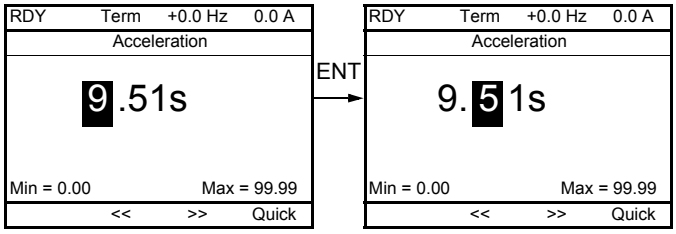
When only one selection is possible, the selection made is indicated by ✓.
Example: Only one language can be chosen.

Multiple selection



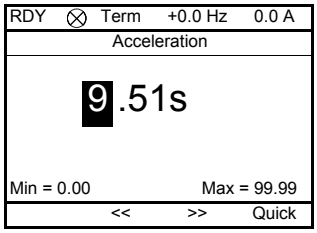
When multiple selection is possible, the selections made are indicated by ✓.
Example: A number of parameters can be chosen to form the **[USER MENU]**.

Example configuration window for one value:



The << and >> arrows (keys F2 and F3) are used to select the digit to be modified, and the jog dial is rotated to increase or decrease this number.

Example visualization of function blocks state:

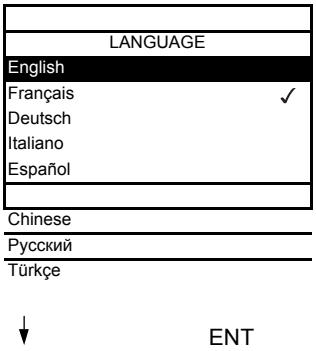


⊗ OFF light: A valid function blocks program is in the ATV320 in stop mode.

⊗ ON light: A valid function blocks program is in the ATV320 in run mode. The drive is considered as being in running state and configuration parameters cannot be modified.

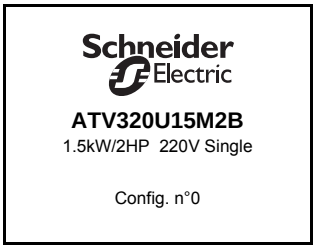
Powering up the drive with Graphic display terminal for the first time

When powering up the graphic display terminal for the first time, the user has to select the required language.



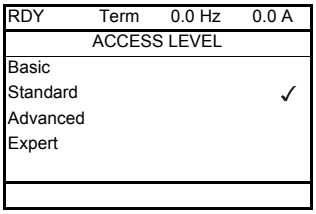
Display after the graphic display terminal has been powered up for the first time. Select the language and press ENT.

ENT

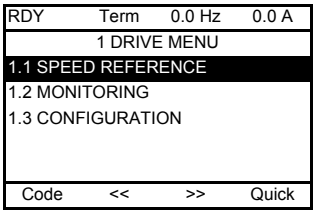


The drive's rating details will now appear.

3 seconds

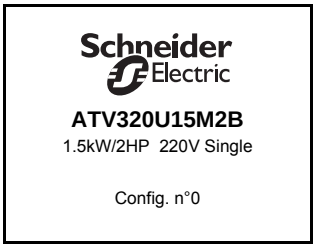


ENT



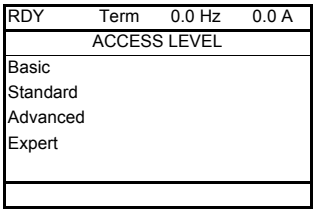
Powering up the drive for the first time

With the integrated display terminal, when powering up the drive for the first time, the user immediately accesses to **[Standard mot. freq]** (bFr) (see page 86) in the menu (COnF > FULL > SIM).



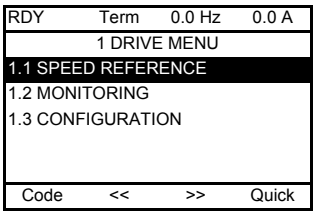
Display after the drive has been powered up for the first time.

↓ 3 seconds



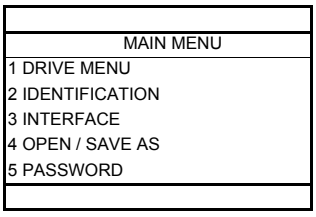
The **[ACCESS LEVEL]** screen follows automatically.

↓ ENT



Automatically switches to the **[1 DRIVE MENU]** menu after 3 seconds.
Select the menu and press ENT.

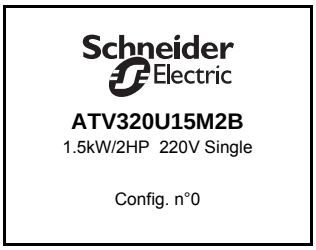
↓ ESC



The MAIN MENU appears on the graphic display terminal if you press the ESC key.

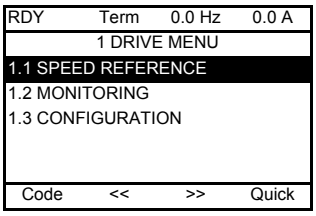
Subsequent power-ups

With the integrated display terminal, at subsequent power-ups of the drive for the first time, the user immediately accesses to the drive state (Same liste than **[Drive state]** (HS I) page 65). Example : Ready (rdY).



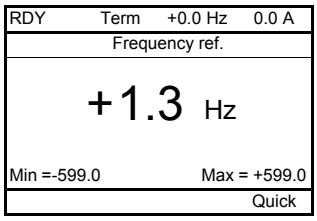
Display after powering up.

3 seconds



Automatically switches to the **[1 DRIVE MENU]** menu after 3 seconds. Select the menu and press ENT.

10 seconds



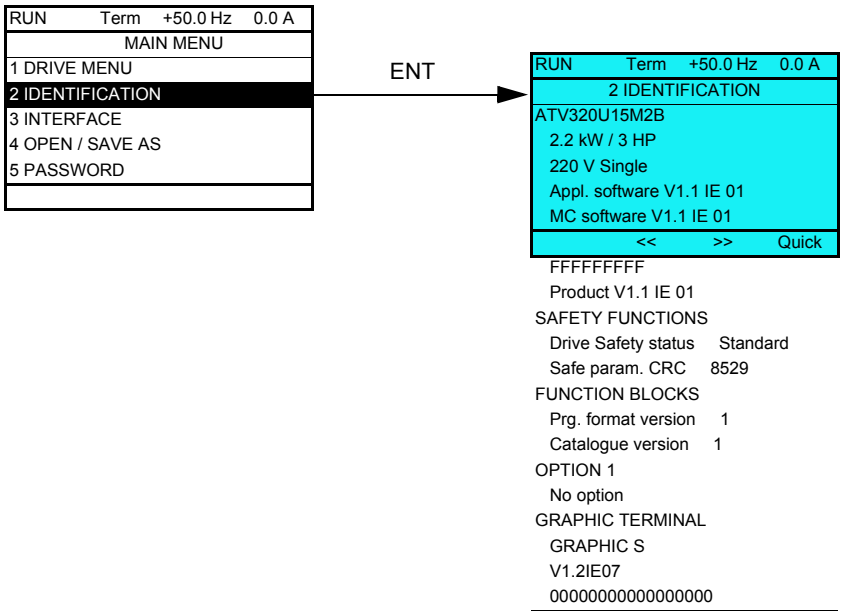
Automatically switches to the monitoring screen after 10 seconds.

Identification menu

The **[IDENTIFICATION]** (o id -) menu can only be accessed on the graphic display terminal.

This is a read-only menu that cannot be configured. It enables the following information to be displayed:

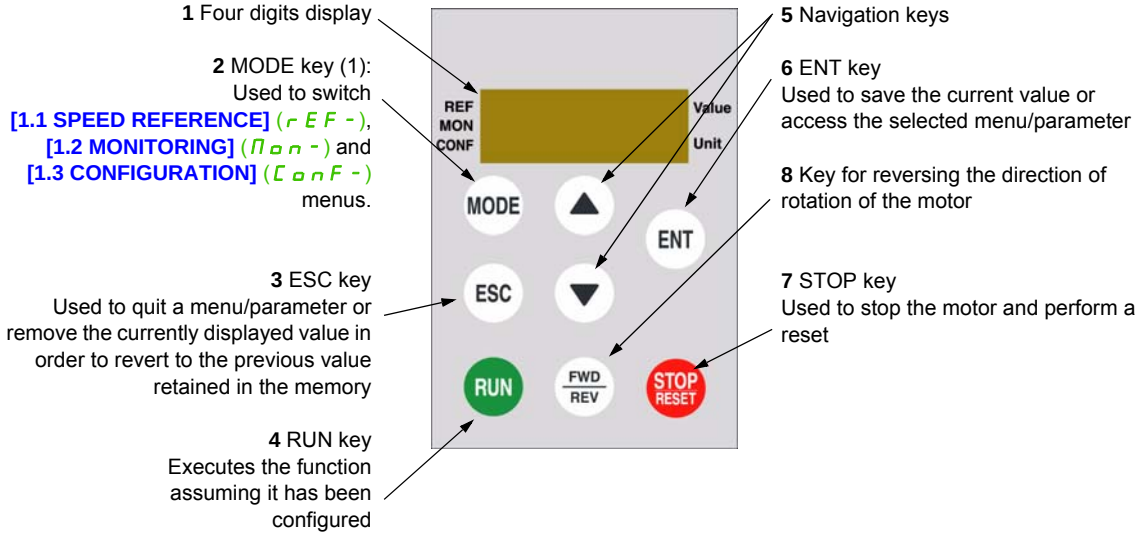
- Drive reference, power rating and voltage
- Drive software version
- Drive serial number
- Safety function status and checksum
- Function blocks program and catalogue version
- Type of options present, with their software version
- Graphic display terminal type and version



Remote display terminal option

Description of the remote display terminal

This remote display terminal is a local control unit which can be mounted on the door of the wall-mounted or floor-standing enclosure. It has a cable with connectors, which is connected to the drive serial link (see the documentation supplied with the remote display terminal). With this remote display terminal, up and down arrows are used for navigation rather than a jog dial.



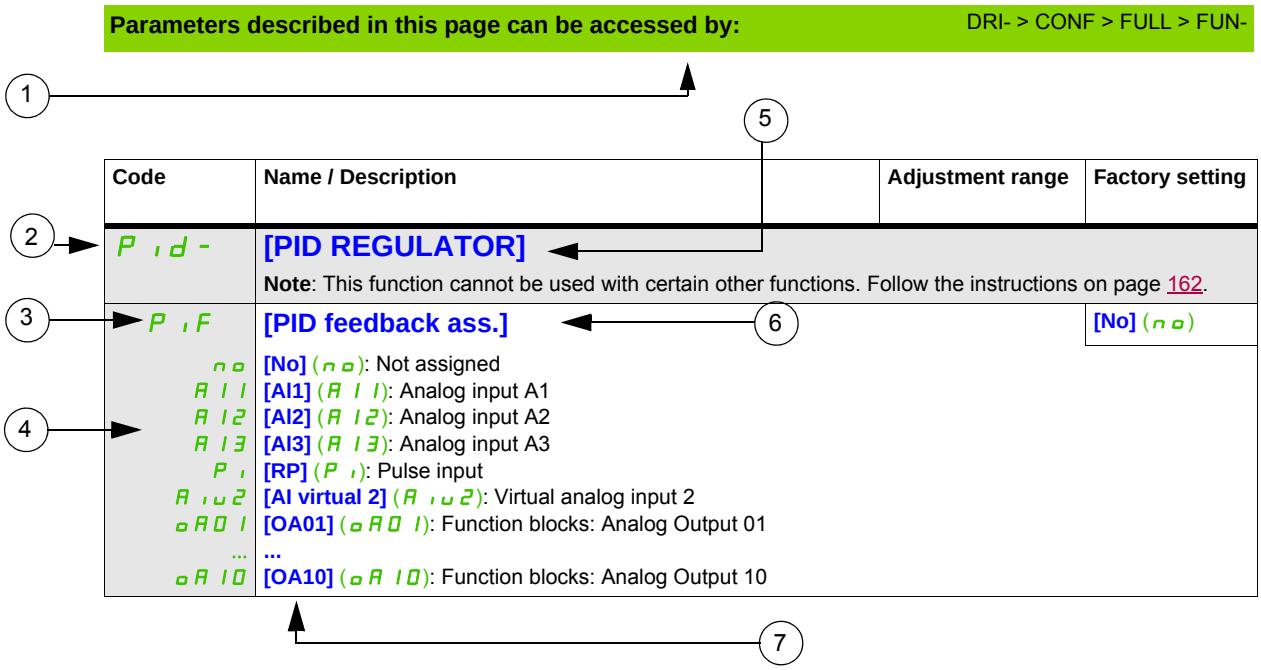
(1) If the drive is locked by a code (**[PIN code 1]** (CodE) page 300), pressing the MODE key enables you to switch from the **[1.2 MONITORING]** (Mon-) menu to the **[1.1 SPEED REFERENCE]** (rEF-) menu and vice versa.

To activate the keys on the remote display terminal, you first have to configure **[Ref.1 channel]** (Fr1) = **[HMI]** (LCC). For more information, see page 154.

Structure of the parameter tables

The parameter tables contained in the descriptions of the various menus are organized as follows.

Example:



1. Way to access the parameters described in this page
2. Submenu code on 4-digit 7-segment display
3. Parameter code on 4-digit 7-segment display
4. Parameter value on 4-digit 7-segment display
5. Name of submenu on graphic display terminal
6. Name of parameter on graphic display terminal
7. Value of parameter on graphic display terminal

Note: The text in square brackets **[ ]** indicates what you will see on the graphic display terminal.

A menu followed by the mention "**(continued)**" appears sometimes to locate you in the structure.

Example:

Fun -	**[APPLICATION FUNCT.] (continued)**
P id -	**[PID REGULATOR]** **Note**: This function cannot be used with certain other functions. Follow the instructions on page 162.

In this case, the mention "**(continued)**" indicates that the **[APPLICATION FUNCT.]** submenu is above the **[PID REGULATOR]** submenu in the structure.

A parameter can contain some pictograms. Each pictogram has its legend at the end of the table.

Main mictograms:

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

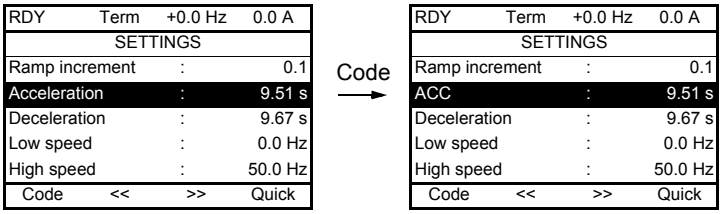
To change the assignment of this parameter, press the ENT key for 2 s.

Finding a parameter in this document

The following assistance with finding explanations on a parameter is provided:

- With the integrated display terminal and the remote display terminal: Direct use of the parameter code index, page 321, to find the page giving details of the displayed parameter.
- With the graphic display terminal: Select the required parameter and press F1 (F1) : **[Code]**. The parameter code is displayed instead of its name while the key is held down.

Example: ACC



- Then use the parameter code index, page 321, to find the page giving details of the displayed parameter.

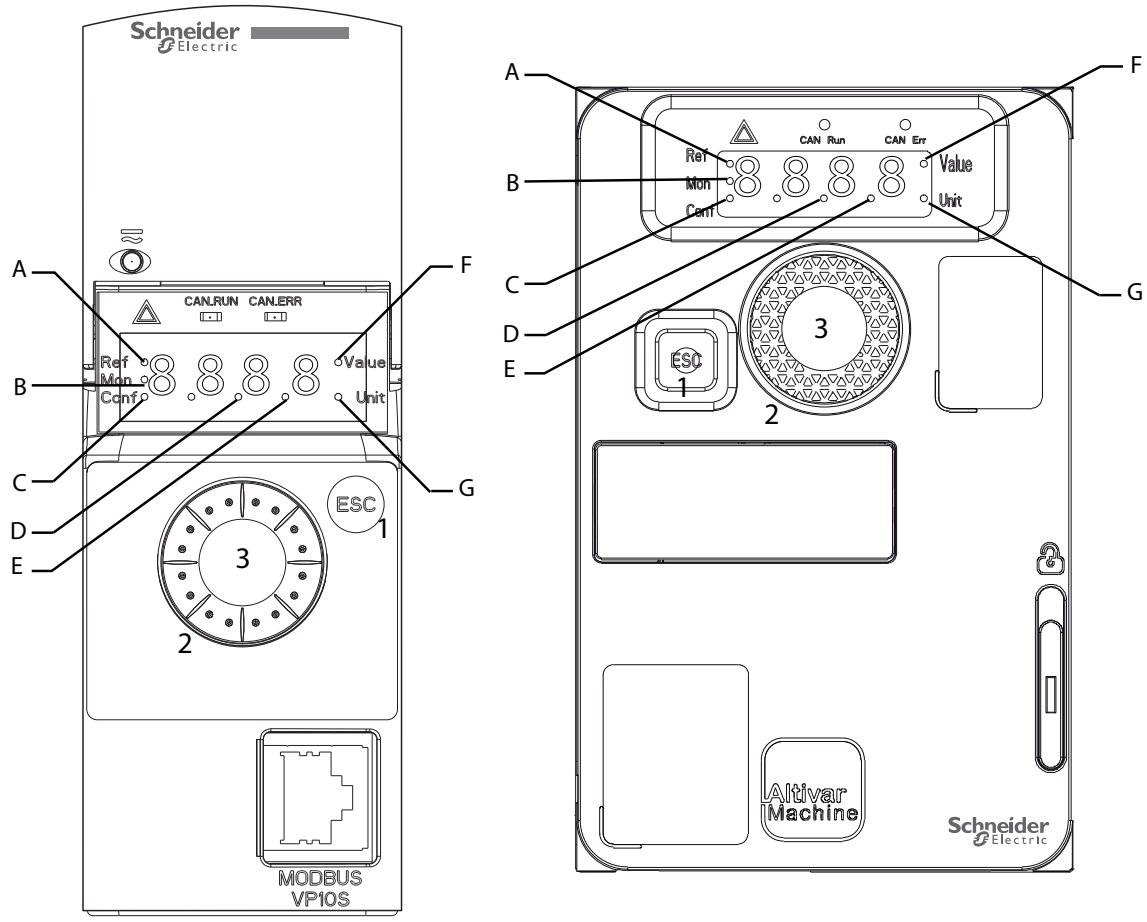
Description of the HMI

Functions of the Display and the Keys

1 The **ESC** key is used for menu navigation (backward) and parameters adjustment (cancel)

2 The **Jog dial** is used for menu navigation (up or down) and parameters adjustment (increase/decrease value or element choice). It can be used as Virtual analogic input 1 for drive frequency reference.

3 The **ENT** key (push on the Jog dial) is used for menu navigation (forward) and parameters adjustment (validate)



A	REF mode selected (rEF-)	E	Dot used to display parameter value (1/10 unit)
B	MON mode selected (Mon-)	F	Current display is parameter value
C	CONF mode selected (ConF)	G	Current display is parameter unit
D	Dot used to display parameter value (1/100 unit)		

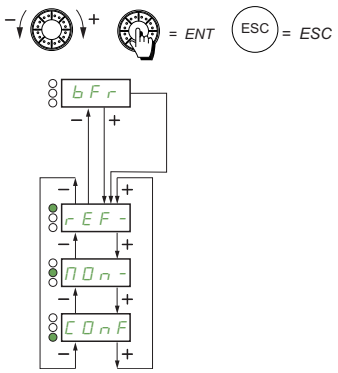
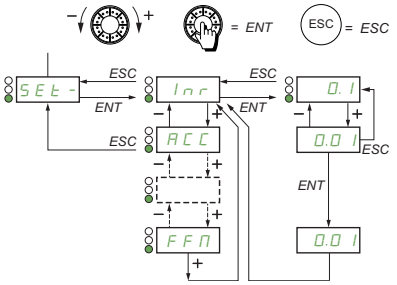
Normal display, with no error code displayed and no startup:
Displays the parameter selected in the **[1.2 MONITORING]** (Mon-) menu (default: **[Frequency ref.]** (FrH)).

- init: Initialization sequence (only on remote display terminal)
- tun: AutoTuning
- dCb: Injection braking
- rdY: Drive ready
- nSt: Freewheel stop control
- CLI: Current limit
- FSt: Fast stop
- FLU: Fluxing function is activated
- nLP: Control is powered on but the DC bus is not loaded
- CtL: Controlled stop

- obr: Adapted deceleration
- SoC: Stand by output cut
- uSA: Undervoltage alarm
- SS1: Safety function SS1
- SLS: Safety function SLS
- Sto: Safety function STO
- SMS: Safety function SMS
- GdL: Safety function GDL

In the event of a detected error, the display will flash to notify the user accordingly. If a graphic display terminal is connected, the name of the detected error will be displayed.

Structure of the menus

Powering up		Parameter selection
	This parameter is only visible when the drive is powered up for the first time. The setting can be amended subsequently in the menu **[MOTOR CONTROL]** (drC-) for **[Standard mot. freq]** (bFr) **[1.1 SPEED REFERENCE]** (rEF-) **[1.2 MONITORING]** (MOn-) **[1.3 CONFIGURATION]** (CONF)	

On the 7-segment display, a dash after menu and submenu codes is used to differentiate them from parameter codes.

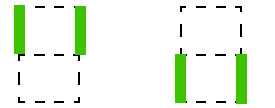
Example: **[APPLICATION FUNCT.]** (FUn-) menu, **[Acceleration]** (ACC) parameter

Selection of multiple assignments for one parameter

Example: List of group 1 alarms in **[INPUTS / OUTPUTS CFG]** (I_O-) menu

A number of alarms can be selected by "checking" them as follows.

The digit on the right indicates:



selected not selected

The same principle is used for all multiple selections.

Setup

2

What's in this Chapter?

This chapter contains the following topics:

Steps for setting-up the drive

INSTALLATION

1. Please refer to the installation manual.

PROGRAMMING

2. Apply input power to the drive, but do not give a run command.

Tips:

- Before beginning programming, complete the customer setting tables, page 321.
- Use the **[Restore config.]** (FCS) parameter, page 81, to return to the factory settings at any time.
- To locate the description of a function quickly, use the index of functions page 319.
- Before configuring a function, read carefully the "Function compatibility" section page 165.

Note: The following operations must be performed for optimum drive performance in terms of accuracy and response time:

- Enter the values indicated on the motor rating plate in the **[MOTOR CONTROL]** (drC-) menu, page 105.
- Perform auto-tuning with the motor cold and connected using the **[Auto-tuning]** (tun) parameter, page 87.

3. Configure:

- The nominal frequency of the motor **[Standard mot. freq]** (bFr) page 86 if this is not 50 Hz.
- The motor parameters in the **[MOTOR CONTROL]** (drC-) menu, page 105, only if the factory configuration of the drive is not suitable.
- The application functions in the **[INPUTS / OUTPUTS CFG]** (I_O-) menu, page 125, the **[COMMAND]** (CtL-) menu, page 154, and the **[APPLICATION FUNCT.]** (Fun-) menu, page 167, only if the factory configuration of the drive is not suitable.

4. In the [SETTINGS] (SEt-) menu, adjust the following parameters:

- **[Acceleration]** (ACC), page 87 and **[Deceleration]** (dEC), page 87.
- **[Low speed]** (LSP), page 87 and **[High speed]** (HSP), page 89.
- **[Mot. therm. current]** (ItH), page 87.

5. Start the drive.

Initial steps

If the drive was not connected to mains for an extended period of time, the capacitors must be restored to their full performance before the motor is started.

NOTICE

REDUCED CAPACITOR PERFORMANCE

- Apply mains voltage to the drive for one hour before starting the motor if the drive has not been connected to mains for the following periods of time:
  - 12 months at a maximum storage temperature of +50°C (+122°F).
  - 24 months at a maximum storage temperature of +45°C (+113°F)
  - 36 months at a maximum storage temperature of +40°C (+104°F).
- Verify that no Run command can be applied before the period of one hour has elapsed.
- Verify the date of manufacture if the drive is commissioned for the first time and run the specified procedure if the date of manufacture is more than 12 months in the past.

Failure to follow these instructions can result in equipment damage.

If the specified procedure cannot be performed without a Run command because of internal mains contactor control, perform this procedure with the power stage enabled, but the motor being at a standstill so that there is no appreciable mains current in the capacitors.

Before powering up the drive

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Before switching on the device, verify that no unintended signals can be applied to the digital inputs that could cause unintended movements.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Drive locked

If a Run command such as Run forward, Run reverse, DC injection is still active during:

- I A product reset to the factory settings,
- I A manual "Fault Reset" using **[Fault Reset]** (rSF),
- I A manual "Fault reset" by applying a product switched off and on again,
- I A stop command given by a channel that is not the active channel command (such as Stop key of the display terminal in 2/3 wires control).

The drive is in a blocking state and displays **[Freewheel stop]** (nSt). It will be necessary to deactivate all active Run commands prior to authorizing a new Run command.

Mains contactor

NOTICE

RISK OF DAMAGE TO THE DRIVE

Do not switch on the drive at intervals of less than 60 s.

Failure to follow these instructions can result in equipment damage.

Using a motor with a lower rating or dispensing with a motor altogether

With the factory settings, motor output phase loss detection is active (**[Output Phase Loss]** (oPL) = **[Yes]** (YES), page 256). To avoid having to use a motor with the same rating as the drive when testing the drive or during a maintenance phase, deactivate the motor output phase loss detection (**[Output Phase Loss]** (oPL) = **[No]** (nO)). This can prove particularly useful if very large drives are being tested with a small motor.

Set **[Motor control type]** (Ctt), page 105, to **[Standard]** (Std) in **[Motor control menu]** (drC-).

NOTICE

MOTOR OVERHEATING

Install external thermal monitoring equipment under the following conditions:

- If a motor with a nominal current of less than 20% of the nominal current of the drive is connected.
- If you use the function Motor Switching.

Failure to follow these instructions can result in equipment damage.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If output phase monitoring is disabled, phase loss and, by implication, accidental disconnection of cables, are not detected.

- Verify that the setting of this parameter does not result in unsafe conditions.

Failure to follow these instructions will result in death or serious injury.

Programming

II

What's in this Part?

This part contains the following chapters:

Incorrect wiring, unsuitable settings or unsuitable data may trigger unanticipated movements, trigger signals or damage parts and disable monitoring functions.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Do not operate the drive system with unknown settings or data.
- Never modify a parameter unless you fully understand the parameter and all effects of the modification.
- When commissioning the product, carefully run tests for all operating states and potential error situations.
- Verify that a functioning emergency stop push-button is within reach of all persons involved in running tests.
- Verify the functions after replacing the product and also after making changes to the settings or data.
- Anticipate movements in unintended directions or oscillation of the motor.
- Only operate the system if there are no persons or obstructions in the zone of operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

If the power stage is disabled unintentionally, for example as a result of power outage, errors or functions, the motor is no longer decelerated in a controlled way.

⚠WARNING

MOVEMENT WITHOUT BRAKING EFFECT

Verify that movements without braking effect cannot cause injuries or equipment damage

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Reference Mode (rEF)

3

What's in this Chapter?

This chapter contains the following topics:

Introduction

Use the reference mode to monitor and, if the reference channel is the analog input 1 (**[Ref.1 channel]** (Fr 1) page 154 set to **[AI virtual 1]** (AIU1)), adjust the actual reference value by modifying the analog input voltage value.

If local control is enabled (**[Ref.1 channel]** (Fr 1) page 154 set to **[HMI]** (LCC)), the jog dial on the remote display terminal or the Up/Down Navigation keys on the remote display terminal acts as a potentiometer to change the reference value up and down within the limits preset by other parameters (**[Low speed]** (LSP) or **[High speed]** (HSP)).

There is no need to press the ENT key to confirm the change of the reference.

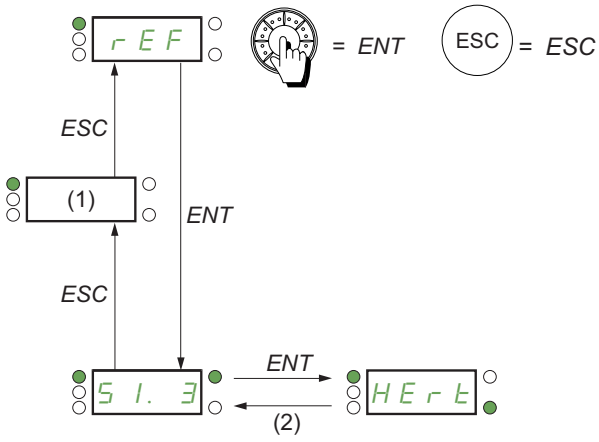
Organization tree

(1) Depending on the active reference channel

Possible values:
(AIU1)
(LFr)
(MFr)
(rP1)
(FrH)
(rPC)

(2) 2 s or ESC

Displayed parameter value and unit of the diagram are given as examples.



Value – Unit

Parameters described in this page can be accessed by: DRI- > REF-

Menu

Code	Name / Description	Adjustment range	Factory setting
dr i-	**[1 DRIVE MENU]**		
rEF-	**[1.1 SPEED REFERENCE]** Displayed parameters depend on drive settings.		
AiuI ★ (1)	**[Image input AIV1]** First virtual AI value. This parameter allows to modify the frequency reference with the embedded jog dial.	0 to 100% of HSP-LSP	0%
LFr ★ (1)	**[HMI Frequency ref.]** HMI frequency reference (signed value). This parameter allows to modify the frequency reference with the remote HMI.	-599 to +599 Hz	0 Hz
MFr ★	**[Multiplying coeff.]** Multiply frequency variable. Multiplying coefficient, can be accessed if **[Multiplier ref.-]** (MA2, MA3) page 169 has been assigned to the graphic terminal.	0 to 100%	100%
rPI ★ (1)	**[Internal PID ref.]** PID: Internal reference PI. This parameter allows to modify the PID internal reference with the jog dial. Internal PID reference is visible if **[PID feedback]** (PIF) is not set to **[No]** (no).	0 to 32,767	150
FrH ★	**[Frequency ref.]** Frequency reference before ramp (signed value). Actual frequency reference applied to the motor regardless of which reference channel has been selected. This parameter is in read-only mode. Frequency reference is visible if the command channel is not HMI or virtual AI.	-599 to +599 Hz	-
rPC ★	**[PID reference]** PID: Setpoint value. PID reference is visible if **[PID feedback]** (PIF) is not set to **[No]** (no).	0 to 65,535	-

(1) It is not necessary to press the ENT key to confirm the modification of the reference.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

Monitoring Mode (MOn)

4

What's in this Chapter?

This chapter contains the following topics:

Introduction

The parameters can be accessed when the drive is running or stopped.

Some functions have numerous parameters. In order to clarify programming and avoid having to scroll through endless parameters, these functions have been grouped in submenus. Like menus, submenus are identified by a dash after their code.

When the drive is running, the value displayed is one of the monitoring parameters. By default, the value displayed is the input frequency reference (**[Frequency ref.]** (FrH) parameter page 50).

While the value of the new monitoring parameter required is being displayed, press a second time on the jog dial key to display the units or press and hold down the jog dial (ENT) again (for 2 seconds) to confirm the change of monitoring parameter and store it. From then on, it is the value of this parameter that will be displayed during operation (even after powering down).

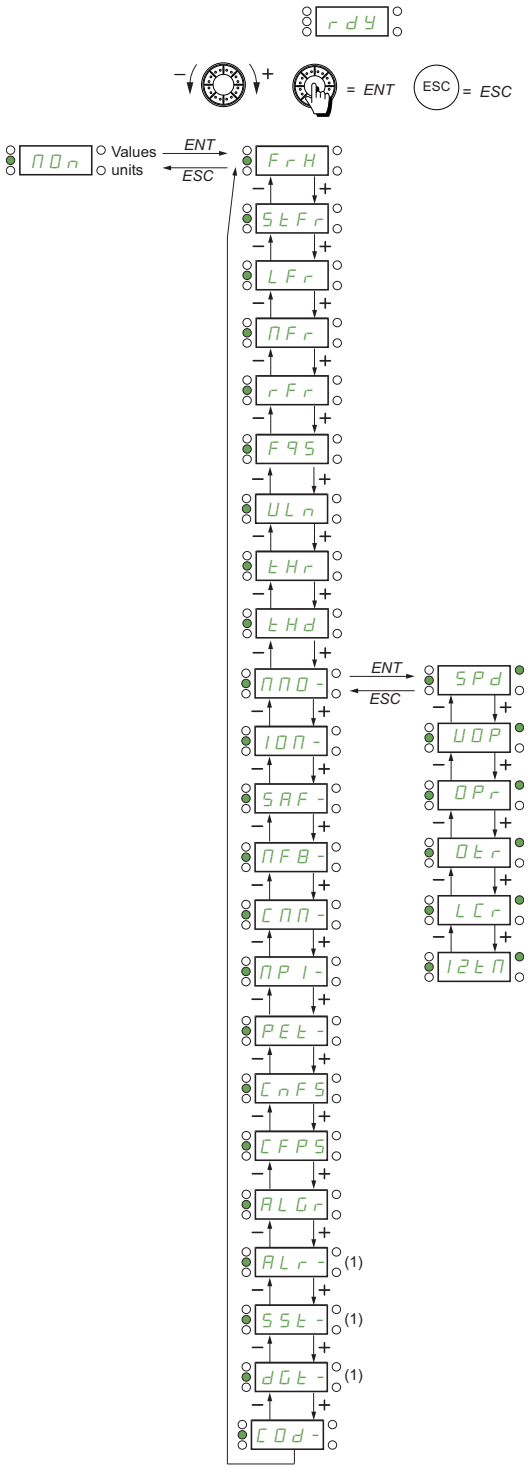
Unless the new choice is confirmed by pressing and holding down ENT again, the display will revert to the previous parameter after powering down.

Note: After the drive has been turned off or following a loss of supply mains, the parameter displayed is the drive status (example: **[Ready]** (rdY)). The selected parameter is displayed following a run command.

Organization tree

Displayed parameters of the diagram are given as examples.

(1) Visible only with graphic display terminal

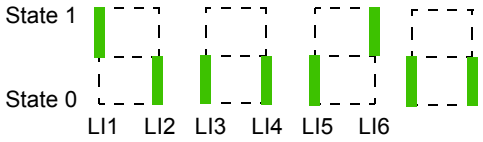
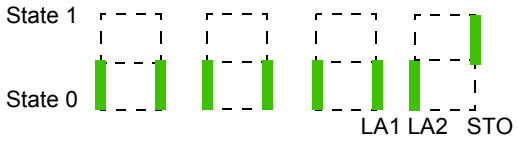


Parameters described in this page can be accessed by: DRI- > MON-

Menu

Code	Name / Description	Unit
Mon-	**[1.2 MONITORING]**	
AIu1	**[Image input AIV1]** First virtual AI value. This parameter is read-only. It enables you to display the speed reference applied to the motor.	%
FrH	**[Frequency ref.]** Frequency reference before ramp (signed value). This parameter is read-only. It enables you to display the speed reference applied to the motor, regardless of which reference channel has been selected.	Hz
StFr	**[Stator Frequency]** Displays the estimated stator frequency in Hz (signed value)	Hz
LFr	**[HMI Frequency ref.]** HMI frequency reference (signed value). This parameter only appears if the function has been enabled. It is used to change the speed reference from the remote control. ENT does not have to be pressed to enable a change of reference.	Hz
MFr ★	**[Multiplying coeff.]** Multiply frequency variable. Multiplying coefficient, can be accessed if **[Multiplier ref. -]** (MA2, MA3) page 169 has been assigned.	%
MMF	**[Measured output fr.]** Measured motor frequency (signed value) The measured motor speed is displayed if the speed monitoring card has been inserted. (VW3A3620)	Hz
rFr	**[Output frequency]** Estimated motor frequency (signed value).	Hz
F9S ★	**[Pulse in. work. freq.]** Measured frequency of the "Pulse input" input (see page 265).	Hz
uLn	**[Mains voltage]** Main voltage (from DC bus). Mains voltage based on DC bus measurement, motor running or stopped.	V
tHr	**[Motor thermal state]** Motor thermal state. 100% = Nominal thermal state, 118% = "OLF" threshold (motor overload).	%
tHd	**[Drv.thermal state]** Drive thermal state. 100% = Nominal thermal state, 118% = "OHF" threshold (drive overload).	%
MMo-	**[MONIT. MOTOR]**	
SPd	**[Motor speed]** Motor speed in rpm. (Estimated value)	rpm
uoP	**[Motor voltage]** Motor voltage. (Estimated value)	V
oPr	**[Motor power]** Output power monitoring (100% = nominal motor power, estimated value based on current measure).	%
otr	**[Motor torque]** Output torque value (100% = nominal motor torque, estimated value based on current measure).	%
LCr	**[Motor current]** Estimated motor current. (Value measured)	A

Parameters described in this page can be accessed by: DRI- > MON- > IOM- > LIA-

Code	Name / Description	Unit
Mon-	**[1.2 MONITORING] (continued)**	
MMo-	**[MONIT. MOTOR]**	
i2tM	**[I²t overload level]** Monitoring of I²t overload level This parameter can be accessed if **[I²t model activation]** (i2tA) is set to **[Yes]** (YES) see page 219	%
ioM-	**[I/O MAP]**	
LiA-	**[LOGIC INPUT CONF.]** Logic input functions.	
LiA	**[LI1 assignment]** Read-only parameters, cannot be configured. It displays all the functions that are assigned to the logic input in order to check for multiple assignments. If no functions have been assigned, **[No]** (no) is displayed. Use the jog dial to scroll through the functions. The use of graphic display terminal allows to see the delay **[LI1 On Delay]** (Lid). Possible values are the same than in configuration menu page 127.	
L2A to L6A LA1A LA2A	**[L-- assignment]** All the logic inputs available on the drive are processed as in the example for LI1 above.	
LiS1	**[State of logic inputs LI1 to LI6]** Can be used to visualize the state of logic inputs LI1 to LI6 (display segment assignment: high = 1, low = 0).  Example above: LI1 and LI6 are at 1; LI2 to LI5 are at 0.	
LiS2	**[State of Safe Torque Off]** Can be used to visualize the state of LA1, LA2 and STO (Safe Torque Off) (display segment assignment: high = 1, low = 0).  Example above: LA1 and LA2 are at 0; STO (Safe Torque Off) is at 1.	

Parameters described in this page can be accessed by: DRI- > MON- > IOM- > AIA-

Code	Name / Description	Unit
AIA-	**[ANALOG INPUTS IMAGE]** Analog input functions.	
AI1C	**[AI1]** AI1 customer image: Value of analog input 1.	V
AI1A	**[AI1 assignment]** AI1 functions assignment. If no functions have been assigned, **[No]** (nO) is displayed. Following parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. nO **[No]** (nO): Not assigned Fr1 **[Ref.1 channel]** (Fr1): Reference source 1 Fr2 **[Ref.2 channel]** (Fr2): Reference source 2 SA2 **[Summing ref. 2]** (SA2): Summing reference 2 PIF **[PID feedback]** (PIF): PI feedback (PI control) tAA **[Torque limitation]** (tAA): Torque limitation: Activation by an analog value dA2 **[Subtract. ref. 2]** (dA2): Subtracting reference 2 PIM **[Manual PID ref.]** (PIM): Manual speed reference of the PI(D) regulator (auto-man) FPI **[PID speed ref.]** (FPI): Speed reference of the PI(D) regulator (predictive reference) SA3 **[Summing ref. 3]** (SA3): Summing reference 3 Fr1b **[Ref.1B channel]** (Fr1b): Reference source 1B dA3 **[Subtract. ref. 3]** (dA3): Subtracting reference 3 FLOC **[Forced local]** (FLOC): Forced local reference source MA2 **[Ref. 2 multiplier]** (MA2): Multiplying reference 2 MA3 **[Ref. 3 multiplier]** (MA3): Multiplying reference 3 PES **[Weight input]** (PES): External weight measurement function IAI1 **[IA01]** (IAI1): Functions blocks: Analog Input 01 ... **...** IA10 **[IA10]** (IA10): Functions blocks: Analog Input 10	
UIL1	**[AI1 min value]** Voltage scaling parameter of 0%.	V
UIH1	**[AI1 max value]** Voltage scaling parameter of 100%.	V
AI1F	**[AI1 filter]** Interference filtering cut-off time of the low-filter.	s
ALA-	**[ANALOG INPUTS IMAGE] (continued)** Analog input functions.	
AI2C	**[AI2]** AI2 customer image: Value of analog input 2.	V
AI2A	**[AI2 assignment]** AI2 functions assignment. If no functions have been assigned, **[No]** (nO) is displayed. Following parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. Identical to **[AI1 assignment]** (AI1A) page 52.	
UIL2	**[AI2 min value]** Voltage scaling parameter of 0%.	V
UIH2	**[AI2 max value]** Voltage scaling parameter of 100%.	V
AI2F	**[AI2 filter]** Interference filtering cutoff time of the low-filter.	s

Parameters described in this page can be accessed by: DRI- > MON- > IOM- > AIA- > AI3C

Code	Name / Description	Unit
AI A-	**[ANALOG INPUTS IMAGE] (continued)** Analog input functions.	
AI 3C	**[AI3]** AI3 customer image: Value of analog input 3.	V
AI 3A	**[AI3 assignment]** AI3 functions assignment. If no functions have been assigned, **[No]** (nO) is displayed. Following parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. Identical to **[AI1 assignment]** (AI 1A) page 52.	
CrL3	**[AI3 min value]** Current scaling parameter of 0%.	mA
CrH3	**[AI3 max value]** Current scaling parameter of 100%.	mA
AI 3F	**[AI3 filter]** Interference filtering cutoff time of the low-filter.	s
IOM-	**[I/O MAP] (continued)**	
AOA-	**[ANALOG OUTPUTS IMAGE]** Analog output functions. Following parameters are visible on the graphic display terminal by pressing the ENT key on the parameter.	
AO 1C ( )	**[AO1C]** AO1 customer image: Value of analog output 1.	
AO 1	**[AO1 assignment]** AO1 functions assignment. If no functions have been assigned, **[No]** (nO) is displayed. Identical to **[AO1 assignment]** (AO 1) page 144.	
uoL 1 ★	**[AO1 min Output]** Voltage scaling parameter of 0%. Can be accessed if **[AO1 Type]** (AO 1t) is set to **[Voltage]** (10u).	V
uoH 1 ★	**[AO1 max Output]** Voltage scaling parameter of 100%. Can be accessed if **[AO1 Type]** (AO 1t) is set to **[Voltage]** (10u).	V
AoL 1 ★	**[AO1 min output]** Current scaling parameter of 0%. Can be accessed if **[AO1 Type]** (AO 1t) is set to **[Current]** (0A).	mA
AoH 1 ★	**[AO1 max output]** Current scaling parameter of 100%. Can be accessed if **[AO1 Type]** (AO 1t) is set to **[Current]** (0A).	mA
ASL 1	**[Scaling AO1 max]** Minimum scaling value for AO1.	%
ASH 1	**[Scaling AO1 min]** Maximum scaling value for AO1.	%
AO 1F	**[AO1 filter]** Cutoff time of the low-filter.	s

Parameters described in this page can be accessed by: DRI- > MON- > IOM- > FSI-

Code	Name / Description	Unit
ioM-	**[I/O MAP] (continued)**	
FSi-	**[FREQ. SIGNAL IMAGE]** Frequency signal image. This menu is visible only on graphic display terminal.	
PFrC	**[RP input]** Filtered customer pulse input frequency reference. Following parameters are visible on the graphic display terminal by pressing the ENT key on the parameter.	Hz
PiA	**[RP assignment]** Pulse input assignment. If no functions have been assigned, **[No]** (no) is displayed. Identical to **[AI1 assignment]** (AI1A) page 52.	
PiL	**[RP min value]** RP minimum value. Pulse input scaling parameter of 0%.	kHz
PFr	**[RP max value]** RP maximum value Pulse input scaling parameter of 100%.	kHz
PFi	**[RP filter]** Interference filtering pulse input cutoff time of the low-filter.	ms
Mon-	**[1.2 MONITORING] (continued)**	
SAF-	**[MONIT. SAFETY]** For more details on Integrated Safety Functions, please refer to dedicated Safety manual.	
StoS	**[STO status]** Status of the Safe Torque Off safety function. idLE **[Idle]** (idLE): STO not in progress Sto **[Safe stop]** (Sto): STO in progress FLt **[Fault]** (FLt): STO error detected	
SLSS	**[SLS status]** Status of the Safely-limited speed safety function. no **[Not config.]** (no): SLS not configured idLE **[Idle]** (idLE): SLS not in progress WAit **[SLS wait time]** (WALt): SLS waiting for activation Strt **[SLS start]** (Strt): SLS in transient state SS1 **[Safe ramp]** (SS1): SLS ramp in progress SLS **[Spd limited]** (SLS): SLS speed limitation in progress Sto **[Safe stop]** (Sto): SLS safe torque off request in progress FLt **[Fault]** (FLt): SLS error detected	
SS1S	**[SS1 status]** Status of the Safe Stop 1 safety function. no **[Not config.]** (no): SS1 not configured idLE **[Idle]** (idLE): SS1 not in progress SS1 **[Safe ramp]** (SS1): SS1 ramp in progress Sto **[Safe stop]** (Sto): SS1 safe torque off request in progress FLt **[Fault]** (FLt): SS1 error detected	
SMSS	**[SMS status]** Status of the Safe Maximum Speed safety function. no **[Not Set]** (no): SMS not set oFF **[Active]** (oFF): SMS active Fti **[Internal Err.]** (Fti): SMS internal error Fto **[Max Speed]** (Fto): Maximum Speed reached	

Parameters described in this page can be accessed by: DRI- > MON- > SAF-

Code	Name / Description	Unit
GdLS	**[GDL status]** Status of the Guard Door Locking safety function. no **[Not Set]** (no): GDL not set oFF **[Inactive]** (oFF): GDL inactive Std **[Short Delay]** (Std): Short Delay In Progress LGd **[Long Delay]** (LGd): Long Delay In Progress on **[Active]** (LGd): GDL active LFt **[Internal Err.]** (LGd): GDL internal error	
SFFE	**[Safety fault reg.]** Safety function error register. Bit0 = 1: Logic inputs debounce time-out (verify value of debounce time LIDT according to the application) Bit1 Reserved Bit2 = 1: Motor speed sign has changed during SS1 ramp Bit3 = 1: Motor speed has reached the frequency limit threshold during SS1 ramp. Bit4: Reserved Bit5: Reserved Bit6 = 1: Motor speed sign has changed during SLS limitation Bit7 = 1: Motor speed has reached the frequency limit threshold during SS1 ramp. Bit8: Reserved Bit9: Reserved Bit10: Reserved Bit11: Reserved Bit12: Reserved Bit13 = 1: Not possible to measure the motor speed (verify the motor wiring connection) Bit14 = 1: Motor ground short-circuit detected (verify the motor wiring connection) Bit15 = 1: Motor phase to phase short-circuit detected (verify the motor wiring connection)	
Mon-	**[1.2 MONITORING] (continued)**	
MFb-	**[MONIT. FUN. BLOCKS]** For more details on Function Blocks, please refer to dedicated Function Blocks manual.	
FbSt	**[FB status]** Function Block Status. idLE **[Idle]** (idLE): Idle state CHEC **[Check prog.]** (CHEC): Check program state StoP **[Stop]** (StoP): STOP state init **[Init]** (init): Initialization state run **[Run]** (run): RUN state Err **[Error]** (Err): Error state	
FbFt	**[FB fault]** Status of the function blocks execution. no **[No]** (no): No error detected int **[Internal]** (int): Internal error detected bin **[Binary file]** (bin): Binary error detected inP **[Intern para.]** (inP): Internal parameter error detected PAr **[Para. RW]** (PAr): Parameter access error detected CAL **[Calculation]** (CAL): Calculation error detected toAu **[TO AUX]** (toAu): TimeOut AUX task toPP **[TO synch]** (toPP): TimeOut in PRE/POST task AdL **[Bad ADLC]** (AdL): ADLC with bad parameter in **[Input assign.]** (in): Input not configured	
Fbi-	**[FB IDENTIFICATION]**	
buEr ★	**[Program version]** Program user version. Can be accessed if **[FB status]** (FbSt) is not set to **[Idle]** (idLE).	
bnS ★	**[Program size]** Program file size. Can be accessed if **[FB status]** (FbSt) is not set to **[Idle]** (idLE).	

Parameters described in this page can be accessed by: DRI- > MON- > CMM-

Code	Name / Description	Unit
bnu	**[Prg. format version]** Binary format version of the drive. Can be accessed if **[FB status]** (FbSt) is not set to **[Idle]** (idLE).	
Ctu	**[Catalogue version]** Catalog version of the drive.	
Mon-	**[1.2 MONITORING] (continued)**	
CMM-	**[COMMUNICATION MAP]** This menu is visible only on graphic display terminal, except for **[COM. SCANNER INPUT MAP]**.(iSA-) and **[COM SCAN MAP]**.(oSA-) menus.	
CMdC	**[Command channel]** Active command channel. tErM **[Terminals]** (tErM): Terminals HMI **[HMI]** (HMI): Graphic display terminal or remote display terminal Mdb **[Modbus]** (Mdb): Integrated Modbus CAn **[CANopen]** (CAn): Integrated CANopen® tud **[+/- speed]** (tud): +/- speed command nEt **[Com. card]** (nEt): Communication card (if inserted) PS **[PC tool]** (PS): PC software	
CMd	**[Cmd value]** DRIVECOM command register value. **[Profile]** (CHCF) is not set to **[I/O profile]** (io), see page 154. Possible values in CiA402 profile, separate or not separate mode. Bit 0: "Switch on"/Contactor command Bit 1: "Disable voltage"/Authorization to supply AC power Bit 2: "Quick stop"/Emergency stop Bit 3: "Enable operation"/Run command Bit 4 to Bit 6: Reserved (set to 0) Bit 7: "Fault reset"/error acknowledgment active on 0 to 1 rising edge Bit 8: Halt Stop according to the **[Type of stop]** (Stt) parameter without leaving the Operation enabled state Bit 9: Reserved (set to 0) Bit 10: Reserved (set to 0) Bit 11 to Bit 15: Can be assigned to a command Possible values in the I/O profile. On state command **[2 wire]** (2C). Bit 0: Forward (on state) command = 0: No forward command = 1: Forward command The assignment of bit 0 cannot be modified. It corresponds to the assignment of the terminals. It can be switched. Bit 0 (CdO0) is only active if the channel of this control word is active. Bit 1 to Bit 15: Can be assigned to commands. On edge command **[3 wire]** (3C). Bit 0: Stop (run authorization). = 0: Stop = 1: Run is authorized on a forward or reverse command Bit 1: Forward (on 0 to 1 rising edge) command The assignment of bits 0 and 1 cannot be modified. It corresponds to the assignment of the terminals. It can be switched. Bits 0 (CdO0) and 1 (CdO1) are only active if the channel of this control word is active. Bit 2 to Bit 15: Can be assigned to commands	
rFCC	**[Active ref. channel]** HMI reference channel. tErM **[Terminals]** (tErM): Terminals LoC **[Local]** (LoC): Jog dial HMI **[HMI]** (HMI): Graphic display terminal or remote display terminal Mdb **[Modbus]** (Mdb): Integrated Modbus CAn **[CANopen]** (CAn): Integrated CANopen® tUd **[tUd]** (tud): +/- speed command nEt **[Com. card]** (nEt): Communication card (if inserted) PS **[PC tool]** (PS): PC software	
FrH	**[Frequency ref.]**	Hz

Parameters described in this page can be accessed by: DRI- > MON- > CMM-

Code	Name / Description	Unit
	Frequency reference before ramp.	
ETA	**[ETA state word]** DRIVECOM status word. Possible values in CiA402 profile, separate or not separate mode. Bit 0: "Ready to switch on", awaiting power section supply mains Bit 1: "Switched on", ready Bit 2: "Operation enabled", running Bit 3: "Fault" = 0: No fault = 1: Fault Bit 4: "Voltage enabled", power section supply mains present = 0: Power section supply mains absent = 1: Power section supply mains present When the drive is powered by the power section only, this bit is always at 1. Bit 5: Quick stop/Emergency stop Bit 6: "Switched on disabled", power section supply mains locked Bit 7: Alarm = 0: No alarm = 1: Alarm Bit 8: Reserved (= 0) Bit 9: Remote: command or reference via the network = 0: Command or reference via the graphic display terminal or the remote display terminal = 1: Command or reference via the network Bit 10: Target reference reached = 0: The reference is not reached = 1: The reference has been reached When the drive is in speed mode, this is the speed reference. Bit 11: "Internal limit active", reference outside limits = 0: The reference is within the limits = 1: The reference is not within the limits When the drive is in speed mode, the limits are defined by the **[Low speed]** (LSP) and **[High speed]** (HSP) parameters. Bit 12 and Bit 13: Reserved (= 0) Bit 14: "Stop key", STOP via stop key = 0: STOP key not pressed = 1: Stop triggered by the STOP key on the graphic display terminal or the remote display terminal Bit 15: "Direction", direction of rotation = 0: Forward rotation at output = 1: Reverse rotation at output The combination of bits 0, 1, 2, 4, 5 and 6 defines the state in the DSP 402 state chart (see the Communication manuals). Possible values in the I/O profile. **Note:** The value is identical in the CiA402 profile and the I/O profile. In the I/O profile, the description of the values is simplified and does not refer to the CiA402 (Drivecom) state chart. Bit 0: Reserved (= 0 or 1) Bit 1: Ready = 0: Not ready = 1: Ready Bit 2: Running = 0: The drive will not start if a reference other than zero is applied. = 1: Running, if a reference other than zero is applied, the drive can start. Bit 3: Fault = 0: No fault = 1: Fault Bit 4: Power section supply mains present = 0: Power section supply mains absent = 1: Power section supply mains present Bit 5: Reserved (= 1) Bit 6: Reserved (= 0 or 1) Bit 7: Alarm = 0: No alarm = 1: Alarm Bit 8: Reserved (= 0) Bit 9: Command via a network = 0: Command via the terminals or the graphic display terminal = 1: Command via a network	

Parameters described in this page can be accessed by: DRI- > MON- > CMM-

Code	Name / Description	Unit
	Bit 10: Reference reached = 0: The reference is not reached = 1: The reference has been reached Bit 11: Reference outside limits = 0: The reference is within the limits = 1: The reference is not within the limits When the drive is in speed mode, the limits are defined by LSP and HSP parameters. Bit 12 and Bit 13: Reserved (= 0) Bit 14: Stop via STOP key = 0: STOP key not pressed = 1: Stop triggered by the STOP key on the graphic display terminal or the remote display terminal Bit 15: Direction of rotation = 0: Forward rotation at output = 1: Reverse rotation at output	
nnd-	**[MODBUS NETWORK DIAG]** Modbus network diagnostic.	
ndb1	**[COM LED]** View of the Modbus Communication.	
nICt	**[Mb NET frames nb.]** Modbus network frame counter: Number of processed frames.	
nIEC	**[Mb NET CRC errors]** Modbus network CRC error counter: Number of CRC errors.	
CMM-	**[COMMUNICATION MAP] (continued)**	
iSA-	**[COM. SCANNER INPUT MAP]** Used for CANopen® and Modbus Network.	
nM1	**[Com Scan In1 val.]** Value of the 1st input word.	
nM2	**[Com Scan In2 val.]** Value of the 2nd input word.	
nM3	**[Com Scan In3 val.]** Value of the 3rd input word.	
nM4	**[Com Scan In4 val.]** Value of the 4th input word.	
nM5	**[Com Scan In5 val.]** Value of the 5th input word.	
nM6	**[Com Scan In6 val.]** Value of the 6th input word.	
nM7	**[Com Scan In7 val.]** Value of the 7th input word.	
nM8	**[Com Scan In8 val.]** Value of the 8th input word.	
CMM-	**[COMMUNICATION MAP] (continued)**	
oSA-	**[COM SCAN MAP]**	
nC1	**[Com Scan Out1 val.]** Value of the 1st output word.	
nC2	**[Com Scan Out2 val.]** Value of the 2nd output word.	
nC3	**[Com Scan Out3 val.]** Value of the 3rd output word.	
nC4	**[Com Scan Out4 val.]** Value of the 4th output word.	
nC5	**[Com Scan Out5 val.]** Value of the 5th output word.	

Parameters described in this page can be accessed by: DRI- > MON- > CMM- > OSA-

Code	Name / Description	Unit
nC6	**[Com Scan Out6 val.]** Value of the 6th output word.	
nC7	**[Com Scan Out7 val.]** Value of the 7th output word.	
nC8	**[Com Scan Out8 val.]** Value of the 8th output word.	
CMM-	**[COMMUNICATION MAP]** **(continued)**	
C i-	**[CMD. WORD IMAGE]** Command word image: Only accessible via graphic display terminal.	
CMd1	**[Modbus cmd.]** Modbus command word image.	
CMd2	**[CANopen cmd.]** CANopen® command word image.	
CMd3	**[COM. card cmd.]** Communication card command word image.	
CMM-	**[COMMUNICATION MAP]** **(continued)**	
r i-	**[FREQ. REF. WORD MAP]** Frequency reference image: Only accessible via graphic display terminal.	
LFr1	**[Modbus ref.]** Modbus frequency reference image.	Hz
LFr2	**[CANopen ref.]** CANopen® frequency reference image.	Hz
LFr3	**[Com. card ref.]** Communication card frequency reference image.	Hz
CMM-	**[COMMUNICATION MAP]** **(continued)**	
CnM-	**[CANopen MAP]** CANopen® image: Only accessible via graphic display terminal.	
Con	**[RUN LED]** View of the CANopen® RUN Led Status.	
CAnE	**[ERR LED]** View of the CANopen® Error Led Status.	
Po1-	**[PDO1 IMAGE]** View of the RPDO1 and TPDO1.	
rP11 ★	**[Received PDO1-1]** First frame of the received PDO1.	
rP12 ★	**[Received PDO1-2]** Second frame of the received PDO1.	
rP13 ★	**[Received PDO1-3]** Third frame of the received PDO1.	
rP14 ★	**[Received PDO1-4]** Fourth frame of the received PDO1.	
tP11 ★	**[Transmit PDO1-1]** First frame of the transmit PDO1.	

Parameters described in this page can be accessed by: DRI- > MON- > CMM- > CNM- > P01-

Code	Name / Description	Unit
tP12 ★	**[Transmit PDO1-2]** Second frame of the transmit PDO1.	
tP13 ★	**[Transmit PDO1-3]** Third frame of the transmit PDO1.	
tP14 ★	**[Transmit PDO1-4]** Fourth frame of the transmit PDO1.	
CnM-	**[CANopen MAP] (continued)** CANopen® image: Only accessible via graphic display terminal.	
Po2-	**[PDO2 IMAGE]** View of the RPDO2 and TPDO2: Same structure as **[PDO1 IMAGE]** (Po1-).	
rP21 ★	**[Received PDO2-1]** First frame of the received PDO2.	
rP22 ★	**[Received PDO2-2]** Second frame of the received PDO2.	
rP23 ★	**[Received PDO2-3]** Third frame of the received PDO2.	
rP24 ★	**[Received PDO2-4]** Fourth frame of the received PDO2.	
tP21 ★	**[Transmit PDO2-1]** First frame of the transmit PDO2.	
tP22 ★	**[Transmit PDO2-2]** Second frame of the transmit PDO2.	
tP23 ★	**[Transmit PDO2-3]** Third frame of the transmit PDO2.	
tP24 ★	**[Transmit PDO2-4]** Fourth frame of the transmit PDO2.	
CnM-	**[CANopen MAP] (continued)** CANopen® image: Only accessible via graphic display terminal.	
Po3-	**[PDO3 IMAGE]** View of the RPDO3 and TPDO3: Same structure as **[PDO1 IMAGE]** (Po1-).	
rP31 ★	**[Received PDO3-1]** First frame of the received PDO3.	
rP32 ★	**[Received PDO3-2]** Second frame of the received PDO3.	
rP33 ★	**[Received PDO3-3]** Third frame of the received PDO3.	
rP34 ★	**[Received PDO3-4]** Fourth frame of the received PDO3.	

Parameters described in this page can be accessed by: DRI- > MON- > CMM- > CNM- > P03-

Code	Name / Description	Unit
tP31 ★	**[Transmit PDO3-1]** First frame of the transmit PDO3.	
tP32 ★	**[Transmit PDO3-2]** Second frame of the transmit PDO3.	
tP33 ★	**[Transmit PDO3-3]** Third frame of the transmit PDO3.	
tP34 ★	**[Transmit PDO3-4]** Fourth frame of the transmit PDO3.	
CnM-	**[CANopen MAP] (continued)** CANopen® image: Only accessible via graphic display terminal.	
nMtS	**[Canopen NMT state]** Drive NMT State of the CANopen® slave. boot **[Boot]** (boot): Bootup StoP **[Stopped]** (StoP): Stopped oPE **[Operation]** (oPE): Operational PoPE **[Pre-op]** (PoPE): Pre-Operational	
nbtP	**[Number of TX PDO]** Number of transmit PDO.	
nbrP	**[Number of RX PDO]** Number of receive PDO.	
ErCo	**[Error code]** CANopen® error register (from 1 to 5).	
rEC1	**[RX Error Counter]** Controller Rx error counter (not stored at power off).	
tEC1	**[TX error counter]** Controller Tx error counter (not stored at power off).	

Parameters described in this page can be accessed by: DRI- > MON- > MPI-

Code	Name / Description	Unit
Mon-	**[1.2 MONITORING] (continued)**	
MPI-	**[MONIT. PI]**	
★	PID management. Visible if **[PID feedback ass.]** (PIF) is not set to **[No]** (nO).	
rPI	**[Internal PID ref.]**	
↻	Internal PID reference: As a process value.	
★		
rPE	**[PID error]**	
★	PID error value.	
rPF	**[PID feedback]**	
★	PID feedback value.	
rPC	**[PID reference]**	
★	PID setpoint value via graphic display terminal.	
rPO	**[PID Output]**	Hz
	PID output value with limitation.	
Mon-	**[1.2 MONITORING] (continued)**	
PEt-	**[MONIT. POWER TIME]**	
APH	**[Consumption]**	Wh, kWh, MWh
	Energy consumption in Wh, kWh or MWh (accumulated consumption).	
rtH	**[Run time]**	s, min, h
	Run elapsed time display (resetable) in seconds, minutes or hours (length of time the motor has been switched on).	
PtH	**[Power on time]**	s, min, h
	Power elapsed time display in seconds, minutes or hours (length of time the drive has been switched on).	
rPr	**[Operating t. reset]**	
↻	Reset of run elapsed time.	
nO	**[No]** (nO): Reset operation not in progress	
APH	**[Reset kWh]** (APH): Clear **[Reset kWh]** (APH)	
rtH	**[rst. runtime]** (rtH): Clear **[rst. runtime]** (rtH)	
PtH	**[rst. P On t.]** (PtH): Clear **[rst. P On t.]** (PtH)	
Mon-	**[1.2 MONITORING] (continued)**	
CnFS	**[Config. active]**	
	View of the active configuration.	
nO	**[In progress]** (nO): Transitory state (configuration changing)	
CnF0	**[Config. n°0]** (CnF0): Configuration 0 active	
CnF1	**[Config. n°1]** (CnF1): Configuration 1 active	
CnF2	**[Config. n°2]** (CnF2): Configuration 2 active	
CFPS	**[Utilised param. set]**	
★	Configuration parameter status (can be accessed if parameter switching has been enabled, see page 229).	
nO	**[None]** (nO): Not assigned	
CFP1	**[Set N°1]** (CFP1): Parameter set 1 active	
CFP2	**[Set N°2]** (CFP2): Parameter set 2 active	
CFP3	**[Set N°3]** (CFP3): Parameter set 3 active	

Parameters described in this page can be accessed by: DRI- > MON-

Code	Name / Description	Unit
ALGr	**[Alarm groups]** Current impacted alarm group numbers. Group of alarms could be user defined in **[INPUTS / OUTPUTS CFG]** (I_O-) page 125.	
---	**[---]** (---): No alarm group impacted	
1--	**[1--]** (1--): Alarm group 1	
-2-	**[-2-]** (-2-): Alarm group 2	
12-	**[12-]** (12-): Alarm group 1 and 2	
--3	**[--3]** (--3): Alarm group 3	
1-3	**[1-3]** (1-3): Alarm group 1 and 3	
-23	**[-23]** (-23): Alarm group 2 and 3	
123	**[123]** (123): Alarm group 1, 2 and 3	
SPd1 or SPd2 or 9SPd3	**[Cust. output value]** [Cust. output value] (SPd1), [Cust. output value] (SPd2) or [Cust. output value] (SPd3) depending on the [Scale factor display] (SdS) parameter, page 104 ([Cust. output value] (SPd3) in the factory setting)	
ALr-	**[ALARMS]** List of current alarms. If an alarm is present, a ✓ appears on the graphic display terminal.	
noAL	**[No alarm]** (noAL)	
PtCL	**[PTC alarm]** (PtCL)	
EtF	**[External fault]** (EtF)	
uSA	**[UnderV. al.]** (uSA)	
CtA	**[I attained]** (CtA)	
FtA	**[Freq. Th. attain.]** (FtA)	
F2A	**[Freq. Th. 2 attained]** (F2A)	
SrA	**[Freq.ref.att]** (SrA)	
tSA	**[Th.mot. att.]** (tSA)	
tS2	**[Th.mot2 att.]** (tS2)	
tS3	**[Th.mot3 att.]** (tS3)	
uPA	**[Underv. prev.]** (uPA)	
FLA	**[HSP attain.]** (FLA)	
tHA	**[Al. °C drv]** (tHA)	
AG1	**[Alarm group 1]** (AG1)	
AG2	**[Alarm group 2]** (AG2)	
AG3	**[Alarm group 3]** (AG3)	
PEE	**[PID error al]** (PEE)	
PFA	**[PID fdbk al.]** (PFA)	
AP3	**[AI3 AI. 4-20mA]** (AP3)	
SSA	**[Lim T/I att.]** (SSA)	
tAd	**[Th.drv.att.]** (tAd)	
tJA	**[IGBT alarm]** (tJA)	
boA	**[Brake R. al.]** (boA)	
uLA	**[Underload. Proc. Al.]** (uLA)	
oLA	**[Overload. Proc. Al.]** (oLA)	
rSdA	**[Rope slack alarm]** (rSdA)	
ttHA	**[High torque alarm]** (ttHA)	
ttLA	**[Low torque alarm]** (ttLA)	
dLdA	**[Dynamic load alarm]** (dLdA)	
F9LA	**[Freq. meter Alarm]** (F9LA)	

Parameters described in this page can be accessed by: DRI- > MON- > SST-

Code	Name / Description	Unit
SSt-	**[OTHER STATE]** List of secondary states. This menu is visible only on graphic display terminal.	
FL	**[In motor fluxing]** (FL)	
PtCL	**[PTC Alarm]** (PtCL)	
FSt	**[Fast stop in prog.]** (FSt)	
CtA	**[Current Th. attained]** (CtA)	
FtA	**[Freq. Th. attained]** (FtA)	
F2A	**[Freq. Th. 2 attained]** (F2A)	
SrA	**[Frequency ref. att.]** (SrA)	
tSA	**[Motor th. state att.]** (tSA)	
EtF	**[External fault alarm]** (EtF)	
Auto	**[Auto restart]** (Auto)	
FtL	**[Remote]** (FtL)	
tun	**[Auto-tuning]** (tun)	
uSA	**[Undervoltage]** (uSA)	
CnF1	**[Config. 1 act.]** (CnF 1)	
CnF2	**[Config. 2 act.]** (CnF2)	
FLA	**[HSP attained]** (FLA)	
CFP1	**[Set 1 active]** (CFP 1)	
CFP2	**[Set 2 active]** (CFP2)	
CFP3	**[Set 3 active]** (CFP3)	
brS	**[In braking]** (brS)	
dbL	**[DC bus loading]** (dbL)	
EtHA	**[High torque alarm]** (EtHA)	
EtLA	**[Low torque alarm]** (EtLA)	
nFrd	**[Forward]** (nFrd)	
nrrS	**[Reverse]** (nrrS)	
F9LA	**[Freq. metre Alarm]** (F9LA)	
dGt-	**[DIAGNOSTICS]** This menu is visible only on graphic display terminal.	
PFH-	**[FAULT HISTORY]** Shows the 8 last detected faults.	
dP1	**[Past fault 1]** Fault record 1 (1 is last).	
noF	**[No fault]** (noF): No detected fault stored	
ASF	**[Angle error]** (ASF): Angle setting detected fault	
bLF	**[Brake control]** (bLF): Brake's motor 3-phases loss	
brF	**[Brake feedback]** (brF): Brake contactor detected error	
CFF	**[Incorrect config.]** (CFF): Invalid configuration at power on	
CFi2	**[Bad conf]** (CFi2): Configuration transfer detected error	
CnF	**[Com. network]** (CnF): NET option communication interruption	
CoF	**[CAN com.]** (CoF): CANopen® communication interruption	
CrF	**[Capa.charg]** (CrF): Load relay detected fault	
CSF	**[Ch.sw. fault]** (CSF): Channel switching detected error	
dLF	**[Load fault]** (dLF): Dynamic load detected error	
EEF1	**[Control EEprom]** (EEF 1): Control EEprom detected error	
EEF2	**[Power Eeprom]** (EEF2): Power EEprom detected error	
EPF1	**[External fault LI/Bit]** (EPF 1): External detected fault from LI or local link	
EPF2	**[External fault com.]** (EPF2): External interruption from communication board	
FbE	**[FB fault]** (FbE): Function block detected error	
FbES	**[FB stop fly.]** (FbES): Function block stop detected error	
FCF1	**[Out. contact. stuck]** (FCF 1): Output contactor: closed contactor	
FCF2	**[Out. contact. open.]** (FCF2): Output contactor: opened contactor	
HCF	**[Cards pairing]** (HCF): Hardware configuration detected error	
HdF	**[IGBT desaturation]** (HdF): Hardware detected error	
iLF	**[Option int link]** (iLF): Option internal link interruption	
inF1	**[Rating error]** (inF 1): Unknown drive rating	
inF2	**[PWR Calib.]** (inF2): Unknown or incompatible power board	
inF3	**[Int.serial link]** (inF3): Internal serial link communication interruption	
inF4	**[Int.Mfg area]** (inF4): Invalid industrialization zone	
inF6	**[Internal-option]** (inF6): Unknown or incompatible option board	
inF9	**[Internal- I measure]** (inF9): Current measurement circuit detected error	

Parameters described in this page can be accessed by: DRI- > MON- > DGT- > PFH-

Code	Name / Description	Unit
inFA	**[Internal-mains circuit]** (inFA): Input phase loss circuit detected error	
inFb	**[Internal- th. sensor]** (inFb): Thermal sensor detected error (OC or SC)	
inFE	**[Internal-CPU]** (inFE): CPU detected fault (ram, flash, task ...)	
LCF	**[Input contactor]** (LCF): Line contactor detected error	
LFF3	**[AI3 4-20mA loss]** (LFF3): AI3 4-20 mA loss	
obF	**[Overbraking]** (obF): Overbraking	
oCF	**[Overcurrent]** (oCF): Overcurrent	
oHF	**[Drive overheat]** (oHF): Drive overheating	
oLC	**[Proc.Overload Flt]** (oLC): Torque overload	
oLF	**[Motor overload]** (oLF): Motor overload	
oPF1	**[1 output phase loss]** (oPF1): Motor 1-phase loss	
oPF2	**[3out ph loss]** (oPF2): Motor 3-phases loss	
oSF	**[Mains overvoltage]** (oSF): Oversupply detected fault	
otFL	**[PTC fault]** (otFL): Motor overheating detected error from PTCL: standard product	
PHF	**[Input phase loss]** (PHF): Main input 1-phase loss	
PtFL	**[LI6=PTC probe]** (PtFL): PTCL detected error (OC or SC)	
SAFF	**[Safety]** (SAFF): Safety function	
SCF1	**[Motor short circuit]** (SCF1): Motor short circuit (hard detection)	
SCF3	**[Ground short circuit]** (SCF3): Direct ground short-circuit (hard detection)	
SCF4	**[IGBT short circuit]** (SCF4): IGBT short-circuit (hard detection)	
SCFS	**[Motor short circuit]** (SCFS): Load short-circuit during Igon load sequence (hard detection)	
SLF1	**[Modbus com.]** (SLF1): Modbus local serial communication interruption	
SLF2	**[PC com.]** (SLF2): PC Software communication interruption	
SLF3	**[HMI com.]** (SLF3): Remote terminal communication interruption	
SoF	**[Overspeed]** (SoF): Overspeed	
SPF	**[Speed fdback loss]** (SPF): Speed feedback loss	
SSF	**[Torque/current lim]** (SSF): Torque current limitation detected fault	
tJF	**[IGBT overheat]** (tJF): IGBT overheating	
tnF	**[Auto-tuning]** (tnF): Tune detected fault	
uLF	**[Pr.Underload Flt]** (uLF): Torque underload	
uSF	**[Undervoltage]** (uSF): Undervoltage	
HS1	**[Drive state]** HMI Status of the detected fault record 1.	
tun	**[Auto-tuning]** (tun): Auto-tuning	
dCb	**[In DC inject.]** (dCb): Injection braking	
rdY	**[Ready]** (rdY): Drive ready	
nSt	**[Freewheel]** (nSt): Freewheel stop control	
run	**[Drv running]** (run): Motor in steady state or run command present and zero reference	
ACC	**[In accel.]** (ACC): Acceleration	
dEC	**[In decel.]** (dEC): Deceleration	
CLI	**[Current lim.]** (CLI): Current limit (in case of using a synchronous motor, if the motor does not start, follow the procedure page 112)	
FSt	**[Fast stop]** (FSt): Fast stop	
FLu	**[Mot. fluxing]** (FLu): Fluxing function is activated	
nLP	**[no mains V.]** (nLP): Control is powered on but the DC bus is not loaded	
CtL	**[control.stop]** (CtL): Controlled stop	
obr	**[Dec. adapt.]** (obr): Adapted deceleration	
SoC	**[Output cut]** (SoC): Stand by output cut	
uSA	**[UnderV. al.]** (uSA): Undervoltage alarm	
tC	**[In mfg. test]** (tC): TC indus mode activated	
St	**[in autotest]** (St): Self test in progress	
FA	**[autotest err]** (FA): Self test detected error	
YES	**[Autotest OK]** (YES): Self test OK	
EP	**[eeprom test]** (EP): Self test Eeprom detected error	
FLt	**[In fault]** (FLt): Product has detected a fault	
SS1	**[SS1 active]** (SS1): Safety function SS1	
SLS	**[SLS active]** (SLS): Safety function SLS	
Sto	**[STO active]** (Sto): Safety function STO	
SMS	**[SMS active]** (SMS): Safety function SMS	
GdL	**[GdL active]** (GdL): Safety function GdL	
EP1	**[ETA state word]** DRIVECOM status register of detected fault record 1 (same as **[ETA state word]** (EtA) page 57).	
iP1	**[ETI state word]** Extended status register of detected fault record 1 (see the communication parameters file).	

Parameters described in this page can be accessed by: DRI- > MON- > DGT- > PFH-

Code	Name / Description	Unit
CMP1	**[Cmd word]** Command register of detected fault record 1 (same as **[Cmd word]** (CMd) page 56).	
LCP1	**[Motor current]** Estimated motor current of detected fault record 1 (same as **[Motor current]** (LCr) page 50).	A
rFP1	**[Output frequency]** Estimated motor frequency of detected fault record 1 (same as **[Output frequency]** (rFr) page 50).	Hz
rtP1	**[Elapsed time]** Elapsed run time of detected fault record 1 (same as **[Elapsed time]** (rtH) page 62).	h
uLP1	**[Mains voltage]** Main voltage of detected fault record 1 (same as **[Mains voltage]** (uLn) page 50).	V
tHP1	**[Motor thermal state]** Motor thermal state of detected fault record 1 (same as **[Motor thermal state]** (tHr) page 50).	%
dCC1	**[Command Channel]** Command channel of detected fault record 1 (same as **[Command channel]** (CMdC) page 56).	
drC1	**[Channel ref. active]** Reference channel of detected fault record 1 (same as **[Channel ref. active]** (rFCC) page 56).	
Sr11	**[Saf01 Reg n-1]** SAF1 Register x (1 is last)	
Sr21	**[Saf02 Reg n-1]** SAF2 Register x (1 is last)	
SrA1	**[SF00 Reg n-1]** SF00 Register x (1 is last)	
Srb1	**[SF01 Reg n-1]** SF01 Register x (1 is last)	
SrC1	**[SF02 Reg n-1]** SF02 Register x (1 is last)	
Srd1	**[SF03 Reg n-1]** SF03 Register x (1 is last)	
SrE1	**[SF04 Reg n-1]** SF04 Register x (1 is last)	
SrF1	**[SF05 Reg n-1]** SF05 Register x (1 is last)	
SrG1	**[SF06 Reg n-1]** SF06 Register x (1 is last)	
SrH1	**[SF07 Reg n-1]** SF07 Register x (1 is last)	
Sr.1	**[SF08 Reg n-1]** SF08 Register x (1 is last)	
SrJ1	**[SF09 Reg n-1]** SF09 Register x (1 is last)	
SrK1	**[SF10 Reg n-1]** SF10 Register x (1 is last)	
SrL1	**[SF11 Reg n-1]** SF11 Register x (1 is last)	

Parameters described in this page can be accessed by: DRI- > MON- > DGT- > PFH-

Code	Name / Description	Unit
PFH-	**[FAULT HISTORY] (continued)** Shows the 8 last detected faults.	
dP2	**[Past fault 2]** [Saf1 Reg n-2] (Sr12), [Saf2 Reg n-2] (Sr22), [SF00 Reg n-2] (SrA2), [SF01 Reg n-2] (Srb2), and [SF02 Reg n-2] (SrC2) to [SF11 Reg n-2] (SrL2) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	
dP3	**[Past fault 3]** [Saf1 Reg n-3] (Sr13), [Saf2 Reg n-3] (Sr23), [SF00 Reg n-3] (SrA3), [SF01 Reg n-3] (Srb3), and [SF02 Reg n-3] (SrC3) to [SF11 Reg n-3] (SrL3) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	
dP4	**[Past fault 4]** [Saf1 Reg n-4] (Sr14), [Saf2 Reg n-4] (Sr24), [SF00 Reg n-4] (SrA4), [SF01 Reg n-4] (Srb4), and [SF02 Reg n-4] (SrC4) to [SF11 Reg n-4] (SrL4) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	
dP5	**[Past fault 5]** [Saf1 Reg n-5] (Sr15), [Saf2 Reg n-5] (Sr25), [SF00 Reg n-5] (SrA5), [SF01 Reg n-5] (Srb5), and [SF02 Reg n-5] (SrC5) to [SF11 Reg n-5] (SrL5) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	
dP6	**[Past fault 6]** [Saf1 Reg n-6] (Sr16), [Saf2 Reg n-6] (Sr26), [SF00 Reg n-6] (SrA6), [SF01 Reg n-6] (Srb6), and [SF02 Reg n-6] (SrC6) to [SF11 Reg n-6] (SrL6) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	
dP7	**[Past fault 7]** [Saf1 Reg n-7] (Sr17), [Saf2 Reg n-7] (Sr27), [SF00 Reg n-7] (SrA7), [SF01 Reg n-7] (Srb7), and [SF02 Reg n-7] (SrC7) to [SF11 Reg n-7] (SrL7) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	
dP8	**[Past fault 8]** [Saf1 Reg n-8] (Sr18), [Saf2 Reg n-8] (Sr28), [SF00 Reg n-8] (SrA8), [SF01 Reg n-8] (Srb8), and [SF02 Reg n-8] (SrC8) to [SF11 Reg n-8] (SrL8) may be visible with this parameter. Identical to **[Past fault 1]** (dP1) page 64.	

Parameters described in this page can be accessed by: DRI- > MON- > PFL-

Code	Name / Description	Unit
dGt-	**[DIAGNOSTICS] (continued)**	
PFL-	**[CURRENT FAULT LIST]**	
noF	**[No fault]** (noF): No detected fault stored	
ASF	**[Angle error]** (ASF): Angle setting detected fault	
bLF	**[Brake control]** (bLF): Brake's motor 3-phases loss	
brF	**[Brake feedback]** (brF): Brake contactor detected error	
CFF	**[Incorrect config.]** (CFF): Invalid configuration at power on	
CFI2	**[Bad conf]** (CFI2): Configuration transfer detected error	
CnF	**[Com. network]** (CnF): NET option communication interruption	
CoF	**[CAN com.]** (CoF): CANopen® communication interruption	
CrF	**[Capa.charg]** (CrF): Load relay detected fault	
CSF	**[Ch.sw. fault]** (CSF): Channel switching detected error	
dLF	**[Load fault]** (dLF): Dynamic load detected error	
EEF1	**[Control EEprom]** (EEF1): Control EEprom detected error	
EEF2	**[Power Eeprom]** (EEF2): Power EEprom detected error	
EPF1	**[External fault LI/Bit]** (EPF1): External detected fault from LI or local link	
EPF2	**[External fault com.]** (EPF2): External interruption from communication board	
FbE	**[FB fault]** (FbE): Function block detected error	
FbE5	**[FB stop fly.]** (FbE5): Function block stop detected error	
FCF1	**[Out. contact. stuck]** (FCF1): Output contactor: closed contactor	
FCF2	**[Out. contact. open.]** (FCF2): Output contactor: opened contactor	
HCF	**[Cards pairing]** (HCF): Hardware configuration detected error	
HdF	**[IGBT desaturation]** (HdF): Hardware detected error	
iLF	**[Option int link]** (iLF): Option internal link interruption	
inF1	**[Rating error]** (inF1): Unknown drive rating	
inF2	**[PWR Calib.]** (inF2): Unknown or incompatible power board	
inF3	**[Int.serial link]** (inF3): Internal serial link communication interruption	
inF4	**[Int.Mfg area]** (inF4): Invalid industrialization zone	
inF6	**[Internal-option]** (inF6): Unknown or incompatible option board	
inF9	**[Internal- I measure]** (inF9): Current measurement circuit detected error	
inFA	**[Internal-mains circuit]** (inFA): Input phase loss circuit detected error	
inFb	**[Internal- th. sensor]** (inFb): Thermal sensor detected error (OC or SC)	
inFE	**[Internal-CPU]** (inFE): CPU detected fault (ram, flash, task ...)	
LCF	**[Input contactor]** (LCF): Line contactor detected error	
LFF3	**[AI3 4-20mA loss]** (LFF3): AI3 4-20 mA loss	
obF	**[Overbraking]** (obF): Overbraking	
oCF	**[Overcurrent]** (oCF): Overcurrent	
oHF	**[Drive overheat]** (oHF): Drive overheating	
oLC	**[Proc.Overload Flt]** (oLC): Torque overload	
oLF	**[Motor overload]** (oLF): Motor overload	
oPF1	**[1 output phase loss]** (oPF1): Motor 1-phase loss	
oPF2	**[3out ph loss]** (oPF2): Motor 3-phases loss	
oSF	**[Mains overvoltage]** (oSF): Oversupply detected fault	
otFL	**[PTC fault]** (otFL): Motor overheating detected error from PTCL: standard product	
PHF	**[Input phase loss]** (PHF): Main input 1-phase loss	
PtFL	**[LI6=PTC probe]** (PtFL): PTCL detected error (OC or SC)	
SAFF	**[Safety]** (SAFF): Safety function	
SCF1	**[Motor short circuit]** (SCF1): Motor short circuit (hard detection)	
SCF3	**[Ground short circuit]** (SCF3): Direct ground short-circuit (hard detection)	
SCF4	**[IGBT short circuit]** (SCF4): IGBT short-circuit (hard detection)	
SCF5	**[Motor short circuit]** (SCF5): Load short-circuit during Igon load sequence (hard detection)	
SLF1	**[Modbus com.]** (SLF1): Modbus local serial communication interruption	
SLF2	**[PC com.]** (SLF2): PC Software communication interruption	
SLF3	**[HMI com.]** (SLF3): Remote terminal communication interruption	
SoF	**[Overspeed]** (SoF): Overspeed	
SPF	**[Speed fdback loss]** (SPF): Speed feedback loss	
SSF	**[Torque/current lim]** (SSF): Torque current limitation detected fault	
tJF	**[IGBT overheat]** (tJF): IGBT overheating	
tnF	**[Auto-tuning]** (tnF): Tune detected fault	
uLF	**[Pr.Underload Flt]** (uLF): Torque underload	
uSF	**[Undervoltage]** (uSF): Undervoltage	

Parameters described in this page can be accessed by: DRI- > MON- > AFI-

Code	Name / Description	Unit
AF1-	**[MORE FAULT INFO]** Additional detected fault information.	
CnF	**[Network fault]** Communication option card fault code. This parameter is read-only. The fault code remains saved in the parameter, even if the cause disappears. The parameter is reset after the drive is disconnected and then reconnected. The values of this parameter depend on the network card. Consult the manual for the corresponding card.	
iLF1	**[Internal link fault 1]** Communication interruption between option card 1 and drive. This parameter is read-only. The fault code remains saved in the parameter, even if the cause disappears. The parameter is reset after the drive is disconnected and then reconnected.	
SFFE	**[Safety fault reg.]** **(1)** Safety function fault error register. Bit0 = 1: Logic inputs debounce time-out (verify value of debounce time LIDT according to the application) Bit1 Reserved Bit2 = 1: Motor speed sign has changed during SS1 ramp Bit3 = 1: Motor speed has reached the frequency limit threshold during SS1 ramp. Bit4: Reserved Bit5: Reserved Bit6 = 1: Motor speed sign has changed during SLS limitation Bit7 = 1: Motor speed has reached the frequency limit threshold during SS1 ramp. Bit8: Reserved Bit9: Reserved Bit10: Reserved Bit11: Reserved Bit12: Reserved Bit13 = 1: Not possible to measure the motor speed (verify the motor wiring connection) Bit14 = 1: Motor ground short-circuit detected (verify the motor wiring connection) Bit15 = 1: Motor phase to phase short-circuit detected (verify the motor wiring connection)	
SAF1	**[Safety fault Reg1]** **(1)** Safety fault register 1. Application control error register. Bit0 = 1: PWRM consistency detected error Bit1 = 1: Safety functions parameters detected error Bit2 = 1: Application auto test has detected an error Bit3 = 1: Diagnostic verification of safety function has detected an error Bit4 = 1: Logical input diagnostic has detected an error Bit5 = 1: SMS or GDL safety functions detected error (Details in [SAFF Subcode 4] SF04 register page 71) Bit6 = 1: Application watchdog management active Bit7 = 1: Motor control detected error Bit8 = 1: Internal serial link core detected error Bit9 = 1: Logical input activation detected error Bit10 = 1: Safe Torque Off function has triggered an error Bit11 = 1: Application interface has detected an error of the safety functions Bit12 = 1: Safe Stop 1 function has detected an error of the safety functions Bit13 = 1: Safely Limited Speed function has triggered an error Bit14 = 1: Motor data is corrupted Bit15 = 1: Internal serial link data flow detected error	

(1) Hexadecimal values are displayed on the Graphic display terminal
Example:
SFFE = **0x0008** in Hexadecimal
SFFE = Bit **3**

Code	Name / Description	Unit
SAF2	**[Safety fault Reg2] (1)** Safety fault register 2 Motor Control error register Bit0 = 1 : Consistency stator frequency verification has detected an error Bit1 = 1 : Stator frequency estimation detected error Bit2 = 1 : Motor control watchdog management is active Bit3 = 1 : Motor control hardware watchdog is active Bit4 = 1 : Motor control auto test has detected an error Bit5 = 1 : Chain testing detected error Bit6 = 1 : Internal serial link core detected error Bit7 = 1 : Direct short-circuit detected error Bit8 = 1 : PWM driver detected error Bit9 = 1 : GDL internal detected error Bit10 : Reserved Bit11 = 1 : Application interface has detected an error of the safety functions Bit12 = 1 : Reserved Bit13: Reserved Bit14 = 1 : Motor data is corrupted Bit15 = 1 : Internal serial link data flow detected error	
SF00	**[SAFF Subcode 0] (1)** Safety fault subregister 00 Appplication auto test error register Bit0 : Reserved Bit1 = 1 : Ram stack overflow Bit2 = 1 : Ram address integrity error Bit3 = 1 : Ram data access error Bit4 = 1 : Flash Checksum Error Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 : Reserved Bit9 = 1 : Fast task overflow Bit10 = 1 : Slow task overflow Bit11 = 1 : Application task overflow Bit12 : Reserved Bit13 : Reserved Bit14 = 1 : PWRM line is not activated during initialization phase Bit15 = 1 : Application hardware Watch Dog is not running after initialization	
SF01	**[SAFF Subcode 1] (1)** Safety fault subregister 01 Logical input diagnostics error register Bit0 = 1 : Management - state machine error Bit1 = 1 : Data required for test management are corrupted Bit2 = 1 : Channel selection detected error Bit3 = 1 : Testing - state machine detected error Bit4 = 1 : Test request is corrupted Bit5 = 1 : Pointer to test method is corrupted Bit6 = 1 : Incorrect test action provided Bit7 = 1 : Detected Error in results collecting Bit8 = 1 : LI3 detected error. Cannot activate safe function Bit9 = 1 : LI4 detected error. Cannot activate safe function Bit10 = 1 : LI5 detected error. Cannot activate safe function Bit11 = 1 : LI6 detected error. Cannot activate safe function Bit12 = 1 : Test sequence updated while a diagnostic is in progress Bit13 = 1 : Detected error in test pattern management Bit14 : Reserved Bit15 : Reserved	

(1) Hexadecimal values are displayed on the Graphic display terminal
Example:
SFFE = **0x0008** in Hexadecimal
SFFE = Bit **3**

Code	Name / Description	Unit
SFD2	**[SAFF Subcode 2] (1)** Safety fault subregister 02 Application Watchdog Management detected error register Bit0 = 1 : Fast task detected error Bit1 = 1 : Slow task detected error Bit2 = 1 : Application task detected error Bit3 = 1 : Background task detected error Bit4 = 1 : Safety fast task/input detected error Bit5 = 1 : Safety slow task/input detected error Bit6 = 1 : Safety app task/input detected error Bit7 = 1 : Safety app task/treatment detected error Bit8 = 1 : Safety background task detected error Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	
SFD3	**[SAFF Subcode 3] (1)** Safety fault subregister 03 Bit0 = 1 : Debounce time out Bit1 = 1 : Input not consistent Bit2 = 1 : Consistency check - state machine detected error Bit3 = 1 : Consistency check - debounce timeout corrupted Bit4 = 1 : Response time data detected error Bit5 = 1 : Response time corrupted Bit6 = 1 : Undefined consumer queried Bit7 = 1 : Configuration detected error Bit8 = 1 : Inputs are not in nominal mode Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	
SFD4	**[SAFF Subcode 4] (1)** Safety fault subregister 04 [Safe Torque Off] Sto detected error register Bit0 = 1 : No signal configured Bit1 = 1 : State machine detected error Bit2 = 1 : Internal data detected error Bit3 : Reserved Bit4 : Reserved Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 = 1 : SMS overspeed detected error Bit9 = 1 : SMS internal detected error Bit10 : Reserved Bit11 = 1 : GDL internal detected error 1 Bit12 = 1 : GDL internal detected error 2 Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	

(1) Hexadecimal values are displayed on the Graphic display terminal
Example:
SFFE = **0x0008** in Hexadecimal
SFFE = Bit **3**

Code	Name / Description	Unit
SFO5	**[SAFF Subcode 5] (1)** Safety fault subregister 05 [Safe Stop 1] SS1 detected error register Bit0 = 1 : State machine detected error Bit1 = 1 : Motor speed sign changed during stop Bit2 = 1 : Motor speed reached trigger area Bit3 = 1 : Theoretical motor speed corrupted Bit4 = 1 : Unauthorized configuration Bit5 = 1 : Theoretical motor speed computation detected error Bit6 : Reserved Bit7 = 1 : Speed sign check: consistency detected error Bit8 = 1 : Internal SS1 request corrupted Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	
SFO6	**[SAFF Subcode 6] (1)** Safety fault subregister 06 [Safely Limited Speed] SLS detected error register Bit0 = 1 : State machine error register Bit1 = 1 : Motor speed sign changed during limitation Bit2 = 1 : Motor speed has reached the frequency limit threshold Bit3 = 1 : Data corruption Bit4 : Reserved Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 : Reserved Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	
SFO7	**[SAFF Subcode 7] (1)** Safety fault subregister 07 Application Watchdog Management detected error register Bit0 : Reserved Bit1 : Reserved Bit2 : Reserved Bit3 : Reserved Bit4 : Reserved Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 : Reserved Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	

(1) Hexadecimal values are displayed on the Graphic display terminal
Example:
SFFE = **0x0008** in Hexadecimal
SFFE = Bit **3**

Code	Name / Description	Unit
SF08	**[SAFF Subcode 8] (1)** Safety fault subregister 08 Application Watchdog Management detected error register Bit0 = 1 : PWM task detected error Bit1 = 1 : Fixed task detected error Bit2 = 1 : ATMC watchdog detected error Bit3 = 1 : DYNFCT watchdog detected error Bit4 : Reserved Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 : Reserved Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	
SF09	**[SAFF Subcode 9] (1)** Safety fault subregister 09 Motor control Auto Test detected error register Bit0 : Reserved Bit1 = 1 : Ram stack overflow Bit2 = 1 : Ram address integrity detected error Bit3 = 1 : Ram data access detected error Bit4 = 1 : Flash Checksum detected error Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 : Reserved Bit9 = 1 : 1ms task overflow Bit10 = 1 : PWM task overflow Bit11 = 1 : Fixed task overflow Bit12 : Reserved Bit13 : Reserved Bit14 = 1 : Unwanted interruption Bit15 = 1 : Hardware WD is not running after initialization	
SF10	**[SAFF Subcode 10] (1)** Safety fault subregister 10 Motor control direct short-circuit detected error register Bit0 = 1 : Ground short circuit - Configuration detected error Bit1 = 1 : Phase to phase short circuit - Configuration detected error Bit2 = 1 : Ground short circuit Bit3 = 1 : Phase to phase short circuit Bit4 : Reserved Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 : Reserved Bit9 : Reserved Bit10 : Reserved Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	

(1) Hexadecimal values are displayed on the Graphic display terminal
Example:
SFFE = **0x0008** in Hexadecimal
SFFE = Bit **3**

Code	Name / Description	Unit
SFI1	**[SAFF Subcode 11] (1)** Safety fault subregister 11 Motor Control dynamic check of activity detected error register Bit0 = 1 : Application requested a diagnostic of direct short circuit Bit1 = 1 : Application requested consistency verification of stator frequency estimation (voltage and current) Bit2 = 1 : Application requested diagnostic of SpdStat provided by Motor Control Bit3 : Reserved Bit4 : Reserved Bit5 : Reserved Bit6 : Reserved Bit7 : Reserved Bit8 = 1 : Motor Control safe diagnostic of direct short circuit is enabled Bit9 = 1 : Motor Control consistency check of stator frequency estimation is enabled Bit10 = 1 : Motor Control diagnostic of SpdStat provided by Motor Control is enabled Bit11 : Reserved Bit12 : Reserved Bit13 : Reserved Bit14 : Reserved Bit15 : Reserved	
dGt-	**[DIAGNOSTICS] (continued)**	
tAC	**[IGBT alarm counter]** Transistor alarm time counter (length of time the "IGBT temperature" alarm has been active).	
tAC2	**[Min. freq time]** Transistor alarm time counter at minimum switching frequency (length of time the "IGBT temperature" alarm has been active after the drive has automatically reduced the switching frequency to the minimum value).	
ntJ ★	**[IGBT alarm Nb]** Transistor alarm counter: number detected during lifecycle. Visible if [3.1 ACCESS LEVEL] (LAC) is set to [Expert] (EPr).	
SEr-	**[SERVICE MESSAGE]** See page 289.	
rFLt	**[Reset past faults]** Reset all resetable previous detected faults. no **[No]** (no): Reset not active YES **[YES]** (YES): Reset in progress	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

(1) Hexadecimal values are displayed on the Graphic display terminal
Example:
SFFE = **0x0008** in Hexadecimal
SFFE = Bit **3**

Code	Name / Description	Unit
Mon-	**[1.2 MONITORING] (continued)**	
Cod-	**[PASSWORD]** HMI Password. If you have lost your code, please contact Schneider Electric.	
CSt	**[State]** Status of the drive (lock/unlock). Information parameter, cannot be modified. LC **[Locked]** (LC): The drive is locked by a password uLC **[Unlocked]** (uLC): The drive is not locked by a password	
Cod	**[PIN code 1]** Confidential code. Enables the drive configuration to be protected using an access code. When access is locked by means of a code, only the parameters in the **[1.2 MONITORING]** (Mon-) and **[1.1 SPEED REFERENCE]** (rEF-) menus can be accessed. The MODE key can be used to switch between menus. **Note:** Before entering a code, do not forget to make a careful note of it. oFF **[OFF]** (oFF): No access locking codes. - To lock access, enter a code (2 to 9,999). The display can be incremented using the jog dial. Then press ENT. **[ON]** (on) appears on the screen to indicate that access has been locked. on **[ON]** (on): A code is locking access (2 to 9,999). - To unlock access, enter the code (incrementing the display using the jog dial) and press ENT. The code remains on the display and access is unlocked until the next time the drive is turned off. Access will be locked again the next time the drive is turned on. - If an incorrect code is entered, the display changes to **[ON]** (on), and access remains locked. Access is unlocked (the code remains on the screen). - To reactivate locking with the same code when access has been unlocked, return to **[ON]** (on) using the jog dial and then press ENT. **[ON]** (on) remains on the screen to indicate that access has been locked. - To lock access with a new code when access has been unlocked, enter the new code (increment the display using the jog dial) and then press ENT. **[ON]** (on) appears on the screen to indicate that access has been locked. - To clear locking when access has been unlocked, return to **[OFF]** (oFF) using the jog dial and then press ENT. **[OFF]** (oFF) remains on the display. Access is unlocked and will remain so until the next restart.	
Cod2 ★	**[PIN code 2]** Confidential code 2. Visible if **[3.1 ACCESS LEVEL]** (LAC) is set to **[Expert]** (EPr). oFF The value **[OFF]** (oFF) indicates that no password has been set **[Unlocked]** (uLC). on The value **[ON]** (on) indicates that the drive configuration is protected and an access code must be entered in order to unlock it. Once the correct code has been entered, it remains on the display and the drive is unlocked until the next time the power supply is disconnected. 8888 PIN code 2 is an unlock code known only to Schneider Electric Product Support.	
uLr	**[Upload rights]** uLr0 **[Permitted]** (uLr0): Means that SoMove or the graphic display terminal can save the whole configuration (password, protections, configuration). When the configuration is edited, only the non protected parameters will be accessible. uLr1 **[Not allowed]** (uLr1): Means that SoMove or the graphic display terminal cannot save the configuration	
dLr	**[Download rights]** dLr0 **[Locked drv]** (dLr0): Locked drive: means that the configuration can be downloaded only in a locked drive which configuration has the same password. If the passwords are different, download is not permitted. dLr1 **[Unlock. drv]** (dLr1): Unlocked drive: means that the configuration can be downloaded only in a drive without active password dLr2 **[Not allowed]** (dLr2): Not allowed: the configuration cannot be downloaded dLr3 **[Lock/unlock]** (dLr3): Lock. + Not: download is permitted following case 0 or case 1	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

Configuration Mode (ConF)

5

What's in this Chapter?

This chapter contains the following topics:

Introduction

Configuration mode includes 4 parts:

1. "My Menu" menu includes up to 25 parameters available for user customization using the graphic display terminal or SoMove software.

2. Store/recall parameter set: These 2 functions are used to store and recall customer settings.

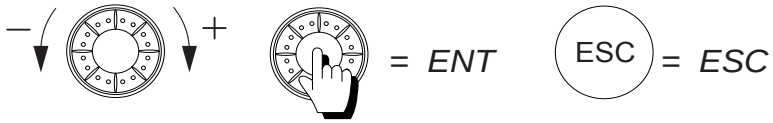
3. **[Macro configuration]** (CFG) parameter which allows to load predefined values for applications (see page 82).

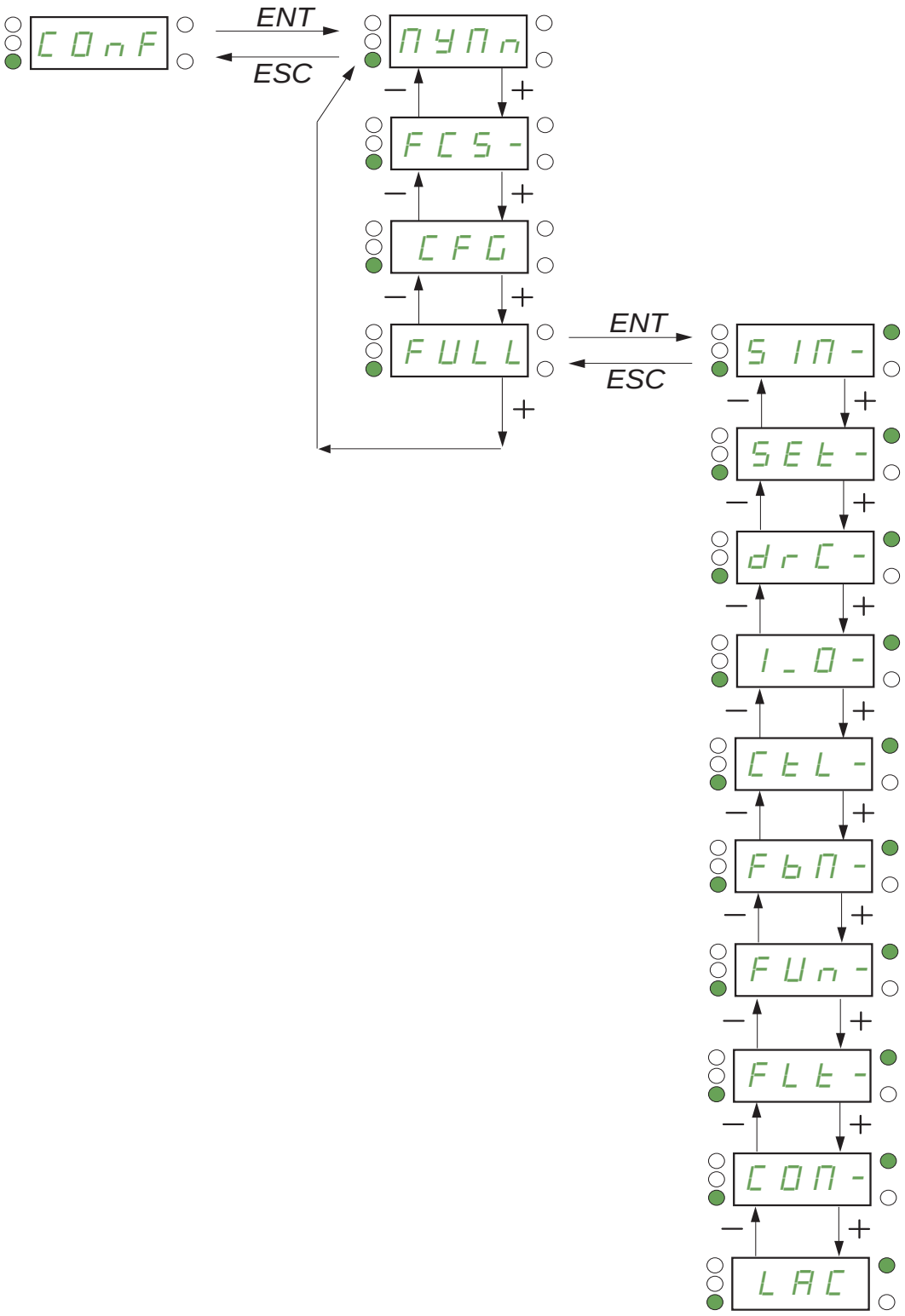
4. FULL: This menu provides access to all other parameters. It includes 10 sub-menus:

- **[SIMPLY START]** (SIM-) page 85
- **[SETTINGS]** (SEt-) page 89
- **[MOTOR CONTROL]** (drC-) page 105
- **[INPUTS / OUTPUTS CFG]** (I_O-) page 125
- **[COMMAND]** (CtL-) page 154
- **[FUNCTION BLOCK]** (FbM-) page 158
- **[APPLICATION FUNCT.]** (Fun-) page 167
- **[FAULT MANAGEMENT]** (FLt-) page 250
- **[COMMUNICATION]** (CoM-) page 275
- **[ACCESS LEVEL]** (LAC) page 280

Organization tree

Displayed parameter values are given as examples.





Parameters described in this page can be accessed by: DRI- > CONF > MYMN-

My Menu

Code	Name / Description
CONF	**[1.3 CONFIGURATION]**
MYMN	**[MY MENU]**
	This menu contains the parameters selected in the **[3.4 DISPLAY CONFIG.]** (dCF-) menu on page 287.

Parameters described in this page can be accessed by: DRI- > CONF > FCS-

Factory Settings

Code	Name / Description	Factory setting
ConF	**[1.3 CONFIGURATION]**	
FCS-	**[FACTORY SETTINGS]**	
FCS1	**[Config. Source]**	**[Macro-Conf]** (in1)
★	Choice of source configuration. If the configuration switching function is configured, it will not be possible to access **[Config 1]** (CFG1) and **[Config 2]** (CFG2). **Note:** To load the drive's presettings previously stored (**[Config 1]** (Str1) or **[Config 2]** (Str2)), select the source configuration **[Config. Source]** (FCS1) = **[Config 1]** (CFG1) or **[Config 2]** (CFG2) followed by a factory setting **[Goto FACTORY SETTINGS]** (GFS) = **[YES]** (YES).	
in1	**[Macro-Conf]** (in1): Factory configuration, return to selected macro configuration	
CFG1	**[Config 1]** (CFG1): Configuration 1	
CFG2	**[Config 2]** (CFG2): Configuration 2	
Fry-	**[PARAMETER GROUP LIST]**	
	Selection of menus to be loaded. See the multiple selection procedure on page 33 for the integrated display terminal and page 24 for the graphic display terminal. **Note:** In factory configuration and after a return to "factory settings", **[PARAMETER GROUP LIST]** will be empty.	
ALL	**[All]** (ALL): All parameters (the function blocks program will also be erased)	
drM	**[Drive configuration]** (drM): The **[1 DRIVE MENU]** (dr1-) menu without **[COMMUNICATION]** (CoM-). In the **[2.4 DISPLAY CONFIG.]** menu, **[Return std name]** (GSP) page 289 returns to **[No]** (no).	
Mot	**[Motor param]** (Mot): Motor parameters, see page 297. The following selections can only be accessed if **[Config. Source]** (FCS1) is set to **[Macro-Conf.]** (in1).	
CoM	**[Comm. menu]** (CoM): The **[COMMUNICATION]** (CoM-) menu without either **[Scan. In1 address]** (nMA1) to **[Scan. In8 address]** (nMAB) or **[Scan.Out1 address]** (nCA1) to **[Scan.Out8 address]** (nCAB).	
d1S	**[Display config.]** (d1S): The **[3.3 MONITORING CONFIG.]** (MCF-) menu	
GFS	**[Goto FACTORY SETTINGS]**	
★	**⚠WARNING** **UNANTICIPATED EQUIPMENT OPERATION** Verify that restoring the factory settings is compatible with the type of wiring used. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**	
2 s	It is only possible to revert to the factory settings if at least one group of parameters has previously been selected.	
no	**[No]** (no): No	
YES	**[Yes]** (YES): The parameter changes back to **[No]** (no) automatically as soon as the operation is complete	
SCS1	**[Save config]**	**[No]** (no)
★	The active configuration to be saved does not appear for selection. For example, if it is **[Config 0]** (Str0), only **[Config 1]** (Str1) and **[Config 2]** (Str2) appear. The parameter changes back to **[No]** (no) as soon as the operation is complete.	
no	**[No]** (no): No	
Str0	**[Config 0]** (Str0): Press and hold down the ENT key for 2 s	
Str1	**[Config 1]** (Str1): Press and hold down the ENT key for 2 s	
Str2	**[Config 2]** (Str2): Press and hold down the ENT key for 2 s	

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Parameters described in this page can be accessed by: DRI- > CONF

Macro Configuration

Code	Name / Description	Factory setting
CONF	**[1.3 CONFIGURATION] (continued)**	
CFG	**[Macro configuration]**	**[Start/Stop]** (STS)

★

2 s

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION
Verify that the selected macro configuration is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

STS **[Start/Stop]** (STS): Start/stop
HdG **[M. handling]** (HdG): Handling
HSt **[Hoisting]** (HSt): Hoisting
GEn **[Gen. Use]** (GEn): General use
PID **[PID regul.]** (PID): PID regulation
nEt **[Network C.]** (nEt): Communication bus

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Example of total return to factory settings

- **[Config. Source]** (FCSI) is set to **[Macro-Conf]** (InI)
- **[PARAMETER GROUP LIST]** (FrY-) is set to **[All]** (ALL)
- **[Goto FACTORY SETTINGS]** (GFS) is set to **[Yes]** (YES)

Assignment of the inputs/outputs

Input/ output	[Start/Stop]	[M. handling]	[Gen. Use]	[Hoisting]	[PID regul.]	[Network C.]
[AI1]	**[Ref.1 channel]**	**[Ref.1 channel]**	**[Ref.1 channel]**	**[Ref.1 channel]**	**[Ref.1 channel]** (PID reference)	**[Ref.2 channel]** (**[Ref.1 channel]** = integrated Modbus) (1)
[AI2]	**[No]**	**[Summing ref. 2]**	**[Summing ref. 2]**	**[No]**	**[PID feedback]**	**[No]**
[AI3]	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**
[AO1]	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**
[R1]	**[No drive flt]**	**[No drive flt]**	**[No drive flt]**	**[No drive flt]**	**[No drive flt]**	**[No drive flt]**
[R2]	**[No]**	**[No]**	**[No]**	**[Brk control]**	**[No]**	**[No]**
[LI1] (2-wire)	**[Forward]**	**[Forward]**	**[Forward]**	**[Forward]**	**[Forward]**	**[Forward]**
[LI2] (2-wire)	**[Reverse]**	**[Reverse]**	**[Reverse]**	**[Reverse]**	**[Reverse]**	**[Reverse]**
[LI3] (2-wire)	**[No]**	**[2 preset speeds]**	**[Jog]**	**[Fault reset]**	**[PID integral reset]**	**[Ref. 2 switching]**
[LI4] (2-wire)	**[No]**	**[4 preset speeds]**	**[Fault reset]**	**[External fault]**	**[2 preset PID ref.]**	**[Fault reset]**
[LI5] (2-wire)	**[No]**	**[8 preset speeds]**	**[Torque limitation]**	**[No]**	**[4 preset PID ref.]**	**[No]**
[LI6] (2-wire)	**[No]**	**[Fault reset]**	**[No]**	**[No]**	**[No]**	**[No]**
[LI1] (3-wire)	**[Drive running]**	**[Drive running]**	**[Drive running]**	**[Drive running]**	**[Drive running]**	**[Drive running]**
[LI2] (3-wire)	**[Forward]**	**[Forward]**	**[Forward]**	**[Forward]**	**[Forward]**	**[Forward]**
[LI3] (3-wire)	**[Reverse]**	**[Reverse]**	**[Reverse]**	**[Reverse]**	**[Reverse]**	**[Reverse]**
[LI4] (3-wire)	**[No]**	**[2 preset speeds]**	**[Jog]**	**[Fault reset]**	**[PID integral reset]**	**[Ref. 2 switching]**
[LI5] (3-wire)	**[No]**	**[4 preset speeds]**	**[Fault reset]**	**[External fault]**	**[2 preset PID ref.]**	**[Fault reset]**
[LI6] (3-wire)	**[No]**	**[8 preset speeds]**	**[Torque limitation]**	**[No]**	**[4 preset PID ref.]**	**[No]**
[LO1]	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**
Graphic display terminal keys						
F1 key	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**	Control via graphic display terminal
F2, F3, F4 keys	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**	**[No]**

In 3-wire control, the assignment of inputs LI1 to LI6 shifts.

(1) To start with, integrated Modbus **[Modbus Address]** (Add) must first be configured, page 276.

Note: These assignments are reinitialized every time the macro configuration changes.

Other configurations and settings

In addition to the assignment of inputs/outputs, other parameters are assigned **only in the Hoisting macro configuration**.

Hoisting:

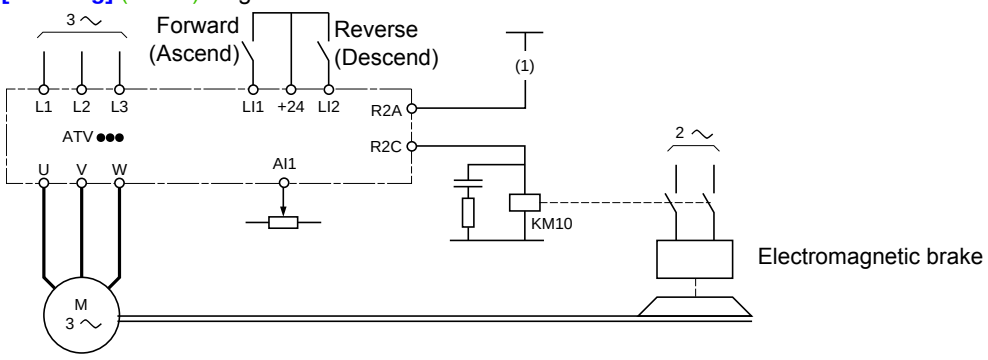
- **[Movement type]** (bSt) is set to **[Hoisting]** (uEr) page 194
- **[Brake contact]** (bC1) is set to **[No]** (nO) page 194
- **[Brake impulse]** (bIP) is set to **[Yes]** (YES) page 194
- **[Brake release I FW]** (Ibr) is set to 0 A page 194
- **[Brake Release time]** (brt) is set to 0 s page 194
- **[Brake release freq]** (bIr) is set to **[Auto]** (Auto) page 195
- **[Brake engage freq]** (bEn) is set to **[Auto]** (Auto) page 195
- **[Brake engage time]** (bEt) is set to 0 s page 195
- **[Engage at reversal]** (bEd) is set to **[No]** (nO) page 195
- **[Jump at reversal]** (JdC) is set to **[Auto]** (Auto) page 195
- **[Time to restart]** (ttr) is set to 0 s page 196
- **[Current ramp time]** (brr) is set to 0 s page 198
- **[Low speed]** (LSP) is set to Rated motor slip calculated by the drive, page 87
- **[Output Phase Loss]** (OPL) is set to **[Yes]** (YES) page 256
  No further modifications can be made to this parameter.
- **[Catch on the fly]** (FLr) is set to **[No]** (nO) page 253
  No further modifications can be made to this parameter.

Return to factory settings:
Returning to factory settings with **[Config. Source]** (FCS1) is set to **[Macro-Conf]** (In1) page 81 will return the drive to the selected macro configuration. The **[Macro configuration]** (CFG) parameter does not change, although **[Customized macro]** (CCFG) disappears.

Note: The factory settings that appear in the parameter tables correspond to **[Macro configuration]** (CFG) = **[Start/Stop]** (StS). This is the macro configuration set at the factory.

Example diagrams for use with the macro configurations

[Hoisting] (HSt) diagram



(1) Whithout integrated safety function, a contact on the Preventa module must be inserted in the brake control circuit to engage it when the "Safe Torque Off" safety function is activated (see connection diagrams in the Installation manual).

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SIM-

Full

Code	Name / Description	Adjustment range	Factory setting
CONF	**[1.3 CONFIGURATION]**		
FULL	**[FULL]**		
SIM-	**[SIMPLY START]**		
tCC	**[2/3 wire control]**		[2 wire] (2C)

2 s

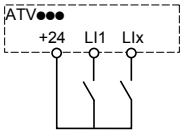
⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION
If this parameter is changed, the parameters **[Reverse assign.]** (rrS) and **[2 wire type]** (tCt) and the assignments of the digital inputs are reset to the factory setting.
Verify that this change is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

See **[2/3 wire control]** (tCC) page 125.

2C **[2 wire]** (2C)
2-wire control (level commands): This is the input state (0 or 1) or edge (0 to 1 or 1 to 0), which controls running or stopping.

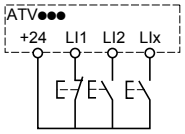
Example of "source" wiring:



LI1: forward
LIx: reverse

3C **[3 wire]** (3C)
3-wire control (pulse commands): A "forward" or "reverse" pulse is sufficient to command starting, a "stop" pulse is sufficient to command stopping.

Example of "source" wiring:



LI1: stop
LI2: forward
LIx: reverse

CFG	**[Macro configuration]**		[Start/Stop] (StS)

★

2 s

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION
Verify that the selected macro configuration is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

See **[Macro configuration]** (CFG) page 82.

StS **[Start/Stop]** (StS): Start/stop
HdG **[M. handling]** (HdG): Handling
HSt **[Hoisting]** (HSt): Hoisting
GEn **[Gen. Use]** (GEn): General use
PId **[PID regul.]** (PId): PID regulation
nEt **[Network C.]** (nEt): Communication bus

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SIM-

Code	Name / Description	Adjustment range	Factory setting
CCFG ★	**[Customized macro]** Read-only parameter, only visible if at least one macro configuration parameter has been modified. nO **[No]** (nO): No YES **[Yes]** (YES): Yes		
bFr	**[Standard mot. freq]**		**[50Hz IEC]** (50)
	This parameter modifies the presets of the following parameters: **[Rated motor volt.]** (UnS) below, **[High speed]** (HSP) page 87, **[Freq. threshold]** (Ftd) page 102, **[Rated motor freq.]** (FrS) and **[Max frequency]** (tFr) . 50 **[50Hz IEC]** (50): Drive 50 Hz 60 **[60Hz NEMA]** (60): Drive 60 Hz		
IPL ★	**[Input phase loss]**		Yes or No, according to drive rating
	This parameter is only accessible in this menu on 3-phase drives. If one phase disappears, the drive switches to fault mode **[Input phase loss]** (PHF), but if 2 or 3 phases disappear, the drive continues to operate until it trips on an undervoltage detected fault (the drive trips in **[Input phase loss]** (PHF) if there is an input phase loss and if this leads to performance decrease). See **[Input phase loss]** (IPL) page 256. nO **[Ignore]** (nO): Detected fault ignored, to be used when the drive is supplied via a single-phase supply or by the DC bus YES **[Freewheel]** (YES): With freewheel stop		
nPr ★	**[Rated motor power]**		According to drive rating
	Rated motor power given on the nameplate, in kW if **[Standard mot. freq]** (bFr) is set to **[50Hz IEC]** (50), in HP if **[Standard mot. freq]** (bFr) is set to **[60Hz NEMA]** (60). See **[Rated motor power]** (nPr) page 107.		
UnS ★	**[Rated motor volt.]**	100 to 480 V	According to drive rating
	Rated motor voltage given on the nameplate. ATV320●●●M2●: 100 to 240 V – ATV320●●●N4●: 200 to 480 V. See **[Rated motor volt.]** (UnS) page 107.		
nCr ★	**[Rated mot. current]**	0.25 to 1.5 In (1)	According to drive rating and **[Standard mot. freq]** (bFr)
	Rated motor current given on the nameplate. See **[Rated mot. current]** (nCr) page 107.		
FrS ★	**[Rated motor freq.]**	10 to 800 Hz	50 Hz
	Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if **[Standard mot. freq]** (bFr) is set to 60 Hz. This parameter is not visible if **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]** (SYn). See **[Rated motor freq.]** (FrS) page 107.		
nSP ★	**[Rated motor speed]**	0 to 65,535 rpm	According to drive rating
	Rated motor speed given on the nameplate. This parameter is not visible if **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]** (SYn). See **[Rated motor speed]** (nSP) page 107. 0 to 9,999 rpm then 10.00 to 60.00 krpm on the integrated display terminal. If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a %, calculate the rated speed as follows: Nominal speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or Nominal speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or Nominal speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors)		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SIM-

Code	Name / Description	Adjustment range	Factory setting
tFr	**[Max frequency]** The factory setting is 60 Hz, or preset to 72 Hz if **[Standard mot. freq]** (bFr) is set to 60 Hz. The maximum value is limited by the following conditions: It must not exceed 10 times the value of **[Rated motor freq.]** (Fr5). See **[Max frequency]** (tFr) page 105.	10 to 599 Hz	60 Hz
tun ( )	**[Auto tuning]** For asynchronous motors, see page 108. For synchronous motors, see page 113.		**[No action]** (nO)
tuS	**[Auto tuning state]** This parameter is not saved at drive power off. It shows the Autotuning status since last power on. See **[Auto tuning state]** (tuS) page 108. tAb **[Not done]** (tAb): Autotune is not done PEnd **[Pending]** (PEnd): Autotune has been requested but not yet performed ProG **[In Progress]** (ProG): Autotune is in progress FAIL **[Failed]** (FAIL): Autotune has detected a fault donE **[Done]** (donE): The stator resistance measured by the auto-tuning function is used to control the motor		**[Not done]** (tAb)
StUn	**[Tune selection]** See **[Tune selection]** (StUn) page 108. tAb **[Default]** (tAb): The default stator resistance value is used to control the motor MEAS **[Measure]** (MEAS): The stator resistance measured by the auto-tuning function is used to control the motor CuS **[Custom]** (CuS): The stator resistance set manually is used to control the motor		**[Default]** (tAb)
ItH ( )	**[Mot. therm. current]** Motor thermal protection current, to be set to the rated current indicated on the motor nameplate. See **[Mot. therm. current]** (ItH) page 90.	0.2 to 1.5 In (1)	According to drive rating
ACC ( )	**[Acceleration]** Time to accelerate from 0 to the **[Rated motor freq.]** (Fr5) (page 86). To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See **[Acceleration]** (ACC) page 89.	0.00 to 6,000 s (2)	3.0 s
dEC ( )	**[Deceleration]** Time to decelerate from the **[Rated motor freq.]** (Fr5) (page 86) to 0. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See **[Deceleration]** (dEC) page 89.	0.00 to 6,000 s (2)	3.0 s
LSP ( )	**[Low speed]** Motor frequency at minimum reference, can be set between 0 and **[High speed]** (HSP). See **[Low speed]** (LSP) page 89.	0 to 599 Hz	0
HSP ( )	**[High speed]** Motor frequency at maximum reference, can be set between **[Low speed]** (LSP) and **[Max frequency]** (tFr). The factory setting changes to 60 Hz if **[Standard mot. freq]** (bFr) is set to **[60Hz NEMA]** (60). See **[High speed]** (HSP) page 89.	0 to 599 Hz	50 Hz

(1) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 s according to **[Ramp increment]** (inr) page 170.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

( ) Parameter that can be modified during operation or when stopped.

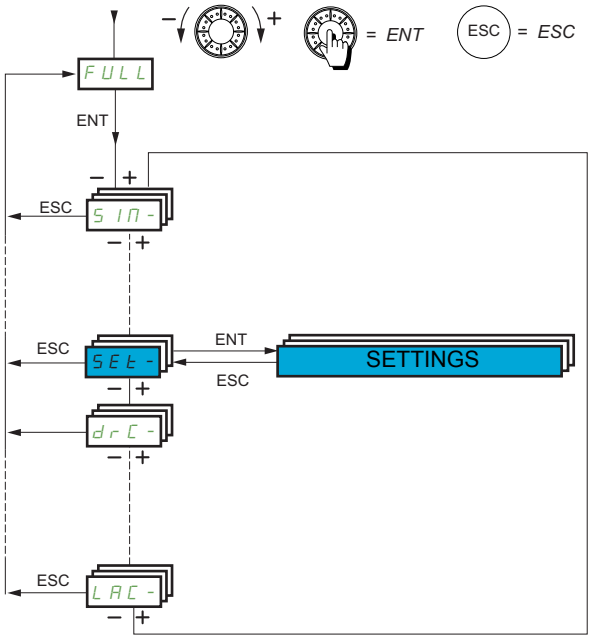
2 s To change the assignment of this parameter, press the ENT key for 2 s.

Settings

With integrated display terminal

It is recommend to stop the motor before modifying any of the settings.

From [o n F menu



The adjustment parameters can be modified with the drive running or stopped.

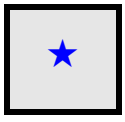
Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
FULL	**[FULL] (continued)**		
SET-	**[SETTINGS]**		
inr	**[Ramp increment]**		0.1
	This parameter is valid for **[Acceleration]** (ACC), **[Deceleration]** (dEC), **[Acceleration 2]** (AC2) and **[Deceleration 2]** (dE2). See **[Ramp increment]** (inr) page 170.		
0.01	**[0,01]**: Ramp up to 99.99 seconds		
0.1	**[0,1]**: Ramp up to 999.9 seconds		
1	**[1]**: Ramp up to 6,000 seconds		
ACC	**[Acceleration]**	0.00 to 6,000 s (1)	3.0 s
	Time to accelerate from 0 to the **[Rated motor freq.]** (Fr5) page 86. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See **[Acceleration]** (ACC) page 170.		
dEC	**[Deceleration]**	0.00 to 6,000 s (1)	3.0 s
	Time to decelerate from the **[Rated motor freq.]** (Fr5) page 86 to 0. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See **[Deceleration]** (dEC) page 170.		
AC2	**[Acceleration 2]**	0.00 to 6,000 s (1)	5 s
★	Time to accelerate from 0 to the **[Rated motor freq.]** (Fr5) page 86. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See **[Acceleration 2]** (AC2) page 171.		
dE2	**[Deceleration 2]**	0.00 to 6,000 s (1)	5 s
★	Time to decelerate from the **[Rated motor freq.]** (Fr5) page 86 to 0. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See **[Deceleration 2]** (dE2) page 171.		
tA1	**[Begin Acc round]**	0 to 100%	10%
★	Rounding of start of acceleration ramp as a % of the **[Acceleration]** (ACC) or **[Acceleration 2]** (AC2) ramp time. Visible if **[Ramp type]** (rPt) is set to **[Customized]** (CUS). See **[Begin Acc round]** (tA1) page 170.		
tA2	**[End Acc round]**	0 to 100%	10%
★	Rounding of end of acceleration ramp as a % of the **[Acceleration]** (ACC) or **[Acceleration 2]** (AC2) ramp time. Can be set between 0 and 100% - **[Begin Acc round]** (tA1). Visible if **[Ramp type]** (rPt) is set to **[Customized]** (CUS). See **[End Acc round]** (tA2) page 171.		
tA3	**[Begin Dec round]**	0 to 100%	10%
★	Rounding of start of deceleration ramp as a % of the **[Deceleration]** (dEC) or **[Deceleration 2]** (dE2) ramp time. Visible if **[Ramp type]** (rPt) is set to **[Customized]** (CUS). See **[Begin Dec round]** (tA3) page 171.		
tA4	**[End Dec round]**	0 to 100%	10%
★	Rounding of end of deceleration ramp as a % of the **[Deceleration]** (dEC) or **[Deceleration 2]** (dE2) ramp time. Can be set between 0 and 100% - **[Begin Dec round]** (tA3). Visible if **[Ramp type]** (rPt) is set to **[Customized]** (CUS). See **[End Dec round]** (tA4) page 171.		
LSP	**[Low speed]**	0 to 599 Hz	0 Hz
	Motor frequency at minimum reference, can be set between 0 and **[High speed]** (HSP) page 87. See **[Low speed]** (LSP) page 87.		
HSP	**[High speed]**	0 to 599 Hz	50 Hz
	Motor frequency at maximum reference, can be set between **[Low speed]** (LSP) and **[Max frequency]** (tFr). The factory setting changes to 60 Hz if **[Standard mot. freq]** (bFr) is set to **[60Hz NEMA]** (60). See **[High speed]** (HSP) page 87.		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
HSP2 ★	**[High speed 2]**	0 to 599 Hz	50 Hz
	Visible if **[2 High speed]** (SH2) is not set to **[No]** (nO). See **[High speed 2]** (HSP2) page 244.		
HSP3 ★	**[High speed 3]**	0 to 599 Hz	50 Hz
	Visible if **[4 High speed]** (SH4) is not set to **[No]** (nO). See **[High speed 3]** (HSP3) page 244.		
HSP4 ★	**[High speed 4]**	0 to 599 Hz	50 Hz
	Visible if **[4 High speed]** (SH4) is not set to **[No]** (nO). See **[High speed 4]** (HSP4) page 244.		
ItH	**[Mot. therm. current]**	0.2 to 1.5 In (2)	According to drive rating
	Motor thermal protection current, to be set to the rated current indicated on the motor nameplate. See **[Mot. therm. current]** (ItH) page 87.		
UFr	**[IR compensation]**	0 to 200%	100%
	IR compensation. See **[IR comprensation]** (UFr) page 118.		
SLP ★	**[Slip compensation]**	0 to 300%	100%
	Slip compensation. See **[Slip compensation]** (SLP) page 118.		
SFC ★	**[K speed loop filter]**	0 to 100	65
	Speed filter coefficient. See **[K speed loop filter]** (SFC) page 118.		
S_It ★	**[Speed time integral]**	1 to 65,535 ms	63 ms
	Speed loop integral time constant. See **[Speed time integral]** (S_It) page 118.		
SPG ★	**[Speed prop. gain]**	0 to 1,000%	40%
	Speed loop proportional gain. See **[Speed prop. gain]** (SPG) page 118.		
SPGU ★	**[UF inertia comp.]**	0 to 1,000%	40%
	Inertia factor. See **[UF inertia comp.]** (SPGU) page 118.		

(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 s according to **[Ramp increment]** (Inr) page 170.
(2) In corresponds to the rated drive current indicated in the Installation manual or on the drive nameplate.



These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

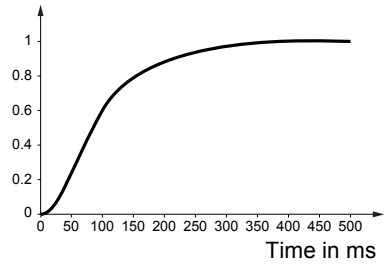
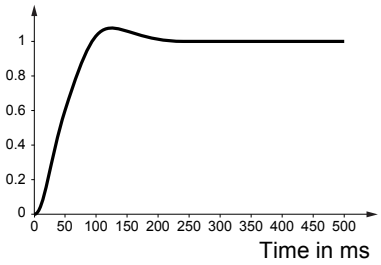
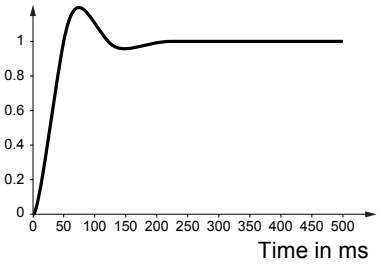
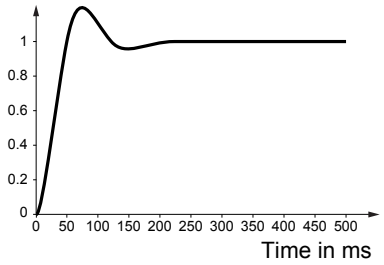
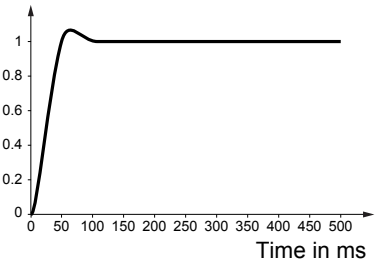
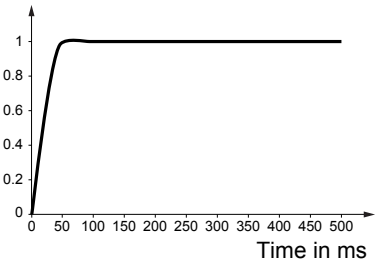
Parameter settings for [K speed loop filter] (SFC), [Speed prop. gain] (SPG) and [Speed time integral] (S itE)

The following parameters can be accessed if **[Motor control type]** (Ctt) page 105 is set to **[SVC V]** (uuC), **[Sync. mot.]** (SYn) or **[Energy Sav.]** (nLd).

General Case: Setting for [K speed loop filter] (SFC) = 0

The regulator is an "IP" type with filtering of the speed reference, for applications requiring flexibility and stability (hoisting or high inertia, for example).

- **[Speed prop. gain]** (SPG) affects excessive speed.
- **[Speed time integral]** (S itE) affects the passband and response time.

Initial response	**Reduction in SIT** ↘	**Reduction in SIT** ↘↘
Reference division  	Reference division  	Reference division 
Initial response	**Increase in SPG** ↗	**Increase in SPG** ↗↗
Reference division  	Reference division  	Reference division 

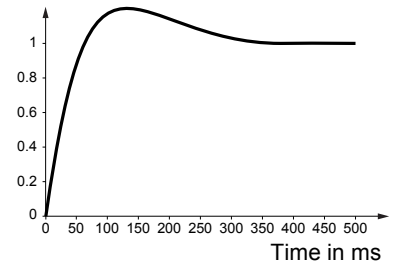
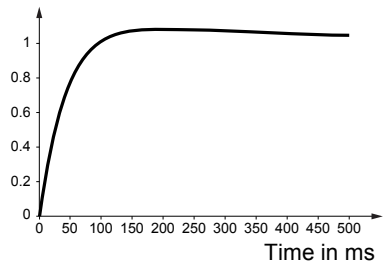
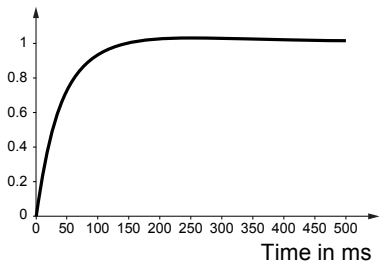
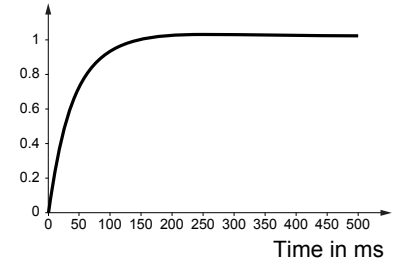
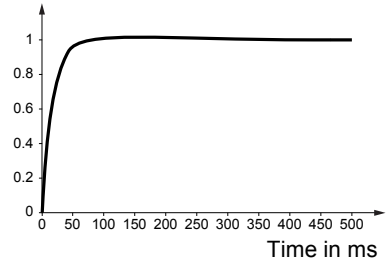
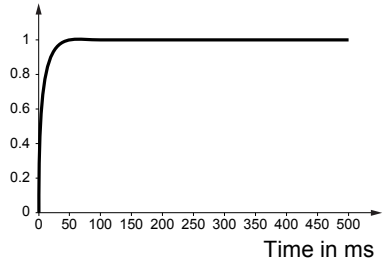
Special case: Parameter [K speed loop filter] (5FC) is not 0

This parameter must be reserved for specific applications that require a short response time (trajectory positioning or servo control).

- When set to 100 as described above, the regulator is a “PI” type, without filtering of the speed reference.
- Settings between 0 and 100 will obtain an intermediate function between the settings below and those on the previous page.

Example: Setting for **[K speed loop filter]** (5FC) = 100

- **[Speed prop. gain]** (5PG) affects the passband and response time.
- **[Speed time integral]** (5 tE) affects excessive speed.

Initial response	**Reduction in SIT** ↘	**Reduction in SIT** ↘↘
Reference division 	Reference division 	Reference division 
Initial response	**Increase in SPG** ↗	**Increase in SPG** ↗↗
Reference division 	Reference division 	Reference division 

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
dCF ★	**[Ramp divider]** Deceleration ramp time reduction. See **[Ramp divider]** (dCF) page 173.	0 to 10	4
IdC ★	**[DC inject. level 1]** Level of DC injection braking current activated via logic input or selected as stop mode. See **[DC inject. level 1]** (IdC) page 174.	0.1 to 1.41 In (1)	0.64 In (1)
tdI ★	**[DC injection time 1]** Maximum current injection time **[DC inject. level 1]** (IdC). After this time, the injection current becomes **[DC inject. level 2]** (IdC2). See **[DC injection time 1]** (tdI) page 174.	0.1 to 30 s	0.5 s
IdC2 ★	**[DC inject. level 2]** Injection current activated by logic input or selected as stop mode, once period of time **[DC injection time 1]** (tdI) has elapsed. See **[DC inject. level 2]** (IdC2) page 175.	0.1 In to 1.41 In (1)	0.5 In (1)
tdC ★	**[DC injection time 2]** Maximum injection time **[DC inject. level 2]** (IdC2) for injection selected as stop mode only. See **[DC injection time 2]** (tdC) page 175.	0.1 to 30 s	0.5 s
SdC1 ★	**[Auto DC inj. level 1]** **NOTICE** **OVERHEATING AND DAMAGE TO THE MOTOR** Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor. **Failure to follow these instructions can result in equipment damage.** Level of standstill DC injection current **[Auto DC injection]** (AdC) is not **[No]** (nO). See page 176.	0 to 1.2 In (1)	0.7 In (1)
tdC1 ★	**[Auto DC inj. time 1]** **NOTICE** **OVERHEATING AND DAMAGE TO THE MOTOR** Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor. **Failure to follow these instructions can result in equipment damage.** Standstill injection time. This parameter can be accessed if **[Auto DC injection]** (AdC) is not set to **[No]** (nO). If **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]**(SYn), this time corresponds to the zero speed maintenance time. See page 176.	0.1 to 30 s	0.5 s

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
SdC2	**[Auto DC inj. level 2]**	0 to 1.2 In (1)	0.5 In (1)

★

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR
Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.
Failure to follow these instructions can result in equipment damage.

2nd level of standstill DC injection current.
This parameter can be accessed if **[Auto DC injection]** (AdC) is not **[No]** (nO).
See page 177.

Code	Name / Description	Adjustment range	Factory setting
tdC2	**[Auto DC inj. time 2]**	0 to 30 s	0 s

★

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR
Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.
Failure to follow these instructions can result in equipment damage.

2nd standstill injection time.
This parameter can be accessed if **[Auto DC injection]** (AdC) is set to **[Yes]** (YES).
See page 177.

Code	Name / Description	Adjustment range	Factory setting
SFr	**[Switching freq.]**	2 to 16 kHz	4.0 kHz

NOTICE

DAMAGE TO THE MOTOR
Verify that the switching frequency of the drive does not exceed 4 kHz if the EMC filter is disconnected for operation of the drive in an IT mains.
Failure to follow these instructions can result in equipment damage.

This applies to the following drive versions: ATV320●●●M2●

Switching frequency setting. See page 119.
Adjustment range: The maximum value is limited to 4 kHz if **[Motor surge limit]** (SuL) parameter, page 120 is configured.
Note: In the event of excessive temperature rise, the drive will automatically reduce the switching frequency and reset it once the temperature returns to normal.

Code	Name / Description	Adjustment range	Factory setting
CLI	**[Current Limitation]**	0 to 1.5 In (1)	1.5 In (1)

★

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR
- Verify that the motor is properly rated for the maximum current to be applied to the motor.
- Consider the duty cycle of the motor and all factors of your application including derating requirements in determining the current limit.

Failure to follow these instructions can result in equipment damage.

Used to limit the motor current. See page 218.
Note: If the setting is less than 0.25 In, the drive may lock in **[Output Phase Loss]** (oPL) fault mode if this has been enabled (see page 256). If it is less than the no-load motor current, the motor cannot run.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
CL2	**[I Limit. 2 value]**	0 to 1.5 In (1)	1.5 In (1)

★

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

- Verify that the motor is properly rated for the maximum current to be applied to the motor.
- Consider the duty cycle of the motor and all factors of your application including derating requirements in determining the current limit.

Failure to follow these instructions can result in equipment damage.

See page 218.
Note: If the setting is less than 0.25 In, the drive may lock in **[Output Phase Loss]** (oPL) fault mode if this has been enabled (see page 256). If it is less than the no-load motor current, the motor cannot run.

Code	Name / Description	Adjustment range	Factory setting
FLU	**[Motor fluxing]**		**[No]** (FnO)

★

⚠ ⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If the parameter **[Motor fluxing]** (FLU) is set to **[Continuous]** (FCt), fluxing is always active, even if the motor does not run.

- Verify that using this setting does not result in unsafe conditions.

Failure to follow these instructions will result in death or serious injury.

2 s

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the flux current to be applied in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

The parameter is visible if **[Motor control type]** (Ctt) page 105 is not set to **[Sync. mot.]** (SYn).
In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor.
In **[Continuous]** (FCt) mode, the drive automatically builds up flux when it is powered up.
In **[Not cont.]** (FnC) mode, fluxing occurs when the motor starts up.
The flux current is greater than **[Rated mot. current]** (nCr) when the flux is established and is then adjusted to the motor magnetizing current. See page 189.

FnC **[Not cont.]** (FnC): Non-continuous mode
FCt **[Continuous]** (FCt): Continuous mode. This option is not possible if **[Auto DC injection]** (AdC) page 176 is **[Yes]** (YES) or if **[Type of stop]** (Stt) page 173 is **[Freewheel]** (nSt).
FnO **[No]** (FnO): Function inactive. This option is not possible if **[Brake assignment]** (bLC) page 194 is not **[No]** (nO).

Code	Name / Description	Adjustment range	Factory setting
tLS	**[Low speed time out]**	0 to 999.9 s	0 s

Maximum operating time at **[Low speed]** (LSP) (see page 87).
Following operation at LSP for a defined period, a motor stop is requested automatically. The motor will restart if the reference is greater than LSP and if a run command is still present. See page 213.
Note: A value of 0 indicates an unlimited period of time.
Note: If **[Low speed time out]** (tLS) is not 0, **[Type of stop]** (Stt) page 173 is forced to **[Ramp stop]** (rMP) (only if a ramp stop can be configured).

Code	Name / Description	Adjustment range	Factory setting
JGF	**[Jog frequency]**	0 to 10 Hz	10 Hz

★

Reference in jog operation. See page 178.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
JGt ★ ( )	**[Jog delay]** Anti-repeat delay between 2 consecutive jog operations. See page 179.	0 to 2.0 s	0.5 s

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
SP2 ★	**[Preset speed 2]** Preset speed 2. See **[Preset speed 2]** (SP2) page 181.	0 to 599 Hz	10 Hz
SP3 ★	**[Preset speed 3]** Preset speed 3. See **[Preset speed 3]** (SP3) page 181.	0 to 599 Hz	15 Hz
SP4 ★	**[Preset speed 4]** Preset speed 4. See **[Preset speed 4]** (SP4) page 181.	0 to 599 Hz	20 Hz
SP5 ★	**[Preset speed 5]** Preset speed 5. See **[Preset speed 5]** (SP5) page 181.	0 to 599 Hz	25 Hz
SP6 ★	**[Preset speed 6]** Preset speed 6. See **[Preset speed 6]** (SP6) page 181.	0 to 599 Hz	30 Hz
SP7 ★	**[Preset speed 7]** Preset speed 7. See **[Preset speed 7]** (SP7) page 181.	0 to 599 Hz	35 Hz
SP8 ★	**[Preset speed 8]** Preset speed 8. See **[Preset speed 8]** (SP8) page 182.	0 to 599 Hz	40 Hz
SP9 ★	**[Preset speed 9]** Preset speed 9. See **[Preset speed 9]** (SP9) page 182.	0 to 599 Hz	45 Hz
SP10 ★	**[Preset speed 10]** Preset speed 10. See **[Preset speed 10]** (SP10) page 182.	0 to 599 Hz	50 Hz
SP11 ★	**[Preset speed 11]** Preset speed 11. See **[Preset speed 11]** (SP11) page 182.	0 to 599 Hz	55 Hz
SP12 ★	**[Preset speed 12]** Preset speed 12. See **[Preset speed 12]** (SP12) page 182.	0 to 599 Hz	60 Hz

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
SP 13 ★	**[Preset speed 13]** Preset speed 13. See **[Preset speed 13]** (SP 13) page 182.	0 to 599 Hz	70 Hz
SP 14 ★	**[Preset speed 14]** Preset speed 14. See **[Preset speed 14]** (SP 14) page 182.	0 to 599 Hz	80 Hz
SP 15 ★	**[Preset speed 15]** Preset speed 15. See **[Preset speed 15]** (SP 15) page 182.	0 to 599 Hz	90 Hz
SP 16 ★	**[Preset speed 16]** Preset speed 16. See **[Preset speed 16]** (SP 16) page 182.	0 to 599 Hz	100 Hz
MFr ★	**[Multiplying coeff.]** Multiplying coefficient, can be accessed if **[Multiplier ref.]** (MA2, MA3) page 169 has been assigned to the graphic display terminal. See page 46.	0 to 100%	100%
SrP ★	**[+/-Speed limitation]** Limitation of +/- speed variation. See page 187.	0 to 50%	10%

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
rPG ★ (↻)	**[PID prop. gain]** Proportional gain. See page 211.	0.01 to 100	1
rIG ★ (↻)	**[PID integral gain]** Integral gain. See page 211.	0.01 to 100	1
rdG ★ (↻)	**[PID derivative gain]** Derivative gain. See page 211.	0.00 to 100	0
PrP ★ (↻)	**[PID ramp]** PID acceleration/deceleration ramp, defined to go from **[Min PID reference]** (PIP1) to **[Max PID reference]** (PIP2) and vice versa. See page 211.	0 to 99.9 s	0 s
PoL ★ (↻)	**[Min PID output]** Minimum value of regulator output in Hz. See page 211.	-599 to 599 Hz	0 Hz
PoH ★ (↻)	**[Max PID output]** Maximum value of regulator output in Hz. See page 211.	0 to 599 Hz	60 Hz
PAL ★ (↻)	**[Min fbk alarm]** Minimum monitoring threshold for regulator feedback. See page 211.	See page 211 (2)	100
PAH ★ (↻)	**[Max fbk alarm]** Maximum monitoring threshold for regulator feedback. See page 212.	See page 212 (2)	1,000
PEr ★ (↻)	**[PID error Alarm]** Regulator error monitoring threshold. See page 212.	0 to 65,535 (2)	100
PSr ★ (↻)	**[Speed input %]** Multiplying coefficient for predictive speed input. See page 212.	1 to 100%	100%
rP2 ★ (↻)	**[Preset ref. PID 2]** Preset PID reference. See page 214.	See page 214 (2)	300

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
r P 3 ★	**[Preset ref. PID 3]** Preset PID reference. See page 214.	See page 214 (2)	600
r P 4 ★	**[Preset ref. PID 4]** Preset PID reference. See page 214.	See page 214 (2)	900

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
ibr ★ ( )	**[Brake release I FW]** Brake release current threshold for lifting or forward movement. See page 194.	0 to 1.36 In (1)	0.0 A
ird ★ ( )	**[Brake release I Rev]** Brake release current threshold for lowering or reverse movement. See page 194.	0 to 1.36 In (1)	0.0 A
brt ★ ( )	**[Brake Release time]** Brake release time delay. See page 194.	0 to 5.00 s	0 s
bir ★ ( )	**[Brake release freq]** See page 195.	**[Auto]** (Auto) 0 to 10 Hz	**[Auto]** (Auto)
Auto	**[Auto]** (Auto): Nominal value		
bEn ★ ( )	**[Brake engage freq]** Brake engage frequency threshold. See page 195.	**[Auto]** (Auto) 0 to 10 Hz	**[Auto]** (Auto)
tbE ★ ( )	**[Brake engage delay]** Time delay before request to engage brake. See page 195.	0 to 5.00 s	0 s
bEt ★ ( )	**[Brake engage time]** Brake engage time (brake response time). See page 195.	0 to 5.00 s	0 s
JdC ★ ( )	**[Jump at reversal]** See page 195.	**[Auto]** (Auto) 0 to 10 Hz	**[Auto]** (Auto)
Auto	**[Auto]** (Auto): Nominal value		
ttr ★ ( )	**[Time to restart]** Time between the end of a brake engage sequence and the start of a brake release sequence. See page 196.	0.00 to 15.00 s	0.00 s
tLiM ★ ( )	**[Motoring torque lim]** Torque limitation in motor mode, as a % or in 0.1% increments of the rated torque in accordance with the **[Torque increment]** (inrP) parameter, page 216. See page 216.	0 to 300%	100%
tLiG	**[Gen. torque lim]**	0 to 300%	100%

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
★ ( )	Torque limitation in generator mode, as a % or in 0.1% increments of the rated torque in accordance with the **[Torque increment]** (inCP) parameter, page 216. See page 216.		
trH ★ ( )	**[Traverse freq. high]** Traverse high. See page 242.	0 to 10 Hz	4 Hz
trL ★ ( )	**[Traverse freq. low]** Traverse low. See page 242.	0 to 10 Hz	4 Hz
qSH ★ ( )	**[Quick step High]** Quick step high. See page 242.	0 to **[Traverse freq. high]** (trH)	0 Hz
qSL ★ ( )	**[Quick step Low]** Quick step low. See page 242.	0 to **[Traverse freq. low]** (trL	0 Hz
Ctd ( )	**[Current threshold]** Current threshold for **[I attained]** (CtA) function assigned to a relay or a logic output (see page 138). See page 252.	0 to 1.5 In (1)	In (1)
tHt ( )	**[High torque thd.]** High torque threshold for **[High tq. att.]** (tHtA) function assigned to a relay or a logic output (see page 138), as a % of the rated motor torque. See page 253.	-300% to +300%	100%
tLt ( )	**[Low torque thd.]** Low torque threshold for **[Low tq. att.]** (tLtA) function assigned to a relay or a logic output (see page 138), as a % of the rated motor torque. See page 253.	-300% to +300%	50%
FqL ★	**[Pulse warning thd.]** Speed threshold measured by the **[FREQUENCY METER]** (FqF-) function, page 266, assigned to a relay or a logic output (see page 138). See page 253.	0 Hz to 20,000 kHz	0 Hz
Ftd ( )	**[Freq. threshold]** Motor frequency threshold for **[Freq.Th.att.]** (FtA) function assigned to a relay or a logic output (see page 138), or used by the **[PARAM. SET SWITCHING]** (nLP-) function, page 230. See page 253.	0.0 to 599 Hz	HSP
F2d ( )	**[Freq. threshold 2]** Motor frequency threshold for **[Freq. th.2 attained]** (F2A) function assigned to a relay or a logic output (see page 138), or used by the **[PARAM. SET SWITCHING]** (nLP-) function, page 230. See page 253.	0.0 to 599 Hz	HSP
FFt ★ ( )	**[Freewheel stop Thd]** Speed threshold below which the motor will switch to freewheel stop. This parameter supports switching from a ramp stop or a fast stop to a freewheel stop below a low speed threshold. It can be accessed if **[Type of stop]** (Stt) is set to **[Fast stop]** (FSt) or **[Ramp stop]** (rMP) and if **[Brake assignment]** (bLC) and **[Auto DC injection]** (AdC) are not configured. See page 173.	0.2 to 599 Hz	0.2 Hz
ttd ( )	**[Motor therm. level]** Threshold for motor thermal alarm (logic output or relay). See page 255.	0 to 118%	100%
JPF ( )	**[Skip Frequency]** Skip frequency. This parameter helps to prevent prolonged operation within an adjustable range around the regulated frequency. This function can be used to help to prevent a speed, which would cause resonance, being reached. Setting the function to 0 renders it inactive. See page 183.	0 to 599 Hz	0 Hz
JF2	**[Skip Frequency 2]**	0 to 599 Hz	0 Hz

Parameters described in this page can be accessed by: DRI- > CONF > FULL > SET-

Code	Name / Description	Adjustment range	Factory setting
	2nd skip frequency. This parameter helps to prevent prolonged operation within an adjustable range around the regulated frequency. This function can be used to help to prevent a speed, which would cause resonance, being reached. Setting the function to 0 renders it inactive. See page 183.		
JF3	**[3rd Skip Frequency]**	0 to 599 Hz	0 Hz
	3rd skip frequency. This parameter helps to prevent prolonged operation within an adjustable range around the regulated frequency. This function can be used to help to prevent a speed, which would cause resonance, being reached. Setting the function to 0 renders it inactive. See page 183.		
JFH	**[Skip.Freq.Hysteresis]**	0.1 to 10 Hz	1 Hz
★	Parameter visible if at least one skip frequency **[Skip Frequency]** (JPF), **[Skip Frequency 2]** (JF2) or **[3rd Skip Frequency]** (JF3) is different from 0. Skip frequency range: between (JPF – JFH) and (JPF + JFH) for example. This adjustment is common to the 3 frequencies (JPF, JF2, JF3). See page 183.		
LUn	**[Unld.Thr.Nom.Speed]**	20 to 100% of **[Rated mot. current]** (nCr)	60%
★	Underload threshold at rated motor frequency (**[Rated motor freq.]** (Fr5) page 86), as a % of the rated motor torque. Visible only if **[Unld T. Del. Detect]** (ULt) page 270 is not set to 0. See page 270.		
LUL	**[Unld.Thr.0.Speed]**	0 to **[Unld.Thr.Nom.Speed]** (LUn)	0%
★	Underload threshold at zero frequency, as a % of the rated motor torque. Visible only if **[Unld T. Del. Detect]** (ULt) page 270 is not set to 0. See page 270.		
rNUd	**[Unld. Freq.Thr. Det.]**	0 to 599 Hz	0 Hz
★	Underload detection minimum frequency threshold. See page 270.		
Srb	**[Hysteresis Freq.Att.]**	0.3 to 599 Hz	0.3 Hz
★	Maximum deviation between the frequency reference and the motor frequency, which defines steady state operation. See page 270.		
FtU	**[Underload T.B.Rest.]**	0 to 6 min	0 min
★	Minimum time permitted between an underload being detected and any automatic restart. In order for an automatic restart to be possible, the value of **[Max. restart time]** (tAr) page 252 must exceed that of this parameter by at least one minute. See page 271.		
LoC	**[Ovld Detection Thr.]**	70% to 150% of **[Rated mot. current]** (nCr)	110%
★	Overload detection threshold, as a % of the rated motor current **[Rated mot. current]** (nCr). This value must be less than the limit current in order for the function to work. See page 272. Visible only if **[Ovld Time Detect.]** (tOL) is not set to 0. This parameter is used to detect an "application overload". This is not a motor or drive thermal overload.		
FtO	**[Overload T.B.Rest.]**	0 to 6 min	0 min
★	Minimum time permitted between an overload being detected and any automatic restart. In order for an automatic restart to be possible, the value of **[Max. restart time]** (tAr) page 252 must exceed that of this parameter by at least one minute. See page 272.		
LbC	**[Load correction]**	0 to 599 Hz	0 Hz
★	Rated correction in Hz. See **[Load correction]** (LbC) page 122.		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

Code	Name / Description	Adjustment range	Factory setting
FFn	**[Fan Mode]**		**[Standard]** (Std)
	If **[Fan Mode]** (FFn) is set to **[Never]** (StP), the fan of the drive is disabled. Service life of electronic component is reduced. **NOTICE** **DAMAGE TO THE DRIVE** The ambient temperature must be limited to 40°C (104°F) **Failure to follow these instructions can result in equipment damage.**		
Std	**[Standard]** (Std): The fan starts and stops automatically according to the drive thermal state		
run	**[Always]** (run): The fan is started		
StP	**[Never]** (StP): The fan is stopped		
SdS	**[Scale factor display]**	0.1 to 200	30
	Used to display a value in proportion to the output frequency [Output frequency] (rFr): the machine speed, the motor speed, etc. The display will show [Cust. output value] (SPd3) = $\frac{\text{[Scale factor display] (SdS)} \times \text{[Output frequency] (rFr)}}{1000}$ to 2 decimal places • If [Scale factor display] (SdS) ≤ 1, [Cust. output value] (SPd1) is displayed (possible definition = 0.01) • If 1 < [Scale factor display] (SdS) ≤ 10, [Cust. output value] (SPd2) is displayed (possible definition = 0.1) • If [Scale factor display] (SdS) > 10, [Cust. output value] (SPd3) is displayed (possible definition = 1) • If [Scale factor display] (SdS) > 10 and [Scale factor display] (SdS) x [Output frequency] (rFr) > 9,999: example: for 24,223, display will show 24.22 - If [Scale factor display] (SdS) > 10 and [Scale factor display] (SdS) x [Output frequency] (rFr) > 65,535, display locked at 65.54 Example: Display motor speed for 4-pole motor, 1,500 rpm at 50 Hz (synchronous speed): [Scale factor display] (SdS) = 30 [Cust. output value] (SPd3) = 1,500 at [Output frequency] (rFr) = 50 Hz		

(1) In corresponds to the rated drive current indicated in the Installation manual or on the drive nameplate.

(2) If a graphic display terminal is not in use, values greater than 9,999 will be displayed on the 4-digit display with a period mark after the thousand digit, example: 15.65 for 15,650.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

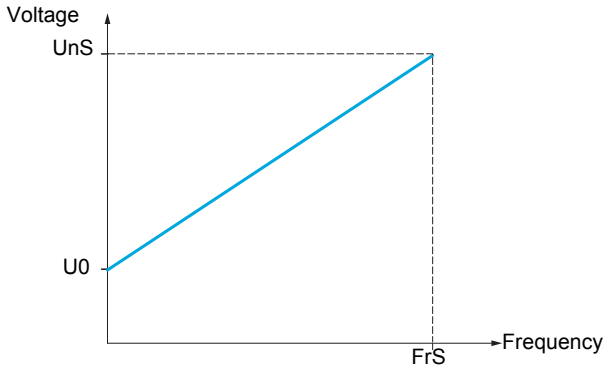
Motor control

The parameters in the **[MOTOR CONTROL]** (drC-) menu can only be modified when the drive is stopped and no run command is present, with the following exceptions:

- **[Auto tuning]** (tun) page 113, which may cause the motor to start up.
- Parameters containing the sign ( ) in the code column, which can be modified with the drive running or stopped.

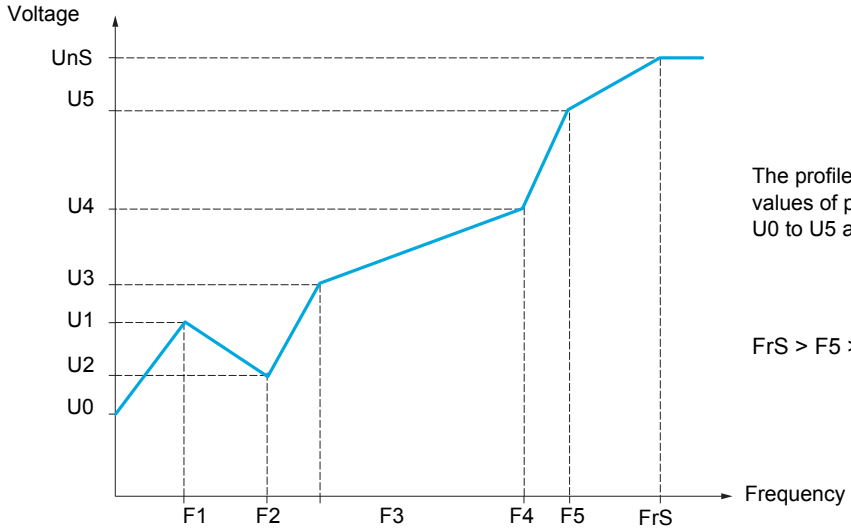
Note : We recommend to perform auto-tuning if one of the following parameters are modified from their factory setting.

Code	Name / Description	Adjustment range	Factory setting
FULL	**[FULL] (continued)**		
drC-	**[MOTOR CONTROL]**		
bFr	**[Standard mot. freq]**		**[50 Hz IEC]** (50)
	This parameter modifies the presets of the following parameters: **[High speed]** (HSP) page 87, **[Freq. threshold]** (Ftd) page 102, **[Rated motor volt.]** (unS), **[Rated motor freq.]** (FrS) and **[Max frequency]** (tFr). 50 **[50 Hz IEC]** (50): IEC 60 **[60 Hz NEMA]** (60): NERA		
tFr	**[Max frequency]**	10 to 599 Hz	60 Hz
	The factory setting is 60 Hz, or preset to 72 Hz if **[Standard mot. freq]** (bFr) is set to 60 Hz. The maximum value is limited by the following conditions: It must not exceed 10 times the value of **[Rated motor freq.]** (FrS).		
Ctt	**[Motor control type]**		**[Standard]** (Std)
	Note: Select law before entering parameter values. uuC **[SVC V]** (uuC): Sensorless vector control with internal speed loop based on voltage feedback calculation. For applications needing high performance during starting or operation. Std **[Standard]** (Std): Standard motor law. For simple applications that do not require high performance. Simple motor control law keeping a constant Voltage Frequency ratio, with a possible adjustment of the curve bottom. This law is generally used for motors connected in parallel. Some specific applications with motors in parallel and high performance levels may require **[SVC V]** (uuC).		



Note: U0 is the result of an internal calculation based on motor parameters and multiplied by UFr (%). U0 can be adjusted by modifying UFr value.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > ASY-

Code	Name / Description	Adjustment range	Factory setting
uF5	**[V/F 5pts]** (uF5): 5-segment V/F profile: As **[Standard]** (Std) profile but also supports the avoidance of resonance (saturation).  The profile is defined by the values of parameters UnS, FrS, U0 to U5 and F1 to F5. FrS > F5 > F4 > F3 > F2 > F1 **Note:** U0 is the result of an internal calculation based on motor parameters and multiplied by UFr (%). U0 can be adjusted by modifying UFr value.		
SYn	**[Sync. mot.]** (SYn): For synchronous permanent magnet motors with sinusoidal electromotive force (EMF) only. This selection makes the asynchronous motor parameters inaccessible, and the synchronous motor parameters accessible.		
uF9	**[V/F Quad.]** (uF9): Variable torque. For pump and fan applications.		
nLd	**[Energy Sav.]** (nLd): Energy saving. For applications that do not require high dynamics.		

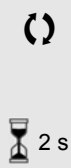
Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > ASY-

Asynchronous motor parameters

Code	Name / Description	Adjustment range	Factory setting
ASY-	**[ASYNC. MOTOR]** Only visible if **[Motor control type]** (CTT) page 105 is not set to **[Sync. mot.]** (SYn).		
nPr ★	**[Rated motor power]** This parameter cannot be accessed if **[Motor control type]** (CTT) page 105 is set to **[Sync. mot.]** (SYn). Rated motor power given on the nameplate, in kW if **[Standard mot. freq]** (bFr) is set to **[50Hz IEC]** (50), in HP if **[Standard mot. freq]** (bFr) is set to **[60Hz NEMA]** (60).	According to drive rating	According to drive rating
CoS ★	**[Motor 1 Cosinus Phi]** Nominal motor cos phi. This parameter can be accessed if **[Motor param choice]** (nPC) is set to **[Mot Cos]** (CoS).	0.5 to 1	According to drive rating
UnS ★	**[Rated motor volt.]** This parameter cannot be accessed if **[Motor control type]** (CTT) page 105 is set to **[Sync. mot.]** (SYn). Rated motor voltage given on the nameplate.	100 to 480 V	According to drive rating and **[Standard mot. freq]** (bFr)
nCr ★	**[Rated mot. current]** This parameter cannot be accessed if **[Motor control type]** (CTT) page 105 is set to **[Sync. mot.]** (SYn). Rated motor current given on the nameplate.	0.25 to 1.5 In (1)	According to drive rating and **[Standard mot. freq]** (bFr)
FrS ★	**[Rated motor freq.]** This parameter cannot be accessed if **[Motor control type]** (CTT) page 105 is set to **[Sync. mot.]** (SYn). Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if **[Standard mot. freq]** (bFr) is set to 60 Hz.	10 to 800 Hz	50 Hz
nSP ★	**[Rated motor speed]** This parameter cannot be accessed if **[Motor control type]** (CTT) page 105 is set to **[Sync. mot.]** (SYn). 0 to 9,999 rpm then 10.00 to 65.53 krpm on the integrated display terminal. If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a %, calculate the rated speed as follows: Nominal speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or Nominal speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or Nominal speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors).	0 to 65,535 rpm	According to drive rating

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > ASY-

Code	Name / Description	Adjustment range	Factory setting
tun	**[Auto tuning]**		**[No]** (nO)



⚠ WARNING

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops.

- Only start the system if there are no persons or obstructions in the zone of operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

During autotuning, the motor makes small movements, noise development and oscillations of the system are normal.

- Auto-tuning is only performed if no stop command has been activated. If a "freewheel stop" or "fast stop" function has been assigned to a logic input, this input must be set to 1 (active at 0).
- Auto-tuning takes priority over any run or prefluxing commands, which will be taken into account after the auto-tuning sequence.
- If auto-tuning detects a fault, the drive displays **[No action]** (nO) and, depending on the configuration of **[Autotune fault mgt]** (tnL) page 268, may switch to **[Auto-tuning]** (tnF) fault mode.
- Auto-tuning may last for 1 to 2 seconds. Do not interrupt the process. Wait for the display to change to **[No action]** (nO).

Note: Motor thermal state has a big influence on tune result. Make the tune with the motor stopped and cold.
To redo a tune of the motor, wait that it is completely stopped and cold. Set first **[Auto tuning]** (tun) to **[Erase tune]** (CLr), then redo the motor tuning.
The use of the motor tuning without doing a **[Erase tune]** (CLr) first is used to get the thermal state estimation of the motor.
In any case, the motor has to be stopped before performing a tune operation.
Cable length has an influence on the Tune result. If the cabling is modified, it is necessary to redo the tune operation.

nO **[No action]** (nO): Auto-tuning not in progress
YES **[Do tune]** (YES): Auto-tuning is performed immediatly if possible, then the parameter automatically changes to **[No action]** (nO). If the drive state does not allow the tune operation immediately, the parameter changes to **[No]** (nO) and the operation must be done again.
CLr **[Erase tune]** (CLr): The motor parameters measured by the auto-tuning function are reseted. The default motor parameters values are used to control the motor. **[Auto tuning status]** (tuS) is set to **[Not done]** (tAb).

tuS	**[Auto tuning state]**		**[Not done]** (tAb)

(for information only, cannot be modified)
This parameter is not saved at drive power off. It shows the Autotuning status since last power on.

tAb **[Not done]** (tAb): Autotune is not done
PEnd **[Pending]** (PEnd): Autotune has been requested but not yet performed
PrOG **[In Progress]** (PrOG): Autotune is in progress
FAIL **[Failed]** (FAIL): Autotune has detected a fault
donE **[Done]** (donE): The motor parameters measured by the auto-tuning function are used to control the motor

Stun	**[Tune selection]**		**[Default]** (tAb)

(for information only, cannot be modified)
tAb **[Default]** (tAb): The default values are used to control the motor
MEAS **[Measure]** (MEAS): The values measured by the auto-tuning function are used to control the motor
CuS **[Custom]** (CuS): The values set manually are used to control the motor
Note: Tune of the motor will increase significantly the performances.

tunu	**[Auto tuning usage]**		**[Therm Mot]** (tM)

This parameter shows the way used to modify the motor parameters according to its estimated thermal state.

nO **[No]** (nO): No thermal state estimation
tM **[Therm Mot]** (tM): Statoric thermal state estimation based on nominal current and current consumed by the motor
Ct **[Cold tun]** (Ct): Statoric thermal state estimation based on statoric resistance measured at the first cold tune and tune done at each power up

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > ASY-

Code	Name / Description	Adjustment range	Factory setting
AUt	**[Automatic autotune]**		**[No]** (nO)

⚠WARNING

UNEXPECTED MOVEMENT

If this function is activated, autotuning is performed each time the drive is switched on.

- Verify that activating this function does not result in unsafe conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

2 s

The motor must be stopped when switching on the drive.
[Automatic autotune] (AUt) is forced to **[Yes]** (YES) if **[Auto tuning usage]** (tUnU) is set to **[Cold tun]** (CtC). The value of motor statoric resistance measured during the tune is used to estimate the thermal state of the motor at power up.

nO **[No]** (nO): Function deactivated
YES **[Yes]** (YES): A tune is automatically done at each power up

Code	Name / Description	Adjustment range	Factory setting
FLU	**[Motor fluxing]**		**[No]** (FnO)

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If the parameter **[Motor fluxing]** (FLU) is set to **[Continuous]** (FCt), fluxing is always active, even if the motor does not run.

- Verify that using this setting does not result in unsafe conditions.

Failure to follow these instructions will result in death or serious injury.

★

(1)

2 s

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the flux current to be applied in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

If **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]** (SYn), the factory setting is replaced by **[Not cont.]** (FnC).
In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor.
In **[Continuous]** (FCt) mode, the drive automatically builds up flux when it is powered up.
In **[Not cont.]** (FnC) mode, fluxing occurs when the motor starts up.
The flux current is greater than **[Rated mot. current]** (nCr) (configured rated motor current) when the flux is established and is then adjusted to the motor magnetizing current.

FnC **[Not cont.]** (FnC): Non-continuous mode
FCt **[Continuous]** (FCt): Continuous mode. This option is not possible if **[Auto DC injection]** (AdC) page 176 is **[Yes]** (YES) or if **[Type of stop]** (Stt) page 173 is **[Freewheel]** (nSt).
FnO **[No]** (FnO): Function inactive. This option is not possible if **[Brake assignment]** (bLC) page 194 is not **[No]** (nO).

If **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]** (SYn), the **[Motor fluxing]** (FLU) parameter causes the alignment of the rotor and not the fluxing.
If **[Brake assignment]** (bLC) page 194 is not **[No]** (nO), the **[Motor fluxing]** (FLU) parameter has no effect.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > ASY-

Code	Name / Description	Adjustment range	Factory setting
nPC ★	**[Motor param choice]**		**[Mot Power]** (nPr)
nPr CoS	**[Mot Power]** (nPr) **[Mot Cos]** (CoS)		

(1) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > SYN-

Asynchronous motor parameters: Expert mode

Code	Name / Description	Adjustment range	Factory setting
ASY-	**[ASYNC. MOTOR]**		
rSA	**[Cust stator resist.]**	0 to 65,535 mOhm	0 mOhm
★ (1)	Cold state stator resistance (per winding), modifiable value. The factory setting is replaced by the result of the auto-tuning operation, if it has been performed.		
LFA	**[Lfw]**	0 to 655.35 mH	0 mH
★	Cold state leakage inductance, modifiable value. The factory setting is replaced by the result of the auto-tuning operation, if it has been performed.		
idA	**[Idw]**	0 to 6,553.5 A	0 A
★	Customer adjusted magnetizing current. The factory setting is replaced by the result of the auto-tuning operation, if it has been performed.		
trA	**[Cust. rotor t const.]**	0 to 65,535 ms	0 ms
★	Customer adjusted rotor time constant. The factory setting is replaced by the result of the auto-tuning operation, if it has been performed.		

(1) On the integrated display unit: 0 to 9,999 then 10.00 to 65.53 (10,000 to 65,535).

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > SYN-

Synchronous motor parameters

These parameters can be accessed if **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]** (SYn). In this case, the asynchronous motor parameters cannot be accessed.

Once the drive is chosen:

1- Enter the motor nameplate.

2 - Perform the tune.

- Do an [Auto tuning] (tun)
- Check the state of the synchronous motor saliency (See page 113.)

If [Saliency mot. state] (SMot) displays [Med salient] (MLS) or [High salient] (HLS)
- follow the procedure below "**3 - Improve the tune result**"
  and
- follow the the procedure below "**4 - Adjust PHS**"

Or if [Saliency mot. state] (SMot) displays [Low salient] (LLS)
- follow the the procedure below "**4 - Adjust PHS**"

3 - Improve the tune results.

NOTICE
OVERHEATING AND DAMAGE TO THE MOTOR • Verify that the motor is properly rated for the maximum current to be applied to the motor. • Consider the duty cycle of the motor and all factors of your application including derating requirements in determining the current limit. **Failure to follow these instructions can result in equipment damage.**

- Set [PSI align curr. max] (nCr) conforming to the maximum motor current. The maximum value of [PSI align curr. max] (nCr)) is limited by [Current Limitation] (CL ı). Without information set [PSI align curr. max] (nCr) to [Auto] (Auto) (see page 116)
- Do a second (tun) after the (nCr) modification.

4 - Adjust PHS.

Adjust [Syn. EMF constant] (PHS) to have optimal behavior (See page 116.)
- Start the motor at minimal stable frequency available on the machine (without load).
- Check and note the [% error EMF sync] (rdAE) value. (See page 117)
  - If the [% error EMF sync] (rdAE) value is lower than 0%, then [Syn. EMF constant] (PHS) may be increased.
  - If the [% error EMF sync] (rdAE) value is upper than 0%, then [Syn. EMF constant] (PHS) may be reduced.

[% error EMF sync] (rdAE) value should be closed to 0%.
- Stop the motor for modify PHS in accordance with the value of the rdAE (previously noted).

Advices:
The drive must be chosen to have enough current according to the need of behavior, but not too much, to have enough accuracy in the current measurement, especially with the high frequency signal injection (see **[HF inj. activation]** (HFı) page 116).

Performances may be higher on high saliency motors by activating high frequency injection function (see **[HF inj. activation]** (HFı) page 116).

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > SYN-

Code	Name / Description	Adjustment range	Factory setting
drC-	**[MOTOR CONTROL] (continued)**		
SYn-	**[SYNCHRONOUS MOTOR]**		
nCrS ★	**[Nominal I sync.]** Rated synchronous motor current given on the nameplate.	0.25 to 1.5 In (1)	According to drive rating
PPnS ★	**[Pole pairs]** Number of pairs of poles on the synchronous motor.	1 to 50	According to drive rating
nSPS ★ (2)	**[Nom motor spdsync]** Rated motor speed given on the nameplate.	0 to 48,000 rpm	According to drive rating
tqS ★	**[Motor torque]** Rated motor torque given on the nameplate.	0.1 to 6,553.5 Nm	According to drive rating
tUn	**[Auto tuning]**		**[No]** (nO)

⚠WARNING

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops.

• Only start the system if there are no persons or obstructions in the zone of operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

2 s

During autotuning, the motor makes small movements, noise development and oscillations of the system are normal.

- Auto-tuning is only performed if no stop command has been activated. If a "freewheel stop" or "fast stop" function has been assigned to a logic input, this input must be set to 1 (active at 0).
- Auto-tuning takes priority over any run or prefluxing commands, which will be taken into account after the auto-tuning sequence.
- If auto-tuning detects a fault, the drive displays **[No action]** (nO) and, depending on the configuration of **[Autotune fault mgt]** (tnL) page 268, may switch to **[Auto-tuning]** (tnF) fault mode.
- Auto-tuning may last for 1 to 2 seconds. Do not interrupt the process. Wait for the display to change to **[No action]** (nO).

Note: Motor thermal state has a big influence on tune result. Make the tune with the motor stopped and cold.
To redo a tune of the motor, wait that it is completely stopped and cold. Set first **[Auto tuning]** (tUn) to **[Erase tune]** (CLr), then redo the motor tuning.
The use of the motor tuning without doing a **[Erase tune]** (CLr) first is used to get the thermal state estimation of the motor.
In any case, the motor has to be stopped before performing a tune operation.
Cable length has an influence on the Tune result. If the cabling is modified, it is necessary to redo the tune operation.

nO **[No action]** (nO): Auto-tuning not in progress
YES **[Do tune]** (YES): Auto-tuning is performed immediatly if possible, then the parameter automatically changes to **[No action]** (nO). If the drive state does not allow the tune operation immediately, the parameter changes to **[No]** (nO) and the operation must be done again.
CLr **[Erase tune]** (CLr): The motor parameters measured by the auto-tuning function are reseted. The default motor parameters values are used to control the motor. **[Auto tuning status]** (tUS) is set to **[Not done]** (tAb).

Code	Name / Description	Factory setting
tUS	**[Auto tuning state]** (for information only, cannot be modified) This parameter is not saved at drive power off. It shows the Autotuning status since last power on.	**[Not done]** (tAb)

tAb **[Not done]** (tAb): Autotune is not done
PEnd **[Pending]** (PEnd): Autotune has been requested but not yet performed
PrOG **[In Progress]** (PrOG): Autotune is in progress
FAIL **[Failed]** (FAIL): Autotune has detected a fault
donE **[Done]** (donE): The motor parameters measured by the auto-tuning function are used to control the motor

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > SYN-

Code	Name / Description	Adjustment range	Factory setting
StUn	**[Tune selection]**		**[Default]** (tAb)
	(for information only, cannot be modified) **Note:** Tune of the motor will increase significantly the performances.		
tAb	**[Default]** (tAb): The default values are used to control the motor		
nEAS	**[Measure]** (nEAS): The values measured by the auto-tuning function are used to control the motor		
CuS	**[Custom]** (CuS): The values set manually are used to control the motor		
tunu	**[Auto tuning usage]**		**[Therm Mot]** (tn)
	This parameter shows the way used to modify the motor parameters according to its estimated thermal state.		
no	**[No]** (no): No thermal state estimation		
tn	**[Therm Mot]** (tn): Statoric thermal state estimation based on nominal current and current consumed by the motor		
Ct	**[Cold tun]** (Ct): Statoric thermal state estimation based on statoric resistance measured at the first cold tune and tune done at each power up		
AuT	**[Automatic autotune]**		**[No]** (no)
	⚠WARNING **UNEXPECTED MOVEMENT** If this function is activated, autotuning is performed each time the drive is switched on. • Verify that activating this function does not result in unsafe conditions. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**		
	2 s		
	The motor must be stopped when switching on the drive. **[Automatic autotune]** (AuT) is forced to **[Yes]** (YES) if **[Auto tuning usage]** (tunu) is set to **[Cold tun]** (Ct). The value of motor statoric resistance measured during the tune is used to estimate the thermal state of the motor at power up.		
no	**[No]** (no): Function deactivated		
YES	**[Yes]** (YES): A tune is automatically done at each power up		
SMot	**[Saliency mot. state]**		
★	(for information only, cannot be modified) Information on synchronous motor saliency. This parameter can be accessed if **[Tune selection]** (StUn) is set to **[Measure]** (nEAS). **Note:** In case of motor with low saliency, the standard control law is advised.		
no	**[No]** (no): Tune not done		
LLS	**[Low salient]** (LLS): Low saliency level (Recommended configuration: **[Angle setting type]** (ASt) = **[PSI align]** (PS i) or **[PSIO align]** (PS io) and **[HF inj. activation]** (HF i) = **[No]** (no)).		
MLS	**[Med salient]** (MLS): Medium saliency level (**[Angle setting type]** (ASt) = **[SPM align]** (SPMA) is possible. **[HF inj. activation]** (HF i) = **[Yes]** (YES) could work).		
HLS	**[High salient]** (HLS): High saliency level (**[Angle setting type]** (ASt) = **[IPM align]** (iPMA) is possible. **[HF inj. activation]** (HF i) = **[Yes]** (YES) is possible).		
ASt	**[Angle setting type]**		**[PSIO align.]** (PS io)
★	Mode for measuring the phase-shift angle. Visible only if **[Motor control type]** (Ctt) is set to **[Sync. mot.]** (SYn). **[PSI align]** (PS i) and **[PSIO align]** (PS io) are working for all type of synchronous motors. **[SPM align]** (SPMA) and **[IPM align]** (iPMA) increase performances depending on the type of synchronous motor.		
iPMA	**[IPM align]** (iPMA): Alignment for IPM motor. Alignment mode for Interior-buried Permanent Magnet motor (usually, this kind of motor has a high saliency level). It uses high frequency injection, which is less noisy than standard alignment mode.		
SPMA	**[SPM align]** (SPMA): Alignment for SPM motor. Mode for Surface-mounted Permanent Magnet motor (usually, this kind of motor has a medium or low saliency level). It uses high frequency injection, which is less noisy than standard alignment mode.		
PS i	**[PSI align]** (PS i): Pulse signal injection. Standard alignment mode by pulse signal injection.		
PS io	**[PSIO align]** (PS io): Pulse signal injection - Optimized. Standard optimized alignment mode by pulse signal injection. The phase shift angle measurement time is re		
no	duced after the first run order or tune operation, even if the drive has been turned off. **[No align]** (no): No alignment		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > SYN-

Code	Name / Description	Adjustment range	Factory setting
HF i	**[HF inj. activation]**		**[No]** (nO)
★	Activation of high frequency signal injection in RUN. This function allows to estimate the motor speed in a view to have torque at low speed without speed feedback. **Note:** The more the saliency is high, the more the **[HF inj. activation]** (HF i) function will be efficient. In order to ensure the performances, it could be necessary to adjust the speed loop parameters (**[K speed loop filter]** (SFC), **[Speed time integral]** (S itC) and **[Speed prop. gain]** (SPG), see page 118) and the speed estimation phase locked loop (Expert parameters **[HF pll bandwith]** (SPb) and **[HF pll dump. factor]** (SPF), see page 116). High frequency injection is not efficient with low saliency motors (see **[Saliency mot. state]** (SMot) page 114). It is advised to have 4 kHz of pwm frequency (**[Switching freq.]** (SFr)). In case of instability with no load, it is advised to decrease **[Speed prop. gain]** (SPG) and **[HF pll bandwith]** (SPb). Then, adjust the speed loop parameters to have the dynamic behavior and the PLL gains to have a good speed estimation at low speed. In case of instability with load, it could help to increase the **[Angle error Comp.]** (PEC) parameter (mainly for SPM motor).		
nO	**[No]** (nO): Function deactivated		
YES	**[Yes]** (YES): High frequency injection is used for speed estimation		

(1) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.
(2) On the integrated display unit: 0 to 9,999 then 10.00 to 65.53 (10,000 to 65,536).

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC- > SYN-

Synchronous motor: Expert mode

Code	Name / Description	Adjustment range	Factory setting
SYn-	**[SYNCHRONOUS MOTOR]**		
rSAS ★ (1)	**[Cust. stator R syn]** Cold state stator resistance (per winding). The factory setting is replaced by the result of the auto-tuning operation, if it has been performed. The value can be entered by the user, if he knows it.	0 to 65,535 mOhm	0 mOhm
LdS ★	**[Autotune L d-axis]** Axis "d" stator inductance in mH (per phase). On motors with smooth poles **[Autotune L d-axis]** (LdS) = **[Autotune L q-axis]** (LqS) = Stator inductance L. The factory setting is replaced by the result of the auto-tuning operation, if it has been performed.	0 to 655.35 mH	0 mH
LqS ★	**[Autotune L q-axis]** Axis "q" stator inductance in mH (per phase). On motors with smooth poles **[Autotune L d-axis]** (LdS) = **[Autotune L q-axis]** (LqS) = Stator inductance L. The factory setting is replaced by the result of the auto-tuning operation, if it has been performed.	0 to 655.35 mH	0 mH
PHS ★ (1)	**[Syn. EMF constant]** Synchronous motor EMF constant, in mV per rpm (peak voltage per phase). PHS adjustment allows to reduce the current in operation without load.	0 to 6,553.5 mV/rpm	0 mV/rpm
FrSS ★	**[Nominal freq sync.]** Nominal motor frequency for synchronous motor in Hz unit. Automatically updated according to **[Nom motor spdsync]** (nSPS) and **[Pole pairs]** (PPnS) data.	10 to 800 Hz	nSPS * PPnS / 60
SPb ★	**[HF pll bandwith]** Bandwidth of the stator frequency Pll.	0 to 100 Hz	25 Hz
SPF ★	**[HF pll dump. factor]** Dumping factor of the stator frequency Pll.	0 to 200%	100%
PEC ★ Auto	**[Angle error Comp.]** Error compensation of the angle position in high frequency mode. It increases performances at low speed in generator and motor mode, particularly for SPM motors. **[Auto]** (Auto): The drive takes a value equal to the rated slip of the motor, calculated using the drive parameters.	0 to 500%	0%
Fri ★	**[HF injection freq.]** Frequency of the high frequency injection signal. It has an influence on the noise during angle shift measurement and speed estimation accuracy.	250 to 1,000 Hz	500 Hz
Hir ★	**[HF current level]** Ratio for the current level of the high frequency injection signal. It has an influence on the noise during angle shift measurement and speed estimation accuracy.	0 to 200%	25%
nCr ★	**[PSI align curr. max]** Current level in % of **[Nominal I sync.]** (nCrS) for **[PSI align]** (PSi) and **[PSIO align]** (PSio) angle shift measurement modes. This parameter has an impact on the inductor measurement. **[PSI align curr. max]** (nCr) is used for tune operation. This current must be equal or higher than the maximum current level of the application, otherwise instability may occur. If **[PSI align curr. max]** (nCr) is set to **[Auto]** (Auto), **[PSI align curr. max]** (nCr) = 150% of **[Nominal I sync.]** (nCrS) during the tune operation and 100% of **[Nominal I sync.]** (nCrS) during angle shift measurement in case of standard alignment (**[PSI align]** (PSi) or **[PSIO align]** (PSio)).	**[Auto]** (Auto) to 300%	**[Auto]** (Auto)
iLr ★	**[Injection level align]** Current level in % of **[Nominal I sync.]** (nCrS) for high frequency phase-shift angle measurement IPMA type.	0 to 200%	50%

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

Code	Name / Description	Adjustment range	Factory setting
5 ir ★	**[Boost level align.]** Current level in % of **[Nominal I sync.]** (nCr5) for high frequency phase-shift angle measurement SPMA type.	0 to 200%	100%
rdAE	**[% error EMF sync]** Ratio D-Axis Current Use rdAE to asjust **[Syn. EMF constant]** (PHS), rdAE should be closed to 0. If the [% error EMF sync] (rdAE) value is lower than 0%, then **[Syn. EMF constant]** (PHS), may be increased. If the [% error EMF sync] (rdAE) value is upper than 0%, then **[Syn. EMF constant]** (PHS), may be reduced.	-3276.7 to 3275.8 %	-

(1) On the integrated display unit: 0 to 9,999 then 10.00 to 65.53 (10,000 to 65,536).

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

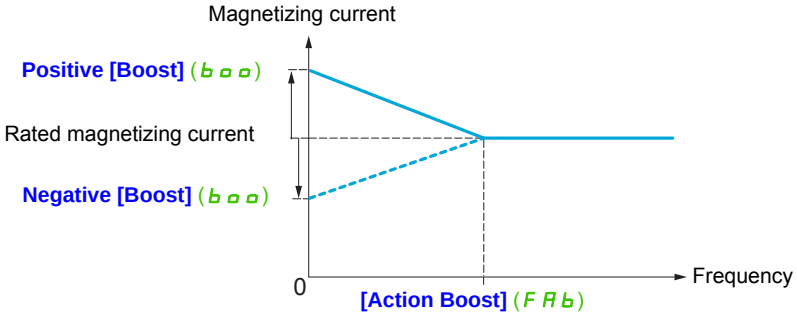
Parameter that can be modified during operation or when stopped.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

Code	Name / Description	Adjustment range	Factory setting
drC-	**[MOTOR CONTROL] (continued)**		
SPG ★ ( )	**[Speed prop. gain]** Speed loop proportional gain. Visible if **[Motor control type]** (Ctt) is not set to **[Standard]** (Std), **[V/F 5pts]** (uF5) or **[V/F Quad.]** (uF9).	0 to 1,000%	40%
SPGu ★ ( )	**[UF inertia comp.]** Inertia factor for following motor control laws. Visible if **[Motor control type]** (Ctt) is set to **[Standard]** (Std), **[V/F 5pts]** (uF5) or **[V/F Quad.]** (uF9).	0 to 1,000%	40%
SIt ★ ( )	**[Speed time integral]** Speed loop integral time constant. Visible if **[Motor control type]** (Ctt) is not set to **[Standard]** (Std), **[V/F 5pts]** (uF5) or **[V/F Quad.]** (uF9).	1 to 65,535 ms	63 ms
SFC ★ ( )	**[K speed loop filter]** Speed filter coefficient (0(IP) to 100(PI)).	0 to 100	65
FFH ★	**[Spd est. filter time]** Accessible in Expert mode only. Frequency to filter the estimated speed.	0 to 100 ms	6.4 ms
CrtF ★	**[Cur. ref. filter time]** Accessible in Expert mode only. Filter time of the current reference filter [of control law (if **[No]** (no): stator natural frequency)].	0 to 100 ms	3.2 ms
uFr ( )	**[IR compensation]** Used to optimize torque at very low speed, or to adapt to special cases (for example: for motors connected in parallel, decrease **[IR compensation]** (uFr)). If there is insufficient torque at low speed, increase **[IR compensation]** (uFr). A too high value can avoid the motor to start (locking) or change the current limiting mode.	0 to 200%	100%
SLP ★ ( )	**[Slip compensation]** This parameter cannot be accessed if **[Motor control type]** (Ctt) is set to **[Sync. mot.]** (SYn). This parameter is written at 0% when **[Motor control type]** (Ctt) is set to **[V/F Quad.]** (uF9). Adjusts the slip compensation around the value set by the rated motor speed. The speeds given on motor nameplates are not necessarily exact. If slip setting is lower than actual slip: The motor is not rotating at the correct speed in steady state, but at a speed lower than the reference. If slip setting is higher than actual slip: The motor is overcompensated and the speed is unstable.	0 to 300%	100%
u1 ★	**[U1]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 800 V according to rating	0 V
F1 ★	**[F1]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 599 Hz	0 Hz
u2 ★	**[U2]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 800 V according to rating	0 V
F2 ★	**[F2]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 599 Hz	0 Hz

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

Code	Name / Description	Adjustment range	Factory setting
u 3 ★	**[U3]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 800 V according to rating	0 V
F 3 ★	**[F3]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 599 Hz	0 Hz
u 4 ★	**[U4]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 800 V according to rating	0 V
F 4 ★	**[F4]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 599 Hz	0 Hz
u 5 ★	**[U5]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 800 V according to rating	0 V
F 5 ★	**[F5]** V/F profile setting. This parameter can be accessed if **[Motor control type]** (Ctt) is set to **[V/F 5pts]** (uF5).	0 to 599 Hz	0 Hz
CL1 ★ ( )	**[Current Limitation]** **NOTICE** **OVERHEATING AND DAMAGE TO THE MOTOR** • Verify that the motor is properly rated for the maximum current to be applied to the motor. • Consider the duty cycle of the motor and all factors of your application including derating requirements in determining the current limit. **Failure to follow these instructions can result in equipment damage.** First current limitation. **Note:** If the setting is less than 0.25 In, the drive may lock in **[Output Phase Loss]** (oPL) fault mode if this has been enabled (see page 256). If it is less than the no-load motor current, the motor cannot run.	0 to 1.5 In (1)	1.5 In (1)
SFt	**[Switch. freq type]** The motor switching frequency will be modified (reduced) when the internal temperature of the drive will be too high. HF1 **[SFR type 1]** (HF1): Heating optimization Allows the system to adapt the switching frequency according to the motor frequency. HF2 **[SFR type 2]** (HF2): Motor noise optimization (for high switching frequency) Allows the system to keep a constant chosen switching frequency **[Switching freq.]** (SFr) whatever the motor frequency **[Output frequency]** (rFr). In the event of overheating, the drive automatically decreases the switching frequency. It is restored to its original value when the temperature returns to normal.		**[SFR type 1]** (HF1)
SFr ( )	**[Switching freq.]** **NOTICE** **DAMAGE TO THE MOTOR** Verify that the switching frequency of the drive does not exceed 4 kHz if the EMC filter is disconnected for operation of the drive in an IT mains. **Failure to follow these instructions can result in equipment damage.** This applies to the following drive versions: ATV320●●●M2● Switching frequency setting. Adjustment range: The maximum value is limited to 4 kHz if **[Motor surge limit]** (SuL) parameter page 120 is configured. **Note:** In the event of excessive temperature rise, the drive will automatically reduce the switching frequency and reset it once the temperature returns to normal. In case of high speed motor, it is advised to increase the Pulse Width Modulation (PWM) frequency **[Switching freq.]** (SFr) at 8, 12 or 16 kHz.	2 to 16 kHz	4 kHz

Code	Name / Description	Adjustment range	Factory setting
nrd	**[Noise reduction]** Random frequency modulation helps to prevent any resonance, which may occur at a fixed frequency. nO: **[No]** (nO): Fixed frequency YES: **[Yes]** (YES): Frequency with random modulation		**[No]** (nO)
boA	**[Boost activation]** nO: **[Inactive]** (nO): No boost dYnA: **[Dynamic]** (dYnA): Dynamic boost StAt: **[Static]** (StAt): Static boost		**[Dynamic]** (dYnA)
boo ★	**[Boost]** This parameter can be accessed if **[Boost activation]** (boA) is not set to **[No]** (nO). Adjustment of the motor magnetizing current at low speed, as a % of the rated magnetizing current. This parameter is used to increase or reduce the time taken to establish the torque. It allows gradual adjustment up to the frequency set by **[Action Boost]** (FAb). Negative values apply particularly to tapered rotor motors.  	-100 to 100%	0%
FAb ★	**[Action Boost]** This parameter can be accessed if **[Boost activation]** (boA) is not set to **[No]** (nO). Frequency above which the magnetizing current is no longer affected by **[Boost]** (boo).	0 to 599 Hz	0 Hz
SuL	**[Motor surge limit.]** This function limits motor overvoltages and is useful in the following applications: - NEMA motors - Japanese motors - Spindle motors - Rewound motors This parameter can remain set to **[No]** (nO) for 230/400 V motors used at 230 V, or if the length of cable between the drive and the motor does not exceed: - 4 m with unshielded cables - 10 m with shielded cables **Note:** When **[Motor surge limit.]** (SuL) is set to **[Yes]**(YES), the maximum switching frequency **[Switching freq.]** (SFr) is modified, see page 120. nO: **[No]** (nO): Function inactive YES: **[Yes]** (YES): Function active		**[No]** (nO)
SoP ★	**[Volt surge limit. opt]** Optimization parameter for transient overvoltages at the motor terminals. This parameter can be accessed if **[Motor surge limit.]** (SuL) is set to **[Yes]** (YES). 6 8 10: Set to 6, 8 or 10 µs, according to the following table. **Note:** This parameter is useful for ATV320●●●N4● drives.		10 µs

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

The value of the **[Volt surge limit. opt]** (5 o P) parameter corresponds to the attenuation time of the cable used. It is defined to help to prevent the superimposition of voltage wave reflections resulting from long cable lengths. It limits overvoltages to twice the DC bus rated voltage.

The tables on the following page give examples of correspondence between the **[Volt surge limit. opt]** (5 o P) parameter and the length of the cable between the drive and the motor. For longer cable lengths, an output of the filter or a dV/dt protection filter must be used.

For motors in parallel, the sum of all the cable lengths must be taken into consideration. Compare the length given in the table row corresponding to the power for one motor with that corresponding to the total power, and select the shorter length.

Example: Two 7.5 kW (10 HP) motors

Take the lengths on the 15 kW (20 HP) table row, which are shorter than those on the 7.5 kW (10 HP) row, and divide by the number of motors to obtain the length per motor (with unshielded "GORSE" cable and SOP = 6, the result is 40/2 = 20 m maximum for each 7.5 kW (10 HP) motor).

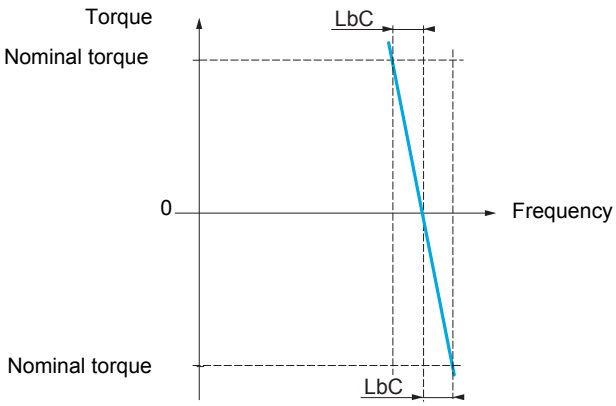
In special cases (for example, different types of cable, different motor powers in parallel, different cable lengths in parallel, etc.), we recommend using an oscilloscope to check the overvoltage values obtained at the motor terminals.

To retain the overall drive performance, do not increase the SOP value unnecessarily.

Tables giving the correspondence between the SOP parameter and the cable length, for 400 V supply mains

Altivar 320	Motor		Cable cross-section (min)		Maximum cable length in meters								
Reference	Power				Unshielded "GORSE" cable Type H07 RN-F 4Gxx			Shielded "GORSE" cable Type GVCSTV-LS/LH			Shielded "BELDEN" cable Type 2950x		
	kW	HP	in mm²	AWG	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6	SOP = 10	SOP = 8	SOP = 6
ATV320U04N4●	0.37	0.50	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U06N4●	0.55	0.75	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U07N4●	0.75	1	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U11N4●	1.1	1.5	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U15N4●	1.5	2	1.5	14	100 m	70 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U22N4●	2.2	3	1.5	14	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U30N4●	3	-	1.5	14	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U40N4●	4	5	2.5	12	110 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320U55N4●	5.5	7.5	4	10	120 m	65 m	45 m	105 m	85 m	65m	50 m	40 m	30 m
ATV320U75N4●	7.5	10	6	8	120 m	65 m	45 m	105 m	85 m	65 m	50 m	40 m	30 m
ATV320D11N4●	11	15	10	8	115 m	60 m	45 m	100 m	75 m	55 m	50 m	40 m	30 m
ATV320D15N4●	15	20	16	6	105 m	60 m	40 m	100 m	70 m	50 m	50 m	40 m	30 m

For 230/400 V motors used at 230 V, the **[Motor surge limit.]** (5 u L) parameter can remain set to **[No]** (n o).

Code	Name / Description	Adjustment range	Factory setting
ubr	**[Braking level]** Braking transistor command level.	335 to 820 V	According to drive rating voltage
LbA ★	**[Load sharing]** When 2 motors are connected mechanically and therefore at the same speed, and each is controlled by a drive, this function can be used to improve torque distribution between the two motors. To do this, it varies the speed based on the torque. This parameter can only be accessed if **[Motor control type]** (Ctt) page 105 is set to **[SVC V]** (uuC). nO **[No]** (nO): Function inactive YES **[Yes]** (YES): Function active		**[No]** (nO)
LbC ★	**[Load correction]** Rated correction in Hz. This parameter can be accessed if **[Load sharing]** (LbA) is set to **[Yes]** (YES). 	0 to 599 Hz	0 Hz

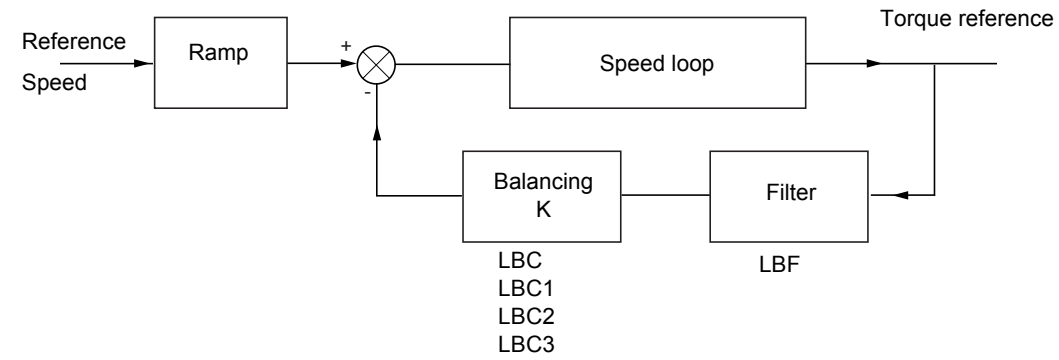
★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

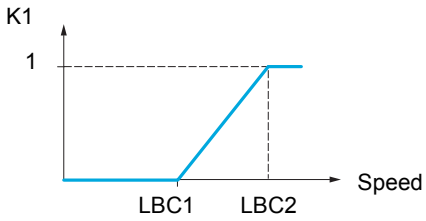
Parameters described in this page can be accessed by: DRI- > CONF > FULL > DRC-

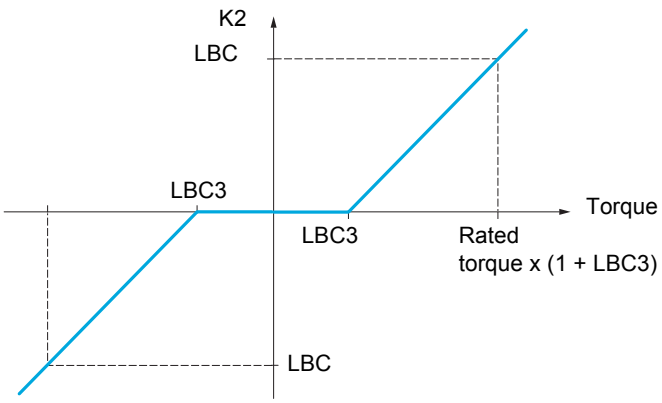
Load sharing, parameters that can be accessed at expert level

Principle:



The load sharing factor K is determined by the torque and speed, with two factors K1 and K2 (K = K1 x K2).





Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O-

Code	Name / Description	Adjustment range	Factory setting
LbC1 ★	**[Correction min spd]** This parameter can be accessed if **[Load sharing]** (LbA) is set to **[Yes]** (YES). Minimum speed for load correction in Hz. Below this threshold, no corrections are made. Used to cancel correction at very low speed if this would hamper rotation of the motor.	0 to 598.9 Hz	0 Hz
LbC2 ★	**[Correction max spd]** This parameter can be accessed if **[Load sharing]** (LbA) is set to **[Yes]** (YES). Speed threshold in Hz above which maximum load correction is applied.	**[Correction min spd]** (LbC1) + 0.1 at 599 Hz	0.1 Hz
LbC3 ★	**[Torque offset]** This parameter can be accessed if **[Load sharing]** (LbA) is set to **[Yes]** (YES). Minimum torque for load correction as a % of the rated torque. Below this threshold, no corrections are made. Used to avoid torque instabilities when the torque direction is not constant.	0 to 300%	0%
LbF ★	**[Sharing filter]** This parameter can be accessed if **[Load sharing]** (LbA) is set to **[Yes]** (YES). Time constant (filter) for correction in ms. Used in the event of flexible mechanical coupling in order to avoid instabilities.	0 to 20 s	100 ms

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O-

Inputs / outputs CFG

The parameters in the **[INPUTS / OUTPUTS CFG]** (I_O-) menu can only be modified when the drive is stopped and no run command is present.

Code	Name / Description	Adjustment range	Factory setting
FULL	**[FULL] (continued)**		
I_O-	**[INPUTS / OUTPUTS CFG]**		
tCC	**[2/3 wire control]**		**[2 wire]** (2C)

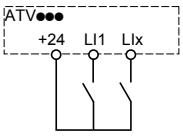
2 s

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION
If this parameter is changed, the parameters **[Reverse assign.]** (rrS) and **[2 wire type]** (tCt) and the assignments of the digital inputs are reset to the factory setting.
Verify that this change is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

2C **[2 wire]** (2C)
2-wire control (level commands): This is the input state (0 or 1) or edge (0 to 1 or 1 to 0) which controls running or stopping.

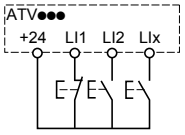
Example of "source" wiring:



LI1: forward
LIx: reverse

3C **[3 wire]** (3C)
3-wire control (pulse commands): A "forward" or "reverse" pulse is sufficient to command starting, a "stop" pulse is sufficient to command stopping.

Example of "source" wiring:



LI1: stop
LI2: forward
LIx: reverse

tCt	**[2 wire type]**		**[Transition]** (trn)

★

2 s

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION
Verify that the parameter setting is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

LEL **[Level]** (LEL): State 0 or 1 is taken into account for run (1) or stop (0)
trn **[Transition]** (trn): A change of state (transition or edge) is necessary to initiate operation, in order to avoid accidental restarts after a break in the power supply
PFo **[Fwd priority]** (PFo): State 0 or 1 is taken into account for run or stop, but the "forward" input takes priority over the "reverse" input

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > L1-

Code	Name / Description	Adjustment range	Factory setting
run	**[Drive Running]** Assignment of the stop command. Visible only if **[2/3 wire control]** (tCC) is set to **[3 wire]** (3C).		**[No]** (nO)
★			
LI1	**[LI1]** (LI1): Logical input LI1 if not in **[I/O profile]** (IO)		
Cd00	**[Cd00]** (Cd00): In **[I/O profile]** (IO), can be switched with possible logic inputs		
oL01	**[OL01]** (oL01): Function blocks: Logical Output 01		
...	**...**		
oL10	**[OL10]** (oL10): Function blocks: Logical Output 10		
Frd	**[Forward]** Assignment of the forward direction command.		**[LI1]** (LI1)
LI1	**[LI1]** (LI1): Logical input LI1 if not in **[I/O profile]** (IO)		
Cd00	**[Cd00]** (Cd00): In **[I/O profile]** (IO), can be switched with possible logic inputs		
oL01	**[OL01]** (oL01): Function blocks: Logical Output 01		
...	**...**		
oL10	**[OL10]** (oL10): Function blocks: Logical Output 10		
rrS	**[Reverse assign.]** Assignment of the reverse direction command.		**[LI2]** (LI2)
nO	**[No]** (nO): Not assigned		
LI1	**[LI1]** (LI1): Logical input LI1		
...	**[...]** (...): See the assignment conditions on page 153		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > L1-

Code	Name / Description	Adjustment range	Factory setting
L I -	**[LI1 CONFIGURATION]**		
L IA	**[LI1 assignment]** Read-only parameter, cannot be configured. It displays all the functions that are assigned to input LI1 in order to check for multiple assignments.		
nO	**[No]** (nO): Not assigned		
run	**[Run]** (run): Run Enable		
Frd	**[Forward]** (Frd): Forward operation		
rrS	**[Reverse]** (rrS): Reverse operation		
rPS	**[Ramp switching]** (rPS): Ramp switching		
JoG	**[Jog]** (JoG): Jog operation		
uSP	**[+Speed]** (uSP): + speed		
dSP	**[- speed]** (dSP): - speed		
PS2	**[2 preset speeds]** (PS2): 2 Preset speeds		
PS4	**[4 preset speeds]** (PS4): 4 Preset speeds		
PS8	**[8 preset speeds]** (PS8): 8 Preset speeds		
rFC	**[Ref. 2 switching]** (rFC): Reference switching		
nSt	**[Freewheel stop]** (nSt): Freewheel stop		
dC I	**[DC injection]** (dC I): Injection DC stop		
FSt	**[Fast stop]** (FSt): Fast stop		
FLo	**[Forced local]** (FLo): Forced local mode		
rSF	**[Fault reset]** (rSF): Fault reset		
tuL	**[Auto-tuning]** (tuL): Auto-tuning		
SPM	**[Ref. memo.]** (SPM): Save reference		
FL I	**[Pre Fluxing]** (FL I): Motor fluxing		
PAu	**[Auto / manual]** (PAu): PI(D) auto-manu		
P IS	**[PID integral reset]** (P IS): Integral shunting PI(D)		
Pr2	**[2 preset PID ref.]** (Pr2): 2 Preset PI(D) references		
Pr4	**[4 preset PID ref.]** (Pr4): 4 Preset PI(D) references		
tLA	**[Torque limitation]** (tLA): Permanent torque limitation		
EtF	**[External fault]** (EtF): External fault		
rCA	**[Output contact. fdbk]** (rCA): Downstream contactor feedback		
CnF1	**[2 config. switching]** (CnF1): Configuration switching 1		
CnF2	**[3 config. switching]** (CnF2): Configuration switching 2		
CHA1	**[2 parameter sets]** (CHA1): Parameter switching 1		
CHA2	**[3 parameter sets]** (CHA2): Parameter switching 2		
tLC	**[Activ. Analog torque limitation]** (tLC): Torque limitation: Activation (analog input) by a logic input		
CCS	**[Cmd switching]** (CCS): Command channel switching		
InH	**[Fault inhibition]** (InH): Fault inhibition		
PS16	**[16 preset speeds]** (PS16): 16 preset speeds		
LC2	**[Current limit 2]** (LC2): Current limitation switching		
rCb	**[Ref 1B switching]** (rCb): Reference channel switching (1 to 1B)		
trC	**[Traverse control]** (trC): Traverse control		
bC I	**[Brake contact]** (bC I): Brake logic input contact		
SAF	**[Stop FW limit sw.]** (SAF): Stop switch forward		
SAr	**[Stop RV limit sw.]** (SAr): Stop switch reverse		
dAF	**[Slowdown forward]** (dAF): Slowdown attained forward		
dAr	**[Slowdown reverse]** (dAr): Slowdown attained reverse		
CLS	**[Disable limit sw.]** (CLS): Limits switches clearing		
LES	**[Drive lock (Line contact. ctrl)]** (LES): Emergency stop		
rtr	**[Init. traverse ctrl.]** (rtr): Reload traverse control		
SnC	**[Counter wobble]** (SnC): Counter wobble synchronization		
rPA	**[Prod. reset]** (rPA): Reset Product		
SH2	**[2 HSP]** (SH2): High Speed 2		
SH4	**[4 HSP]** (SH4): High Speed 4		
FPS1	**[Preset spd2]** (FPS1): Function key preset speed 1 assignment		
FPS2	**[Preset spd3]** (FPS2): Function key preset speed 2 assignment		
FPr1	**[PID ref. 2]** (FPr1): Function key preset PI 1 assignment		
FPr2	**[PID ref. 3]** (FPr2): Function key preset PI 2 assignment		
FuSP	**[+Speed]** (FuSP): Function key faster assignment		
FdSP	**[-Speed]** (FdSP): Function key slower assignment		
Ft	**[T/K]** (Ft): Function key bumpless assignment		
uS I	**[+speed around ref.]** (uS I): + Speed around ref		
dS I	**[-speed around ref.]** (dS I): - Speed around ref		

Code	Name / Description	Adjustment range	Factory setting
uS1 dS1 iL01 ... iL10 FbrM SLS1 SLS2 SS11 SS12 Sto1 Sto2 SMS1 SMS2	**[+speed around ref.]** (uS1): + Speed around ref **[-speed around ref.]** (dS1): - Speed around ref **[IL01]** (iL01): Function blocks: Logical Input 1 **...** **[IL10]** (iL10): Function blocks: Logical Input 10 **[FB start]** (FbrM): Function blocks: Run mode **[SLS ch.1]** (SLS1): SLS safety function Channel 1 **[SLS ch.2]** (SLS2): SLS safety function Channel 2 **[SS1 ch.1]** (SS11): SS1 safety function Channel 1 **[SS1 ch.2]** (SS12): SS1 safety function Channel 2 **[STO ch.1]** (Sto1): STO safety function Channel 1 **[STO ch.2]** (Sto2): STO safety function Channel 2 **[SMS ch.1]** (SMS1): SMS safety function Channel 1 **[SMS ch.2]** (SMS2): SMS safety function Channel 2 **Note:** Safety function channels are available for LI3-LI4 and LI5-LI6 only.		
LId	**[LI1 On Delay]** This parameter is used to take account of the change of the logic input to state 1 with a delay that can be adjusted between 0 and 200 milliseconds, in order to filter out possible interference. The change to state 0 is taken into account without delay.	0 to 200 ms	0 ms
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
L2- to L6-	**[LIx CONFIGURATION]** All the logic inputs available on the drive are processed as in the example for LI1 above, up to LI6.		
L5-	**[LI5 CONFIGURATION]** Specific parameters for LI5 used as a pulse input.		
PIA	**[RP assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with the Pulse input in order to check, for example, for compatibility problems. Identical to **[AI1 assignment]** (AI1A) page 133.		
PIL	**[RP min value]** Pulse input scaling parameter of 0% in Hz * 10 unit.	0 to 20.00 kHz	0 kHz
PFr	**[RP max value]** Pulse input scaling parameter of 100% in Hz * 10 unit.	0 to 20.00 kHz	20.00 kHz
PFI	**[RP filter]** I/O ext Pulse input cutoff time of the low-filter.	0 to 1,000 ms	0 ms
LAI- LA2-	**[LAx CONFIGURATION]** The 2 analog inputs AI1 and AI2 on the drive could be used as LI inputs and are processed as in the example for LI1 above.		

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

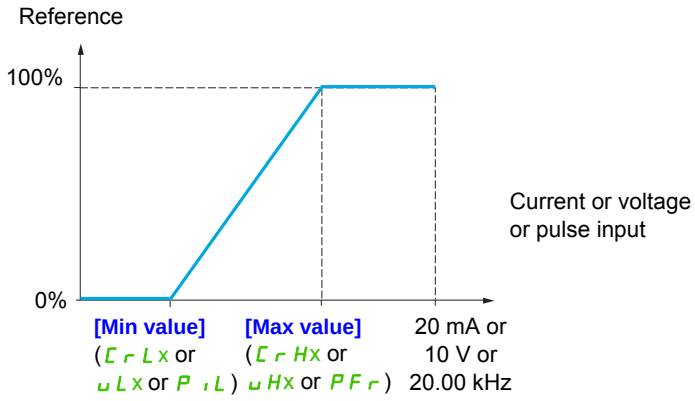
2 s To change the assignment of this parameter, press the ENT key for 2 s.

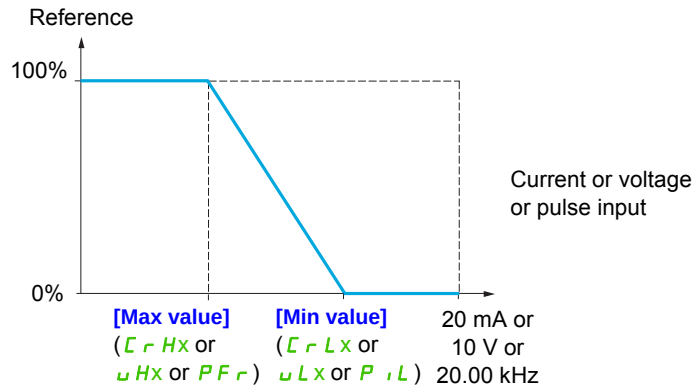
Configuration of analog inputs and Pulse input

The minimum and maximum input values (in volts, mA, etc.) are converted to % in order to adapt the references to the application.

Minimum and maximum input values:

The minimum value corresponds to a reference of 0% and the maximum value to a reference of 100%. The minimum value may be greater than the maximum value:



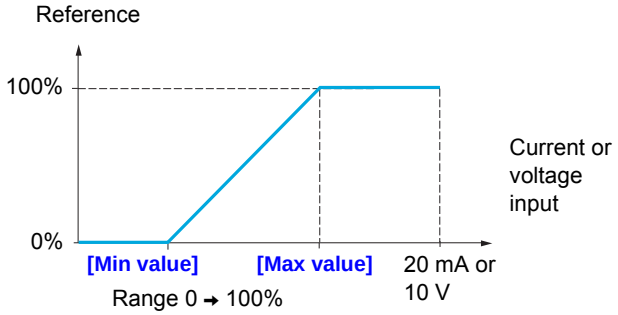


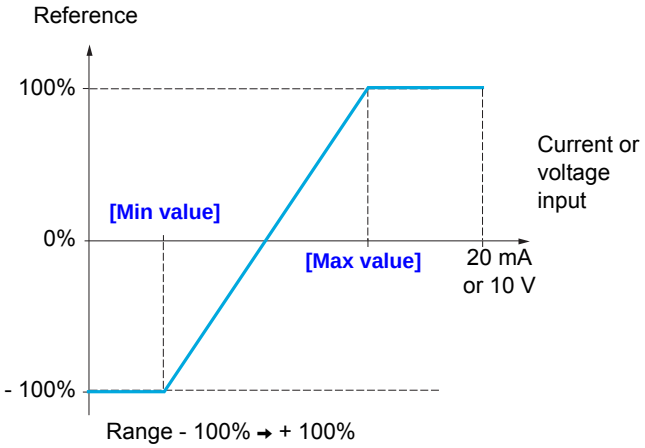
For +/- bidirectional inputs, the min. and max. are relative to the absolute value, for example +/- 2 to 8 V.

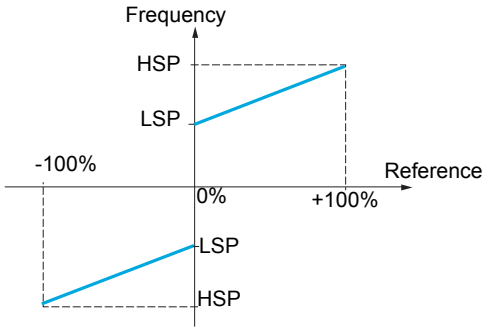
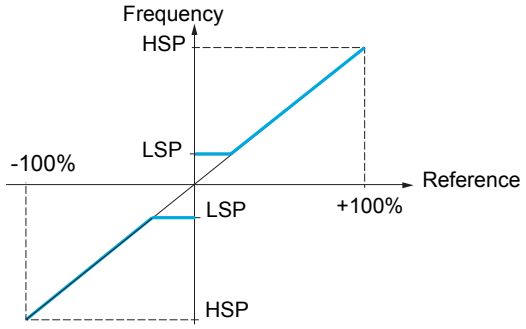
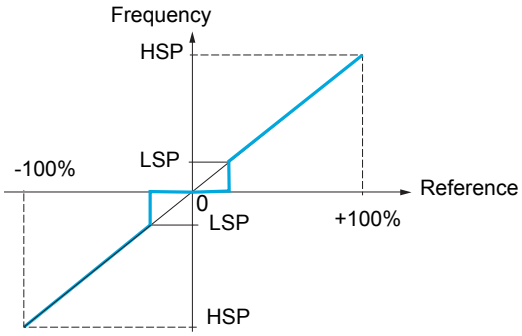
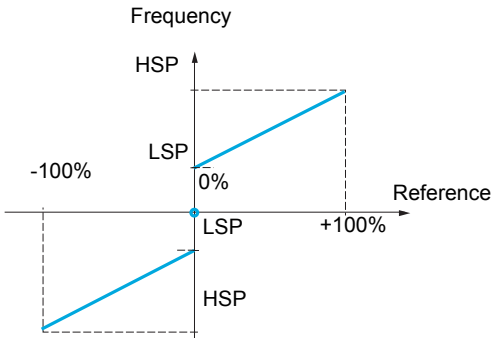
Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O-

Range (output values): For analog inputs only:

This parameter is used to configure the reference range to [0% ➞100%] or [-100% ➞ +100%] in order to obtain a bidirectional output from a unidirectional input.





Code	Name / Description	Adjustment range	Factory setting
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
b5P	**[Reference template]**		**[Standard]** (b5d)
b5d	**[Standard]** (b5d)  At zero reference the frequency = LSP		
bLS	**[Pedestal]** (bLS)  At reference = 0 to LSP the frequency = LSP		
bnS	**[Deadband]** (bnS)  At reference = 0 to LSP the frequency = 0		
bnS0	**[Deadband 0]** (bnS0)  This operation is the same as **[Standard]** (b5d), except that in the following cases at zero reference, the frequency = 0: The signal is less than **[Min value]**, which is greater than 0 (example 1 V on a 2 - 10 V input) The signal is greater than **[Min value]**, which is greater than **[Max value]** (example: 11 V on a 10 - 0 V input). If the input range is configured as "bidirectional", operation remains identical to **[Standard]** (b5d). This parameter defines how the speed reference is taken into account, for analog inputs and Pulse input only. In the case of the PID regulator, this is the PID output reference. The limits are set by the **[Low speed]** (LSP) and **[High speed]** (HSP) parameters, page 87.		

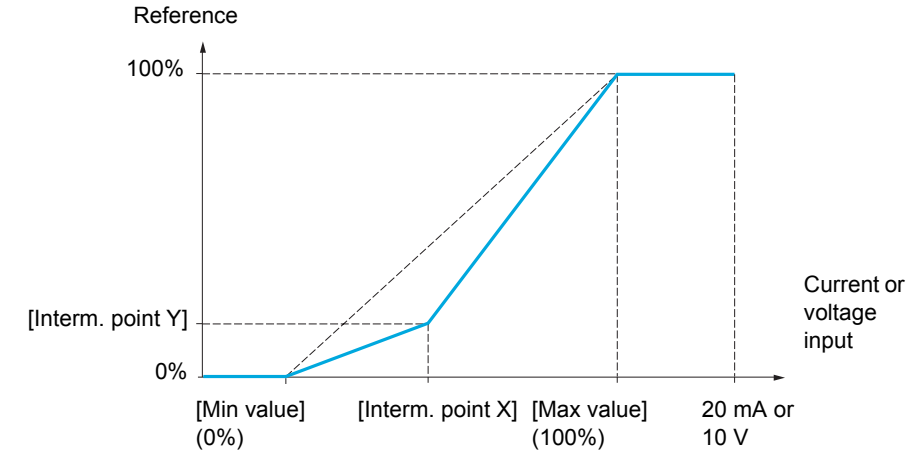
Parameter that can be modified during operation or when stopped.

Delinearization: For analog inputs only:

The input can be delinearized by configuring an intermediate point on the input/output curve of this input:

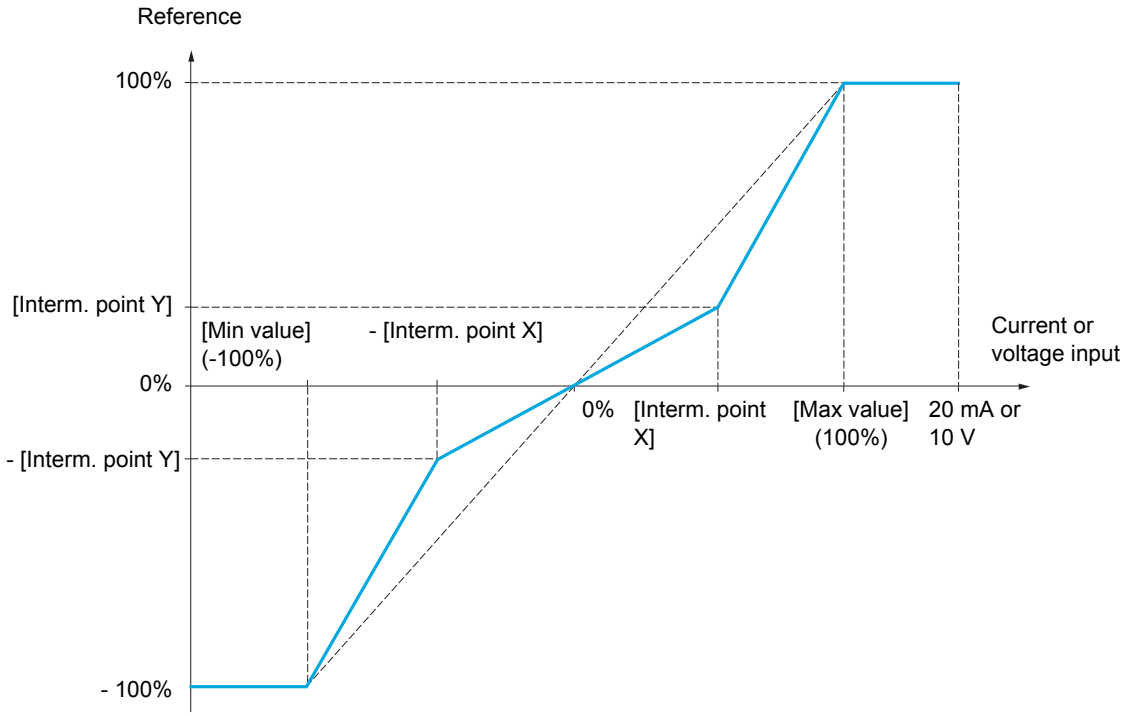
Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > AI1-

For range 0 ➞ 100%



Note: For [Interm. point X], 0% corresponds to [Min value] and 100% to [Max value].

For range -100% ➞ 100%



Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > AI2-

Code	Name / Description	Adjustment range	Factory setting
AI1-	**[AI1 CONFIGURATION]**		
AI1A	**[AI1 assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with input AI1 in order to check, for example, for compatibility problems. nO **[No]** (nO): Not assigned AO1 **[AO1 assignment]** (AO1): Analog output AO1 Fr1 **[Ref.1 channel]** (Fr1): Reference source 1 Fr2 **[Ref.2 channel]** (Fr2): Reference source 2 SA2 **[Summing ref. 2]** (SA2): Summing reference 2 PIF **[PID feedback]** (PIF): PI feedback (PI control) tAA **[Torque limitation]** (tAA): Torque limitation: Activation by an analog value dA2 **[Subtract. ref. 2]** (dA2): Subtracting reference 2 PIM **[Manual PID ref.]** (PIM): Manual speed reference of the PI(D) regulator (auto-man) FPI **[PID speed ref.]** (FPI): Speed reference of the PI(D) regulator (predictive reference) SA3 **[Summing ref. 3]** (SA3): Summing reference 3 Fr1b **[Ref.1B channel]** (Fr1b): Reference source 1B dA3 **[Subtract. ref. 3]** (dA3): Subtracting reference 3 FLOC **[Forced local]** (FLOC): Forced local reference source MA2 **[Ref.2 multiplier]** (MA2): Multiplying reference 2 MA3 **[Ref. 3 multiplier]** (MA3): Multiplying reference 3 PES **[Weight input]** (PES): Hoisting: External weight measurement function IAO1 **[IA01]** (IAO1): Function blocks: Analog Input 01 ... **...** IA10 **[IA10]** (IA10): Function blocks: Analog Input 10		
AI1t	**[AI1 Type]**		**[Voltage]** (10U)
10U	**[Voltage]** (10U): Positive voltage input 0 - 10 V (negative values are interpreted as zero: the input is unidirectional)		
UIL1	**[AI1 min value]** AI1 voltage scaling parameter of 0%.	0 to 10.0 V	0 V
UIH1	**[AI1 max value]** AI1 voltage scaling parameter of 100%.	0 to 10.0 V	10.0 V
AI1F	**[AI1 filter]** Interference filtering.	0 to 10.00 s	0 s
AI1L	**[AI1 range]**		**[0 - 100%]** (PoS)
PoS	**[0 - 100%]** (PoS): Positive logical		
nEG	**[+/- 100%]** (nEG): Positive and negative logical		
AI1E	**[AI1 Interm. point X]** Input delinearization point coordinate. Percentage of the physical input signal. 0% corresponds to **[AI1 min value]** (UIL1). 100% corresponds to **[AI1 max value]** (UIH1).	0 to 100%	0%
AI1S	**[AI1 Interm. point Y]** Output delinearization point coordinate (frequency reference). Percentage of the internal frequency reference corresponding to the **[AI1 Interm. point X]** (AI1E) percentage of physical input signal.	0 to 100%	0%
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
AI2-	**[AI2 CONFIGURATION]**		
AI2A	**[AI2 assignment]** Identical to **[AI1 assignment]** (AI1A) page 133.		
AI2t	**[AI2 Type]**		**[Voltage +/-]** (n10U)
10U	**[Voltage]** (10U): Positive voltage input 0 - 10 V (negative values are interpreted as zero: the input is unidirectional)		
n10U	**[Voltage +/-]** (n10U): Positive and negative voltage input +/- 10 V (the input is bidirectional)		
UIL2	**[AI2 min value]** AI2 voltage scaling parameter of 0%.	0 to 10.0 V	0 V

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > AU2-

Code	Name / Description	Adjustment range	Factory setting
uiH2	**[AI2 max. value]** AI2 voltage scaling parameter of 100%.	0 to 10.0 V	10.0 V
AI2F	**[AI2 filter]** Interference filtering.	0 to 10.00 s	0 s
AI2L	**[AI2 range]** This parameter is forced to **[0 - 100%]** (PoS) and can not be accessed if **[AI2 Type]** (AI2t) (page 133) is set to **[Voltage +/-]** (nIOu). PoS **[0 - 100%]** (PoS): Positive logical nEG **[+/- 100%]** (nEG): Positive and negative logical		**[0 - 100%]** (PoS)
AI2E	**[AI2 Interm. point X]** Input delinearization point coordinate. Percentage of the physical input signal. 0% corresponds to **[Min value]** if the range is 0 ➡ 100%. 0% corresponds to $\frac{\text{[Max value]} + \text{[Min value]}}{2}$ if the range is -100% ➡ +100%. 100% corresponds to **[Max value]**.	0 to 100%	0%
AI2S	**[AI2 Interm. point Y]** Output delinearization point coordinate (frequency reference). Percentage of the internal frequency reference corresponding to the **[AI2 Interm. point X]** (AI2E) percentage of physical input signal.	0 to 100%	0%
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
AI3-	**[AI3 CONFIGURATION]**		
AI3A	**[AI3 assignment]** Identical to **[AI1 assignment]** (AI1A) page 133.		
AI3t	**[AI3 Type]** OA **[Current]** (OA): Current input 0 - 20 mA		**[Current]** (OA)
CrL3	**[AI3 min. value]** AI3 current scaling parameter of 0%.	0 to 20.0 mA	0 mA
CrH3	**[AI3 max. value]** AI3 current scaling parameter of 100%.	0 to 20.0 mA	20.0 mA
AI3F	**[AI3 filter]** Interference filtering.	0 to 10.00 s	0 s
AI3L	**[AI3 range]** PoS **[0 - 100%]** (PoS): Unidirectional input nEG **[+/- 100%]** (nEG): Bidirectional input Example: On a 4 - 20 mA input. 4 mA corresponds to reference -100%. 12 mA corresponds to reference 0%. 20 mA corresponds to reference +100%. Since AI3 is, in physical terms, a bidirectional input, the **[+/- 100%]** (nEG) configuration must only be used if the signal applied is unidirectional. A bidirectional signal is not compatible with a bidirectional configuration.		**[0 - 100%]** (PoS)
AI3E	**[AI3 Interm. point X]** Input delinearization point coordinate. Percentage of the physical input signal. 0% corresponds to **[Min value]** (CrL3) if the range is 0 ➡ 100%. 0% corresponds to $\frac{\text{[AI3 max. value]} (CrH3) - \text{[AI3 min. value]}}{(CrL3)}$ if the range is -100% ➡ +100%. 100% corresponds to **[AI3 max. value]** (CrH3).	0 to 100%	0%

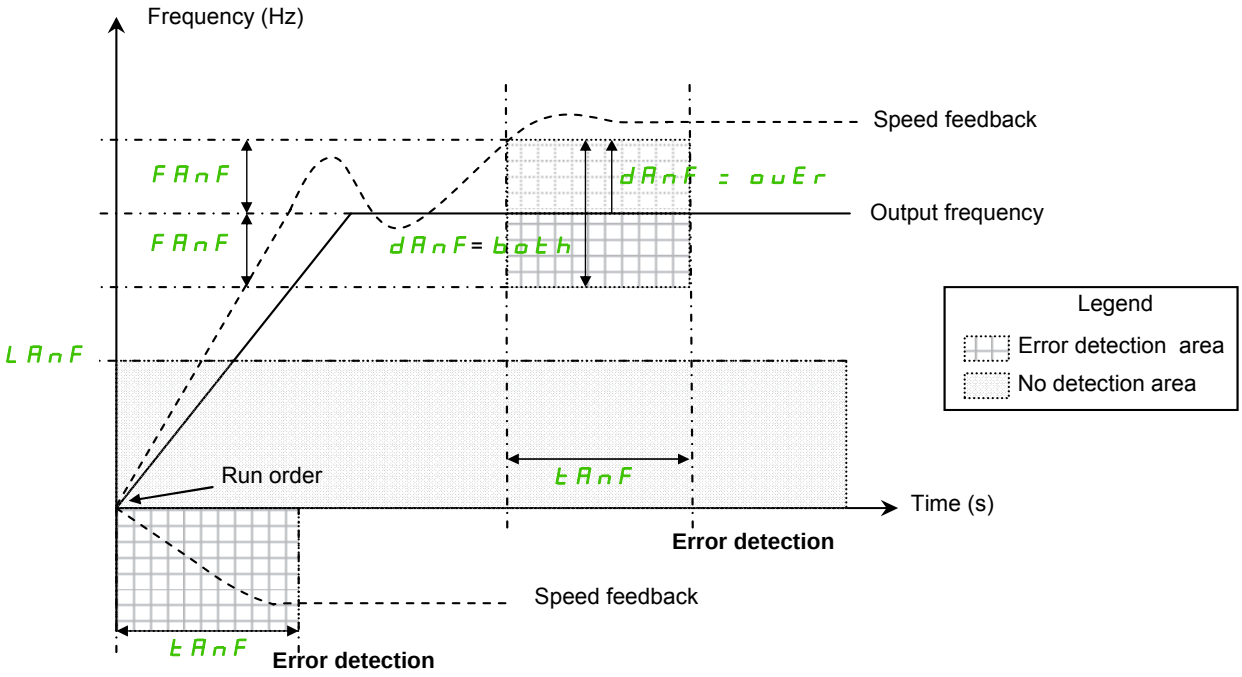
Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > IEn-

Code	Name / Description	Adjustment range	Factory setting
AI3S	**[AI3 Interm. point Y]** Output delinearization point coordinate (frequency reference). Percentage of the internal frequency reference corresponding to the **[AI3 Interm. point X]** (AI3E) percentage of physical input signal.	0 to 100%	0%
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
AUI-	**[VIRTUAL AI1]**		
AUIA	**[AIV1 assignment]** Virtual analog input 1 via the jog dial available on the front side of the product. Identical to **[AI1 assignment]** (AI1A) page 133.		
AU2-	**[VIRTUAL AI2]**		
AU2A	**[AIV2 assignment]** Possible assignments for **[AI virtual 2]** (AIU2): Virtual analog input 2 via communication channel, to be configured with **[AI2 net. channel]** (AIC2). Identical to **[AIV1 assignment]** (AUIA) page 133.		
AIC2 ★	**[AI2 net. Channel]** **[VIRTUAL AI2]** (AU2A) source channel. This parameter can also be accessed in the **[PID REGULATOR]** (PID-) submenu page 210. Scale: The value 8192 transmitted by this input is equivalent to 10 V on a 10 V input. nO **[No]** (nO): Not assigned Mdb **[Modbus]** (Mdb): Integrated Modbus CAn **[CANopen]** (CAn): Integrated CANopen® nEt **[Com. card]** (nEt): Communication card (if inserted)		**[No]** (nO)
IEn-	**[ENCODER CONFIGURATION]** Following parameters can be accessed if the speed monitoring card VW3A3620 has been inserted.		
Enu	**[Encoder usage]** nO [No] (nO): Function inactive. SEC [Fdbk monit.] (SEC): The encoder provides speed feedback for monitoring.		**[No]** (nO)
EnS ★	**[Encoder type]** Encoder usage configuration. Encoder usage configuration. To be configured in accordance with the type of encoder used. AAbb [AABB] (AAbb): For signals A, /A, B, /B. Ab [AB] (Ab): For signals A, B. Following parameters can be accessed if [Encoder usage] (Enu) is set to [Fdbk monit.] (SEC).		**[AABB]** (AAbb)
PGI ★	**[Number of pulses]** Encoder usage configuration. Number of pulses per encoder revolution. Following parameters can be accessed if [Encoder usage] (Enu) is set to [Fdbk monit.] (SEC).	100 to 3600	1024

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > IEn-

Load slip detection :



The drive will detect an error and display the error code [Load slipping] (AnF) in the following cases:

- As soon as the RUN order is received, if the sign of the output frequency and the speed feedback are in opposite way during [ANF Time Thd.] (tAnF).
- During operation:
  - if the speed feedback is in the same direction than the output frequency
  - and the speed feedback is over [ANF Detection level] (LAnF).
  - and,

    "if [ANF Direction check] (dAnF) is set to [Over] (ouEr), the difference between the output frequency and the speed feedback is over [ANF Frequency Thd.] (FAnF) during [ANF Time Thd.] (TAnF) (Overspeed detection).

    or,

    "if [ANF Direction check] (dAnF) is set to [Both] (both), the difference between the output frequency and the speed feedback is over [ANF Frequency Thd.] (FAnF) or below - [ANF Frequency Thd.] (FAnF) during [ANF Time Thd.] (tAnF) (Overspeed or underspeed detection).

Code	Name / Description	Adjustment range	Factory setting
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
IEn-	**[ENCODER CONFIGURATION] (continued)** Following parameters can be accessed if the speed monitoring card VW3A3620 has been inserted and if [Encoder usage] (Enu) is set to [Fdbk monit.] (SEC).		
FAnF ★	**[ANF Frequency Thd.]** Level of [Load slipping] (AnF) detected error. The drive will not detect the error [Load slipping] (AnF) if the difference between the output frequency and the speed feedback is below than [ANF Frequency Thd.] (FAnF).	0.1 to 50 Hz	5.0 Hz
LAnF ★	**[ANF Detection level]** Level of ANF detected error. The drive will not detect the error [Load slipping] (AnF) if the speed feedback is below [ANF Detection level] (LAnF).	0 to 10 Hz	0.0 Hz

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > LO1-

Code	Name / Description	Adjustment range	Factory setting
dAnF	**[ANF Direction check]**		**[Over]** (ouEr)
★ ouEr both	Available [Load slipping] (AnF) detection direction. [Over] (ouEr): The drive will detect the error [Load slipping] (AnF) in case of overspeed. [Both] (both): The drive will detect the error [Load slipping] (AnF) in case of overspeed or underspeed.		
tAnF ★	**[ANF Time Thd.]**	0 to 10 s	0.10 s
	Level of [Load slipping] (AnF) detected error. The drive will detect the error [Load slipping] (AnF) if the conditions are present during [ANF Time Thd.] (AnF).		

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > DO1-

Code	Name / Description	Adjustment range	Factory setting
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
r1-	**[R1 CONFIGURATION]**		
r1	**[R1 Assignment]**		**[No drive flt]** (FLt)
nO	**[No]** (nO): Not assigned		
FLt	**[No drive flt]** (FLt): Drive fault detection status (relay normally energized, and de-energized in the event of an error)		
run	**[Drv running]** (run): Drive running		
FtA	**[Freq. Th. attain.]** (FtA): Frequency threshold attained (**[Freq. threshold]** (Ftd) page 102)		
FLA	**[HSP attain.]** (FLA): High speed attained		
CtA	**[I attained]** (CtA): Current threshold attained (**[Current threshold]** (Ctd) page 102)		
SrA	**[Freq.ref.att]** (SrA): Frequency reference attained		
tSA	**[Th.mot. att.]** (tSA): Motor 1 thermal state attained		
PEE	**[PID error al]** (PEE): PID error alarm		
PFA	**[PID fdbk al]** (PFA): PID feedback alarm		
F2A	**[Freq. Th. 2 attained]** (F2A): Frequency threshold 2 attained (**[Freq. threshold 2]** (F2d) page 102)		
tAd	**[Th. drv. att.]** (tAd): Drive thermal state attained		
uLA	**[Pro.Undload]** (uLA): Underload alarm		
oLA	**[Ovld.P.Alrm]** (oLA): Overload alarm		
rSdA	**[Rope slack]** (rSdA): Rope slack (see **[Rope slack config.]** (rSd) parameter page 205)		
ttHA	**[High tq. att.]** (ttHA): Motor torque overshooting high threshold **[High torque thd.]** (ttH) page 102		
ttLA	**[Low tq. att.]** (ttLA): Motor torque undershooting low threshold **[Low torque thd.]** (ttL) page 102		
nFrd	**[Forward]** (nFrd): Motor in forward rotation		
nrrS	**[Reverse]** (nrrS): Motor in reverse rotation		
tS2	**[Th.mot2 att]** (tS2): Motor 2 thermal threshold (TTD2) reached		
tS3	**[Th.mot3 att]** (tS3): Motor 3 thermal threshold (TTD3) reached		
AtS	**[Neg Torque]** (AtS): Negative torque (braking)		
CnF0	**[Cnfg.0 act.]** (CnF0): Configuration 0 active		
CnF1	**[Cnfg.1 act.]** (CnF1): Configuration 1 active		
CnF2	**[Cnfg.2 act.]** (CnF2): Configuration 2 active		
CFP1	**[Set 1 active]** (CFP1): Parameter set 1 active		
CFP2	**[Set 2 active]** (CFP2): Parameter set 2 active		
CFP3	**[Set 3 active]** (CFP3): Parameter set 3 active		
dbL	**[DC charged]** (dbL): DC bus charging		
brS	**[In braking]** (brS): Drive braking		
PrM	**[P. removed]** (PrM): Drive locked by "Safe Torque Off" input		
F9LA	**[Fr.met. alar.]** (F9LA): Measured speed threshold attained **[Pulse warning thd.]** (F9L) page 102		
MCP	**[I present]** (MCP): Motor current present		
LSA	**[Limit sw. att]** (LSA): Limit switch attained		
dLdA	**[Load alarm]** (dLdA): Load variation detection (see page 267)		
AG1	**[Alarm Grp 1]** (AG1): Alarm group 1		
AG2	**[Alarm Grp 2]** (AG2): Alarm group 2		
AG3	**[Alarm Grp 3]** (AG3): Alarm group 3		
PLA	**[LI6=PTC al.]** (PLA): LI6 = PTCL alarm		
EFA	**[Ext. fault al]** (EFA): External fault alarm		
uSA	**[Under V. al.]** (uSA): Undervoltage alarm		
uPA	**[Uvolt warn]** (uPA): Undervoltage threshold		
tHA	**[Al. °C drv]** (tHA): Drive overheating		
SSA	**[Lim T/I att.]** (SSA): Torque limit alarm		
tJA	**[IGBT al.]** (tJA): Thermal junction alarm		
AP3	**[AI3 AI. 4-20]** (AP3): AI3 4-20 mA loss alarm		
rdY	**[Ready]** (rdY): Ready to start		
r1-	**[R1 CONFIGURATION] (continued)**		
r1d (1)	**[R1 Delay time]**	0 to 60,000 ms	0 ms
	The change in state only takes effect once the configured time has elapsed, when the information becomes true. The delay cannot be set for the **[No drive flt]** (FLt) assignment, and remains at 0.		
r1S	**[R1 Active at]**		**[1]** (PoS)
	Configuration of the operating logic:		
PoS	**[1]** (PoS): State 1 when the information is true		
nEG	**[0]** (nEG): State 0 when the information is true		
	Configuration **[1]** (PoS) cannot be modified for the **[No drive flt]** (FLt) assignment.		

Code	Name / Description	Adjustment range	Factory setting
r 1H	**[R1 Holding time]**	0 to 9,999 ms	0 ms
	The change in state only takes effect once the configured time has elapsed, when the information becomes false. The holding time cannot be set for the **[No drive flt]** (FLt) assignment, and remains at 0.		
r 1F	**[Enable Relay1 fallback]**		**[No]** (nO)
	Available if **[R1 Assignment]** (r 1) page 138 is set **[No]** (nO) : Not assigned		
YES	**[YES]** (YES): Relay controlled by OL1R. The relay is de-energized if the drive is in operating state "Fault"		
nO	**[No]** (nO): Relay controlled by OL1R.		
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
r2-	**[R2 CONFIGURATION]**		
r2	**[R2 Assignment]**		**[No]** (nO)
	Identical to **[R1 Assignment]** (r 1) page 138 with the addition of:		
bLC	**[Brk control]** (bLC): Brake contactor control		
LLC	**[Input cont.]** (LLC): Line contactor control		
oCC	**[Output cont]** (oCC): Output contactor control		
Ebo	**[End reel]** (Ebo): End of reel (traverse control function)		
tSY	**[Sync. wobble]** (tSY): "Counter wobble" synchronization		
dCo	**[DC charging]** (dCo): DC bus precharging contactor control		
oL01	**[OL01]** (oL01): Function blocks: Logical Output 01		
...	**...**		
oL10	**[OL10]** (oL10): Function blocks: Logical Output 10		
r2d (1)	**[R2 Delay time]**	0 to 60,000 ms	0 ms
	The delay cannot be set for the **[No drive flt]** (FLt), **[Brk control]** (bLC), **[Output cont.]** (oCC) and **[Input cont.]** (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.		
r2S	**[R2 Active at]**		**[1]** (POS)
	Configuration of the operating logic:		
POS	**[1]** (POS): State 1 when the information is true		
nEG	**[0]** (nEG): State 0 when the information is true		
	The configuration **[1]** (POS) cannot be modified for the **[No drive flt]** (FLt), **[Brk control]** (bLC), **[DC charging]** (dCo), and **[Input cont.]** (LLC) assignments.		
r2H	**[R2 Holding time]**	0 to 9,999 ms	0 ms
	The holding time cannot be set for the **[No drive flt]** (FLt), **[Brk control]** (bLC) and **[Input cont]** (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.		
r2F	**[Enable Relay2 fallback]**		**[No]** (nO)
	Available if **[R2 Assignment]** (r 2) page 139 is set **[No]** (nO) : Not assigned		
YES	**[YES]** (YES): Relay controlled by OL1R. The relay is de-energized if the drive is in operating state "Fault"		
nO	**[No]** (nO): Relay controlled by OL1R.		
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
Lo1-	**[LO1 CONFIGURATION]**		
Lo1	**[LO1 assignment]**		**[No]** (nO)
	Identical to **[R1 Assignment]** (r 1) page 138 with the addition of following parameter value (shown for information only as these selections can only be configured in the **[APPLICATION FUNCT.]** (Fun-) menu):		
bLC	**[Brk control]** (bLC): Brake contactor control		
LLC	**[Input cont.]** (LLC): Line contactor control		
oCC	**[Output cont]** (oCC): Output contactor control		
Ebo	**[End reel]** (Ebo): End of reel(traverse control function)		
tSY	**[Sync. wobble]** (tSY): "Counter wobble" synchronization		
dCo	**[DC charging]** (dCo): DC bus precharging contactor control		
oL01	**[OL01]** (oL01): Function blocks: Logical Output 01		
...	**...**		
oL10	**[OL10]** (oL10): Function blocks: Logical Output 10		
GdL	**[GDL]** (GdL): GDL safety function		
Lo1d	**[LO1 delay time]**	0 to 60,000 ms (1)	0 ms
	The delay cannot be set for the **[No drive flt]** (FLt), **[Brk control]** (bLC), **[Output cont.]** (oCC) and **[Input cont.]** (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.		

Code	Name / Description	Adjustment range	Factory setting
LO1S	**[LO1 active at]**		**[1]** (POS)
POS nEG	Configuration of the operating logic: **[1]** (POS): State 1 when the information is true **[0]** (nEG): State 0 when the information is true The configuration **[1]** (POS) cannot be modified for the **[No drive flt]** (FLT), **[Brk control]** (bLC) and **[Input cont.]** (LLC) assignments.		
LO1H	**[LO1 holding time]**	0 to 9,999 ms	0
	The holding time cannot be set for the **[No drive flt]** (FLT), **[Brk control]** (bLC) and **[Input cont]** (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.		

(1) 0 to 9,999 ms then 10.00 to 60.00 s on the integrated display terminal.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > AO1-

Use of analog output AO1 as a logic output

Analog output AO1 can be used as a logic output, by assigning DO1. In this case, when set to 0, this output corresponds to the AO1 min. value (0 V, or 0 mA for example), and when set to 1 to the AO1 max. value (10 V, or 20 mA for example).

The electrical characteristics of this analog output remain unchanged. As these characteristics are different from logic output characteristics, check that it is still compatible with the intended application.

Code	Name / Description	Adjustment range	Factory setting
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
dO1-	**[DO1 CONFIGURATION]**		
dO1	**[DO1 assignment]**		**[No]** (nO)
	Identical to **[R1 Assignment]** (r1) page 138 with the addition of the following parameter values (shown for information only as these selections can only be configured in the **[APPLICATION FUNCT.]** (FUn-) menu): bLC **[Brk control]** (bLC): Brake contactor control LLC **[Input cont.]** (LLC): Line contactor control oCC **[Output cont]** (oCC): Output contactor control Ebo **[End reel]** (Ebo): End of reel(traverse control function) tSY **[Sync. wobble]** (tSY): "Counter wobble" synchronization dCo **[DC charging]** (dCo): DC bus precharging contactor control oL01 **[OL01]** (oL01): Function blocks: Logical Output 01 ... **...** oL10 **[OL10]** (oL10): Function blocks: Logical Output 10		
dO1d	**[DO1 delay time]**	0 to 60,000 ms (1)	0 ms
	The delay cannot be set for the **[No drive flt]** (FLt), **[Brk control]** (bLC), **[Output cont.]** (oCC) and **[Input cont.]** (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.		
dO1S	**[DO1 active at]**		**[1]** (POS)
	Configuration of the operating logic: POS **[1]** (POS): State 1 when the information is true nEG **[0]** (nEG): State 0 when the information is true The configuration **[1]** (POS) cannot be modified for the **[No drive flt]** (FLt), **[Brk control]** (bLC) and **[Input cont.]** (LLC) assignments.		
dO1H	**[DO1 holding time]**	0 to 9,999 ms	0 ms
	The holding time cannot be set for the **[No drive flt]** (FLt), **[Brk control]** (bLC) and **[Input cont]** (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.		

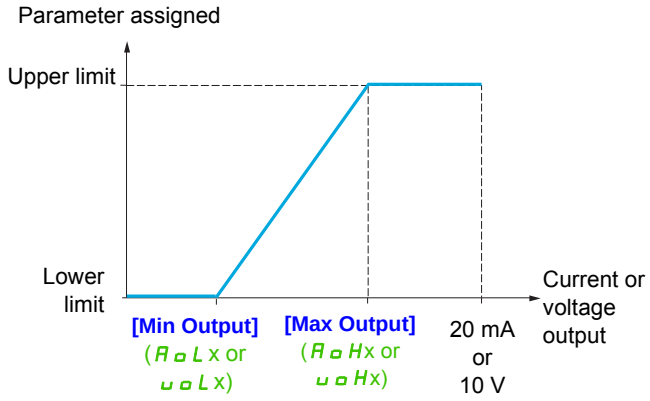
(1) 0 to 9,999 ms then 10.00 to 60.00 s on the integrated display terminal.

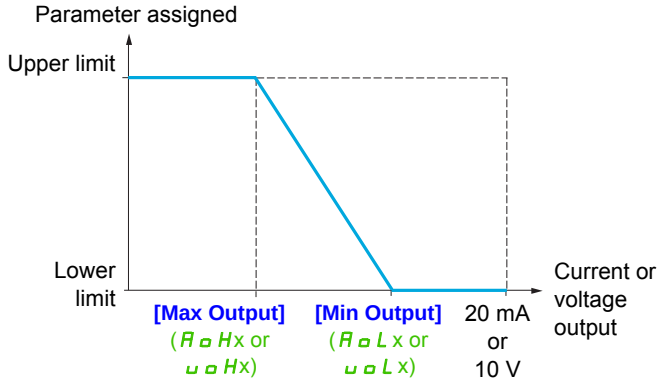
Parameters described in this page can be accessed by: DRI- > CONF > FULL > I_O- > A1C-

Configuration of analog output

Minimum and maximum values (output values):

The minimum output value, in volts, corresponds to the lower limit of the assigned parameter and the maximum value corresponds to its upper limit. The minimum value may be greater than the maximum value.



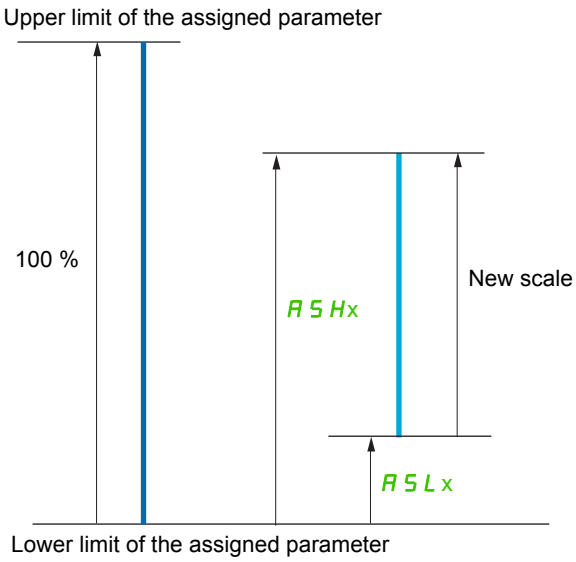


Scaling of the assigned parameter

The scale of the assigned parameter can be adapted in accordance with requirements by modifying the values of the lower and upper limits by means of two parameters for each analog output.

These parameters are given in %. 100% corresponds to the total variation range of the configured parameter, so: 100% = upper limit - lower limit For example, **[Sign. torque]** (StQ) which varies between -3 and +3 times the rated torque, 100% corresponds to 6 times the rated torque.

- The **[Scaling AOx min]** (ASLx) parameter modifies the lower limit: new value = lower limit + (range x ASLx). The value 0% (factory setting) does not modify the lower limit.
- The **[Scaling AOx max]** (ASHx) parameter modifies the upper limit: new value = lower limit + (range x ASLx). The value 100% (factory setting) does not modify the upper limit.
- **[Scaling AOx min]** (ASLx) must always be lower than **[Scaling AOx max]** (ASHx).



Application example 2

The value of the motor current at the AO1 output is to be transferred with 0 - 20 mA, range 2 In motor, In motor being the equivalent of a 0.8 In drive.

The **[I motor]** (oCr) parameter varies between 0 and 2 times the rated drive current, or a range of 2.5 times the rated drive current.

[Scaling AO1 min] (ASL 1) must not modify the lower limit, which therefore remains at its factory setting of 0%.

[Scaling AO1 max] (ASH 1) must modify the upper limit by 0.5x the rated motor torque, or 100 - 100/5 = 80% (new value = lower limit + (range x ASH1).

Code	Name / Description	Adjustment range	Factory setting
I_O-	**[INPUTS / OUTPUTS CFG] (continued)**		
AO1-	**[AO1 CONFIGURATION]**		
AO1	**[AO1 assignment]**		**[No]** (nO)
nO	**[No]** (nO): Not assigned		
oCr	**[I motor]** (oCr): Current in the motor, between 0 and 2 In (In = rated drive current indicated in the Installation manual and on the drive nameplate)		
oFr	**[Motor freq.]** (oFr): Output frequency, from 0 to **[Max frequency]** (tFr)		
oFS	**[Sig. o/p frq.]** (oFS): Signed output frequency, between - **[Max frequency]** (tFr) and + **[Max frequency]** (tFr)		
orP	**[Ramp out.]** (orP): From 0 to **[Max frequency]** (tFr)		
tr9	**[Motor torq.]** (tr9): Motor torque, between 0 and 3 times the rated motor torque		
St9	**[Sign. torque]** (St9): Signed motor torque, between -3 and +3 times the rated motor torque. The + sign corresponds to the motor mode and the - sign to the generator mode (braking).		
orS	**[sign ramp]** (orS): Signed ramp output, between - **[Max frequency]** (tFr) and + **[Max frequency]** (tFr).		
oPS	**[PID ref.]** (oPS): PID regulator reference between **[Min PID reference]** (PIP1) and **[Max PID reference]** (PIP2).		
oPF	**[PID feedbk]** (oPF): PID regulator feedback between **[Min PID feedback]** (PIF1) and **[Max PID feedback]** (PIF2)		
oPE	**[PID error]** (oPE): PID regulator error between- 5 % and + 5 % of (**[Max PID feedback]** (PIF2) - **[Min PID feedback]** (PIF1))		
oP1	**[PID output]** (oP1): PID regulator output between **[Low speed]** (LSP) and **[High speed]** (HSP)		
oPr	**[Mot. power]** (oPr): Motor power, between 0 and 2.5 times **[Rated motor power]** (nPr)		
uoP	**[Motor volt.]** (uoP): Voltage applied to the motor, between 0 and **[Rated motor volt.]** (unS)		
tHr	**[Mot thermal]** (tHr): Motor thermal state, between 0 and 200% of the rated thermal state		
tHr2	**[Mot therm2]** (tHr2): Motor thermal state 2, between 0 and 200 % of the rated thermal state		
tHr3	**[Mot therm3]** (tHr3): Motor thermal state 3, between 0 and 200% of the rated thermal state		
tHd	**[Drv thermal]** (tHd): Drive thermal state, between 0 and 200% of the rated thermal state		
t9L	**[Torque lim.]** (t9L): Torque limit, between 0 and 3 times the rated motor torque		
dO1	**[dO1]** (do1): Assignment to a logic output. This assignment can only appear if **[DO1 assignment]** (do1) has been assigned. This is the only possible choice in this case, and is only displayed for informational purposes.		
t9nS	**[Torque 4Q]** (t9nS): Signed motor torque, between -3 and +3 times the rated motor torque. The + sign and the - sign correspond to the physical direction of the torque, regardless of mode (motor or generator).		
oAO1	**[OA01]** (oAO1): Function blocks: Analog Output 01		
...	**...**		
oA10	**[OA10]** (oA10): Function blocks: Analog Output 10		
AO1t	**[AO1 Type]**		**[Current]** (0A)
10u	**[Voltage]** (10u): Voltage output		
0A	**[Current]** (0A): Current output		
AOL1 ★	**[AO1 min Output]**	0 to 20.0 mA	0 mA
	This parameter can be accessed if **[AO1 Type]** (AO1t) is set to **[Current]** (0A).		
AOH1 ★	**[AO1 max Output]**	0 to 20.0 mA	20.0 mA
	This parameter can be accessed if **[AO1 Type]** (AO1t) is set to **[Current]** (0A).		
uoL1 ★	**[AO1 min Output]**	0 to 10.0 V	0 V
	This parameter can be accessed if **[AO1 Type]** (AO1t) is set to **[Voltage]** (10u).		
uoH1 ★	**[AO1 max Output]**	0 to 10.0 V	10.0 V
	This parameter can be accessed if **[AO1 Type]** (AO1t) is set to **[Voltage]** (10u).		
ASL1	**[Scaling AO1 min]**	0 to 100.0%	0%
	Scaling of the lower limit of the assigned parameter, as a % of the maximum possible variation.		
ASH1	**[Scaling AO1 max]**	0 to 100.0%	100.0%
	Scaling of the upper limit of the assigned parameter, as a % of the maximum possible variation.		
AO1F	**[AO1 Filter]**	0 to 10.00 s	0 s
	Interference filtering. This parameter is forced to 0 if **[AO1 assignment]** (AO1) is set to **[dO1]** (do1).		

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

The following submenus group the alarms into 1 to 3 groups, each of which can be assigned to a relay or a logic output for remote signaling. These groups can also be displayed on the graphic display terminal (see **[3.3 MONITORING CONFIG.]** (MCF-) menu page 284) and viewed via the **[1.2 MONITORING]** (Mon-) menu page 47.

When one or a number of alarms selected in a group occurs, this alarm group is activated.

Code	Name / Description
I_O-	**[INPUTS / OUTPUTS CFG]** (continued)
A1C-	**[ALARM GRP1 DEFINITION]**
	Selection to be made from the following list: PLA **[LI6=PTC al.]** (PLA): LI6 = PTCL alarm EFA **[Ext. fault al.]** (EFA): External fault alarm USA **[Under V. al.]** (USA): Undervoltage alarm CTA **[I attained]** (CTA): Current threshold attained (**[Current threshold]** (CTd) page 102) FTA **[Freq.Th.att.]** (FTA): Frequency threshold attained (**[Freq. threshold]** (FTd) page 102) F2A **[Freq. th.2 attained]** (F2A): Frequency threshold 2 attained (**[Freq. threshold 2]** (F2d) page 102) SrA **[Freq.ref.att]** (SrA): Frequency reference attained TSA **[Th.mot. att.]** (TSA): Motor 1 thermal state attained TS2 **[Th.mot2 att]** (TS2): Motor 2 thermal state attained TS3 **[Th.mot3 att]** (TS3): Motor 3 thermal state attained UPA **[Uvolt warn]** (UPA): Undervoltage threshold FLA **[HSP attain.]** (FLA): High speed attained THA **[AI. °C drv]** (THA): Drive overheating PEE **[[PID error al]** (PEE): PID error alarm PFA **[PID fdbk al.]** (PFA): PID feedback alarm AP3 **[AI3 AI. 4-20]** (AP3): Alarm indicating absence of 4-20 mA signal on input AI3 SSA **[Lim T/I att.]** (SSA): Torque limit alarm TAd **[Th. drv. att.]** (TAd): Drive thermal state attained TJA **[IGBT alarm]** (TJA): IGBT alarm ULA **[Underload. Proc. AI.]** (ULA): Underload alarm OLA **[Overload. Proc. AI.]** (OLA): Overload alarm rSdA **[Rope slack alarm]** (rSdA): Rope slack (see **[Rope slack config.]** (rSd) parameter page 205) TTHA **[High torque alarm]** (TTHA): Motor torque overshooting high threshold **[High torque thd.]** (TTH) page 102. TTLA **[Low torque alarm]** (TTLA): Motor torque undershooting low threshold**[Low torque thd.]** (TTL) page 102. FqLA **[Freq. meter Alarm]** (FqLA): Measured speed threshold attained: **[Pulse warning thd.]** (FqL) page 102. dLdA **[Dynamic load alarm]** (dLdA): Load variation detection (see **[DYNAMIC LOAD DETECT.]** (dLd-) page 267). See the multiple selection procedure on page 33 for the integrated display terminal, and page 24 for the graphic display terminal.
A2C-	**[ALARM GRP2 DEFINITION]**
	Identical to **[ALARM GRP1 DEFINITION]** (A1C-) page 145.
A3C-	**[ALARM GRP3 DEFINITION]**
	Identical to **[ALARM GRP1 DEFINITION]** (A1C-) page 145.

Command

The parameters in the **[COMMAND]** (CtL-) menu can only be modified when the drive is stopped and no run command is present.

Command and reference channels

Run commands (forward, reverse, stop, etc.) and references can be sent using the following channels:

Command	Reference
Terminals: logic inputs LI or analog inputs used as logic inputs LA Function blocks Remote display terminal Graphic display terminal Integrated Modbus Integrated CANopen® Communication card	Terminals: analog inputs AI, pulse input Function blocks Remote display terminal Graphic display terminal Integrated Modbus Integrated CANopen® Communication card +/- speed via the terminals +/- speed via the graphic display terminal

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

If analog inputs **[AI1]** (AI1) or **[AI2]** (AI2) are used as logic inputs (**[LAI1]** (LAI1) or **[LAI2]** (LAI2)), they remain active in their behaviors in analog input mode (example : **[Ref.1 channel]** (Fr1) is still set to **[AI1]** (AI1)).

- Remove the configuration of **[AI1]** (AI1) or **[AI2]** (AI2) in analog input mode

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Note: **[LA1]** (LA1) and **[LA2]** (LA2) can be used as 2 logic inputs in source mode only.

- + 24 V power supply (max. 30 V)
- State 0 if < 7.5 V, state 1 if > 8.5 V.

Note: The stop keys on the graphic display terminal or remote display can be programmed as non-priority keys. A stop key can only have priority if the **[Stop Key priority]** (PSt) parameter in the **[COMMAND]** (CtL-) menu, page 154 is set to **[Yes]** (YES).

The behavior of the Altivar 320 can be adapted according to requirements:

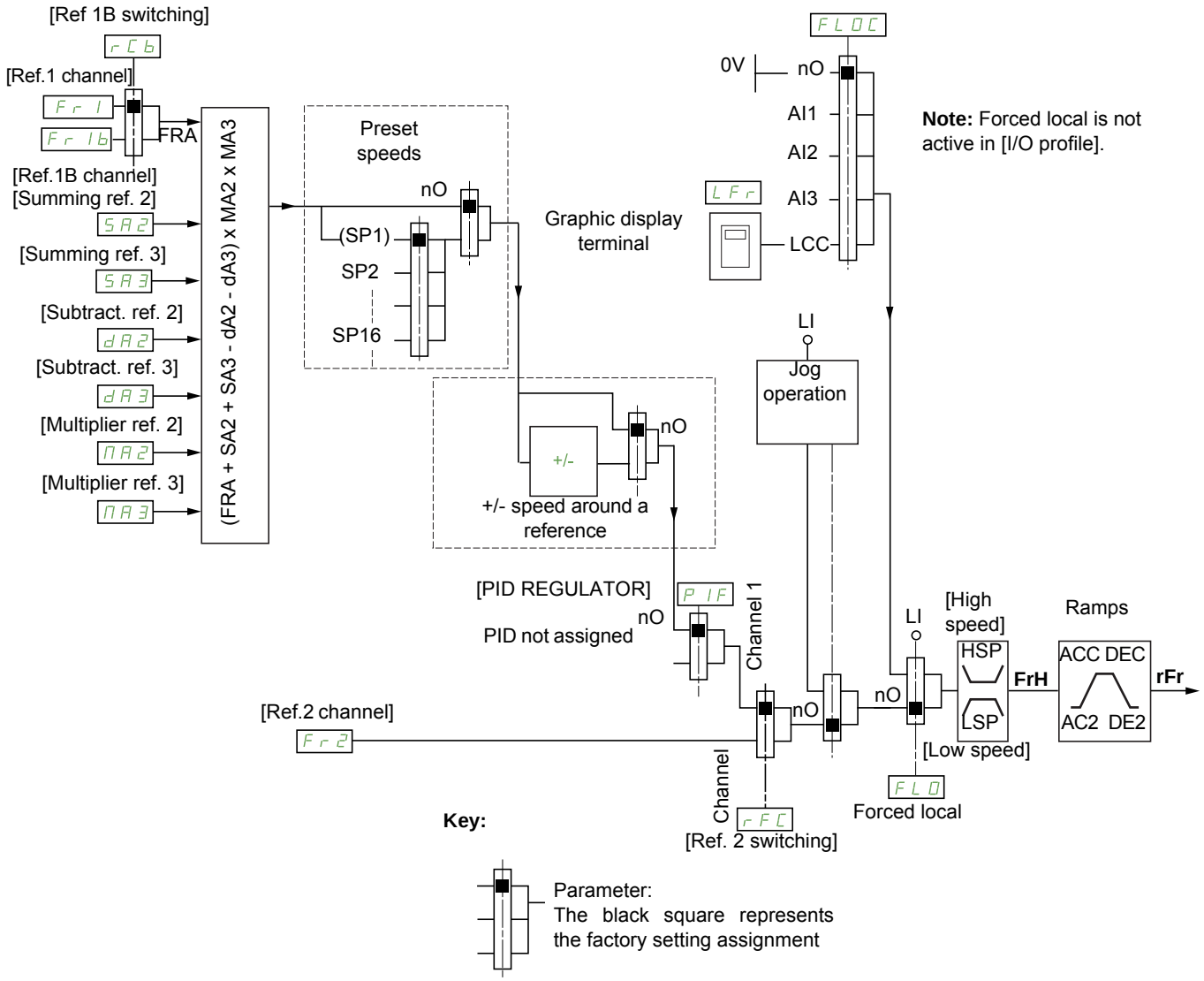
- **[Not separ.]** (Sim): Command and reference are sent via the same channel.
- **[Separate]** (SEP): Command and reference may be sent via different channels.

In these configurations, control via the communication bus is performed in accordance with the DRIVECOM standard with only 5 freely-assignable bits (see Communication Parameters Manual). The application functions cannot be accessed via the communication interface.

- **[I/O profile]** (io): The command and the reference can come from different channels. This configuration both simplifies and extends use via the communication interface. Commands may be sent via the logic inputs on the terminals or via the communication bus. When commands are sent via a bus, they are available on a word, which acts as virtual terminals containing only logic inputs. Application functions can be assigned to the bits in this word. More than one function can be assigned to the same bit.

Note: Stop commands from the graphic display terminal or remote display terminal remain active even if the terminals are not the active command channel.

Reference channel for [Not separ.] (5 IN), [Separate] (5EP) and [I/O profile] (IO) configurations, PID not configured



Fr1, SA2, SA3, dA2, dA3, MA2, MA3:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b, for 5EP and IO:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b, for 5IN:

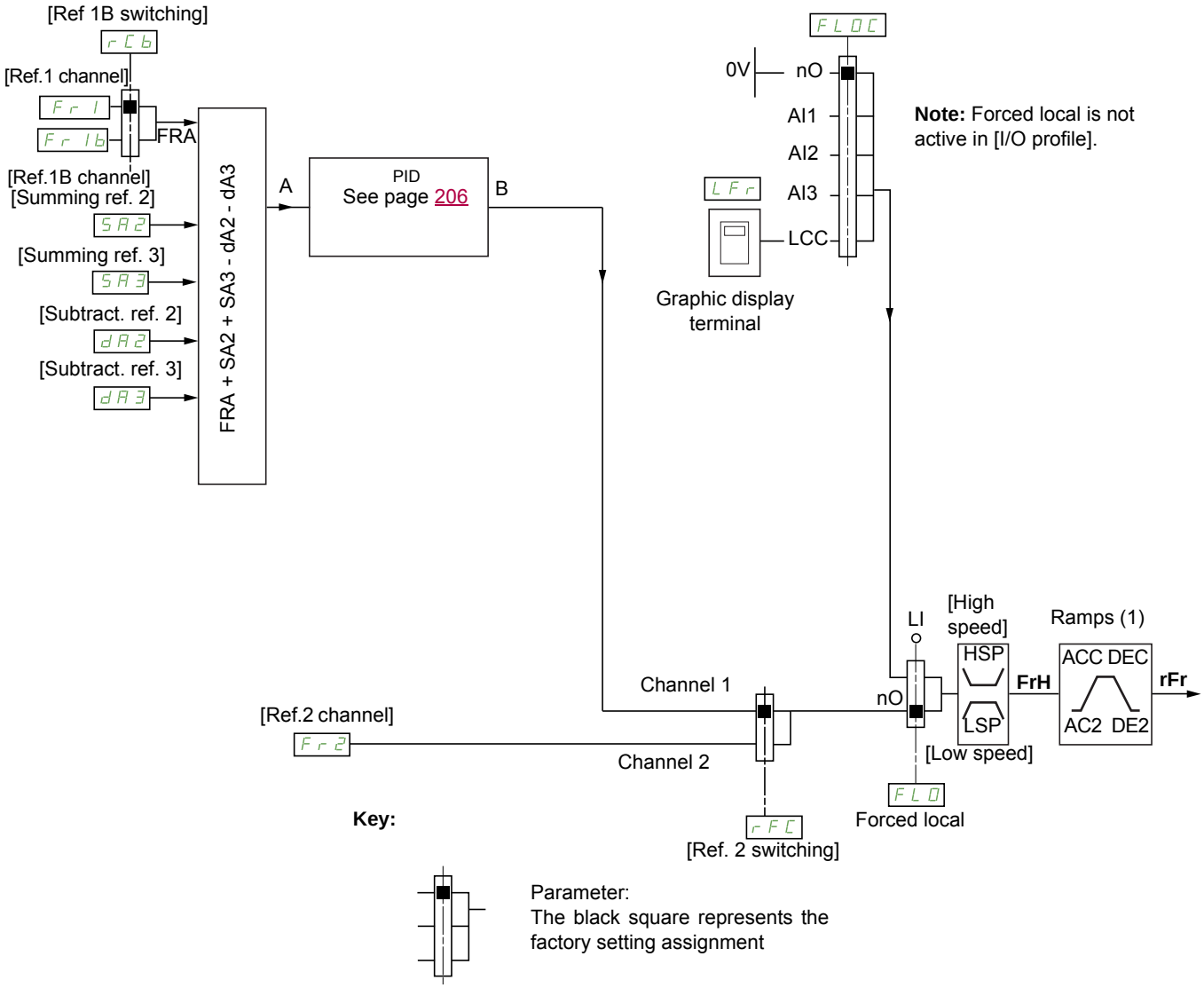
- Terminals, only accessible if Fr1 = terminals

Fr2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card, and +/- speed

Note: **[Ref.1B channel]** (Fr1b) and **[Ref 1B switching]** (rCb) must be configured in the **[APPLICATION FUNCT.]** (FUn-) menu.

Reference channel for [Not separ.] (SIM), [Separate] (SEP) and [I/O profile] (IO) configurations, PID configured with PID references at the terminals



(1) Ramps not active if the PID function is active in automatic mode.

Fr1:
- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b, for SEP and IO:
- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Fr1b, for SIM:
- Terminals, only accessible if Fr1 = terminals

SA2, SA3, dA2, dA3:
- Terminals only

Fr2:
- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card, **and +/- speed**

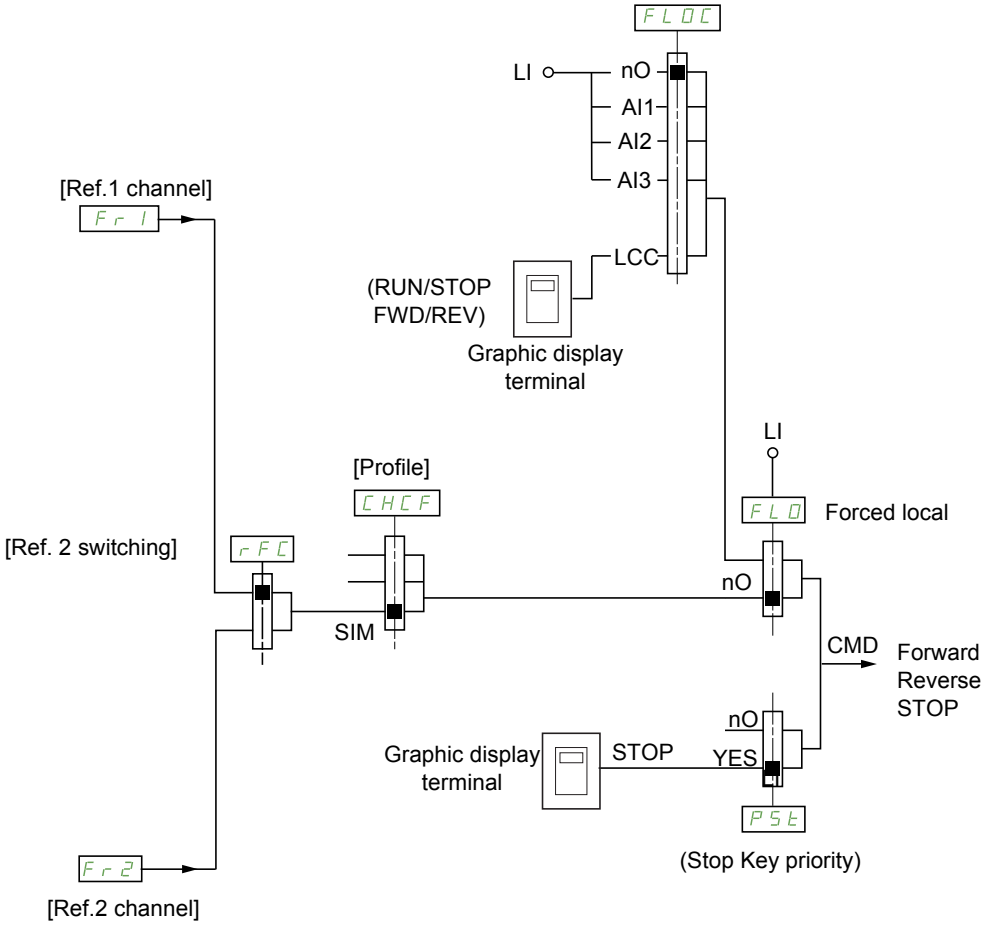
Note: [Ref.1B channel] (Fr1b) and **[Ref 1B switching]** (rCb) must be configured in the **[APPLICATION FUNCT.]** (FUn-) menu.

Command channel for [Not separ.] (SIM) configuration

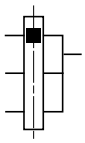
Reference and command, not separate

The command channel is determined by the reference channel. Parameters Fr1, Fr2, rFC, FLO and FLOC are common to reference and command.

Example: If the reference is Fr1 = AI1 (analog input at the terminals), control is via L1 (logic input at the terminals).



Key:



Parameter:
The black square represents
the factory setting assignment

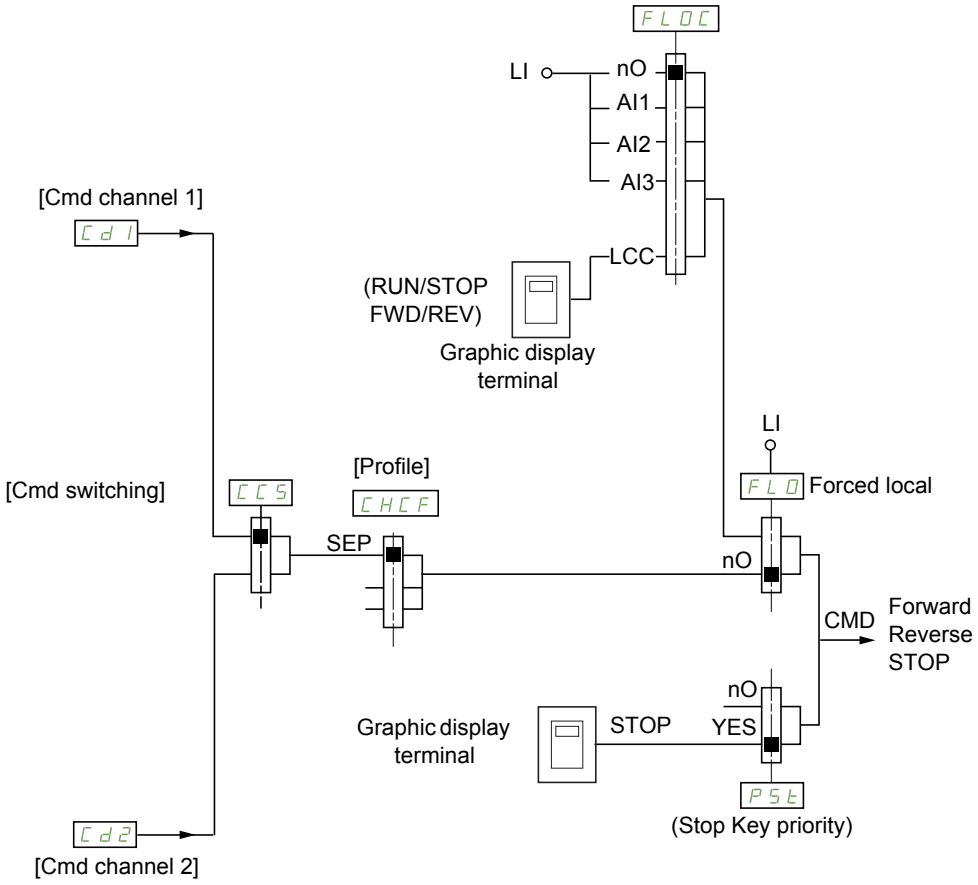
Command channel for [Separate] (SEP) configuration

Separate reference and command

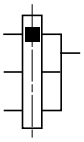
Parameters FLO and FLOC are common to reference and command.

Example: If the reference is in forced local mode via AI1 (analog input at the terminals), command in forced local mode is via LI1 (logic input at the terminals).

The command channels Cd1 and Cd2 are independent of the reference channels Fr1, Fr1b and Fr2.



Key:



Parameter:
The black square represents the factory setting assignment, except for [Profile].

Cd1, Cd2:

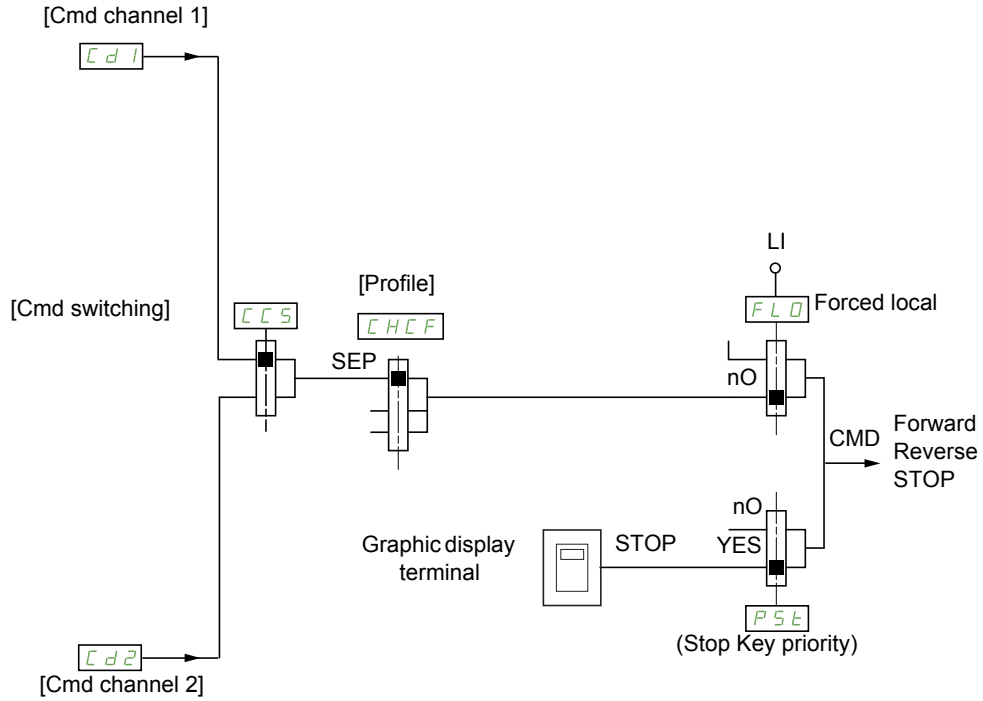
- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

Parameters described in this page can be accessed by: DRI- > CONF > FULL > CTL-

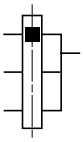
Command channel for [I/O profile] (IO) configuration

Separate reference and command, as in **[Separate]** (SEP) configuration

The command channels Cd1 and Cd2 are independent of the reference channels Fr1, Fr1b and Fr2.



Key:



Parameter:
The black square represents the factory setting assignment, except for [Profile].

Cd1, Cd2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, communication card

A command or an action can be assigned:

- To a fixed channel by selecting an LI input or a Cxxx bit:
  - By selecting, for example, LI3, this action will be triggered by LI3 regardless of which command channel is switched.
  - By selecting, for example, C214, this action will be triggered by integrated CANopen® with bit 14 regardless of which command channel is switched.
- To a switchable channel by selecting a CDxx bit:
  - By selecting, for example, Cd11, this action will be triggered by:
    - LI12 if the terminals channel is active
    - C111 if the integrated Modbus channel is active
    - C211 if the integrated CANopen® channel is active
    - C311 if the communication card channel is active

If the active channel is the graphic display terminal, the functions and commands assigned to CDxx switchable internal bits are inactive.

Note: Cd06 to Cd13 can only be used for switching between 2 networks. They do not have equivalent logic inputs.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > CTL-

Terminals	Integrated Modbus	Integrated CANopen®	Communication card	Internal bit, can be switched
				CD00
LI2 (1)	C101 (1)	C201 (1)	C301 (1)	CD01
LI3	C102	C202	C302	CD02
LI4	C103	C203	C303	CD03
LI5	C104	C204	C304	CD04
LI6	C105	C205	C305	CD05
-	C106	C206	C306	CD06
-	C107	C207	C307	CD07
-	C108	C208	C308	CD08
-	C109	C209	C309	CD09
-	C110	C210	C310	CD10
-	C111	C211	C311	CD11
-	C112	C212	C312	CD12
LAI1	C113	C213	C313	CD13
LAI2	C114	C214	C314	CD14
-	C115	C215	C315	CD15
OL01 to OL10				

(1) If **[2/3 wire control]** (tCC) page 85 is set to **[3 wire]** (3C), L i2, C 101, C201 and C301 cannot be accessed.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > CTL-

Assignment conditions for logic inputs and control bits

The following elements are available for every command or function that can be assigned to a logic input or a control bit:

[LI1] (L I 1) to **[LI6]** (L I 6)	Drive with or without option
[LAI1] (L A I 1) to **[LAI2]** (L A I 2)	Logical inputs
[C101] (C 101) to **[C110]** (C 110)	With integrated Modbus in **[I/O profile]** (IO) configuration
[C111] (C 111) to **[C115]** (C 115)	With integrated Modbus regardless of configuration
[C201] (C201) to **[C210]** (C210)	With integrated CANopen® in **[I/O profile]** (IO) configuration
[C211] (C211) to **[C215]** (C215)	With integrated CANopen® regardless of configuration
[C301] (C301) to **[C310]** (C310)	With a communication card in **[I/O profile]** (IO) configuration
[C311] (C311) to **[C315]** (C315)	With a communication card regardless of configuration
[CD00] (CD00) to **[CD10]** (CD10)	In **[I/O profile]** (IO) configuration
[CD11] (CD11) to **[CD15]** (CD15)	Regardless of configuration
[OL01] (OL01) to **[OL10]** (OL10)	Regardless of configuration

Note: In **[I/O profile]** (IO) configuration, L I 1 cannot be accessed and if **[2/3 wire control]** (tCC) page 85 is set to **[3 wire]** (3C), L I2, C 101, C201 and C301 cannot be accessed either.

⚠ WARNING

LOSS OF CONTROL

Inactive communication channels are not monitored (no error detection in the event of a communication interruption).

Verify that using the commands and functions assigned to bits C101 to C315 does not result in unsafe conditions in the event of a communication interruption.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > CTL-

Code	Name / Description	Adjustment range	Factory setting
FULL	**[FULL] (continued)**		
CTL-	**[COMMAND]**		
Fr1	**[Ref.1 channel]**		**[AI1]** (AI1)
AI1	**[AI1]** (AI1): Analog input A1		
AI2	**[AI2]** (AI2): Analog input A2		
AI3	**[AI3]** (AI3): Analog input A3		
LCC	**[HMI]** (LCC): Graphic display terminal or remote display terminal source		
Mdb	**[Modbus]** (Mdb): Integrated Modbus		
CAn	**[CANopen]** (CAn): Integrated CANopen®		
nET	**[Com. card]** (nET): Communication card (if inserted)		
PI	**[RP]** (PI): Pulse input		
AIU1	**[AI virtual 1]** (AIU1): Virtual analog input 1 with the jog dial (only available if **[Profile]** (CHCF) is not set to **[Not separ.]** (SIM))		
OA01	**[OA01]** (oA01): Function blocks: Analog Output 01		
...	**...**		
oA10	**[OA10]** (oA10): Function blocks: Analog Output 10		
rIn	**[RV Inhibition]**		**[No]** (no)
	Inhibition of movement in reverse direction, does not apply to direction requests sent by logic inputs. Reverse direction requests sent by logic inputs are taken into account. Reverse direction requests sent by the graphic display terminal are not taken into account. Reverse direction requests sent by the fieldbus are not taken into account. Any reverse speed reference originating from the PID, summing input, etc., is interpreted as a zero reference (0 Hz).		
no	**[No]** (no)		
YES	**[Yes]** (YES)		
PST	**[Stop Key priority]**		**[Yes]** (YES)
2 s	**⚠WARNING** **LOSS OF CONTROL** This function disables the Stop keys of the Remote Display Terminal if the setting of the parameter **[Command channel]** (CMDC) is not **[HMI]** (HMI). Only set this parameter to **[No]** (no) if you have implemented appropriate alternative stop functions. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**		
	This will be a freewheel stop. If the active command channel is the graphic display terminal, the stop will be performed according to the **[Type of stop]** (STT) page 173 irrespective of the configuration of **[Stop Key priority]** (PST).		
no	**[No]** (no)		
YES	**[Yes]** (YES): Gives priority to the STOP key on the graphic display terminal when the graphic display terminal is not enabled as the command channel.		
CHCF	**[Profile]**		**[Not separ.]** (SIM)
2 s	**⚠WARNING** **UNANTICIPATED EQUIPMENT OPERATION** Disabling **[I/O profile]** (IO) resets the drive to the factory settings. • Verify that restoring the factory settings is compatible with the type of wiring used. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**		
SIM	**[Not separ.]** (SIM): Reference and command, not separate		
SEP	**[Separate]** (SEP): Separate reference and command. This assignment cannot be accessed in **[I/O profile]** (IO).		
IO	**[I/O profile]** (IO): I/O profile		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FBM- > MFB-

Code	Name / Description	Adjustment range	Factory setting
CCS	**[Cmd switching]**		**[ch1 active]** (Cd1)
★	This parameter can be accessed if **[Profile]** (CHCF) is set to **[Separate]** (SEP) or **[I/O profile]** (IO). If the assigned input or bit is at 0, channel **[Cmd channel 1]** (Cd1) is active. If the assigned input or bit is at 1, channel **[Cmd channel 2]** (Cd2) is active.		
Cd1	**[ch1 active]** (Cd1): **[Cmd channel 1]** (Cd1) active (no switching)		
Cd2	**[ch2 active]** (Cd2): **[Cmd channel 2]** (Cd2) active (no switching)		
LI1	**[LI1]** (LI1): Logical input LI1		
...	**[...]** (...): See the assignment conditions on page 153 (not CD00 to CD15)		
Cd1	**[Cmd channel 1]**		**[Terminals]** (tEr)
★	This parameter can be accessed if **[Profile]** (CHCF) is set to **[Separate]** (SEP) or **[I/O profile]** (IO).		
tEr	**[Terminals]** (tEr): Terminals		
LCC	**[HMI]** (LCC): Graphic display terminal or remote display terminal		
Mdb	**[Modbus]** (Mdb): Integrated Modbus		
CAn	**[CANopen]** (CAn): Integrated CANopen®		
nEt	**[Com. card]** (nEt): Communication card (if inserted)		
Cd2	**[Cmd channel 2]**		**[Modbus]** (Mdb)
★	This parameter can be accessed if **[Profile]** (CHCF) is set to **[Separate]** (SEP) or **[I/O profile]** (IO).		
tEr	**[Terminals]** (tEr): Terminals		
LCC	**[HMI]** (LCC): Graphic display terminal or remote display terminal		
Mdb	**[Modbus]** (Mdb): Integrated Modbus		
CAn	**[CANopen]** (CAn): Integrated CANopen®		
nEt	**[Com. card]** (nEt): Communication card (if inserted)		
rFC	**[Ref. 2 switching]**		**[Ref.1 channel]** (Fr1)
	This parameter can be accessed if **[Profile]** (CHCF) is set to **[Separate]** (SEP) or **[I/O profile]** (IO). If the assigned input or bit is at 0, channel **[Cmd channel 1]** (Cd1) is active. If the assigned input or bit is at 1, channel **[Cmd channel 2]** (Cd2) is active.		
Fr1	**[Ref. 1 channel]** (Fr1): **[Cmd channel 1]** (Cd1) active (no switching)		
Fr2	**[Ref. 2 channel]** (Fr2): **[Cmd channel 2]** (Cd2) active (no switching)		
LI1	**[LI1]** (LI1): Logical input LI1		
...	**[...]** (...): See the assignment conditions on page 153 (not CD00 to CD15)		
Fr2	**[Ref.2 channel]**		**[No]** (no)
no	**[No]** (no): Not assigned. If **[Profile]** (CHCF) is set to **[Not separ.]** (SIM), the command is at the terminals with a zero reference. If **[Profile]** (CHCF) is set to **[Separate]** (SEP) or **[I/O profile]** (IO), the reference is zero.		
AI1	**[AI1]** (AI1): Analog input A1		
AI2	**[AI2]** (AI2): Analog input A2		
AI3	**[AI3]** (AI3): Analog input A3		
uPdt	**[+/-Speed]** (uPdt): +/- speed command		
LCC	**[HMI]** (LCC): Graphic display terminal or remote display terminal		
Mdb	**[Modbus]** (Mdb): Integrated Modbus		
CAn	**[CANopen]** (CAn): Integrated CANopen®		
nEt	**[Com. card]** (nEt): Communication card (if inserted)		
PI	**[RP]** (PI): Pulse input		
AIuI	**[AI virtual 1]** (AIuI): Virtual analog input 1 with the jog dial		
OA01	**[OA01]** (oA01): Function blocks: Analog Output 01		
...	**...**		
oA10	**[OA10]** (oA10): Function blocks: Analog Output 10		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FBM-

Code	Name / Description	Adjustment range	Factory setting
CoP	**[Copy channel 1 <> 2]**		**[No]** (nO)

2 s

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

This parameter can cause unintended movements, for example, inversion of the direction of rotation of the motor, sudden acceleration or stops.

- Verify that the setting of this parameter does not cause unintended movements.
- Verify that the setting of this parameter does not result in unsafe conditions

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Can be used to copy the current reference and/or the command by means of switching, in order to avoid speed surges, for example.
If **[Profile]** (CHCF) page 154 is set to **[Not separ.]** (SIM) or **[Separate]** (SEP), copying will only be possible from channel 1 to channel 2.
If **[Profile]** (CHCF) is set to **[I/O profile]** (IO), copying will be possible in both directions.
A reference or a command cannot be copied to a channel on the terminals.
The reference copied is **[Frequency ref.]** (FrH) (before ramp) unless the destination channel reference is set via +/- speed. In this case, the reference copied is **[Output frequency]** (rFr) (after ramp).

nO	**[No]** (nO): No copy
SP	**[Reference]** (SP): Copy reference
Cd	**[Command]** (Cd): Copy command
ALL	**[Cmd + ref.]** (ALL): Copy command and reference

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FBM- > FBA-

As the graphic display terminal may be selected as the command and/or reference channel, its action modes can be configured.

The parameters on this page can only be accessed on the graphic display terminal, and not on the integrated display terminal.

Comments:

- The display terminal command/reference is only active if the command and/or reference channels from the terminal are active with the exception of **[T/K]** (FtK) (command via the display terminal), which takes priority over these channels. Press **[T/K]** (FtK) (command via the display terminal) again to revert control to the selected channel.
- Command and reference via the display terminal are impossible if the latter is connected to more than one drive.
- The JOG, preset speed and +/- speed functions can only be accessed if **[Profile]** (CHCF) is set to **[Not separ.]** (SIM).
- The preset PID reference functions can only be accessed if **[Profile]** (CHCF) is set to **[Not separ.]** (SIM) or **[Separate]** (SEP).
- The **[T/K]** (FtK) (command via the display terminal) can be accessed regardless of the **[Profile]** (CHCF).

Code	Name / Description	Adjustment range	Factory setting
Fn1	**[F1 key assignment]**		**[No]** (nO)
nO	**[No]** (nO): Not assigned		
JOG	**[Jog]** (JOG): JOG operation		
PS1	**[Preset spd2]** (PS1): Press the key to run the drive at the 2nd preset speed **[Preset speed 2]** (SP2) page 97. Press STOP to stop the drive.		
PS2	**[Preset spd3]** (PS2): Press the key to run the drive at the 3rd preset speed **[Preset speed 3]** (SP3) page 97. Press STOP to stop the drive.		
Pr1	**[PID ref. 2]** (Pr1): Sets a PID reference equal to the 2nd preset PID reference **[Preset ref. PID 2]** (rP2) page 99, without sending a run command. Only operates if **[Ref.1 channel]** (Fr1) is set to **[HMI]** (LCC). Does not operate with the **[T/K]** (FtK) function.		
Pr2	**[PID ref. 3]** (Pr2): Sets a PID reference equal to the 3rd preset PID reference **[Preset ref. PID 3]** (rP3) page 100, without sending a run command. Only operates if **[Ref.1 channel]** (Fr1) is set to **[HMI]** (LCC). Does not operate with the **[T/K]** (FtK) function.		
USP	**[+speed]** (USP): Faster, only operates if **[Ref.2 channel]** (Fr2) is set to **[HMI]** (LCC). Press the key to run the drive and increase the speed. Press STOP to stop the drive.		
dSP	**[- speed]** (dSP): Slower, only operates if **[Ref.2 channel]** (Fr2) is set to **[HMI]** (LCC) and if a different key has been assigned to **[+ speed]**. Press the key to run the drive and decrease the speed. Press STOP to stop the drive.		
Ft	**[T/K]** (FtK): Command via the display terminal: Takes priority over **[Cmd switching]** (CCS) and over **[Ref. 2 switching]** (rFC).		
Fn2	**[F2 key assignment]**		**[No]** (nO)
	Identical to **[F1 key assignment]** (Fn1) page 157.		
Fn3	**[F3 key assignment]**		**[No]** (nO)
	Identical to **[F1 key assignment]** (Fn1) page 157.		
Fn4	**[F4 key assignment]**		**[No]** (nO)
	Identical to **[F1 key assignment]** (Fn1) page 157.		
bMP	**[HMI cmd.]**		**[Stop]** (StoP)
★	When the **[T/K]** (FtK) function is assigned to a key and that function is active, this parameter defines the behavior at the moment when control returns to the graphic display terminal or remote display terminal.		
StoP	**[Stop]** (StoP): Stops the drive (although the controlled direction of operation and reference of the previous channel are copied (to be taken into account on the next RUN command)).		
bUMF	**[Bumpless]** (bUMF): Does not stop the drive (the controlled direction of operation and the reference of the previous channel are copied)		

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FBM- > FBP-

Function Block Management

Code	Name / Description	Adjustment range	Factory setting
FULL	**[FULL] (continued)**		
FBM-	**[FUNCTION BLOCKS]**		
MFB-	**[MONIT. FUN. BLOCKS]** **Note:** This section shows only what is possible to do with local or remote display on the drive. For advanced configuration using PC software, please refer to the dedicated Function blocks manual.		
FBST	**[FB Status]**		
idLE	**[Idle]** (idLE): No binary file in the target, the FB is waiting for a download		
CHEC	**[Check prog.]** (CHEC): Check the program downloaded		
StoP	**[Stop]** (StoP): The Function blocks application is stopped		
init	**[Init]** (init): Check coherency between ATVLogic program and Function blocks parameters		
run	**[Run]** (run): The Function blocks application is running		
Err	**[Error]** (Err): An internal error has been detected. The Function blocks application is in fault state mode.		
FBFT	**[FB Fault]**		
no	**[No]** (no): No detected fault		
int	**[Internal]** (int): Internal detected error		
bin	**[Binary file]** (bin): Binary file corrupted		
inP	**[Intern Para.]** (inP): Internal parameter detected error		
PAr	**[Para. RW]** (PAr): Parameter access detected error		
CAL	**[Calculation]** (CAL): Calculation detected error		
toAu	**[TO AUX]** (toAu): TimeOut AUX task		
toPP	**[TO synch]** (toPP): TimeOut in PRE/POST task		
AdL	**[Bad ADLC]** (AdL): ADLC with bad parameter		
in	**[Input assig.]** (in): Input not configured		
FBI-	**[FB IDENTIFICATION]**		
buEr ★	**[Program version]** Program user version.	0 to 255	-
bnS ★	**[Program size]** Program file size.	0 to 65,535	-
bnu	**[Prg. format version]** Binary format version of the drive.	0 to 255	-
CtU	**[Catalog version]** Catalog version of the drive.	0 to 65,535	-
FBM-	**[FUNCTION BLOCKS] (continued)**		
FbCd ( )	**[FB Command]** Allows to start and stop the function blocks manually. **[FB Command]** (FbCd) is forced to **[Stop]** (StoP) if there is no valid function blocks application in the drive memory. **[FB Command]** (FbCd) is set to **[Start]** (Strt) when the function blocks application switch to Run according to **[FB start mode]** (FbrM) configuration. **Note:** As soon as the function blocks are started, the drive is considered as in running state and the modification of configuration parameters is no longer possible.		
StoP	**[Stop]** (StoP): Function blocks application Stop command		
Strt	**[Start]** (Strt): Function blocks application Start command		

Code	Name / Description	Adjustment range	Factory setting
FbrM	**[FB start mode]**		**[No]** (nO)
2 s	**⚠WARNING** **UNANTICIPATED EQUIPMENT OPERATION** Depending on the setting of this parameter, function blocks may be immediately executed. • Verify that this setting does not result in unsafe conditions. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**		
	Allows to choose the different ways of starting the Function blocks application. **Note:** Modifications of this parameter are not taken into account if the Function blocks application is running.		
nO	**[No]** (nO): Function blocks application is controlled by **[FB command]** (FbCd) parameter		
YES	**[Yes]** (YES): Function blocks application switches to Run automatically at drive power on		
LI1	**[LI1]** (LI1): Function blocks application switches to Run on a rising edge of the logic input. It switch to Stop on falling edge of the logic input.		
...	**[...]** (...): See the assignment conditions on page 153 (not **[OL10]** (oL01) to **[OL10]** (oL10)).		
FbSM	**[Stop FB Stop motor]**		**[Freewheel]** (YES)
	⚠WARNING **LOSS OF CONTROL** If **[Stop FB stop motor]** (FbSM) is set to **[No]** (nO), the motor will not stop when the program will be stopped. • Only set this parameter to **[No]** (nO) if you have implemented appropriate alternative stop functions. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**		
	Allows to setup the way of working of the drive when function blocks are stopped.		
nO	**[Ignore]** (nO): The drive does not stop		
YES	**[Freewheel]** (YES): Motor stops in freewheel		
rMP	**[Ramp stop]** (rMP): Ramp stop		
FSt	**[Fast stop]** (FSt): Fast stop		
dCI	**[DC injection]** (dCI): DC injection		
FbdF	**[FB on drive fault]**		**[Stop]** (StoP)
	Behavior of function blocks when the drive trips.		
StoP	**[Stop]** (StoP): Function blocks stops when the drive trips, outputs are realeased		
IGn	**[Ignore]** (IGn): Function blocks continue to work when the drive trips (except CFF and INFE)		
FbA-	**[INPUTS ASSIGNMENTS]**		
IL01	**[Logic input 1 assignment]**		**[No]** (nO)
	Possible assignment for the Function block logic input.		
nO	**[No]** (nO): Not assigned		
FLt	**[No drive flt]** (FLt): Drive fault detection status (relay normally energized, and de-energized in the event of an error)		
FtA	**[Freq. Th. attain.]** (FtA): Frequency threshold attained (**[Freq. threshold]** (Ftd) page 102)		
F2A	**[Freq. Th. 2 attained]** (F2A): Frequency threshold 2 attained (**[Freq. threshold 2]** (F2d) page 102)		
Fr1	**[Ref.1 channel]** (Fr1) Reference source 1		
Fr2	**[Ref.2 channel]** (Fr2) Reference source 2		
Cd1	**[ch1 active]** (Cd1): Command channel = channel 1 (for [Cmd switching] (CCS))		
Cd2	**[ch2 active]** (Cd2): Command channel = channel 2 (for [Cmd switching] (CCS))		
Fr1b	**[Ref.1B channel]** (Fr1b): Reference channel = channel 1b (for [Ref. 2 switching] (rFC))		
YES	**[Yes]** (YES): Yes		
LI1	**[LI1]** (LI1): Logical input LI1		
...	**[...]** (...): See the assignment conditions on page 153		
IL- -	**[Logic input x assignment]**		**[No]** (nO)
	All the Function Blocks logic inputs available on the drive are processed as in the example for **[Logic input 1 assignment]** (IL01) above, up to **[Logic input 10 assignment]** (IL10).		

Code	Name / Description	Adjustment range	Factory setting
iAO1	**[Analog input 1 assignment]** Possible assignment for the Function block analog input. nO: **[No]** (nO): Not assigned AI1: **[AI1]** (AI1): Analog input A1 AI2: **[AI2]** (AI2): Analog input A2 AI3: **[AI3]** (AI3): Analog input A3 oCr: **[I motor]** (oCr): Motor current oFr: **[Motor freq.]** (oFr): Motor speed orP: **[Ramp. out]** (orP): Ramp output trq: **[Motor torq.]** (trq): Motor torque Stq: **[Sign torque]** (Stq): Signed motor torque orS: **[Sign ramp]** (orS): Signed ramp output oPS: **[PID ref.]** (oPS): PI(D) reference oPF: **[PID feedbk]** (oPF): PI(D) feedback oPE: **[PID error]** (oPE): PI(D) error oPi: **[PID output]** (oPi): PI(D) integral oPr: **[Mot. power]** (oPr): Motor power tHr: **[Mot. thermal]** (tHr): Motor thermal state tHd: **[Drv thermal]** (tHd): Drive thermal state tqNS: **[Torque 4Q]** (tqNS): Signed motor torque uPdt: **[+/-Speed]** (uPdt): Up/Down function is assigned by Lix uPdH: **[+/-spd HMI]** (uPdH): Up/Down function is assigned by graphic display terminal or remote display terminal LCC: **[HMI]** (LCC): Graphic display terminal or remote display terminal source Mdb: **[Modbus]** (Mdb): Integrated Modbus CAn: **[CANopen]** (CAn): Integrated CANopen® nEt: **[Com. card]** (nEt): Communication option board source oFS: **[Sig. o/p frq.]** (oFS): Signed output frequency tHr2: **[Mot therm2]** (tHr2): Motor 2 thermal state tHr3: **[Mot therm3]** (tHr3): Motor 3 thermal state tqL: **[Torque lim.]** (tqL): Torque limitation uoP: **[Motor volt.]** (uoP): Motor voltage PI: **[RP]** (PI): Pulse input AIU1: **[AI virtual 1]** (AIU1): Virtual analog input 1 with the jog dial dO1: **[DO1]** (dO1): Analog/logical output DO1 AIU2: **[AI virtual 2]** (AIU2): Virtual analog input 2 by the communication bus oAO1: **[OA01]** (oAO1): Function blocks: Analog Output 01 ...: **...** oA10: **[OA10]** (oA10): Function blocks: Analog Output 10		**[No]** (nO)
iA- -	**[Analog input x assignment]** All the Function blocks analog inputs available on the drive are processed as in the example for **[IA01]** (iAO1) above, up to **[IA10]** (iA10).		**[No]** (nO)
FbM-	**[FUNCTION BLOCKS] (continued)**		
FAd-	**[ADL CONTAINERS]** ADL containers contain Modbus logical adress of internal parameters of the drive. If the chosen adress is valid, the display shows the parameter name instead of the adress.		
LAO1	ADL Container 01	3,015 to 64,299	0
LAO2	ADL Container 02	3,015 to 64,299	0
LAO3	ADL Container 03	3,015 to 64,299	0
LAO4	ADL Container 04	3,015 to 64,299	0
LAO5	ADL Container 05	3,015 to 64,299	0
LAO6	ADL Container 06	3,015 to 64,299	0
LAO7	ADL Container 07	3,015 to 64,299	0
LAO8	ADL Container 08	3,015 to 64,299	0

Code	Name / Description	Adjustment range	Factory setting
FbM-	**[FUNCTION BLOCKS] (continued)**		
FbP-	**[FB PARAMETERS]** Internal parameters available for the user program.		
M001 (1)	**[ ]** M001 Parameter saved in EEprom.	0 to 65,535	0
M002 (1)	**[ ]** M002 Parameter saved in EEprom	0 to 65,535	0
M003 (1)	**[ ]** M003 Parameter saved in EEprom	0 to 65,535	0
M004 (1)	**[ ]** M004 Parameter saved in EEprom	0 to 65,535	0
M005 (1)	**[ ]** M005 Parameter written in RAM	0 to 65,535	0
M006 (1)	**[ ]** M006 Parameter written in RAM	0 to 65,535	0
M007 (1)	**[ ]** M007 Parameter written in RAM	0 to 65,535	0
M008 (1)	**[ ]** M008 Parameter written in RAM	0 to 65,535	0

(1) If a graphic display terminal is not in use, values greater than 9,999 will be displayed on the 4-digit display with a period mark after the thousand digit, for example, 15.65 for 15,650.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

[APPLICATION FUNCT.] (Fun-)

Summary of functions:

Code	Name	Page
(rEF-)	[REFERENCE SWITCH.]	167
(oAI-)	[REF. OPERATIONS]	168
(rPt-)	[RAMP]	170
(Stt-)	[STOP CONFIGURATION]	173
(AdC-)	[AUTO DC INJECTION]	176
(JoG-)	[JOG]	178
(PSS-)	[PRESET SPEEDS]	181
(uPd)	[+/- SPEED]	185
(SrE-)	[+/-SPEED AROUND REF.]	187
(SPM-)	[MEMO REFERENCE]	188
(FLI-)	[FLUXING BY LI]	189
(bLC-)	[BRAKE LOGIC CONTROL]	194
(ELM-)	[EXTERNAL WEIGHT MEAS.]	200
(HSH-)	[HIGH SPEED HOISTING]	205
(PId-)	[PID REGULATOR]	210
(PrI-)	[PID PRESET REFERENCES]	214
(toL-)	[TORQUE LIMITATION]	216
(CLI-)	[2nd CURRENT LIMIT.]	218
(I2t-)	[DYN CURRENT LIMIT]	219
(LLC-)	[LINE CONTACTOR COMMAND]	221
(oCC-)	[OUTPUT CONTACTOR CMD]	223
(LPo-)	[POSITIONING BY SENSORS]	227
(MLP-)	[PARAM. SET SWITCHING]	230
(MMC-)	[MULTIMOTORS/CONFIG.]	235
(tnL-)	[AUTO TUNING BY LI]	236
(tro-)	[TRAVERSE CONTROL]	237
(CHS-)	[HSP SWITCHING]	244
(dCC-)	[DC BUS]	245

The parameters in the **[APPLICATION FUNCT.]** (Fun-) menu can only be modified when the drive is stopped and there is no run command, except for parameters with a ↻ symbol in the code column, which can be modified with the drive running or stopped.

Note: Compatibility of functions

The choice of application functions may be limited by the number of I/O and by the fact that some functions are incompatible with others. Functions that are not listed in the table below are fully compatible.

If there is an incompatibility between functions, the first function configured will help to prevent the others being configured.

Each of the functions on the following pages can be assigned to one of the inputs or outputs.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Multiple functions can be assigned to and simultaneously activated via a single input.

- Verify that assigning multiple functions to a single input does not result in unsafe conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > REF-

It is only possible to assign one input to several functions at **[Advanced]** (Adu) and **[Expert]** (EPr) levels.

Before assigning a command, reference or function to an input or output, the user must check that this input or output has not already been assigned and that another input or output has not been assigned to an incompatible function.

The drive factory setting or macro configurations automatically configure functions, **which may help to prevent other functions being assigned.**

In some case, it is necessary to unconfigure one or more functions in order to be able to enable another. Check the compatibility table below.

Stop functions have priority over run commands.

Speed references via logic command have priority over analog references.

Note: This compatibility table does not affect commands that can be assigned to the keys of the graphic display terminal (see page 24).

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > OAI-

Compatibility table

	Reference operations (page 168)	+/- speed (3) (page 185)	Preset speeds (page 180)	PID regulator (page 210)	Traverse control (page 242)	JOG operation (page 178)	Reference switching (page 167)	Skip frequency (page 183)	Brake logic control (page 194)	Auto DC injection (page 176)	Catch on the fly (page 253)	Output contactor command (page 223)	DC injection stop (page 173)	Fast stop (page 173)	Freewheel stop (page 173)	+/- speed around a reference (page 187)	High speed hoisting (page 205)	Load sharing (page 122)	Positioning by sensors (page 227)
Reference operations (page 168)			↑	● (2)		↑	↑	↑											
+/- speed (3) (page 185)					●	●	↑	↑											
Preset speeds (page 180)	←					↑	↑	↑											
PID regulator (page 210)	● (2)				●	●	↑	↑	●							●	●	●	●
Traverse control (page 242)		●		●		●	↑	↑								●	●		
JOG operation (page 178)	←	●	←	●	●			↑	●	←						●	●		
Reference switching (page 167)	←	←	←	←	←			↑								↑			
Skip frequency (page 183)	←	←	←	←	←	←	←									←			
Brake logic control (page 194)				●		●					●	●	●						
Auto DC injection (page 176)						↑							↑		↑				
Catch on the fly (page 253)									●										
Output contactor command (page 223)									●										
DC injection stop (page 173)									●	←				● (1)	↑				
Fast stop (page 173)													● (1)		↑				
Freewheel stop (page 173)										←			←	←					
+/- speed around a reference (page 187)				●	●	●	←	↑											
High speed hoisting (page 205)				●	●	●													
Load sharing (page 122)				●															
Positioning by sensors (page 227)				●															

(1) Priority is given to the first of these two stop modes to be activated.
(2) Only the multiplier reference is incompatible with the PID regulator.

● Incompatible functions Compatible functions Not applicable

Priority functions (functions which cannot be active at the same time):

← ↑ The function indicated by the arrow has priority over the other.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > OAI-

Incompatible Functions

The following function will be inaccessible or deactivated after an Automatic restart.
This is only possible for control type if **[2/3 wire control]** (tCC) is set to **[2 wire]** (2C) and if **[2 wire type]** (tCt) is set to **[Level]** (LEL) or **[Fwd priority]** (PFo). See **[2/3 wire control]** (tCC) page 85.

The **[1.2 MONITORING]** (Mon-) menu page 47 can be used to display the functions assigned to each input in order to check their compatibility.

When a function is assigned, a ✓ appears on the graphic display terminal, as illustrated in the example below:

RDY Term 0.0Hz 0A	
APPLICATION FUNCT.	
REFERENCE SWITCH.	
REF. OPERATIONS	
RAMP	
STOP CONFIGURATION	
AUTO DC INJECTION	
Code	<< >> Quick

If you attempt to assign a function that is incompatible with another function that has already been assigned, an alarm message will appear:

- With the graphic display terminal:

RDY Term +0.0 Hz 0.0 A
INCOMPATIBILITY
The function can't be assigned because an incompatible function is already selected. See programming book.
ENT or ESC to continue

- With the integrated display terminal and the remote display terminal:

COMP flashes until ENT or ESC is pressed.

When you assign a logic input, an analog input, a reference channel or a bit to a function, pressing the HELP key will display the functions that may already have been activated by this input, bit or channel.

When a logic input, an analog input, a reference channel or a bit that has already been assigned is assigned to another function, the following screens appear:

- With the graphic display terminal:

RUN Term 0.0 Hz 0.0 A	
WARNING - ASSIGNED TO	
Forward	
ENT-Valid.	ESC-Abort

If the access level permits this new assignment, pressing ENT confirms the assignment.

If the access level does not permit this new assignment, pressing ENT results in the following display:

RUN Term 0.0 Hz 0.0 A
ASSIGNMENT FORBIDDEN
Un-assign the present functions, or select "Advanced" access level

- With the integrated display terminal:

The code for the first function, which is already assigned, is displayed flashing.

If the access level permits this new assignment, pressing ENT confirms the assignment.

If the access level does not permit this new assignment, pressing ENT has no effect, and the message continues to flash. It is only possible to exit by pressing ESC.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > RPT-

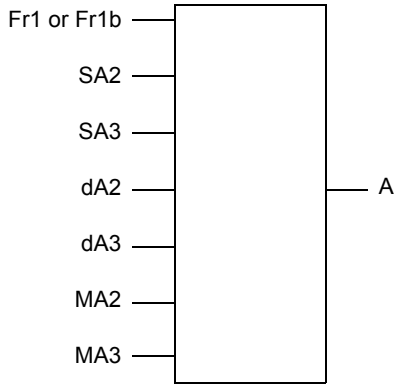
REFERENCE SWITCHING

Code	Name / Description	Adjustment range	Factory setting
Fun-	**[APPLICATION FUNCT.]**		
rEF-	**[REFERENCE SWITCH.]**		
rCb	**[Ref 1B switching]**		**[ch1 active]** (Fr1)
	See the diagrams on pages 147 and 148. If the assigned input or bit is at 0, **[Ref.1 channel]** (Fr1) is active (see **[Ref.1 channel]** (Fr1) page 154). If the assigned input or bit is at 1, **[Ref.1B channel]** (Fr1b) is active. **[Ref 1B switching]** (rCb) is forced to **[ch1 active]** (Fr1) if **[Profile]** (CHCF) is set to **[Not separ.]** (SIM) with **[Ref.1 channel]** (Fr1) assigned via the terminals (analog inputs, pulse input). See **[Ref.1 channel]** (Fr1) page 154.		
Fr1	**[ch1 active]** (FrL): No switching, **[Ref.1 channel]** (Fr1) active		
Fr1b	**[ch1B active]** (Fr1b): No switching, **[Ref.1B channel]** (Fr1b) active		
LI1	**[LI1]** (LI1): Logical input LI1		
...	**[...]** (...): See the assignment conditions on page 153 (not **[Cd00]** (Cd00) to **[Cd15]** (Cd15)).		
Fr1b	**[Ref.1B channel]**		**[No]** (nO)
nO	**[No]** (nO): Not assigned		
AI1	**[AI1]** (AI1): Analog input A1		
AI2	**[AI2]** (AI2): Analog input A2		
AI3	**[AI3]** (AI3): Analog input A3		
LCC	**[HMI]** (LCC): Graphic display terminal or remote display terminal source		
Mdb	**[Modbus]** (Mdb): Integrated Modbus		
CAn	**[CANopen]** (CAn): Integrated CANopen®		
nEt	**[Com. card]** (nEt): Communication option board source		
PI	**[RP]** (PI): Pulse input		
AIU1	**[AI virtual 1]** (AIU1): Virtual analog input 1 with the jog dial (only available if **[Profile]** (CHCF) is not set to **[Not separ.]** (SIM))		
oAO1	**[OA01]** (oAO1): Function blocks: Analog Output 01		
...	**...**		
oA10	**[OA10]** (oA10): Function blocks: Analog Output 10		

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > RPT-

REFERENCE OPERATIONS

Summing input / Subtracting input / Multiplier



A = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3

- If SA2, SA3, dA2, dA3 are not assigned, they are set to 0.
- If MA2, MA3 are not assigned, they are set to 1.
- A is limited by the minimum LSP and maximum HSP parameters.
- For multiplication, the signal on MA2 or MA3 is interpreted as a %. 100% corresponds to the maximum value of the corresponding input. If MA2 or MA3 is sent via the communication bus or graphic display terminal, an MFr multiplication variable, page 284 must be sent via the bus or graphic display terminal.
- Reversal of the direction of operation in the event of a negative result can be inhibited (see **[RV Inhibition]** (Sin) page 154).

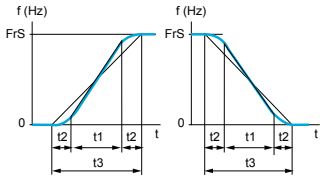
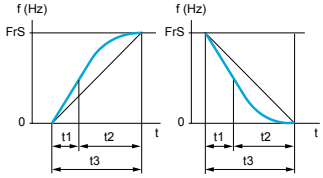
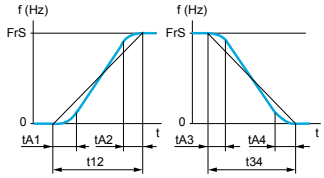
Code	Name / Description	Adjustment range	Factory setting
Fun-	**[APPLICATION FUNCT.] (continued)**		
oAi-	**[REF. OPERATIONS]** Reference = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3. See the diagrams on pages 147 and 148. **Note:** This function cannot be used with certain other functions. Follow the instructions on page 163.		
SA2	**[Summing ref. 2]** Selection of a reference to be added to **[Ref.1 channel]** (Fr1) or **[Ref.1B channel]** (Fr1b). nO **[No]** (nO): Not assigned AI1 **[AI1]** (AI1): Analog input A1 AI2 **[AI2]** (AI2): Analog input A2 AI3 **[AI3]** (AI3): Analog input A3 LCC **[HMI]** (LCC): Graphic display terminal or remote display terminal source Mdb **[Modbus]** (Mdb): Integrated Modbus CAn **[CANopen]** (CAn): Integrated CANopen® nEt **[Com. card]** (nEt): Communication option board source PI **[RP]** (PI): Motor voltage AIU1 **[AI virtual 1]** (AIU1): Virtual analog input 1 with the jog dial AIU2 **[AI virtual 2]** (AIU2): Virtual analog input 2 by the communication bus oAO1 **[OA01]** (oAO1): Function blocks: Analog Output 01 ... oA10 **[OA10]** (oA10): Function blocks: Analog Output 10		**[No]** (nO)
SA3	**[Summing ref. 3]** Selection of a reference to be added to **[Ref.1 channel]** (Fr1) or **[Ref.1B channel]** (Fr1b). Identical to **[Summing ref. 2]** (SA2) page 168.		**[No]** (nO)
dA2	**[Subtract. ref. 2]** Selection of a reference to be subtracted from **[Ref.1 channel]** (Fr1) or **[Ref.1B channel]** (Fr1b). Identical to **[Summing ref. 2]** (SA2) page 168.		**[No]** (nO)

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > RPT-

Code	Name / Description	Adjustment range	Factory setting
dA3	**[Subtract. ref. 3]** Selection of a reference to be subtracted from **[Ref.1 channel]** (Fr 1) or **[Ref.1B channel]** (Fr 1b). Identical to **[Summing ref. 2]** (SA2) page 168.		**[No]** (nO)
MA2	**[Multiplier ref. 2]** Selection of a multiplier reference **[Ref.1 channel]** (Fr 1) or **[Ref.1B channel]** (Fr 1b). Identical to **[Summing ref. 2]** (SA2) page 168.		**[No]** (nO)
MA3	**[Multiplier ref. 3]** Selection of a multiplier reference **[Ref.1 channel]** (Fr 1) or **[Ref.1B channel]** (Fr 1b). Identical to **[Summing ref. 2]** (SA2) page 168.		**[No]** (nO)

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > STT-

RAMP

Code	Name / Description	Adjustment range	Factory setting
Fun-	**[APPLICATION FUNCT.] (continued)**		
rPt-	**[RAMP]**		
rPt	**[Ramp type]**		**[Linear]** (Lin)
Lin	**[Linear]** (Lin)		
S	**[S ramp]** (S)		
U	**[U ramp]** (U)		
CuS	**[Customized]** (CuS)		
	S ramps  The rounding coefficient is fixed, t1 = 0.6 set ramp time (linear) t2 = 0.4 set ramp time (round) t3 = 1.4 set ramp time		
	U ramps  The rounding coefficient is fixed, t1 = 0.5 set ramp time (linear) t2 = 1.0 set ramp time (round) t3 = 1.5 set ramp time		
	Customized ramps  tA1: adjustable from 0 to 100% tA2: adjustable from 0 to (100% - tA1) tA3: adjustable from 0 to 100% tA4: adjustable from 0 to (100% - tA3) t12 = ACC * (tA1(%) / 100 + tA2(%) / 100 + 1) t34 = DEC * (tA3(%) / 100 + tA4(%) / 100 + 1)		
inr	**[Ramp increment]**		**[0,1]** (0.1)
	This parameter is valid for **[Acceleration]** (ACC), **[Deceleration]** (dEC), **[Acceleration 2]** (AC2) and **[Deceleration 2]** (dE2).		
(1)			
0.01	**[0,01]**: Ramp up to 99.99 seconds		
0.1	**[0,1]**: Ramp up to 999.9 seconds		
1	**[1]**: Ramp up to 6,000 seconds		
ACC	**[Acceleration]**	0.00 to 6,000 s (2)	3.0 s
	Time to accelerate from 0 to the **[Rated motor freq.]** (FrS) (page 86). To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application.		
(1)			
dEC	**[Deceleration]**	0.00 to 6,000 s (2)	3.0 s
	Time to decelerate from the **[Rated motor freq.]** (FrS) (page 86) to 0. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application.		
(1)			
tA1	**[Begin Acc round]**	0 to 100%	10%
★	Rounding of start of acceleration ramp as a % of the **[Acceleration]** (ACC) or **[Acceleration 2]** (AC2) ramp time. Can be set between 0 and 100%. This parameter can be accessed if the **[Ramp type]** (rPt) is **[Customized]** (CuS).		
(1)			

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > STT-

Code	Name / Description	Adjustment range	Factory setting
tA2	**[End Acc round]**	0 to 100%	10%
★	Rounding of end of acceleration ramp as a % of the **[Acceleration]** (ACC) or **[Acceleration 2]** (AC2) ramp time. Can be set between 0 and (100% - **[Begin Acc round]** (tA1)). This parameter can be accessed if the **[Ramp type]** (rPt) is **[Customized]** (CUS).		
(1)			
tA3	**[Begin Dec round]**	0 to 100%	10%
★	Rounding of start of deceleration ramp as a % of the **[Deceleration]** (dEC) or **[Deceleration 2]** (dE2) ramp time. Can be set between 0 and 100%. This parameter can be accessed if the **[Ramp type]** (rPt) is **[Customized]** (CUS).		
(1)			
tA4	**[End Dec round]**	0 to 100%	10%
★	Rounding of end of deceleration ramp as a % of the **[Deceleration]** (dEC) or **[Deceleration 2]** (dE2) ramp time. Can be set between 0 and (100% - **[Begin Dec round]** (tA3)). This parameter can be accessed if the **[Ramp type]** (rPt) is **[Customized]** (CUS).		
(1)			
Frt	**[Ramp 2 threshold]**	0 to 599 Hz according to rating	0 Hz
	Ramp switching threshold The 2nd ramp is switched if the value of **[Ramp 2 threshold]** (Frt) is not 0 (0 deactivates the function) and the output frequency is greater than **[Ramp 2 threshold]** (Frt). Threshold ramp switching can be combined with **[Ramp switch ass.]** (rPS) switching as follows:		

LI or bit	Frequency	Ramp
0	< Frt	ACC, dEC
0	> Frt	AC2, dE2
1	< Frt	AC2, dE2
1	> Frt	AC2, dE2

rPS	**[Ramp switch ass.]**	**[No]** (nO)
	Identical to **[Ref.1B channel]** (Fr1b) page 167.	
AC2	**[Acceleration 2]**	0.00 to 6,000 s (2)	5.0 s
★	Time to accelerate from 0 to the **[Rated motor freq.]** (FrS). To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. This parameter can be accessed if **[Ramp 2 threshold]** (Frt) is greater than 0 or if **[Ramp switch ass.]** (rPS) is assigned.		
(1)			
dE2	**[Deceleration 2]**	0.00 to 6,000 s (2)	5.0 s
★	Time to decelerate from **[Rated motor freq.]** (FrS) to 0. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. This parameter can be accessed if **[Ramp 2 threshold]** (Frt) is greater than 0 or if **[Ramp switch ass.]** (rPS) is assigned.		
(1)			

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > STT-

Code	Name / Description	Adjustment range	Factory setting
brA	**[Dec ramp adapt.]**		**[Yes]** (YES)

NOTICE

DAMAGE TO THE MOTOR

- Only set this parameter to **[Yes]** (YES) or **[No]** (no) if the connected motor is a permanent magnet synchronous motor.

Other settings demagnetize permanent magnet synchronous motors.

Failure to follow these instructions can result in equipment damage.

Activating this function automatically adapts the deceleration ramp, if this has been set at a too low value according to the inertia of the load, which can cause an overvoltage detected fault.
[Dec ramp adapt.] (brA) is forced to **[No]** (no) if the brake logic control **[Brake assignment]** (bLC) is assigned (page 194).
The function is incompatible with applications requiring:
- Positioning on a ramp.
- The use of a braking resistor (the resistor would not operate correctly).

no **[No]** (no): Function inactive
YES **[Yes]** (YES): Function active, for applications that do not require strong deceleration
The following selections appear depending on the rating of the drive and **[Motor control type]** (CtT) page 105. They enable stronger deceleration to be obtained than with **[Yes]** (YES). Use comparative testing to determine your selection.
dynA **[High torq. A]** (dynA): Addition of a constant current flow component.
When **[Dec ramp adapt.]** (brA) is configured on **[High torq. x]** (dynx), the dynamic performances for braking are improved by the addition of a current flow component. The aim is to increase the iron loss and magnetic energy stored in the motor.

(1) The parameter can also be accessed in the **[SETTINGS]** (SEt-) menu.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 s according to **[Ramp increment]** (inr) page 170.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > ADC-

STOP CONFIGURATION

Code	Name / Description	Adjustment range	Factory setting
Fun-	**[APPLICATION FUNCT.] (continued)**		
StT-	**[STOP CONFIGURATION]** **Note:** Some types of stops cannot be used with all other functions. Follow the instructions on page 163.		
StT	**[Type of stop]**		**[Ramp stop]** (rMP)
	Stop mode on disappearance of the run command or appearance of a stop command. **Note:** If the "brake logic" function on page 194 has been enabled, or if **[Low speed time out]** (tLS) page 95 or 213 is not 0, only ramp type stops may be configured. rMP **[Ramp stop]** (rMP): Stop on ramp FSt **[Fast stop]** (FSt): Fast stop nSt **[Freewheel]** (nSt): Freewheel stop dCI **[DC injection]** (dCI): DC injection stop. Available only if **[Motor control type]** (CtT) page 105 is not set to **[Sync. mot.]** (SYn).		
FFt ★ (1)	**[Freewheel stop Thd.]** Speed threshold below which the motor will switch to freewheel stop. This parameter supports switching from a ramp stop or a fast stop to a freewheel stop below a low speed threshold. This parameter can be accessed if **[Type of stop]** (StT) is set to **[Fast stop]** (FSt) or **[Ramp stop]** (rMP) and if **[Brake assignment]** (bLC) or **[Auto DC injection]** (AdC) are configured.	0.2 to 599 Hz	0.2 Hz
nSt	**[Freewheel stop ass.]** The stop is activated when the input or the bit changes to 0. If the input returns to state 1 and the run command is still active, the motor will only restart if **[2/3 wire control]** (tCC) page 85 is set to **[2 wire]** (2C) and if **[2 wire type]** (tCt) is set to **[Level]** (LEL) or **[Fwd priority]** (PFo). If not, a new run command must be sent. no **[No]** (no): Not assigned LI1 **[LI1]** (LI1): Logical input LI1 ... **[...]** (...): See the assignment conditions on page 153		**[No]** (no)
FSt	**[Fast stop assign.]** The stop is activated when the input changes to 0 or the bit changes to 1 (bit in **[I/O profile]** (IO) at 0). If the input returns to state 1 and the run command is still active, the motor will only restart if **[2/3 wire control]** (tCC) page 85 is set to **[2 wire]** (2C) and if **[2 wire type]** (tCt) is set to **[Level]** (LEL) or **[Fwd priority]** (PFo). If not, a new run command must be sent. **Note:** This function cannot be used with certain other functions. Follow the instructions on page 163. no **[No]** (no): Not assigned LI1 **[LI1]** (LI1): Logical input LI1 ... **[...]** (...): See the assignment conditions on page 153		**[No]** (no)
dCF ★ (1)	**[Ramp divider]** This parameter can be accessed if **[Type of stop]** (StT) is set to **[Fast stop]** (FSt) and if **[Fast stop assign.]** (FSt) is not **[No]** (no) and if **[Stop type]** (PrS) is set to **[Fast stop]** (FSt). The ramp that is enabled (**[Deceleration]** (dEC) or **[Deceleration 2]** (dE2)) is then divided by this coefficient when stop requests are sent. Value 0 corresponds to a minimum ramp time.	0 to 10	4

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > ADC-

Code	Name / Description	Adjustment range	Factory setting
dC1	**[DC injection assign.]**		**[No]** (nO)

⚠WARNING

UNINTENDED MOVEMENT

- Do not use DC injection to generate holding torque when the motor is at a standstill.
- Use a holding brake to keep the motor in the standstill position.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

DC injection braking is initiated when the assigned input or bit changes to state 1.
If the input returns to state 0 and the run command is still active, the motor will only restart if **[2/3 wire control]** (tCC) page 85 is set to **[2 wire]** (2C) and if **[2 wire type]** (tCt) is set to **[Level]** (LEL) or **[Fwd priority]** (PFO). If not, a new run command must be sent.
Note: This function cannot be used with certain other functions. Follow the instructions on page 163.

nO **[No]** (nO): Not assigned
LI1 **[LI1]** (LI1): Logical input LI1
... **[...]** (...): See the assignment conditions on page 153

IdC	**[DC inject. level 1]**	0.1 to 1.41 In (2)	0.64 In (2)

★
(1) (3)

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

Level of DC injection braking current activated via logic input or selected as stop mode.
This parameter can be accessed if **[Type of stop]** (Stt) is set to **[DC injection]** (dC1) or if **[DC injection assign.]** (dC1) is not **[No]** (nO).

tdI	**[DC injection time 1]**	0.1 to 30 s	0.5 s

★
(1) (3)

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

Maximum current injection time **[DC inject. level 1]** (IdC). After this time, the injection current becomes **[DC inject. level 2]** (IdC2).
This parameter can be accessed if **[Type of stop]** (Stt) is set to **[DC injection]** (dC1) or if **[DC injection assign.]** (dC1) is not set to **[No]** (nO).

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > JOG-

Code	Name / Description	Adjustment range	Factory setting
idC2	**[DC inject. level 2]**	0.1 In (2) to **[DC inject. level 1]** (idC)	0.5 In (2)
★ ↻ (1) (3)	**NOTICE** **OVERHEATING AND DAMAGE TO THE MOTOR** Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor. **Failure to follow these instructions can result in equipment damage.** Injection current activated by logic input or selected as stop mode, once period of time **[DC injection time 1]** (tdi) has elapsed. This parameter can be accessed if **[Type of stop]** (Stt) is set to **[DC injection]** (dCi) or if **[DC injection assign.]** (dCi) is not set to **[No]** (no).		
tdC	**[DC injection time 2]**	0.1 to 30 s	0.5 s
★ ↻ (1) (3)	**NOTICE** **OVERHEATING AND DAMAGE TO THE MOTOR** Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor. **Failure to follow these instructions can result in equipment damage.** Maximum injection time **[DC inject. level 2]** (idC2) for injection, selected as stop mode only. This parameter can be accessed if **[Stop type]** (Stt) is set to **[DC injection]** (dCi).		
dotd	**[Dis. operat opt code]** Disable operation stop mode.		**[Ramp stop]** (rMP)
nSt rMP	**[Freewheel]** (nSt): Disable drive function **[Ramp stop]** (rMP): Ramp stop then disable drive function		

(1) The parameter can also be accessed in the **[SETTINGS]** (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.
(3) These settings are independent of the **[AUTO DC INJECTION]** (AdC-) function.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

↻ Parameter that can be modified during operation or when stopped.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > JOG-

AUTO DC INJECTION

Code	Name / Description	Adjustment range	Factory setting
FUn-	**[APPLICATION FUNCT.] (continued)**		
AdC-	**[AUTO DC INJECTION]**		
AdC	**[Auto DC injection]**		**[Yes]** (YES)

⚠ ⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If the parameter **[Auto DC injection]** (AdC) is set to **[Continuous]** (Ct), DC injection is always active, even if the motor does not run.

- Verify that using this setting does not result in unsafe conditions.

Failure to follow these instructions will result in death or serious injury.

2 s

⚠WARNING

UNINTENDED MOVEMENT

- Do not use DC injection to generate holding torque when the motor is at a standstill.
- Use a holding brake to keep the motor in the standstill position.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Automatic current injection on stopping (at the end of the ramp).
Note: There is an interlock between this function and **[Motor fluxing]** (FLU) page 95. If **[Motor fluxing]** (FLU) is set to **[Continuous]** (FCt), **[Auto DC injection]** (AdC) must be **[No]** (nO).
Note: **[Auto DC injection]** (AdC) is set to **[No]** (nO) when **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]** (SYn).
[Auto DC injection] (AdC) is forced to **[No]** (nO) when **[Brake assignment]** (bLC) page 194 is not set to **[No]** (nO).
This parameter gives rise to the injection of current even if a run command has not been sent. It can be accessed with the drive running.

nO **[No]** (nO): No injection
YES **[Yes]** (YES): Adjustable injection time
Ct **[Continuous]** (Ct): Continuous standstill injection

SdC 1	**[Auto DC inj. level 1]**	0 to 1.2 In (2)	0.7 In (2)

★

(1)

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

Level of standstill DC injection current **[Auto DC injection]** (AdC) is not **[No]** (nO).

tdC 1	**[Auto DC inj. time 1]**	0.1 to 30 s	0.5 s

★

(1)

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

Standstill injection time. This parameter can be accessed if **[Auto DC injection]** (AdC) is not set to **[No]** (nO).
If **[Motor control type]** (Ctt) page 105 is set to **[Sync. mot.]**(SYn), this time corresponds to the zero speed maintenance time.

Code	Name / Description	Adjustment range	Factory setting
SdC2	**[Auto DC inj. level 2]**	0 to 1.2 In (2)	0.5 In (2)

★

(1)

NOTICE

OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

2nd level of standstill DC injection current.

This parameter can be accessed if **[Auto DC injection]** (AdC) is not **[No]** (nO).

Code	Name / Description	Adjustment range	Factory setting
tdC2	**[Auto DC inj. time 2]**	0 to 30 s	0 s

★

(1)

NOTICE

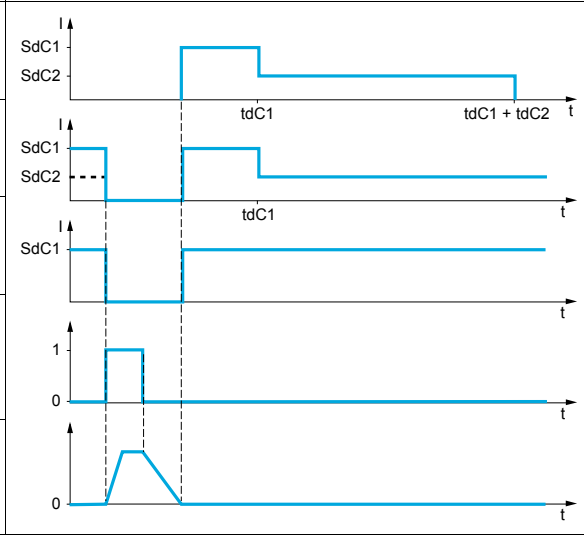
OVERHEATING AND DAMAGE TO THE MOTOR

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor.

Failure to follow these instructions can result in equipment damage.

2nd standstill injection time.

This parameter can be accessed if **[Auto DC injection]** (AdC) is set to **[Yes]** (YES).

AdC	SdC2	Operation
YES	x	
Ct	≠ 0	
Ct	= 0	
Run command		
Speed		

(1) The parameter can also be accessed in the **[SETTINGS]** (SEt-) menu.

(2) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.

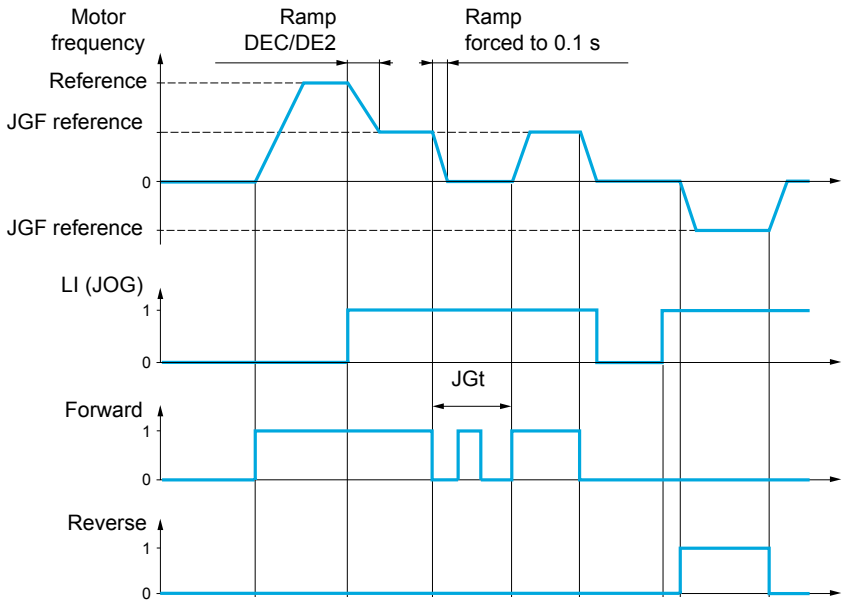
★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 s.

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > PSS-

JOG

Code	Name / Description	Adjustment range	Factory setting
Fun-	**[APPLICATION FUNCT.] (continued)**		
JoG-	**[JOG]** **Note:** This function cannot be used with certain other functions. Follow the instructions on page 163.		
JoG	**[JOG]**		**[LI3]** (LI3)
	Pulse operation. The JOG function is only active if the command channel and the reference channels are on the terminals. The function is active when the assigned input or bit is at 1. Example: 2-wire control operation (tCC = 2C).  		
nO	**[No]** (nO): Not assigned		
LI1	**[LI1]** (LI1): Logical input LI1		
...	**[...]** (...): See the assignment conditions on page 153 (not **[Cd00]** (Cd00) to **[Cd15]** (Cd15))		
JGF ★ (1)	**[Jog frequency]** Reference in jog operation. This parameter can be accessed if **[JOG]** (JoG) is not set to **[No]** (nO).	0 to 10 Hz	10 Hz

Parameters described in this page can be accessed by: DRI- > CONF > FULL > FUN- > PSS-

Code	Name / Description	Adjustment range	Factory setting
JGt ★ (1)	**[Jog delay]** Anti-repeat delay between 2 consecutive jog operations. This parameter can be accessed if **[JOG]** (JoG) is not set to **[No]** (no).	0 to 2.0 s	0.5 s

(1) The parameter can also be accessed in the **[SETTINGS]** (SEt-) menu.

★ These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

2 s To change the assignment of this parameter, press the ENT key for 2 s.