# ATV310

## Variable speed drives for asynchronous motors

## User manual

01/2016


380 V...460 V three-phase, power rating 0.37 kW to 11 kW

EAV94277

Schneider Electric

# Contents

## NOTICE

Read these instructions carefully, and 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 injury hazards that exist at this point. Obey all safety messages that follow this symbol to avoid possible injury or death.

**⚠ DANGER**

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

**⚠ WARNING**

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

**⚠ CAUTION**

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

**NOTICE**

*Notice*, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result** in equipment damage.

PLEASE NOTE
The word "drive" as used in this manual refers to the controller of the adjustable speed drive as defined by NEC.

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 product.

# Before you begin

**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. Before 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 15minutes 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 800Vdc.
  - Measure the voltage on the DC bus between the DC bus terminals (PA/+ and DC/-) using a properly rated voltmeter to verify that the voltage is < 42Vdc.
  - If the DC bus capacitors do not discharge properly, contact your local Schneider Electric representative.
- Install and close all covers before applying voltage.

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

## ⚠ WARNING

### UNEXPECTED MOVEMENT

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

- 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 equipmentoperation.

## ⚠⚠ 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. (a)
- 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.**

a. 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.**

## Using motors in parallel

Set Motor control type 309 (page 52) to 03.
Motor thermal monitoring is no longer provided by the drive.

## NOTICE

**MOTOR OVERHEATING**

Install external thermal monitoring equipment under the following conditions:
If several motor are connected to the same drive, Install external thermal monitoring equipment for each motor

**Failure to follow these instructions can result in equipment damage.**

The following Altivar 310 technical documents are available on the Schneider Electric website (www.schneider-electric.com).

## ATV310 Quick Start Guide (EAV96135)

The Quick Start Guide is delivered with the drive and describes how to wire and configure the drive to start motor quickly and simply for simple applications.

## ATV310 User manual ( EAV94277)

This manual describes how to install, program and operate the drive.

## ATV310 Modbus Communication manual (EAV94278)

This manual describes the assembly, connection to the bus or network, signaling, diagnostics, and configuration of the communication-specific parameters via the 7 segment LED display.
It also describes the communication services of the Modbus protocol.
This manual includes all Modbus addresses. It explains the operating mode specific to communication (state chart).

## ATV310 Modbus parameters description file ( EAV94279)

All the parameters are grouped together in an Excel file with the following data:

- Code
- Name
- Modbus Addresses
- Category
- Read/write access
- Type: signed numerical, unsigned numerical, etc.
- Unit
- Factory setting
- Minimum value
- Maximum value
- Display on the 7-segment integrated display terminal
- Relevant menu
- This file offers the option of sorting and arranging the data according to any criterion chosen by the user.

## 1. Receive and inspect the drive

- ☐ Check that the part number printed on the label is the same as that on the purchase order.
- ☐ Remove the ATV310 from its packaging and check that it has not been damaged in transit.

## 2. Check the line voltage

- ☐ Check that the line voltage is compatible with the voltage range of the drive (page 8).

## 3. Mount the drive

- ☐ Mount the drive in accordance with the instructions in this document (page 13).
- ☐ Install any options required.

Steps 2 to 4 must be performed with the power off.

## 4. Wire the drive (page14)

- ☐ Connect the motor, ensuring that its connections correspond to the voltage.
- ☐ Connect the line supply, after making sure that the power is off.
- ☐ Connect the control part.

## 5. Configure the drive (page 26)

- ☐ Apply input power to the drive, but do not give a run command.
- ☐ Set the motor parameters (in Conf mode) only if the factory configuration of the drive is not suitable.
- ☐ Perform auto-tuning.

## 6. Start

## Prior to switching on 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.**

## Using the drive with motor having a different size

The motor could have a different rating to the drive. In case of smaller motors, there is no specific calculation. The estimated motor current has to be set at Motor thermal current 6 0 4.0 parameter (page 90). In case of large motors (with up to 2 times the capacity of the drive), e.g., using a 4 kW motor in conjunction with a 2.2 kW drive, motor current and actual motor power must not exceed the rated current and power of the drive.

## Line 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.**

## Use with a smaller rated motor or without a motor

- In factory settings mode, Output Phase loss 6 0 5 (page 90) is active (6 0 5 = 0 1). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high power drives), deactivate Output Phase loss 6 0 5 (6 0 5 = 0 0).
- In Motor control menu 3 0 0 - set Motor control type 3 0 9 (page 52) to 0 3.

**NOTICE**

**MOTOR OVERHEATING**

Install external thermal monitoring equipment if a motor with a nominal current of less than 20% of the nominal current of the drive is connected.

**Failure to follow these instructions can result in equipment damage.**

## Three-phase supply voltage: 380V...460V 50/60 Hz

For three Phase Output 380V...460V motors

| Motor | Line supply (input) | | | | Drive (output) | | | Reference | Size |
|---|---|---|---|---|---|---|---|---|---|
| Power indicated on plate (1) | Maximum line current (2) | | Apparent power | Power dissipated at nominal current | Nominal Current In | Max. transient current for | | | |
| | at 380 V | at 460 V | | | | 60 s | 2 s | | |
| kW | A | A | kVA | W | A | A | A | | |
| 0.37 | 2.1 | 1.8 | 1.4 | 19.6 | 1.5 | 2.3 | 3.0 | ATV310H037N4 | Size 1 |
| 0.75 | 3.5 | 3.1 | 2.5 | 28.8 | 2.3 | 3.5 | 4.6 | ATV310H075N4 | Size 1 |
| 1.5 | 6.5 | 5.4 | 4.3 | 51.0 | 4.1 | 6.2 | 8.2 | ATV310HU15N4 | Size 2 |
| 2.2 | 8.8 | 7.2 | 5.7 | 65.5 | 5.5 | 8.3 | 11.0 | ATV310HU22N4 | Size 2 |
| 3 | 11.1 | 9.2 | 7.3 | 80.2 | 7.1 | 10.7 | 14.2 | ATV310HU30N4 | Size 3 |
| 4 | 13.7 | 11.4 | 9.1 | 102.7 | 9.5 | 14.3 | 19.0 | ATV310HU40N4 | Size 3 |
| 5.5 | 21.3 | 14.3 | 11.4 | 141.5 | 12.6 | 18.9 | 25.2 | ATV310HU55N4 | Size 3 |
| 7.5 | 26.6 | 22.4 | 17.8 | 203.9 | 17 | 25.5 | 34.0 | ATV310HU75N4 | Size 4 |
| 11 | 36.1 | 30.4 | 24.2 | 294.7 | 24 | 36.0 | 48.0 | ATV310HD11N4 | Size 4 |

(1) These power ratings are for a Switching frequency range of 4 kHz, in continuous operation. The Switching frequency range is adjustable from 2 to 12 kHz.
Above 4 kHz, the drive will reduce the Switching frequency range if an excessive temperature rise occurs. Derating should be applied to the nominal drive current if continuous operation above 4 kHz is required:
- 10% derating for 8 kHz
- 20% derating for 12 kHz

(2) Line current network requirements:
* ⩽ 4kW, network short circuit current Isc ⩽ 5kA
* > 4kW, network short circuit current Isc ⩽ 22kA

**NOTICE**

**RISK OF DAMAGE TO THE DRIVE**

The drive will be damaged if it operates above the nominal current (In) for an extended period of time.
Operating time should not exceed 60 s at 1.5 x In, or 2 s at 2 x In.

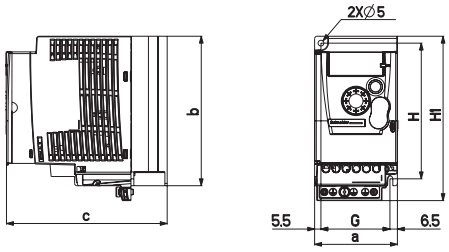
**Failure to follow these instructions can result in equipment damage.**

## Circuit breaker and mains contactor selection according to the Drive

| Drive | Circuit-breaker | Contactor | Rated |
|---|---|---|---|
| ATV310H037N4● | GV2ME07C | LC1-D09●●●●N | 2.5 A |
| ATV310H075N4● | GV2ME08C | LC1-D09●●●●N | 4 A |
| ATV310HU15N4● | GV2ME14C | LC1-D09●●●●N | 10 A |
| ATV310HU22N4● | GV2ME14C | LC1-D09●●●●N | 10 A |
| ATV310HU30N4● | GV2ME16C | LC1-D09●●●●N | 14 A |
| ATV310HU40N4● | GV2ME16C | LC1-D09●●●●N | 14 A |
| ATV310HU55N4● | GV2ME22C | LC1-D09●●●●N | 25 A |
| ATV310HU75N4● | GV2ME32C | LC1-D18●●●●N | 32 A |
| ATV310HD11N4● | NCS100S340MA | LC1-D25●●●●N | 40 A |

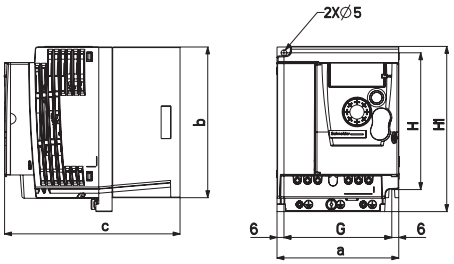
# Dimensions and weights

### ATV310H037N4, ATV310H075N4



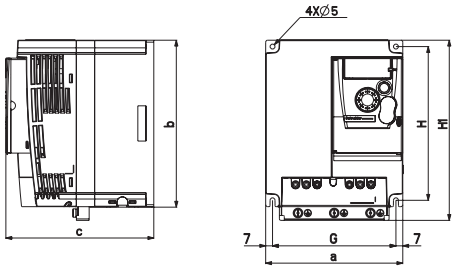

| ATV310H | a mm (in.) | b mm (in.) | c mm (in.) | G mm (in.) | H mm (in.) | H1 mm (in.) | Ø mm (in.) | For screws | Weight kg (lb) |
|---|---|---|---|---|---|---|---|---|---|
| 037N4 | 72 (2.83) | 130 (5.12) | 130 (5.12) | 60 (2.36) | 118 (4.65) | 143 (5.63) | 5 (0.20) | M4 | 0.8 (1.8) |
| 075N4 | 72 (2.83) | 130 (5.12) | 140 (5.51) | 60 (2.36) | 118 (4.65) | 143 (5.63) | 5 (0.20) | M4 | 0.8 (1.8) |

ATV310HU15N4, ATV310HU22N4



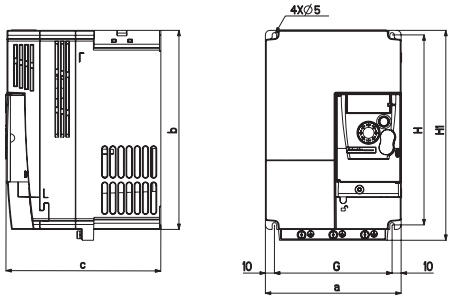

| ATV310H | a mm (in.) | b mm (in.) | c mm (in.) | G mm (in.) | H mm (in.) | H1 mm (in.) | Ø mm (in.) | For screws | Weight kg (lb) |
|---|---|---|---|---|---|---|---|---|---|
| U15N4 | 105 (4.13) | 130 (5.12) | 151 (5.94) | 93 (3.66) | 118 (4.65) | 143 (5.63) | 5 (0.20) | M4 | 1.1 (2.43) |
| U22N4 | 105 (4.13) | 130 (5.12) | 151 (5.94) | 93 (3.66) | 118 (4.65) | 143 (5.63) | 5 (0.20) | M4 | 1.1 (2.43) |

ATV310HU30N4, ATV310HU40N4, ATV310HU55N4




| ATV310H | a mm (in.) | b mm (in.) | c mm (in.) | G mm (in.) | H mm (in.) | H1 mm (in.) | Ø mm (in.) | For screws | Weight kg (lb) |
|---|---|---|---|---|---|---|---|---|---|
| U30N4 | 140 (5.51) | 171 (6.73) | 151 (5.94) | 126 (4.96) | 157 (6.18) | 184 (7.24) | 5 (0.20) | M4 | 1.8 (3.97) |
| U40N4 | 140 (5.51) | 171 (6.73) | 151 (5.94) | 126 (4.96) | 157 (6.18) | 184 (7.24) | 5 (0.20) | M4 | 1.8 (3.97) |
| U55N4 | 140 (5.51) | 171 (6.73) | 151 (5.94) | 126 (4.96) | 157 (6.18) | 184 (7.24) | 5 (0.20) | M4 | 1.8 (3.97) |

ATV310HU75N4, ATV310HD11N4




| ATV310H | a mm (in.) | b mm (in.) | c mm (in.) | G mm (in.) | H mm (in.) | H1 mm (in.) | Ø mm (in.) | For screws | Weight kg (lb) |
|---|---|---|---|---|---|---|---|---|---|
| U75N4 | 150 (5.91) | 220 (8.66) | 171 (6.73) | 130 (5.12) | 210 (8.27) | 232 (9.13) | 5 (0.20) | M4 | 3.7 (8.16) |
| D11N4 | 150 (5.91) | 220 (8.66) | 171 (6.73) | 130 (5.12) | 210 (8.27) | 232 (9.13) | 5 (0.20) | M4 | 3.7 (8.16) |

## Mounting

**⚠⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- The drive panel must be properly grounded before power is applied.
- Use the provided ground connecting point as shown in the figure below.

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

**⚠⚠ DANGER**

**ATV310H●●●N4 - GROUND CONTINUITY HAZARD**

An anodized heatsink can create an insulation barrier to the mounting surface. Ensure that you follow the recommended grounding connections.

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

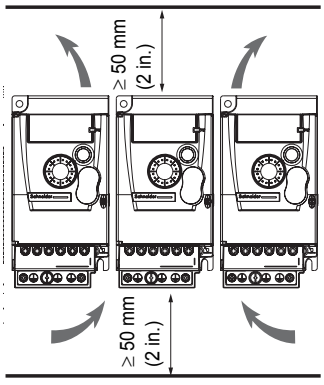
**⚠⚠ DANGER**

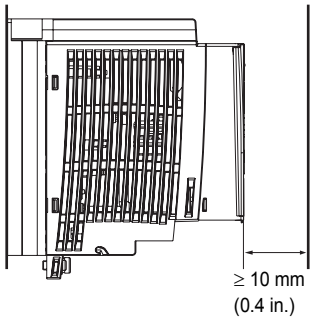
**ELECTRIC SHOCK CAUSED BY FOREIGN OBJECTS OR DAMAGE**

Conductive foreign objects in the product or damage may cause parasitic voltage.

- Do not use damaged products.
- Keep foreign objects such as chips, screws or wire clippings from getting into the product.

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




Install the drive vertically, at ±10°.
Do not place it close to heating elements.
Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the drive.

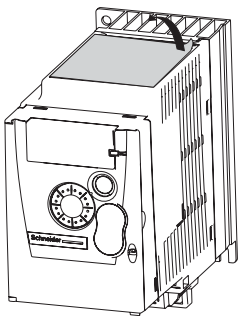
Free space in front of unit: 10 mm (0.4 in.) minimum.

When IP20 protection is adequate, we recommend that the vent cover(s) on the top of the drive be removed, as shown below.

We recommend that the drive is installed on a dissipative surface.

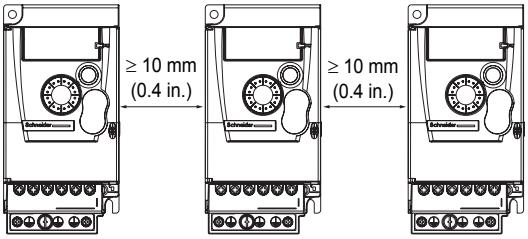
Drive installation should employ fastening washers and screws in combination.

## Removing the vent cover



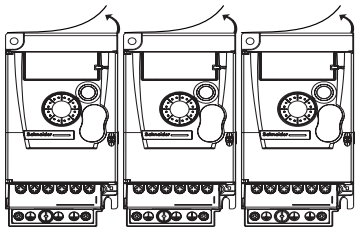
# Mounting types

## Type A mounting




Free space ⩾ 10 mm (0.4 in.) on each side, with vent cover fitted. Mounting type A is suitable for drive operation at surrounding air temperatures less than or equal to 55°C.
When temperature exceeds 55°C, the top vent cover should be removed to ensure cooling.

## Type B mounting



Drives mounted side-by-side with vent covers removed. Mounting type B is suitable for drive operation at surrounding air temperatures less than or equal to 55°C.

With these types of mounting, drives with a Switching frequency range of 4 kHz can be used up to an ambient temperature of 55°C.

At ambient temperatures between +55°C and +65°C:
- Remove top safeguard covers on drives
- Derate current by 2.2% for every 1°C of temperature rise
- Switching frequency range will adjust according to the internal temperature of the drive

## General instructions

**⚠⚠ DANGER**

**HAZARD OF FIRE OR ELECTRIC SHOCK**

- Wire cross sections and tightening torques must comply with the specifications provided in this document
- Do not use multi-conductor cables without cable lugs for any connection with a voltage higher than 25 Vac.

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

Keep power cables separate from devices containing circuits with low-level signals (detectors, PLCs, measuring apparatus, video, telephone). Always cross control and power cables at 90° if possible.

### Power and circuit protection

Adhere to wire size recommendations contained in local codes and standards.
Before wiring power terminals, connect the ground terminal to the grounding screws located below the output terminals.
The drive must be grounded in accordance with the applicable safety standards.
When upstream protection by means of a residual current device is required by the installation standards, a type A circuit breaker should be used for single-phase drives and type B for 3-phase drives. Choose a suitable model incorporating:

- High frequency current filtering
- A time delay which prevents tripping caused by the load from stray capacitance on power-up. The time delay is not possible for 30mA devices.

In this case, choose devices with high interference immunity, such as RCDs with SI type leakage protection.
If the installation includes several drives, provide one "residual current device" per drive.

**⚠ WARNING**

**INSUFFICIENT PROTECTION AGAINST OVERCURRENTS**

- Properly rated overcurrent protective devices must be used.
- Use the circuit breakers specified in the "Drive ratings" chapter.
- Do not connect the product to a supply mains whose network short-circuit current exceeds the permissible value specified in the "Drive ratings" chapter.

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

### Control

For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.). Connect the shielding to ground.

**⚠ WARNING**

**UNINTENDED BEHAVIOR OF INPUTS AND OUTPUTS**

The functions of the inputs and outputs depend on the selected operating mode and the settings of the corresponding parameters.

- Verify that the wiring is appropriate for the settings.
- Only start the system if there are no persons or obstructions in the zone of operation.
- When commissioning, carefully run tests for all operating states and potential error situations.

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

### Length of motor cables

Please use output filters for shielded motor cable lengths longer than 25 m (82 ft) and unshielded cables longer than 50 m (164 ft).
For accessory part numbers, please refer to the catalogue.

## Equipment Grounding

Ground the drive according to local and national code requirements. A minimum wire size of 10 mm² may be required to meet standards limiting leakage current.

### ⚠⚠ DANGER

**ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING**

Insufficient grounding causes the hazard of electric shocks.

- Ground the drive system before applying voltage.
- Do not use conduits as protective ground conductors; use a protective ground conductor inside the conduit.
- The cross section of the protective ground conductor must comply with the applicable standards.
- Do not consider cable shields to be protective ground conductors.

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

### ⚠⚠ DANGER

**ATV310H●●●N4 - GROUND CONTINUITY HAZARD**

An anodized heatsink can create an insulation barrier to the mounting surface. Ensure that you follow the recommended grounding connections.

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

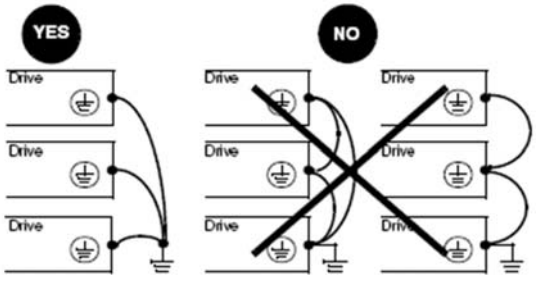
### ⚠⚠ DANGER

**ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING**

This product has an increased leakage current > 3.5 mA.

- Use a protective ground conductor with at least 10 $mm^2$ (AWG 6) or two protective ground conductors with the cross section of the conductors supplying the power terminals.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.

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




- Ensure that the resistance of the ground is one ohm or less.
- When grounding several drives, you must connect each one directly, as shown in the figure to the left.
- Do not loop the ground cables or connect them in series.

### 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

**INSUFFICIENT PROTECTION AGAINST OVERCURRENTS**

- Properly rated overcurrent protective devices must be used.
- Do not connect the product to a supply mains whose short-circuit current rating exceeds the permissible value (1).

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

(1) the permisible value of the drive short-circuit current rating is 5kA for product up to 4kW and 22kA above 4kW.

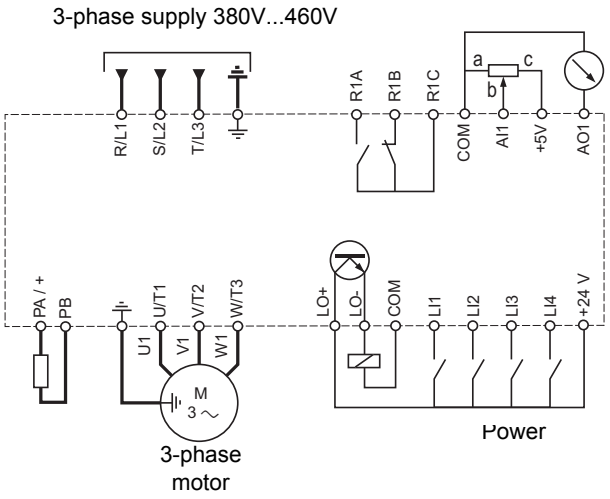
## ⚠ ⚠ DANGER

**HAZARD OF FIRE OR ELECTRIC SHOCK**

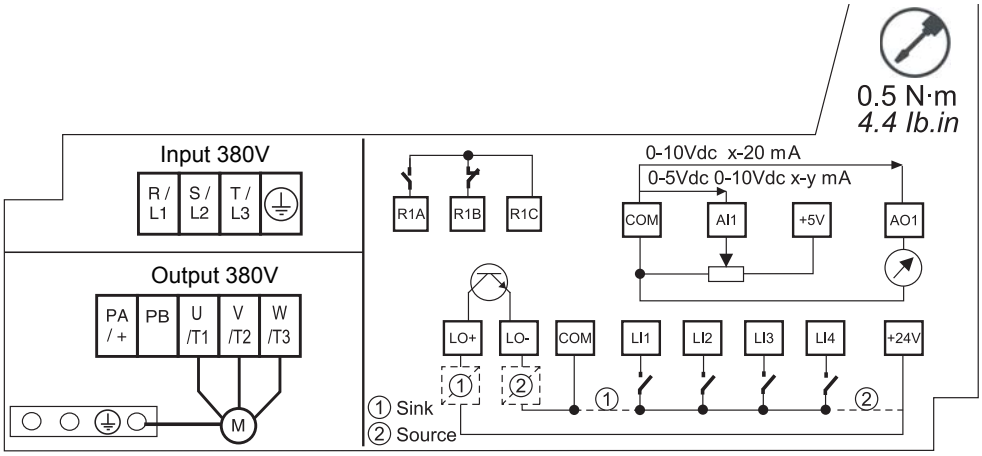
For drives ⩽ 4kW, the length of stripped part of wires connecting motors and drives and connecting to brake resistor should not exceed 10 mm (0.4 in.).

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

## General wiring diagram




## Wiring label



## ⚠ ⚠ DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

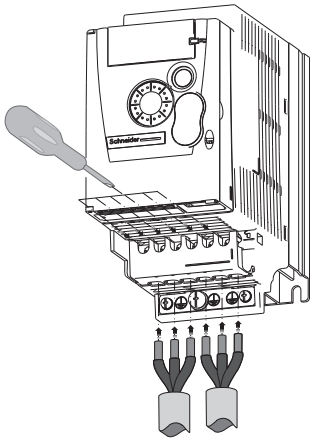
Read and understand the instructions in "**Before your begin**" chapter before performing any procedure in this chapter.

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

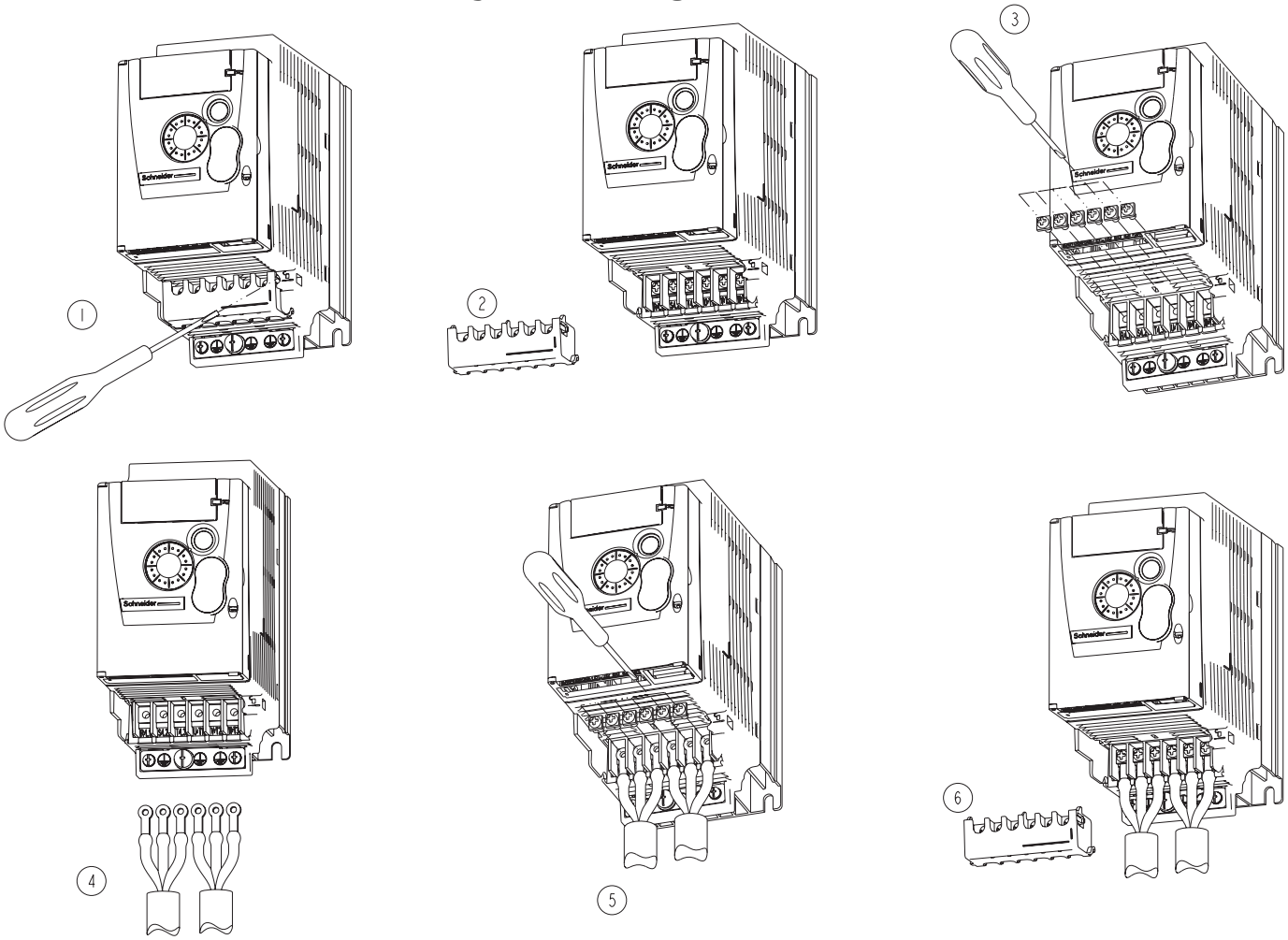
The incoming line power terminals and output terminals to the motor are located at the bottom of the drive. The power terminals can be accessed without opening the wiring trap if you use stripped wire cables.

# Access to the power terminals

## Access to the terminals if you use stripped wire cables



## Access to the terminals if you use ring terminals

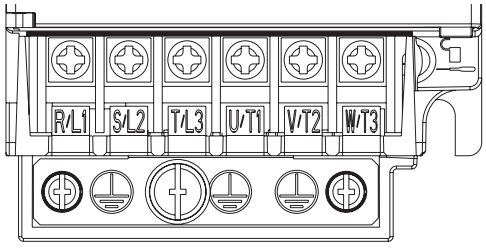



## Characteristics and functions of power terminals

| Terminal | Function | For ATV310 |
|---|---|---|
| ⏚ | Ground terminal | All ratings |
| R/L1 - S/L2 - T/L3 | Power input terminal | All ratings |
| PA/+ | Brake resistor terminal (DC Bus + output) | ATV310HU15N4...ATV310HD11N4 |
| PB | Brake resistor terminal | ATV310HU15N4...ATV310HD11N4 |
| U/T1 - V/T2 - W/T3 | Motor wiring terminal | All ratings |

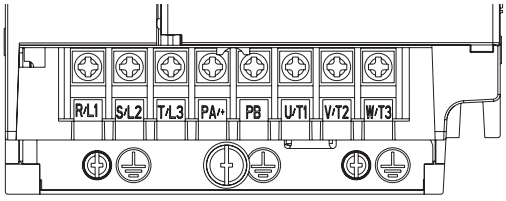
# Power terminals

## Arrangement of the power terminals



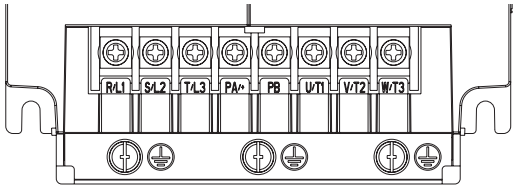

| R/L1 | S/L2 | T/L3 | U/T1 | V/T2 | W/T3 |
|---|---|---|---|---|---|

| ATV310H | Applicable wire size (1) mm² (AWG) | Recommended wire size (2) mm² (AWG) | Tightening torque (3) N·m (lb.in) |
|---|---|---|---|
| 037N4<br>075N4 | 1.5~2.5<br>(16~14) | 2.5 (14) | 0.8~1<br>(7.1 to 8.9) |



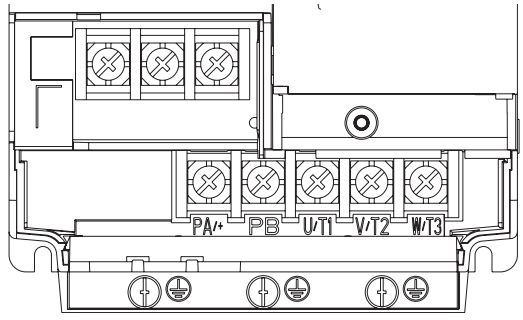

| R/L1 | S/L2 | T/L3 | PA/+ | PB | U/T1 | V/T2 | W/T3 |
|---|---|---|---|---|---|---|---|

| ATV310H | Applicable wire size (1) mm² (AWG) | Recommended wire size (2) mm² (AWG) | Tightening torque (3) N·m (lb.in) |
|---|---|---|---|
| U15N4<br>U22N4 | 1.5~2.5<br>(16~14) | 2.5 (14) | 0.8~1<br>(7.1 to 8.9) |




| R/L1 | S/L2 | T/L3 | PA/+ | PB | U/T1 | V/T2 | W/T3 |
|---|---|---|---|---|---|---|---|

| ATV310H | Applicable wire size (1) mm² (AWG) | Recommended wire size (2) mm² (AWG) | Tightening torque (3) N·m (lb.in) |
|---|---|---|---|
| U30N4<br>U40N4<br>U55N4 | 1.5~4<br>(16~12)<br>2.5~4<br>(14~12)<br>4 (12) | 2.5 (14)<br>4 (12)<br>4 (12) | 1.2~1.4<br>(10.6 to 12.4) |




| R/L1 | S/L2 | T/L3 | | | | | |
|---|---|---|---|---|---|---|---|
| | | | PA/+ | PB | U/T1 | V/T2 | W/T3 |

| ATV310H | Applicable wire size (1) mm² (AWG) | Recommended wire size (2) mm² (AWG) | Tightening torque (3) N·m (lb.in) |
|---|---|---|---|
| U75N4<br>D11N4 | 6~10 (10~7)<br>10 (7) | 10 (7)<br>10 (7) | 2.2~2.4<br>(19.5 to 21.2) |

(1) The value in bold corresponds to the minimum wire gauge to permit secureness.
(2) 70°C copper cable (minimum wire size for rated use).
(3) Recommended to maximum value.

### Recommended screwdriver(s)

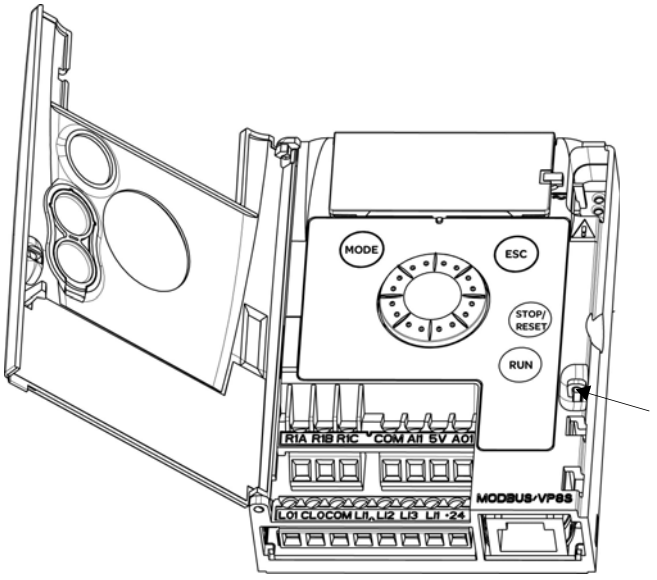
For ⩽ 5.5kW drive terminal wiring, a Phillips-head screwdriver PH1 (Φ4.5) is recommended.
For 7.5kW and 11kW terminal wiring, a Phillips-head screwdriver PH2 (Φ6) is recommended.

# Control terminals

Keep the control circuits away from the power cables. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50mm (1 and 2 in.). Connect the shield to ground as outlined on page 24.

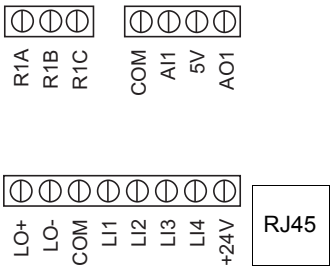
## Access to the control terminals

To access the control terminals, open the cover.
**Note:** For information regarding HMI button functions, see "HMI description" on page 28.




It is possible to lock the cover with a lead seal.

## Arrangement of control terminals




| | |
|---|---|
| R1A | Normally open (NO) contact of the relay |
| R1B | Normally closed (NC) contact of the relay |
| R1C | Common pin of the relay |
| COM | COMmon of analog and logic I/Os |
| AI1 | Analog Input |
| 5V | +5VDC supply provided by the drive |
| AO1 | Analog Output |
| LO+ | Logic Output (collector) |
| LO- | Common of the logic Output (emitter) |
| COM | COMmon of analog and logic I/Os |
| LI1 | Logic Input |
| LI2 | Logic Input |
| LI3 | Logic Input |
| LI4 | Logic Input |
| +24V | +24 VDC supply provided by the drive |
| RJ45 | Modbus network or remote display panel interface. |

| ATV310 Control terminals | Applicable wire size (1) $mm^2$ (AWG) | Tightening torque (2) N·m (lb.in) |
|---|---|---|
| R1A, R1B, R1C | **0.75** to 1.5 (**18** to 16) | 0.5 to 0.6 (4.4 to 5.3) |
| Other terminals | **0.14** to 1.5 (**26** to 16) | |

(1) The value in bold corresponds to the minimum wire gauge to permit secureness.
(2) Recommended to maximum value.

### Recommended screwdriver(s)

Control terminal wiring requires a Phillips-head screwdriver PH0 (Φ3).

## Characteristics and functions of the control terminals

| Terminal | Function | Electrical characteristics |
|---|---|---|
| R1A | NO contact of the relay | Minimum switching capacity:<br>• 5mA for 24 V ⎓<br>Maximum switching capacity:<br>• on inductive load (cos φ = 0.4 and L/R = 7 ms):<br>2A for 250V ∿ and 30V ⎓<br>• on resistive load (cos φ = 1 and L/R = 0):<br>3A for 250V ∿, 4A for 30V ⎓<br>• response time: 30ms maximum. |
| R1B | NC contact of the relay | |
| R1C | Common pin of the relay | |
| COM | Common of analog and logic I/Os | |
| AI1 | Voltage or current analog input | • resolution: 10 bits<br>• precision: ± 1% at 25°C (77°F)<br>• linearity: ± 0.3% (of full scale)<br>• sampling time: 20 ms ± 1 ms<br>Analog voltage input 0 to +5 V or 0 to + 10 V<br>(maximum voltage 30 V) impedance: 30 kΩ<br>Analog current input x to y mA, impedance: 250 Ω |
| 5V | Power supply for reference potentiometer | • precision: ± 5%<br>• maximum current: 10 mA |
| AO1 | Voltage or current analog output | • resolution: 8 bits<br>• precision: ± 1% at 25°C (77°F)<br>• linearity: ± 0.3% (of full scale)<br>• sampling time: 4 ms (max. 7 ms)<br>Analog voltage output: 0 to +10 V (maximum voltage +1%)<br>• minimum output impedance: 470 Ω<br>Analog current output: x to 20 mA<br>• maximum output impedance: 800 Ω |
| LO+ | Logic output | • voltage: 24 V (maximum 30 V)<br>• impedance: 1 kΩ, maximum 10 mA (100 mA in open collector)<br>• linearity: ± 1%<br>• sampling time: 20 ms ± 1 ms. |
| LO- | Common of the logic output (emitter) | |
| LI1<br>LI2<br>LI3<br>LI4 | Logic inputs | Programmable logic inputs<br>• +24 VDC power supply (maximum 30 V)<br>• impedance: 3.5 kΩ<br>• state: 0 if < 5 V, state 1 if > 11 V in positive logic<br>• state: 1 if < 10 V, state 0 if > 16 V or switched off (not connected) in negative logic<br>• sampling time: < 20 ms ± 1 ms. |
| +24V | +24 VDC supply provided by the drive | +24 VDC -15% +20% protected against short-circuits and overloads.<br>Maximum customer current available: 100 mA |

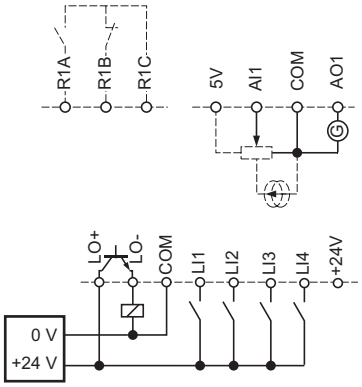
## Control connection diagrams

Logic inputs type 203 parameter (page 47) is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

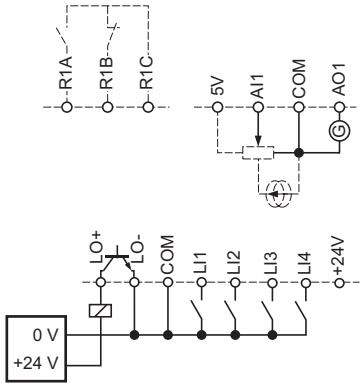
- Set the parameter to 00 for Source operation.
- Set the parameter to 01 for internal Sink operation.
- Set the paramters to 02 for external Sink operation.

**Note:** The modification will be taken into account only at the next control power-on.

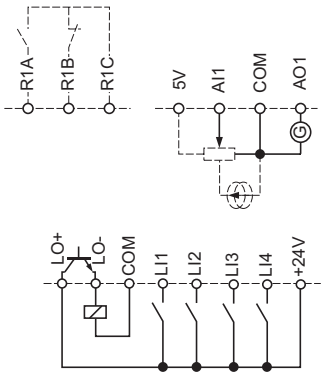
**Source** - using external supply



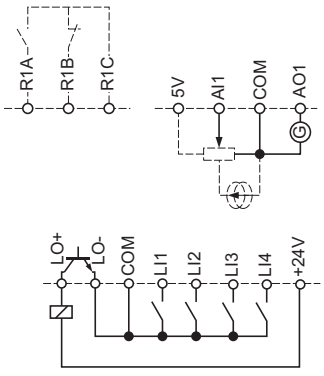

**Sink** - using external supply




**Source** - using internal supply




**Sink** - using internal supply




**⚠ WARNING**

**UNANTICIPATED EQUIPMENT OPERATION**

- If the function Logic input type 203 is set to "01" or "02", do not connect the "O V" terminal to ground or to protective ground.
- Verify that accidental grounding of digital inputs configured for sink logic, caused, for example, by damage to the signal cables, cannot occur.
- Follow all applicable standards and directives such as NFPA 79 and EN 60204 for proper control circuit grounding practices.

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

**⚠ WARNING**

**UNANTICIPATED EQUIPMENT OPERATION**

- Do not used a PLC to command the logic input of the drive in sink mode.
- If this behaviour is required, contact Schneider Office for additional information.

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

# Electromagnetic Compatibility (EMC), Wiring

## EMC requirements for the control cabinet

| EMC measures | Objective |
|---|---|
| Use mounting plates with good electrical conductivity, connect large surface areas of metal parts, remove paint from contact areas. | Good conductivity due to large surface contact. |
| Ground the control cabinet, the control cabinet door and the mounting plate with ground straps or ground wires. The conductor cross section must be at least 10 $mm^2$ (AWG 8). | Reduces emissions. |
| Fit switching devices such as power contactors, relays or solenoid valves with interference suppression units or arc suppressors (for example, diodes, varistors, RC circuits). | Reduces mutual interference. |
| Install power components and control components separately. | |

## Shielded cables

| EMC measures | Objective |
|---|---|
| Connect large surface areas of cable shields, use cable clamps and ground straps. | Reduces emissions. |
| Use cable clamps to connect a large surface area of the shields of all shielded cables to the mounting plate at the control cabinet entry. | |
| Ground shields of digital signal wires at both ends by connecting them to a large surface area or via conductive connector housings | Reduces interference affecting the signal wires, reduces emissions |
| Ground the shields of analog signal wires directly at the device (signal input); insulate the shield at the other cable end or ground it via a capacitor (for example, 10 nF, 100 V or higher. | Reduces ground loops due to low-frequency interference. |
| Use only shielded motor cables with copper braid and a coverage of at least 85%, ground a large surface area of the shield at both ends. | Diverts interference currents in a controlled way, reduces emissions. |

## Cable Installation

| EMC measures | Objective |
|---|---|
| Do not route fieldbus cables and signal wires in a single cable duct together with lines with DC and AC voltages of more than 60 V. (Fieldbus cables, signal lines and analog lines may be in the same cable duct)<br>Recommendation: Use separate cable ducts at least 20 cm apart. | Reduces mutual interference. |
| Keep cables as short as possible. Do not install unnecessary cable loops, use short cables from the central grounding point in the control cabinet to the external ground connection. | Reduces capacitive and inductive interference. |
| Use equipotential bonding conductors in the following cases: wide-area installations, different voltage supplies and installation across several buildings. | Reduces current in the cable shield, reduces emissions. |
| Use fine stranded equipotential bonding conductors. | Diverts high-frequency interference currents |
| If motor and machine are not conductively connected, for example by an insulated flange or a connection without surface contact, you must ground the motor with a ground strap or a ground wire. The conductor cross section must be at least 10 mm2 (AWG 6). | Reduces emissions, increases immunity. |
| Use twisted pair for the DC supply.<br>For digital and analog inputs use shielded twisted cables with a pitch of between 25...50 mm (1...2 in). | Reduces interference affecting the signal cables, reduces emissions. |

## Power Supply

| EMC measures | Objective |
|---|---|
| Operate product on mains with grounded neutral point. | Enables effectiveness of mains filter. |
| Surge arrester if there is a risk of overvoltage. | Reduces the risk of damage caused by overvoltage. |

## Mechanical Installation

Verify the mechanical installation of the entire drive system:

| Step | Action | ✔ |
|---|---|---|
| 1 | Does the installation meet the specified distance requirements? | |
| 2 | Did you tighten all fastening screws with the specified tightening torque? | |

## Electrical installation

Verify the electrical connections and the cabling:

| Step | Action | ✔ |
|---|---|---|
| 1 | Did you connect all protective ground conductors? | |
| 2 | Does circuit breaker has the correct rating refer to page (tableau ajouté en Safety page 10, dans les drive ratings). | |
| 3 | Did you connect or insulate all wires at the cable ends? | |
| 4 | Did you properly connect and install all cables and connectors? | |
| 5 | Do all plug-in terminals colors and markings correspond to the colors and marking of the control block? | |
| 6 | Did you properly connect the signal wires? | |

## Covers And Seals

Verify that all covers and seals of the control cabinet are properly installed to meet the required degree of protection.

## Drive factory settings

The ATV310 is factory-set for the most common operating conditions (motor rating according to drive rating):

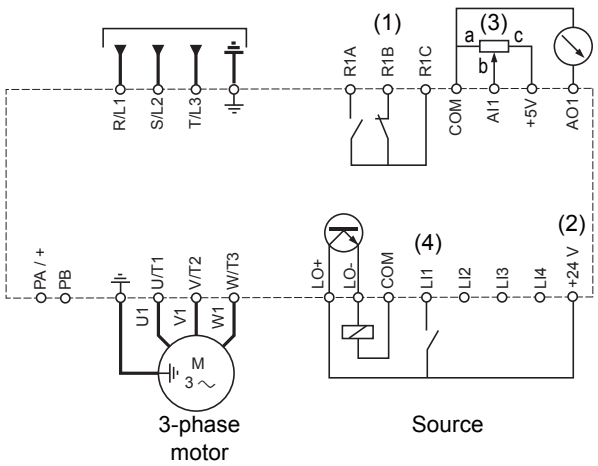
- Display: drive ready ( - - 00 ) with motor stopped or motor frequency reference while running
- Automatic adaptation of the deceleration ramp in the event of overvoltage on braking
- No automatic restarting after a detected fault is cleared
- Logic inputs:
  - LI1: forward (2-wire transitional control)
  - LI2, LI3, LI4: no assignment
- Logic output: LO1: no assignment
- Analog input: AI1 (0 to + 5 V) speed reference
- Relay R1: fault as default setting. R1A opens and R1B closes when a fault is detected or no line voltage is present.
- Analog output AO1: no assignment

| Code | Description | Value | Page |
|---|---|---|---|
| 30 1 | Standard motor frequency | 50 Hz | 52 |
| 304 | Rated motor voltage | 380V | 52 |
| 501.0 | Acceleration | 3 s | 60 |
| 501.1 | Deceleration | 3 s | 60 |
| 512.0 | Low speed | 0 Hz | 85 |
| 512.2 | High speed | 50 Hz | 86 |
| 309 | Motor control type | Standard U/F law | 52 |
| 310 | IR compensation | 100% | 53 |
| 604.0 | Motor thermal current | equal to nominal motor current (value determined by drive rating) | 90 |
| 504.1 | Automatic DC injection current | 0.7 x rated drive current, for 0.5 seconds. | 63 |
| 315 | Switching frequency | 4 kHz | 54 |

If the above values are compatible with the application, the drive can be used without changing the settings.

## Drive factory wiring diagram

ATV310●●●●N4




(1) R1 relay contacts, for remote indication of the drive status.
(2) Internal + 24 V ⎓. If an external source is used (+ 30 V ⎓ maximum), connect the 0 V of the source to the COM terminal, and do not use the + 24 V ⎓ terminal on the drive.
(3) Reference potentiometer SZ1RV1202 (2.2 kΩ) or similar (10 kΩ maximum).
(4) Forward.

## Status relay, unlocking

The R1 status relay is energized when the drive power is applied with no fault detected. It de-energizes in the event of a detected fault or when the drive power is removed.

The drive is reset after a detected fault:

- by switching off the drive until the display disappears completely, then switching on again.
- automatically when "automatic restart" function is enabled, fault detection menu 600-, Automatic restart 602.0 parameter (page 87) set to 01.
- via a logic input when this input is assigned to the "drive reset" function, fault detection menu 600- menu, Detected fault reset assignment 601 (page 87) set to L●H.
- by using the "run" key on the drive to reset section fault. See Reset all previous detected faults via Run key 614 parameter (page 93).

## Drive thermal detection

Thermal detection is provided by a built-in PTC probe in the power module.

## Drive ventilation

Ratings up to 0.75 kW (1 HP) do not include a fan. Other ratings do contain a built-in cooling fan. There are two cooling fan run modes: in the first, the fan runs when drive is running; in the second, the fan runs when the drive thermal state requires ventilation. The fan runs only runs when the drive thermal state requires ventilation.

## Motor thermal detection

### Function:

Thermal detection by calculating the $I^2t$.

**Note:** The motor thermal state memo returns to zero when the drive power is cycled if Motor thermal state memo 604.3 parameter (page 90) is not set to 01.

**NOTICE**

**MOTOR OVERHEATING**

The motor thermal state is not saved when drive is switched off.
When the drive is switched on, it is not aware of the thermal state of the connected motor or motors.
To enable correct temperature monitoring of the motors, install an external temperature sensor for each motor.

**Failure to follow these instructions can result in equipment damage.**

**NOTICE**

**MOTOR OVERHEATING**

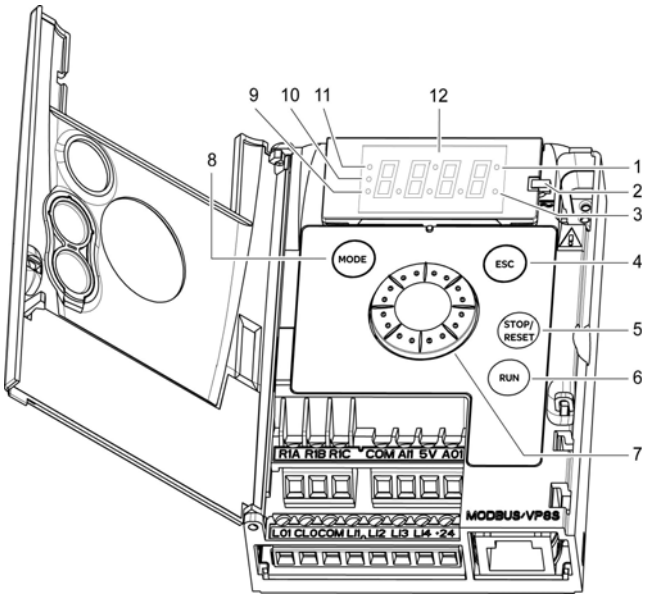
Install external thermal monitoring equipment under the following conditions:

- 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.
- If several motors are connected to the same drive

**Failure to follow these instructions can result in equipment damage.**

# HMI description

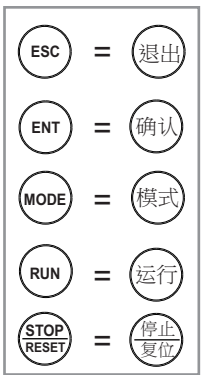
## Functions of the display and keys




1. Value LED (a) (b)
2. Charge LED
3. Unit LED (c)
4. ESC button: Exits a menu or parameter, or aborts the displayed value to return to the previous value in the memory. In LOCAL configuration, a 2 s press on ESC button switches between the control/programming modes.
   **Note:** In LOCAL configuration, the three Leds 9, 10, 11 are blinking simultaneously in programming mode and are working as a Led chaser in control mode.
5. STOP/RESET button: stops the motor (could be hidden by door if function disabled). **Important: See instructions for "RUN/STOP" cover removal.**
6. RUN button: Starts running in LOCAL configuration and in REMOTE configuration if the function is configured (could be hidden by door if function disabled).
7. Jog Dial
   - Acts as a potentiometer in local mode in LOCAL configuration and in REMOTE configuration if the function is configured
   - For navigation when turned clockwise or counterclockwise
   - And selection / validation when pushed
   This action is represented by the symbol on the right.


8. MODE button
   Switches between the control/programming modes. A 3 s press on MODE button switches between the REMOTE/LOCAL configurations.
9. CONFIGURATION mode LED (b)
10. MONITORING mode LED
11. REFERENCE mode LED
12. Four "7-segment" displays

**Note:** In LOCAL configuration, the three Leds **9**, **10**, **11** are blinking simultaneously in programming mode and are working as a Led chaser in control mode.
(a) If illuminated, indicates that a **value** is displayed, for example, 0.5 is displayed for “0.5”.
(b) When changing a value the Configuration mode LED and the value LED are on steady.
(c) If illuminated, indicates that a unit is displayed, for example, AMP is displayed for “Amps”.




## ⚠ WARNING

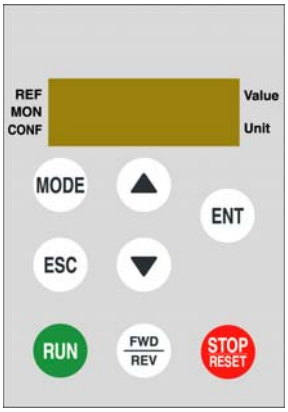
**LOSS OF CONTROL**

The function Stop key priority 405 parameter disables the Stop keys of the drive and of the Remote Display Terminal if the setting of the parameter is 00.
Only set this parameter to 00 if you have implemented appropriate alternative stop functions.

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

## Remote control

Remote operation and programming by HMI is possible using the optional display terminal part VW3A1006. The dimensions of the display terminal part are 70 mm (2.76 in) x 50 mm (2.76 in).



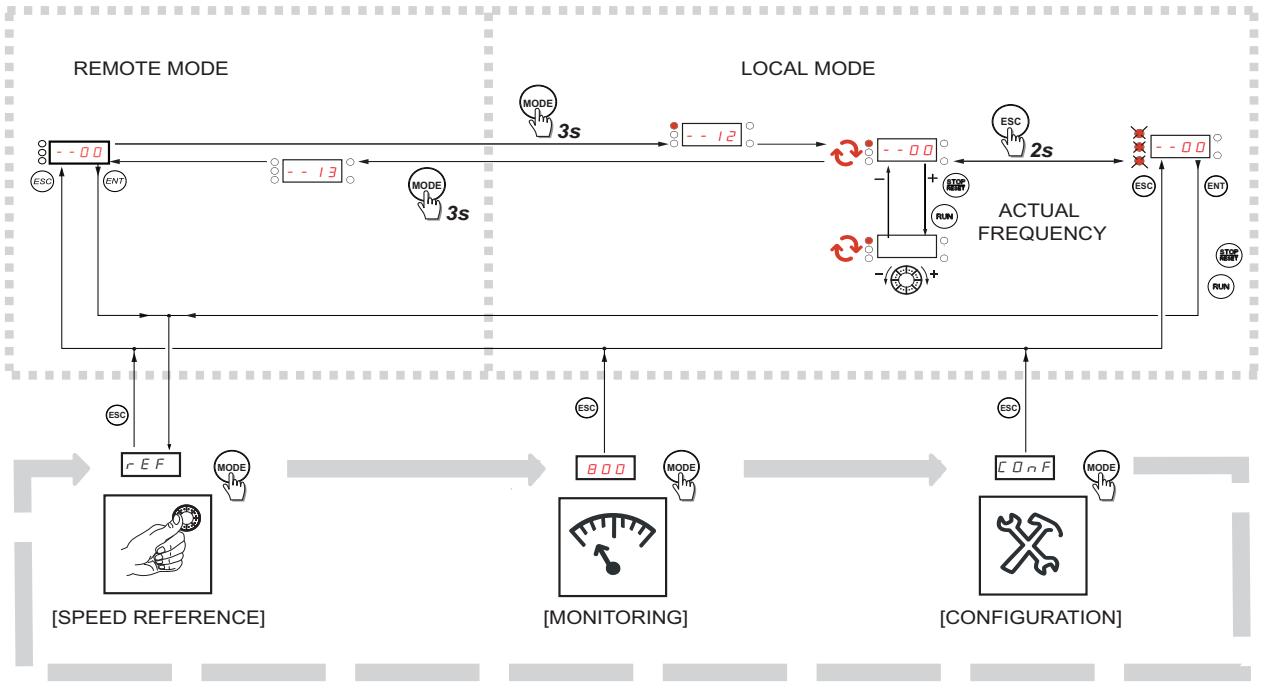

**Note:** Set the remote display terminal with:
- Modbus rate = 19.2 Kbps, (see 7 0 2, page 94 )
- Modbus format = 8E1, 8 bit, even parity, 1 stop bit (see 7 0 3, page 94).

## First power-up

At first power-up you are prompted to set Standard motor frequency 3 0 1 (page 52). Next time power is applied - - 0 0 appears. Operating mode selection is then possible using the MODE or JOG key as detailed below.

## Menus structure

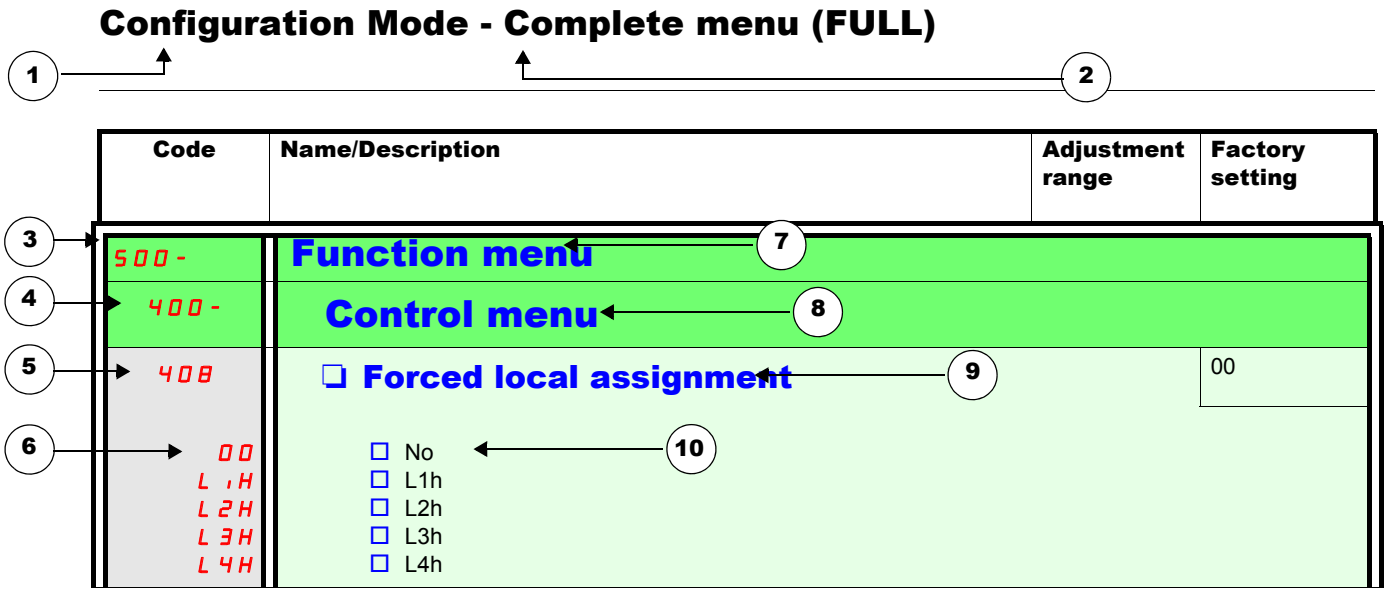
Access to menus and parameters is possible through the Reference ( r E F ) mode (page 35), Monitoring ( M O N - ) mode (page 35) and Configuration ( C o n F ) mode (page 41). Switching between these modes is possible at any time using the MODE key or Jog Dial on the keyboard. The first MODE key depression moves from current position to the top of the branch. A second depression switches to next mode.



# Structure of parameter tal

The mode, sectional, menu, sub-menu and parameter table structure is laid out below.
**Note:** Parameters containing the sign ↻ in the code column can be modified with the drive running or stopped.

**Example:**




**1.** Name of mode

**2.** Name of section, if any

**3.** Menu code on 4-digit 7-segment display, followed by a "-"

**4.** Sub-menu code on 4-digit 7-segment display, if any

**5.** Parameter code

**6.** Value code

**7.** Name of menu

**8.** Name of sub-menu

**9.** Parameter description

**10.** Possible value(s) / state of parameter, if any

# Function compatibility tab

| | Preset speed (page 72) | PI regulator (page 66) | Jog operation (page 64) | Auto DC injection (page 63) | Catch on the fly (page 88) | Fast stop (page 62) | Freewheel (page 62) |
|---|---|---|---|---|---|---|---|
| Preset speed (page 72) | | | ↑ | | | | |
| PI regulator (page 66) | | | ● | | | | |
| Jog operation (page 64) | ← | ● | | ← | | | |
| Auto DC injection (page 63) | | | ↑ | | | | ↑ |
| Catch on the fly (page 88) | | | | | | | ← |
| Fast stop (page 62) | | | | | | | ↑ |
| Freewheel (page 62) | | | | ← | ↑ | ← | |

● Incompatible functions

Compatible functions

Not applicable

The function indicated by the arrow has priority over the other.

← ↑ Priority function (function which can be active at the same time)

Stop functions have priority over run commands.
Speed references via logic command have priority over analog references.

# Reference Mode rEF

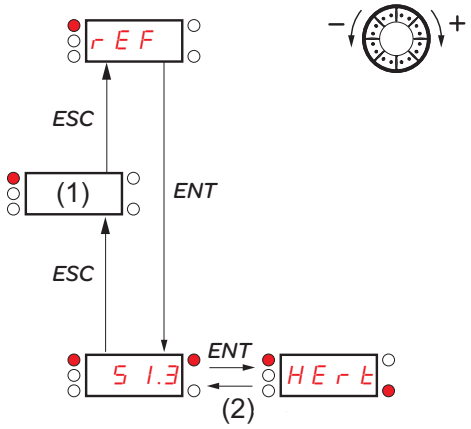
Use the reference mode to monitor and if local control is enabled (Reference channel 1 401 page 58 = 183), adjust the actual reference value by rotating the jog dial.
When local control is enabled, the jog dial of the HMI acts as a potentiometer to change the reference value up and down within the limits preset by other parameters (512.0 and 512.2). There is no need to press the ENT key to confirm the change of the reference.
If local command mode is disabled, using Command channel 1 407 page 59, only reference values and units are displayed. The value will be "read only" and cannot be modified by the jog dial (the reference is no longer given by the jog dial but from an AI or other source). The actual reference displayed determined by the choice made in Reference channel 1 401 page 58.

## Organization tree

(1) Determined by active reference channel.
Possible values:
402
403
801
59.11
806

(2) 2 s or ESC

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



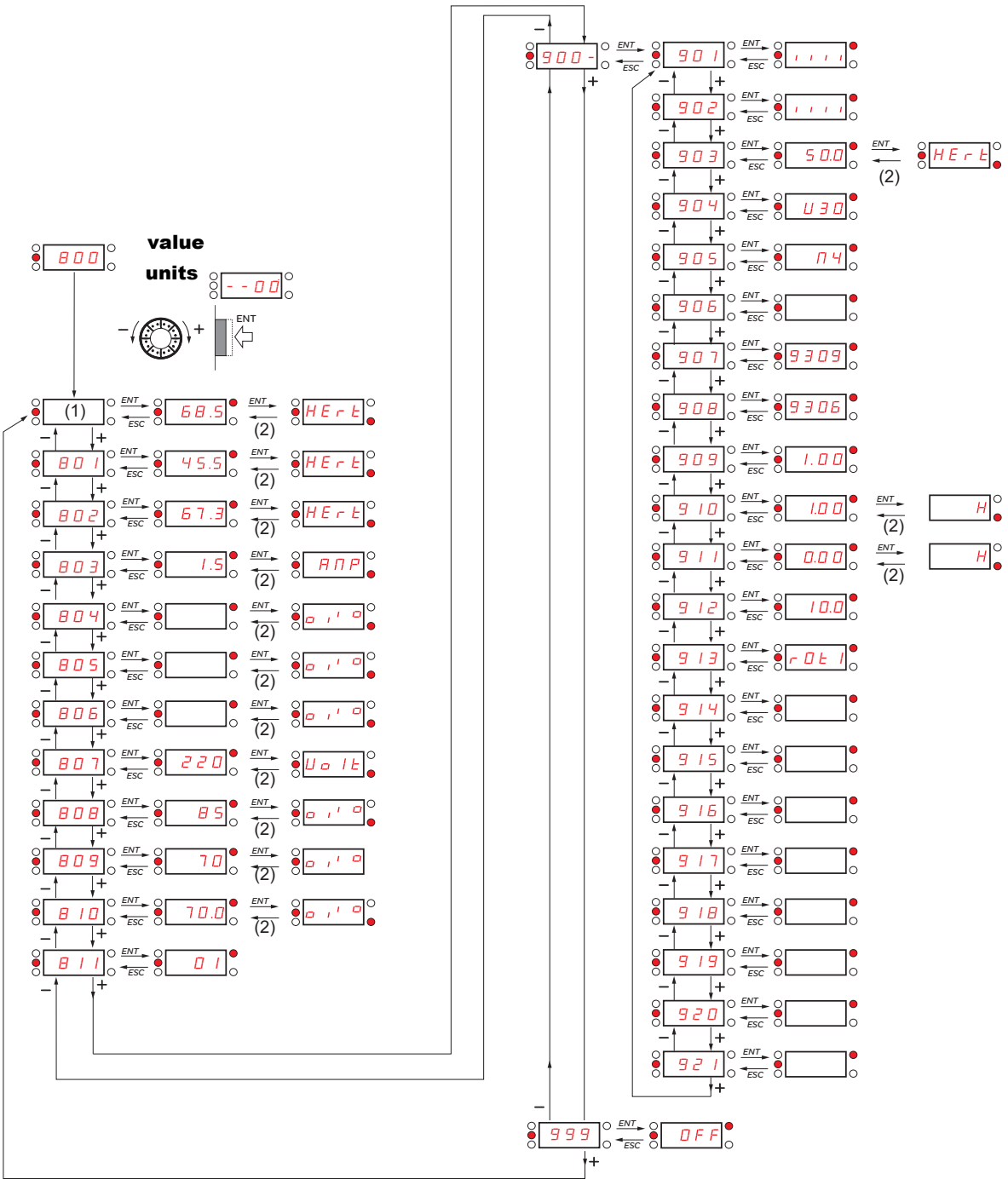

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 402 ↻ (1) | **❑ External reference value**<br>Frequency reference visible if reference channel active is remote display.<br>Reference channel 1 401 (page 58) set to 163.<br>or Forced local reference 409 (page 59) set to 163.<br>This parameter allows modification of the frequency reference with the jog dial.<br>Visibility determined by drive settings. | -400 to +400 Hz | - |
| 403 ↻ (1) | **❑ Analog input virtual**<br>This parameter allows modification of the frequency reference by analog input.<br>Reference channel 1 401 (page 58) set to 183<br>or Forced local reference 409 (page 59) set to 183<br>or PID manual reference 59.18 (page 68) set to 02.<br>Visibility determined by drive settings. | 0 to 100% of 512.2 parameter value | - |
| 801<br>01<br>163<br>164<br>183 | **❑ Speed reference**<br>Actual frequency reference. This parameter is in read-only mode. Visibility determined by drive settings.<br>☐ Analog input terminal<br>☐ Remote display<br>☐ Modbus<br>☐ Integrated display with Jog dial | 512.0 parameter value - 512.2 parameter value | - |
| 59.11 ↻ (1) | **❑ Internal PID reference value**<br>This parameter allows modification of the PID internal reference with the jog dial.<br>Visibility determined by drive settings. | 0 to 100% | - |
| 806 | **❑ PID reference value value**<br>This parameter is the PID reference value expressed as a %. | 0 to 100% | - |

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

↻ Parameter that can be modified during operation or when stopped.

When the drive is running, the value displayed is that of one of the monitoring parameters. The default value displayed is the motor Output frequency 802 (page 35).
While the value of the desired new monitoring parameter is being displayed, press the jog dial button a second time to display the unit.

## Organization tree




(1) Determined by active reference channel.
Possible values:
402
403

(2) 2 s or ESC

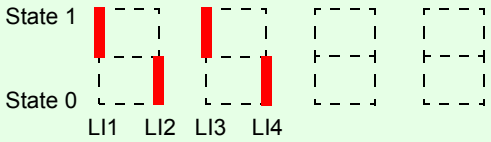
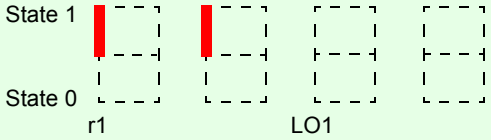
*Displayed parameter values and units of the diagram are given as examples.*

# Monitoring mode MOn

| Code | Name/Description | Unit |
|---|---|---|
| 402 ( ) | **❑ External reference value**<br>External display terminal or local force mode configured. Forced local reference 409 (page 59) set to 163 and Forced local assignment 408 (page 59) is not 00.<br>Displays the Actual speed reference coming from the remote display terminal. This value is not visible in factory setting. | Hz |
| 403 ( ) | **❑ Analog input virtual**<br>Embedded display terminal active or local force mode configured. Forced local reference 409 (page 59) set to 183 and Forced local assignment 408 (page 59) is not 00.<br>Displays the Actual speed reference coming from the jog dial. This value is not visible in factory setting. | % |
| 801 | **❑ Speed reference**<br>Actual frequency reference | Hz |
| 802 | **❑ Output frequency**<br>This parameter provides the estimated motor speed. It corresponds to the estimated motor frequency (on the motor shaft). In Standard motor control type 03 (page 52), Output frequency 802 is equal to motor stator frequency.<br>In motor control type 309 selection of high performance motor control type 00 (page 52), Output frequency 802 is equal to the frequency corresponding to estimated motor speed.<br>Range: -400 to 400 Hz | Hz |
| 803 | **❑ Motor current**<br>Estimation of the effective motor current (output of the drive) from phase current measurements with an accuracy of 5%.<br>During DC injection, the current displayed is the maximum value of current injected in the motor. | A |
| 804 | **❑ PID error**<br>Visible only if the PID function is configured [PID feedback assignment 59.00 (page 66) set to 00]. See PID diagram on page 65. | % |
| 805 | **❑ PID feedback**<br>Visible only if the PID function is configured [PID feedback assignment 59.00 (page 66) set to 00]. See PID diagram on page 65. | % |
| 806 | **❑ PID reference**<br>Visible only if the PID function is configured [PID feedback assignment 59.00 (page 66) set to 00]. See PID diagram on page 65. | % |
| 807 | **❑ Main voltage**<br>Line voltage from the point of view of the DC bus, motor running or stopped. | V |
| 808 | **❑ Motor thermal state**<br>Display of the motor thermal state. Above 118%, drive displays (page 98) Motor overload F013 fault. | % |
| 809 | **❑ Drive thermal state**<br>Display of the drive thermal state. Above 118%, drive displays (page 98) Drive overheat F011 fault. | % |
| 810 | **❑ Output power**<br>The parameter displays the ratio between "estimated motor power (on the shaft) versus drive rating." | % |

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

| Code | Name/Description |
|---|---|
| bII | **❑ Product status**<br>This parameter displays the state of the drive and motor. |
| --00 | ☐ Drive ready |
| --01 | ☐ Drive running, the last 6-segment digit to the right of the code also indicates direction and speed |
| --02 | ☐ Acceleration, the last 6-segment digit to the right of the code also indicates direction and speed |
| --03 | ☐ Deceleration, the last 6-segment digit to the right of the code also indicates direction and speed |
| --04 | ☐ DC injection braking in progress |
| --05 | ☐ Current limitation state, 4-segment digit blinks |
| --06 | ☐ Freewheel stop control |
| --07 | ☐ Auto-adapted deceleration |
| --08 | ☐ Controlled stop on mains phase loss |
| --09 | ☐ Auto-tuning in progress |
| --10 | ☐ Fast stop state |
| --11 | ☐ No line power state. When the control part is energized via the RJ45 connector and there is no line voltage and no run order present. |
| --12 | ☐ Drive is running and using the Fall back speed |
| --13 | ☐ Remote configuration |
| --14 | ☐ Local configuration |

| Code | Name/Description | Unit |
|---|---|---|
| 900- | **Maintenance menu**<br>**Parameters of 900- cannot be selected for monitoring.** | |
| 901 | **❑ State of logic inputs LI1 to LI4**<br>Can be used to visualize the state of the 4 logic inputs.<br>  <br>Example above: LI1 and LI3 are at 1; LI2 and LI4 are at 0. | - |
| 902 | **❑ State of the logic output LO1 and relay R1**<br>Can be used to visualize the state of the logic output.<br>  | - |
| 903 | **❑ Display of high speed value**<br>Displays frequency corresponding to the high speed value. Range from Low speed 5 12.0 (page 85) to Maximum frequency 308 (page 52). Visible only if 2 High speed assignment 5 12.3 or 4 High speed assignment 5 12.4 (page 86) is configured. | Hz |
| 904 | **❑ Drive Power rating**<br>Indicates the drive power rating. This is part the of the drive reference. Refer to page 10. Possible values:<br>037 = 0.37 kW<br>075 = 0.75 kW<br>U15 = 1.5 kW<br>U22 = 2.2 kW<br>U30 = 3 kW<br>U40 = 4 kW<br>U55 = 5.5kW<br>U75 = 7.5kW<br>D11 = 11kW | - |
| 905 | **❑ Drive voltage rating**<br>Indicates the Drive rate voltage. This is part of the drive reference, see page 10. Possible values:<br>N4= 360V~460V 3-phase in, 360V~460V 3-phase out | - |
| 906 | **❑ Specific Product Number**<br>This parameter is used to identify the specific version of the product. Visible only if 906 is non-zero. | - |
| 907 | **❑ Card 1 Software Version**<br>Application software version<br>Example: 1105 for 1.1 ie 05<br>1 (version, major), 1 (version, minor), 05 (ie, evolution number) | - |
| 908 | **❑ Card 2 Software Version**<br>Motor control software version<br>Example: 1105 for 1.1 ie 05<br>1 (version, major), 1 (version, minor), 05 (ie, evolution number) | - |

| Code | Name/Description | Unit |
|---|---|---|
| 900- | **Maintenance menu (continued)** | |
| 909 | **❑ Run elapsed time display**<br>Total time the motor has been powered up. Range: 0 to 65535 hours. Value displayed is as described in the table below. Parameter resettable by services.<br>Hours / Display: 1 / 0.01; 10 / 0.10; 100 / 1.00; 1000 / 10.0; 10000 / 100 | 0.01 |
| 910 | **❑ Power On time display**<br>Total time the drive has been powered on. Range: 0 to 65535 hours. Value displayed is as described in the table above. Parameter resettable by services. | 0.01 |
| 911 | **❑ Fan time display**<br>Range: 0 to 65535 hours. Value displayed is as described in the table above. Parameter resettable by customer. | 0.01 |
| 912 ( ) | **❑ Process elapsed time**<br>Range: 0 to 65535 hours. Value displayed is as described in the table above. Parameter resettable by customer. | 0.01 |
| 913<br>rOt0<br>rot1<br>r1t0<br>r1t1 | **❑ Modbus communication status**<br>☐ Modbus no reception, no transmission = communication idle<br>☐ Modbus no reception, transmission<br>☐ Modbus reception, no transmission<br>☐ Modbus reception and transmission | - |
| 914 | **❑ Last fault 1**<br>This parameter describes the Last fault. | - |

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

| Code | Name/Description | Unit |
|---|---|---|
| 900- | **Maintenance menu (continued)** | |
| 915 | ❑ **State of drive at fault 1** | - |

This parameter describes the drive state at the moment of the first detected fault.

| bit 0 | bit 1 | bit 2 | bit 3 | bit 4 |
|---|---|---|---|---|
| ETA.1: Switched on | ETA.5: Fast stop | ETA.6: Switch on disabled | Forced local enabled | ETA.15 : Motor rotation in forward direction (or stopped) |

| bit 5 | bit 6 | bit 7 | bit 8 | bit 9 |
|---|---|---|---|---|
| ETI.4: Run order present | ETI.5: DC injection running | ETI.7: Motor thermal threshold reached | ETI.8: Reserved | ETI.9: Product in acceleration |

| bit 10 | bit 11 | bit 12 | bit 13 - 14 | bit 15 |
|---|---|---|---|---|
| ETI.10 : Product in deceleration | ETI.11 : Current limitation or torque limitation is running | Fast stop in progress | ETI.14= 0 + ETI.13=0 : Drive controlled by terminal or local display terminal<br>ETI.14= 0 + ETI.13=1 : Drive controlled by remote display terminal<br>ETI.14= 1 + ETI.13=0 : Drive controlled by Modbus<br>ETI.14= 1 + ETI.13=0 : Reserved | ETI.15 : Reverse direction applied to the ramp |

| | | |
|---|---|---|
| 916 | ❑ **Last fault 2** | - |

This parameter describes the second detected fault.

| | | |
|---|---|---|
| 917 | ❑ **State of drive at fault 2** | - |

This parameter describes the drive state at the moment of the second detected fault. See 915.

| | | |
|---|---|---|
| 918 | ❑ **Last fault 3** | - |

This parameter describes the third detected fault.

| | | |
|---|---|---|
| 919 | ❑ **State of drive at fault 3** | - |

This parameter describes the drive state at the moment of the third detected fault. See 915.

| | | |
|---|---|---|
| 920 | ❑ **Last fault 4** | - |

This parameter describes the fourth detected fault.

| | | |
|---|---|---|
| 921 | ❑ **State of drive at fault 4** | - |

This parameter describes the drive state at the moment of the fourth detected fault. See 915.

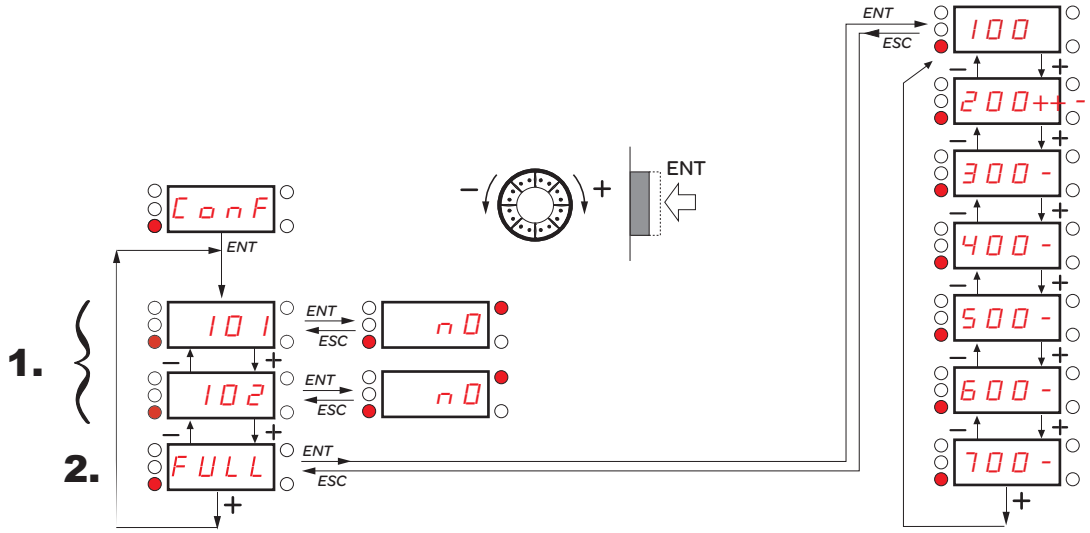
| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 999 | ❑ **HMI Password** | 2 - 9999 | OFF |
| oFF<br>on | Possible state value:<br>☐ Password disabled<br>☐ Password activated<br><br>Range: 2 - 9999<br><br>If you have lost your password, please contact Schneider Electric.<br><br>This parameter is used to restrict access to the drive.<br>To lock the drive, go to the HMI Password 999 parameter and enter a password within the above range.<br><br>Once activated, the password state changes to on:<br>Password protection only enables access to Reference (rEF) (see page 33) mode and Monitor (800-) (see page 41) mode. Return to factory settings or access to FuLL section are disabled.<br>To unlock the drive, go to the 999 parameter, enter the valid password, then press ENT.<br>Password protection removal is then possible and carried out by entering oFF using the jog dial and then pressing ENT. | | |

# Configuration mode, ConF

The Configuration mode comprises 2 parts :

1. Store/recall parameter set: these 2 functions are used to store and recall customer settings.
2. FULL: This menu permits to access to all other parameters. It includes 6 sub-menus:
   - Macro-configuration 100- (page 43)
   - Input Output menu 200- (page44)
   - Motor Control menu 300- (page 52)
   - Control menu 400- (page 58)
   - Function menu 500- (page 60)
   - Fault detection management menu 600- (page 87)
   - Communication menu 700- (page 94)

## Organization tree




Displayed parameter values are given as examples only.

(1) Determined by active reference channel. (2) 2 s or ESC
Possible values: 402 or 403

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 101 | **❑ Store customer parameter set** | | 00 |
| | This function creates a backup of the present configuration:<br>☐ 00 Function inactive<br>☐ 01 Saves the current configuration in the drive memory. 101 automatically switches to 00 as soon as the save has been performed.<br><br>When a drive leaves the factory the current configuration and the backup configuration are both initialized with the factory configuration. | | |
| 102 | **❑ Factory / recall customer parameter set** | | 00 |
| | This function permits restoration of a configuration.<br>☐ 00 Function inactive<br>As soon as one of the following action has been performed, 102 automatically changes to 00.<br>☐ 02 The current configuration becomes identical to the backup configuration previously saved by 101.<br>As soon as this action has been performed, 102 automatically changes to 0002 is only visible if the backup has been carried out. If this value appears, 64 is not visible.<br>☐ 64 The current configuration becomes identical to the factory setting. If this value appears, 64 is not visible.<br><br>**⚠ WARNING**<br>**UNANTICIPATED EQUIPMENT OPERATION**<br>Verify that restoring the factory settings is compatible with the type of wiring used.<br>**Failure to follow these instructions can result in death, serious injury, or equipment damage.** | | |

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

## How to control the drive locally

In factory setting, RUN, STOP and jog dial are inactive. To control the drive locally, adjust the following parameters:
Set Reference channel 1 401 (page 58) to 183 (use integrated display with jog dial).

## LI assignment information

It is possible with ATV310 to use multi assignment function (ie: 501.4 and 503 on the same LI).
It is also possible on some functions to assign LIH (high) or LIL (low), which means that the assigned function will be activated to high (LIH) or low level (LIL) of LI.

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 100 | **❑ Macro-configuration** | | StS |

**⚠ 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.**

Macro configuration provides a shortcut to configure a set of parameters suited to a specific field of application.

3 macro configurations are available:

- 00 Start/stop. Only forward is assigned.
- 04 PID regulation. Activate PID function, dedicate AI1 for feedback and AIV1 for reference.
- 09 Speed. Allocate LI to a preset speed which provides a means of configuring speed functions for a specific field of application.

2 s

Selecting a macro configuration assigns the parameters in this macro configuration.
Each macro configuration can still be modified in other menus.

| **Input / output or parameter** | Start/stop | PID regulation | Speed |
|---|---|---|---|
| AI1 | Ref. channel 1 | PID feedback | NONE |
| AIV1 | NONE | Ref. channel 1 | |
| AO1 | NONE | | |
| LO1 | NONE | | |
| R1 | No drive detected fault | | |
| L1h (2-wire) | Forward | | |
| L2h (2-wire) | NONE | | Reverse |
| L3h (2-wire) | NONE | Auto/Manual | 2 preset speeds |
| L4h (2-wire) | NONE | | 4 preset speeds |
| L1h (3-wire) | Stop | | |
| L2h (3-wire) | Forward | | |
| L3h (3-wire) | NONE | | Reverse |
| L4h (3-wire) | NONE | Auto/Manual | 2 preset speeds |
| 401 (Reference source 1) | | **Integrated Jog dial** | Integrated Jog dial |
| 309 (Motor control type) | | PUMP? 309=06 | |
| 404 (Reverse inhibition) | | YES | |
| 204.0 (AI1 type) | | 10A | |
| LFLL (4-20 mA signal loss) | | YES | |
| 507.3 (Preset speed 2) | | | 10.0HZ |
| 507.4 (Preset speed 3) | | | 25.0HZ |
| 507.5 (Preset speed 4) | | | 50.0HZ |
| 319 (Motor parameter choice) | | | Motor PoWEr FActor |
| 504.0 (Automatic DC injection) | LInItEddC inJEct ion | LInItEddC inJEct ion | LInItEddC inJEct ion |

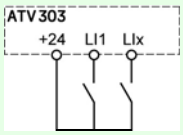
2 s To change the assignment of this parameter, press the ENT key for 2 s.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 200 - | **I/O MENU** | | |
| 201 | **❑ Type of control** | | 00 |

00

☐ 2 wire type control (see page 47)
The open or closed state of the input controls running and stopping.
Example of "source" wiring:

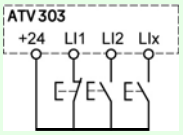
2 s




LI1: forward
LIx: reverse

01

☐ 3-wire control (see page 47)
"Forward" or "reverse" pulse send a run command. A "stop" pulse sends a stop command.
Example of "source" wiring:




LI1: stop
LI2: forward
LIx: reverse

**⚠ WARNING**

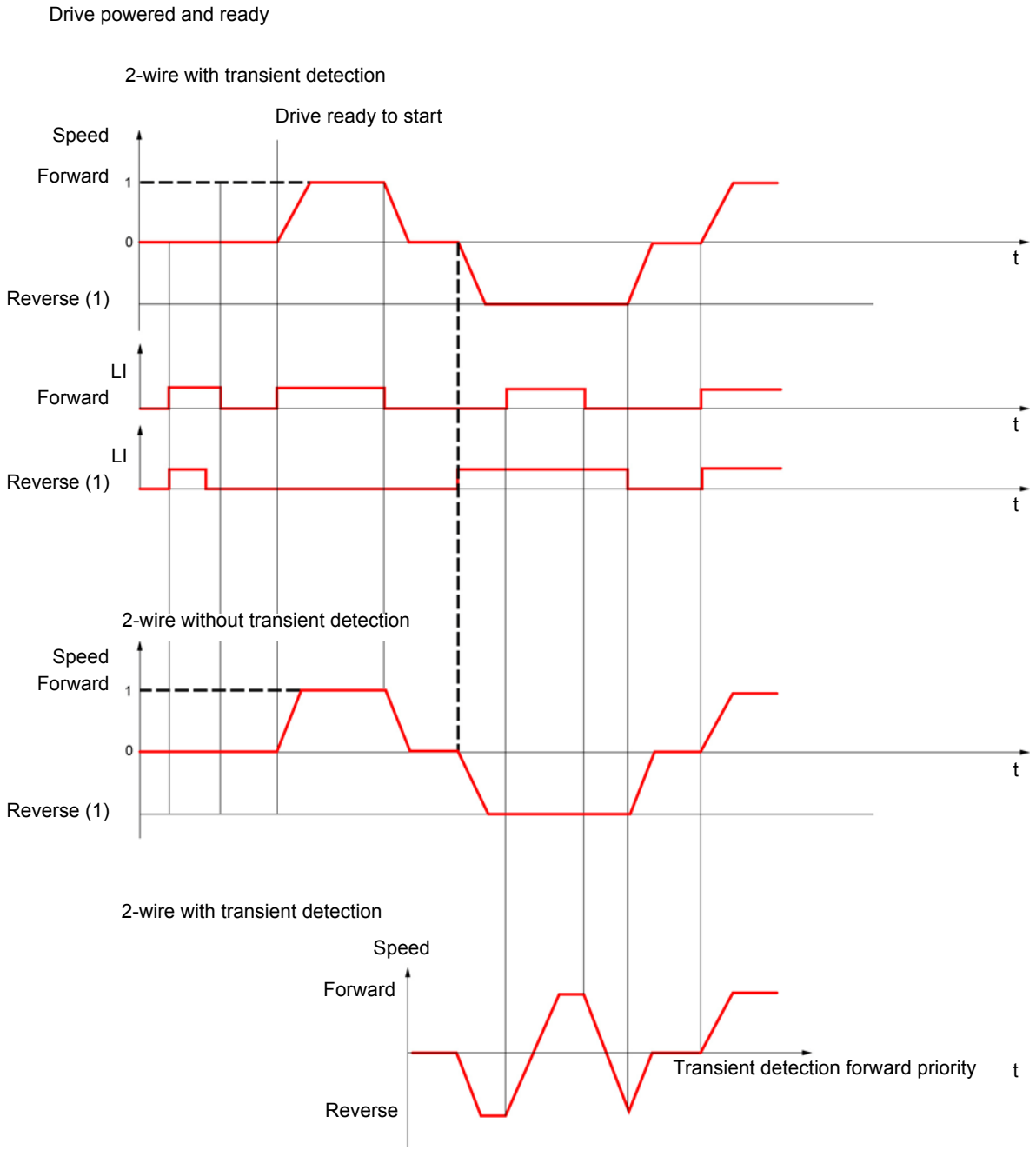
**UNANTICIPATED EQUIPMENT OPERATION**

If this parameter is changed, the parameters 2-wire type control 202 (page 47) 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.**

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

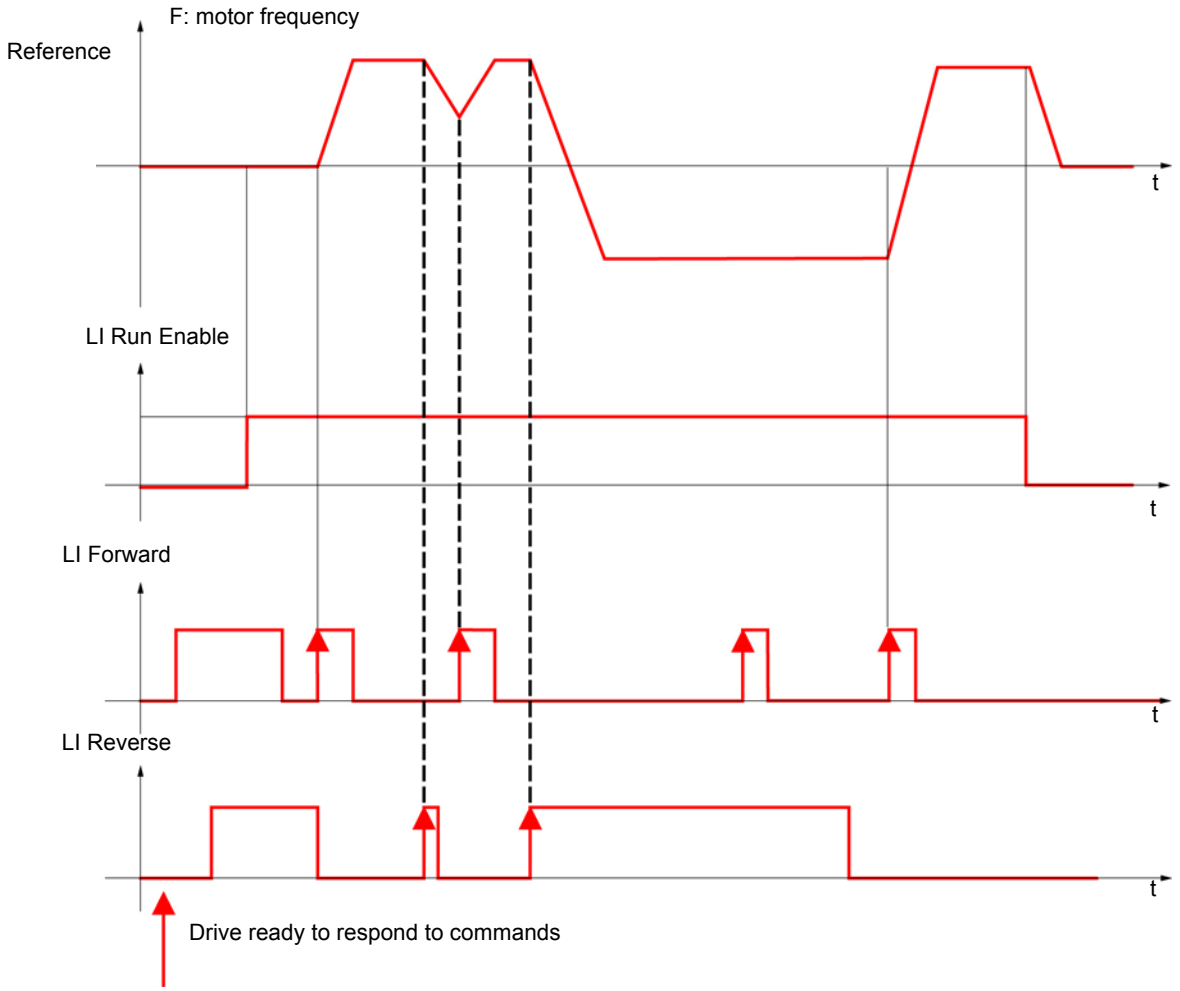
## 2 wire type control diagrams (see page 47)




(1) Reverse is not factory assigned. See Reverse direction 503 (page 62).

Simultaneous issuing of Forward and Reverse commands will start the motor in the Forward direction.

## 3-wire control diagrams (see page 47)



| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 200 - | **I/O MENU (continued)** | | |
| 202 | **❑ 2-wire type control** | | 01 |

**⚠ 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.**

2-wire type control parameter can only be accessed if Type of control 201 (page 44) is set to 2C.

- 00 ☐ Level 0/1: Run or stop determined by level state 0 or 1.
- 01 ☐ Transition: A change of state (transition or edge) is necessary to initiate operation, to help prevent accidental restarts after a power supply interruption.
- 02 ☐ Priority FW: Run or stop determined by state 0 or 1, but "forward" input takes priority over the "reverse" input.

| | | | |
|---|---|---|---|
| 203 | **❑ Logic inputs type** | | 00 |

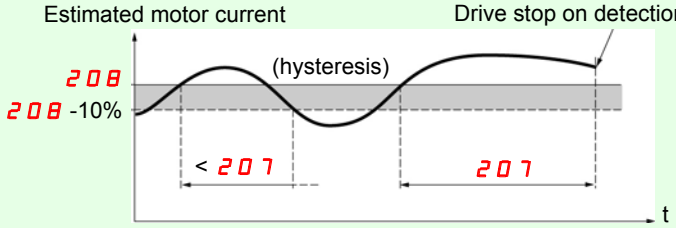
- 00 ☐ Positive: the inputs are active (state 1) at a voltage equal to or higher than 11 V (for example +24 V terminal). They are inactive (state 0) when the drive is disconnected or at a voltage lower than 5 V.
- 01 ☐ Negative using internal supply: the inputs are active (state 1) at a voltage lower than 10 V (for example COM terminal). They are inactive (state 0) at a voltage equal to or higher than 16 V or when the drive is disconnected.
- 02 ☐ Negative using external supply: the inputs are active (state 1) at a voltage lower than 10 V (for example COM terminal). They are inactive (state 0) at a voltage equal to or higher than 16 V.

**Note**: The modification will be taken into account only at the next control power-on.

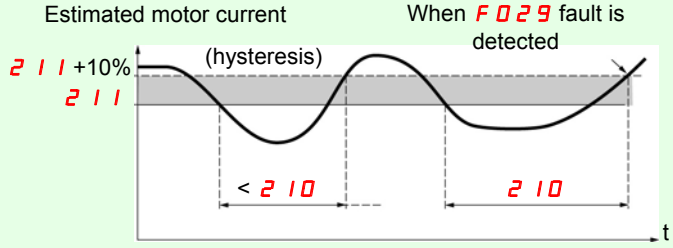
See Control connection diagrams on page 23.

200 -
300 -
400 -
500 -
600 -
700 -

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 200 - | **I/O MENU (continued)** | | |
| 204 - | **AI1 CONFIGURATION MENU** | | |
| 204.0 | **❑ AI1 type** | | 5U |
| | This function establishes an interface between the analog input signal and drive internal value.<br>5U ☐ Voltage: 0-5 Vdc<br>10U ☐ Voltage: 0-10 Vdc<br>0A ☐ Current: x-y mA. Range determined by the AI1 current scaling parameter of 0% 204. 1 and AI1 current scaling parameter of 100% 204.2 settings below. See page 48.<br>LIU ☐ Logic input | | |
| 204. 1 | **❑ AI1 current scaling parameter of 0%**<br>Visible only if AI1 type 204.0 is set to 0A. | 0 - 20 mA | 4 mA |
| 204.2 | **❑ AI1 current scaling parameter of 100%**<br>Visible only if AI1 type 204.0 is set to 0A. | 0 - 20 mA | 20 mA |
| 204.3 | **❑ AI1 filter** | 0 to 10 s | 0 s |
| 200 - | **I/O MENU (continued)** | | |
| 205 | **❑ R1 assignment** | | 01 |
| | 00 ☐ Not assigned<br>01 ☐ No fault<br>02 ☐ Drive run<br>04 ☐ Frequency threshold reached<br>05 ☐ Motor frequency when max. reference value reached 512.2<br>06 ☐ I threshold reached<br>07 ☐ Frequency reference reached<br>08 ☐ Motor thermal threshold reached<br>21 ☐ Underload alarm<br>22 ☐ Overload alarm<br>123 ☐ 4-20 mA signal loss visible only if 204.0 is set to 0A (see above).<br>**Note:** Relay R1 can be assigned to upstream protection to avoid overvoltage in the drive:<br>• Connect fault relay R1 to the contactor, see schematic page 17.<br>• Use Relay R1 (R1 assignment 205 ) with protection.<br>• Use LO1 assignment 206.0 (page 49) for remote indication of the drive status. | | |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 200 - | **I/O MENU (continued)** | | |
| 206 - | **LO1 CONFIGURATION MENU** | | |
| 206.0 | **❑ LO1 assignment** | | 00 |
| | ☐ 00 Not assigned<br>☐ 01 No fault<br>☐ 02 Drive run<br>☐ 04 Frequency threshold reached<br>☐ 05 Motor frequency when max. reference value reached 5 12.2<br>☐ 06 I threshold reached<br>☐ 07 Frequency reference reached<br>☐ 08 Motor thermal threshold reached<br>☐ 21 Underload alarm<br>☐ 22 Overload alarm<br>☐ 123 4-20 mA signal loss visible only if 204.0 is set to 0A (see above).<br>☐ 126 Auxiliary pump | | |
| 206.1 | **❑ LO1 status (output active level)** | | 00 |
| | ☐ 00 Positive logic: active high<br>☐ 01 Negative logic: active low | | |
| | **⚠ WARNING**<br>**LOSS OF CONTROL**<br>Depending on the assignments and settings of the logic outputs, signal output functions may not be effective if the wiring is incorrect or inoperative.<br>• Do not set this parameter to 01 unless you can ensure that the signal will be available under all circumstances.<br>• Verify correct settings for all parameters used to set signal output functions.<br>**Failure to follow these instructions can result in death, serious injury or equipment damage.** | | |
| 200 - | **I/O MENU (continued)** | | |
| 207 | **❑ Application Overload time delay** | 0 to 100 s | 0 s |
| | This function can be used to stop the motor in the event of an application overload. This is not a motor or drive thermal overload. If the motor current exceeds the Application Overload threshold 208, an Application Overload time delay 207 is activated. Once this time delay 207 has elapsed, if the current is still greater than the overload threshold 208 -10%, the drive will stop running and display Process overload.<br>Overload detection is only active when the system is in steady state (Actual speed reference reached).<br>A value of 0 will disable application overload detection.<br>Estimated motor current Drive stop on detection of F0 12 fault.<br>  | | |
| 208 ↻ | **❑ Application Overload threshold** | 70% - 150% of 305 parameter value 70% - 150% | 90% of 305 parameter value |
| | Visible only if Overload time delay 207 above is not 0.<br>This parameter is used to detect an "application overload". 208 can be adjusted between 70 and 150% of the rated drive current. This is not the same as a motor or drive thermal overload. | | |

↻ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 200 - | **I/O MENU (continued)** | | |
| 209 ↻ | **❑ Time delay before automatic start for the overload fault**<br>If 602.0=01, the drive will automatically restart after this time delay following the overload fault F012. Minimum time permitted between an overload being detected and any automatic restart. In order for an automatic restart to be possible, the maximum restart time 602.1 (page 87) must exceed that of this parameter by at least one minute.<br>Visible only if the "Overload time delay 207" above is not set to 0. | 0-6 min. | 0 min. |
| 210 | **❑ Application underload time delay**<br>210 can be adjust between 0 to 100 s<br>If the motor current undershoots the underload threshold 211 for longer than the adjustable time delay 210, the drive will stop running and display F029 (Underload fault), see page 99.<br>  <br><br>Underload detection is only active when the system is in steady state (Actual speed reference reached). A value of 0 will disable application underload detection. | 0 to 100 s | 0 s |
| 211 ↻ | **❑ Application Underload threshold**<br>Visible only if Underload time delay 210 is not set to 0. This parameter is used to detect an application underload condition on the motor. Application Underload threshold 211 can be adjusted between 20 and 100% of the rated drive current. | 20% to 100% of 305 parameter | 60% |
| 212 ↻ | **❑ Underload fault duration start**<br>If 602.001, the drive will automatically restart after this time delay following the underload fault F029. Minimum time permitted between an underload being detected and any automatic restart. In order for an automatic restart to be possible, the maximum restart time 602.1 (page 87) must exceed that of this parameter by at least one minute.<br>Visible only if the "Application underload time delay 210" above is not set to 0. | 0-6 min. | 0 min. |
| 213 ↻ | **❑ Motor frequency threshold**<br>Visible only if R1 assignment 205 (page 48) or LO1 assignment 206.0 (page 49) is set to 04. | 0 to 400 Hz | 50 or 60 Hz, Determined by drive rating |
| 214 ↻ | **❑ Motor current threshold**<br>Visible only if R1 assignment 205 (page 48) or LO1 assignment 206.0 (page 49) is set to 06. | 0 to 1.5 In (1) | In |
| 215 ↻ | **❑ Motor thermal state threshold**<br>Visible only if R1 assignment 205 (page 48) is set to 08.<br>Trip threshold for motor thermal alarm (logic output or relay) | 0 to 118% of 808 parameter | 100% |

(1) In = rated drive current

↻ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 200- | **I/O MENU (continued)** | | |
| 216- | **AO1 configuration menu** | | |
| 216.0 | **❑ AO1 assignment** | | 00 |

This parameter is used to set the value of an analog output.

- ☐ 00 Not assigned
- ☐ 129 Estimated motor current
- ☐ 130 Estimated motor frequency
- ☐ 131 Ramp output
- ☐ 135 PID reference value - Visible only if PID feedback assignment 59.00 (page 66) is not set to 00.
- ☐ 136 PID feedback - Visible only if PID feedback assignment 59.00 (page 66) is not set to 00.
- ☐ 137 PID error - Visible only if PID feedback assignment 59.00 (page 66) is not set to 00.
- ☐ 139 Output power
- ☐ 140 Motor thermal state
- ☐ 141 Drive thermal state

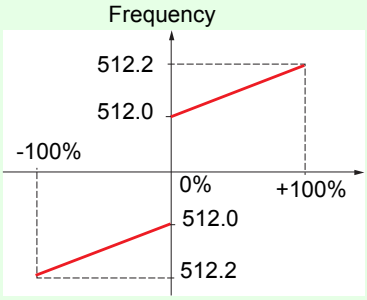
| | | | |
|---|---|---|---|
| 216.1 | **❑ AO1 type** | | 0A |

This parameter provides type selection for the drive analog output signal.

- ☐ 10u Voltage: 0-10 Vdc
- ☐ 0A Current: 0-20 mA
- ☐ 4A Current: 4-20 mA

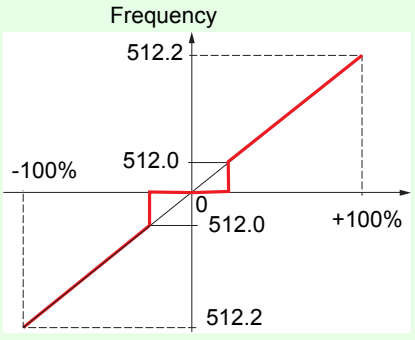
| | | | |
|---|---|---|---|
| 200- | **I/O MENU (continued)** | | |
| 217 | **❑ Reference Template** | | 00 |

00 ☐ **Standard**




At zero reference the frequency = 512.0

02 ☐ **Deadband**




At reference = 0 to 512.0 the frequency = 0

## ⚠ WARNING

**LOSS OF CONTROL**

- Fully read and understand the manual of the connected motor.
- Verify that all motor parameters are correctly set by referring to the nameplate and the manual of the connected motor.

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

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 300 - | **Motor control menu** | | |
| 301 | ❑ **Standard motor frequency** | | 50 Hz |
| 302 | ❑ **Rated Motor Power** | Drive power -5 to drive power +2 | Determined by drive rating |
| 303 | ❑ **Rated motor cos phi** | 0.5 to 1 | Determined by drive rating |
| | This parameter is visible only if Motor parameter choice 319 (page 55) is set to [00]. If Rated motor cos phi 303 is available, Rated Motor Power 302 disappears.<br>Power factor (pf) is given on the motor rating plate.<br>**Note:** Do not confuse this with motor "Service Factor". Setting 303 to 1 or very near to 1 may result in unsatisfactory motor operation. If the motor power factor is not indicated on the nameplate, leave this parameter at the factory default (approximately 0.80). | | |
| 304 | ❑ **Rated motor voltage** | 360 to 460V | 380V |
| | Nominal motor voltage is given on the nameplate. If the line voltage is less than the nominal motor voltage, Rated motor voltage 304 should be set to the value of the line voltage applied to the drive terminals. | | |
| 305 | ❑ **Rated motor current** | 0.25 In to 1.5 In (1) | Determined by drive rating |
| | Nominal motor current is given on the nameplate. Motor thermal current 604.0 (page 90) varies according to the nominal motor current 305. | | |
| 306 | ❑ **Rated motor frequency** | 10 to 400 Hz | 50 Hz |
| | Nominal motor frequency is given on the nameplate.<br>The factory setting is 50 Hz, or preset to 60 Hz [if Standard motor frequency 301 (page 52) is set to 60 Hz]. | | |
| 307 | ❑ **Rated motor speed** | 0 to 24000 rpM | Determined by drive rating |
| | Nominal motor speed is given on the nameplate. | | |
| 308 | ❑ **Maximum frequency** | 10 to 400 Hz | 60 Hz |
| | Maximum frequency 308 gives the upper value possible for High speed 512.2 (page 86). The factory setting is 60 Hz, or preset to 72 Hz [if Standard motor frequency 301 (page 52) is set to 60 Hz]. | | |
| 309 | ❑ **Motor control type** | | 03 |
| | Permits selection of motor control types suitable for application and performance requirements. | | |
| 00 | ☐ Performance: Sensorless vector control with internal speed loop based on a voltage feedback calculation. For applications requiring high performance during starting or operation. | | |
| 03 | ☐ Standard: 2 point V/F control without internal speed loop. For simple applications that do not require high performance. Simple motor control law maintaining a constant Voltage Frequency ratio, permits adjustment of curve start point. This law is generally used for motors connected in parallel. Some applications using motors in parallel or with high performance requirements may require use of the "high performance" (00) control type. | | |
| 06 | ☐ Pump: $U^2/F$; for dedicated use with variable torque fan and pump applications not requiring high starting torque. | | |

(1) In = rated drive current

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 300 - | **Motor control menu (continued)** | | |
| 310 | **❑ IR compensation** | 25 to 200% | 100% |

Used to optimize torque at very low speed, or to adapt to special cases (for example, for motors connected in parallel, decrease IR compensation 310). If there is insufficient torque at low speed, increase IR compensation 310. Too high a value can cause the motor not to start (locking) or to change to current limiting mode.

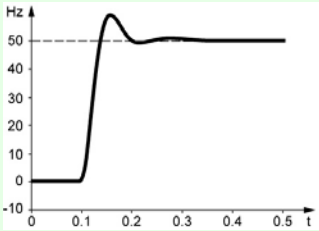
| | | | |
|---|---|---|---|
| 311 | **❑ Slip compensation** | 0 to 150% | 100% |

Visible only if Motor control type 309 (page 52) is not set to 06.
Used to adjust the slip compensation around the value set by the nominal motor slip, or to adjust to special circumstances (for example, for motors connected in parallel, decrease Slip compensation 311).
If the set slip compensation is lower than the actual slip compensation, the motor will not run at nominal speed in a steady state but at a speed lower than the reference.
If the set slip compensation is greater than the actual slip compensation, the motor speed becomes unstable.

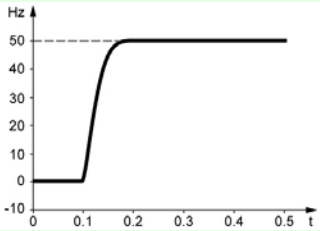
| | | | |
|---|---|---|---|
| 312 | **❑ Frequency loop stability** | 0 to 100% | 20% |

The 312 parameter can be used to reduce overshoots and oscillations at the end of acceleration. After a period of acceleration or deceleration, 312 adjusts the return value of the steady state to the dynamic value of the equipment;
Too high a value can cause an extended response time.
Too low a value can cause overspeed, or even instability.

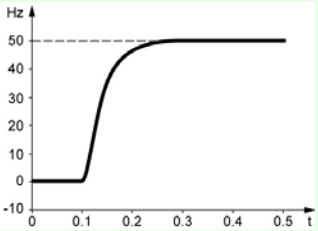
Low 312 parameter value
In this case, increase 312




Correct 312 parameter value




High 312 parameter value
In this case, reduce 312

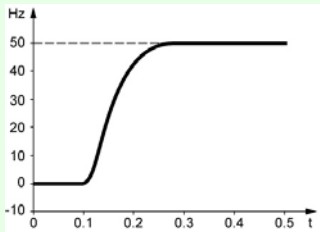



Visible only if Motor control type 309 (page 52) is set to 00.

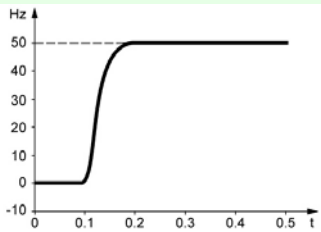
| | | | |
|---|---|---|---|
| 313 | **❑ Frequency loop gain** | 0 to 100% | 20% |

The 313 parameter adjusts the slope of the speed increase according to the inertia of the machine being driven.
Too high a value can cause overspeed, or even instability.
Too low a value can cause an extended response time.

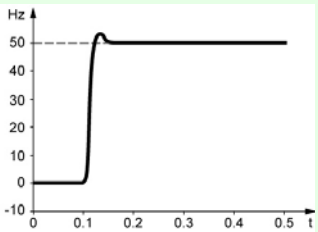
Low 313 parameter value
In this case, increase 313




Correct 313 parameter value




High 313 parameter value
In this case, reduce 313




Visible only if Motor control type 309 (page 52) is set to 00.

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 300 - | **Motor control menu (continued)** | | |
| 314 | **❑ Flux Profile**<br>This function defines the magnetizing current at zero frequency as a % of the rated magnetizing current.<br>Adjustment curve for PUMP law<br>  <br><br>Visible only if Motor control type 309 (page 52) is set to 06. | 0 to 100% | 20% |
| 315 | **❑ Switching frequency**<br>Switching frequency range setting.<br>In the event of overheating, the drive automatically decreases the Switching frequency range. Returns to its original value once the temperature has returned to normal. | 2 to 12 kHz | 4 kHz |
| 317 | **❑ Motor noise reduction**<br>Noise refers to audible noise. Means of adjusting motor noise must be provided to satisfy environmental requirements.<br>Random frequency modulation avoids possible noise resonance that can occur at fixed frequency.<br>00 ☐ No<br>01 ☐ Yes | | 00 |

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 300 - | **Motor control menu (continued)** | | |
| 318 | **❑ Auto-tuning** | | 00 |

**⚠⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK OR ARC FLASH**

- During Auto-tuning 318, the motor operates at nominal current.
- Verify that the same precautions are in place during Auto-tuning 318 as during normal operation of the motor as specified in product manuals and in the manual of the motor

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

00 ☐ 00: Use factory parameters for standard motors
01 ☐ 01: Launches auto-tuning
02 ☐ 02: Auto-tuning has already been performed

**Attention:**

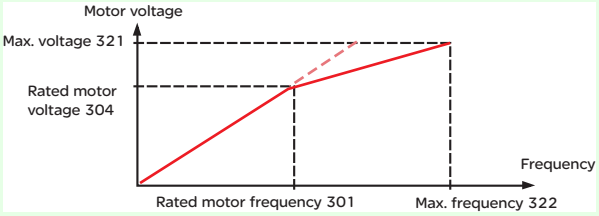
- Auto-tuning must be performed with the motor connected and cold.
- The parameters Rated Motor Power 302 (page 52) and Rated motor current 305 (page 52) must be consistent.
- Auto-tuning is performed only if no stop command has been activated. If a freewheel stop or fast stop function has been assigned 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 take effect after the auto-tuning sequence.
- Auto-tuning may last for 1 to 10 seconds. Do not interrupt. Wait for the display to change to 02 or 00.
- Re-perform auto-tuning after motor cables are replaced to ensure effectiveness of motor control.

**Note:** During auto-tuning, the motor operates at rated current.

| | | | |
|---|---|---|---|
| 319 | **❑ Motor parameter choice** | | 00 |

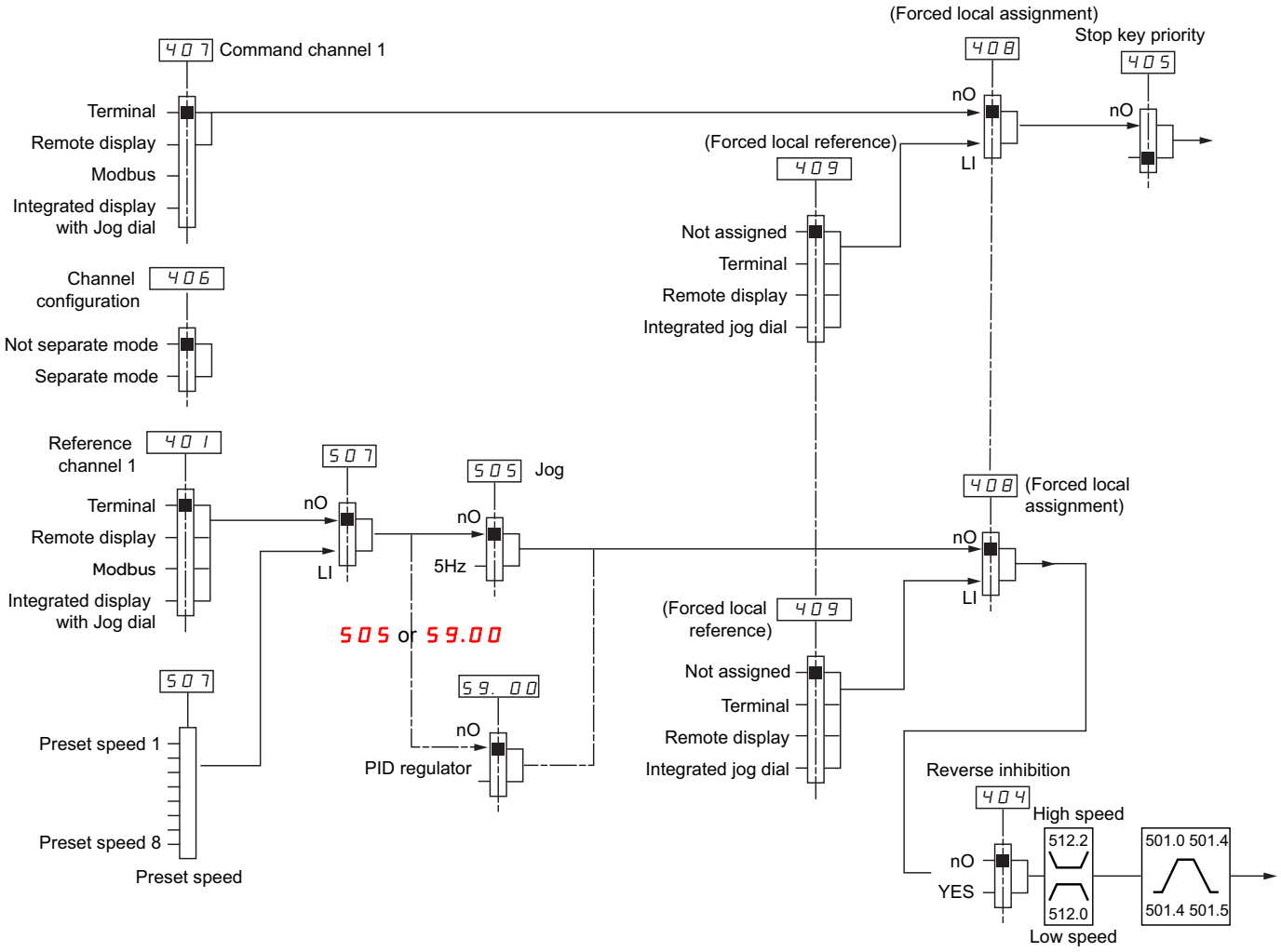
This parameter allows to choose which motor parameter will be configured (power or power factor).

00 ☐ Rated Motor Power (page 52)
01 ☐ Rated motor cos phi (page 52)

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 320<br>00<br>01 | **❑ Vector control 2 points**<br>☐ [00] No<br>☐ [01] Yes<br>For use in the following application contexts: when the rated speed and rated frequency of the motor must be exceeded for optimization of operation performance at constant power, or when the maximum voltage of the motor must be limited to a certain value below the main voltage.<br>The U/F diagram must therefore be modified according to the motor's work ability at maximum voltage and Top frequency.<br>  <br> | | 00 |
| 321 | **❑ Max voltage of constant power**<br>Visible if 320 = YES | 314 parameter value ~ 460V | 380V |
| 322 | **❑ Max frequency of constant power**<br>Visible if 320 = YES | 306 parameter value ~ 400Hz | 50Hz |

# Control menu

## Control channel diagram

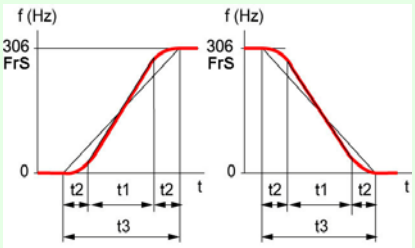
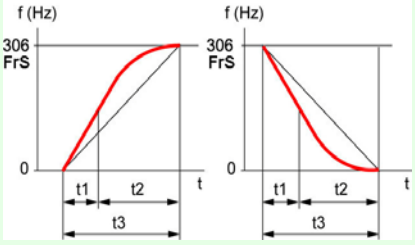


| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 400 - | **Control menu** | | |
| 401 | **❑ Reference channel 1**<br>☐ 01 Analog terminal<br>☐ 163 Remote display<br>☐ 164 Modbus<br>☐ 183 Integrated display with Jog dial | | 01 |
| 402 ( ) | **❑ External reference value** | -400 Hz to 400 Hz | - |
| 403 ( ) | **❑ Analog input virtual** | 0% to 100% | |
| 404 | **❑ Reverse inhibition**<br>Inhibition of movement in the reverse direction. Does not apply to direction requests sent by logic inputs.<br>- Reverse direction requests sent by logic inputs are taken into account.<br>- Reverse direction requests sent by the display are not taken into account.<br>- Reverse direction requests sent by the communication line are not taken into account.<br>- Any reverse Actual speed reference originating from the PID, summing input etc., is interpreted as a zero reference (0 Hz).<br>☐ 00 No<br>☐ 01 Yes | | 00 |
| 405 2 s | **❑ Stop key priority**<br>This parameter can enable or disable the stop button located on the drive and remote display.<br>Disabling the stop button is effective if the active command channel is not the drive display terminal or the remote display.<br>**⚠ WARNING**<br>**LOSS OF CONTROL**<br>The function Stop key priority 405 parameter disables the Stop keys of the drive and of the Remote Display Terminal if the setting of the parameter is 00.<br>Only set this parameter to 00 if you have implemented appropriate alternative stop functions.<br>**Failure to follow these instructions can result in death, serious injury or equipment damage.**<br>☐ 00 No: Stop inactive<br>☐ 01 Yes: Stop active<br>It is advised in case this function is set to 01 to use the front door cover or the optional display cover on the "run" and "stop" keys. | | 01 |
| 406 | **❑ Channel configuration**<br>Channel configuration 406 allows the selection of:<br>- Combined mode (command and reference come from the same channel)<br>- Separate mode (command and reference come from different channels)<br>☐ 01 Combined mode<br>☐ 02 Separate mode | | 01 |

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

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

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 400 - | **Control menu (continued)** | | |
| 407 | **❑ Command channel 1**<br>This parameter permits selection of the command channel.<br>☐ 01 Terminals<br>☐ 02 Local<br>☐ 03 Remote display<br>☐ 10 Modbus<br>Visible only if Channel configuration 406 (page 58) is set to Seperate. | | 01 |
| 408 | **❑ Forced local assignment**<br>☐ 00 Function inactive<br>☐ L1H - L4H, LUH: Forced local mode is active when the input is at state 1. | | 00 |
| 409 | **❑ Forced local reference**<br>Visible only if Forced local assignment 408 is not set to 00<br>☐ 00 Not assigned<br>☐ 01 Analog input terminal<br>☐ 163 Remote display<br>☐ 183 Integrated display with Jog dial | | 00 |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu** | | |
| 501 - | **Ramp menu** | | |
| 501.0 ↻ | **❑ Acceleration**<br>Acceleration time between 0 Hz and the Rated motor frequency 306 (page 52).<br>Make sure this value is compatible with the inertia being driven. | 0.0 s to 999.9 s | 3.0 s |
| 501.1 ↻ | **❑ Deceleration**<br>Time to decelerate from the Rated motor frequency 306 (page 52) to 0 Hz.<br>Make sure this value is compatible with the inertia being driven. | 0.0 s to 999.9 s | 3.0 s |
| 501.2<br>00<br>01<br>02<br>↻ | **❑ Ramp shape assignment**<br>☐ Linear<br>☐ S Shape<br>☐ U Shape<br>S Shape  The rounding coefficient is fixed, wherein<br>t1 = 0.6 x set ramp time (linear)<br>t2 = 0.4 x set ramp time (round)<br>t3 = 1.4 x ramp time<br>U Shape  The rounding coefficient is fixed, wherein<br>t1 = 0.5 x set ramp time (linear)<br>t2 = set ramp time (round)<br>t3 = 1.5 x ramp time | | 00 |
| 501.3<br>00<br>L1H<br>L2H<br>L3H<br>L4H<br>LUH<br>L1L<br>L2L<br>L3L<br>L4L<br>LUL | **❑ Ramp switching commutation**<br>☐ Not assigned<br>☐ L1H: LI1 active high<br>☐ L2H: LI2 active high<br>☐ L3H: LI3 active high<br>☐ L4H: LI4 active high<br>☐ LUH: LIU active high<br>☐ L1L: LI1 active low<br>☐ L2L: LI2 active low<br>☐ L3H: LI3 active low<br>☐ L4H: LI4 active low<br>☐ LUL: LIU active low<br>See LI assignment information on page 42. | | 00 |







↻ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 501 - | **Ramp menu (continued)** | | |
| 501.4 ↻ | **❑ Acceleration 2**<br>Visible only if Ramp switching commutation 501.3 (page 60) is not set to 00.<br>Second acceleration ramp time, adjustable from 0.0 to 999.9 s<br>This ramp becomes the active ramp only when PID is used to perform start and wake-up phases.<br>See PID: wake up level (page 69). | 0.0 to 999.9 s | 5.0 s |
| 501.5 ↻ | **❑ Deceleration 2**<br>Visible only if Ramp switching commutation 501.3 (page 60) is not set to 00.<br>Second deceleration ramp time, adjustable from 0.0 to 999.9 s | 0.0 to 999.9 s | 5.0 s |
| 501.6 | **❑ Decel Ramp Adaptation assignment** | | 01 |
| 00 | ☐ Function inactive. The drive will decelerate based on normal deceleration time settings. This setting is compatible with optional dynamic braking (if used). | | |
| 01 | ☐ This function automatically increases deceleration time when stopping or reducing the speed of high inertia loads to help prevent DC bus overvoltage or overbraking. | | |
| 02 | ☐ Motor Braking: This mode allows the drive to attempt the most rapid stop possible without the use of a dynamic brake resistor. It uses motor losses to dissipate energy generated by braking. This function may be incompatible with positioning. This function should not be used when an optional braking resistor and module are being used.<br>**Attention: When using a braking resistor set 501.6 to 00.** | | |

↻ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 502 - | **Stop configuration menu** | | |
| 502.0 | **❑ Type of stop** | | 00 |
| | Stop mode on disappearance of the run command or appearance of a stop command.<br>00 ☐ Ramp stop<br>08 ☐ Fast stop<br>13 ☐ Freewheel stop | | |
| 502.1 | **❑ Freewheel stop assignment** | | 00 |
| | This stop type is activated when the input or corresponding register bit changes to 0. If the input returns to state 1 and the run command is still active, the motor will only restart if Type of control 201 (page 44) = 2C and 2-wire type control 202 (page 47) = 00 or 02. If not, a new run command must be sent.<br>00 ☐ Not assigned<br>L1L ☐ L1L: LI1 active Low to stop<br>L2L ☐ L2L: LI2 active Low to stop<br>L3L ☐ L3L: LI3 active Low to stop<br>L4L ☐ L4L: LI4 active Low to stop<br>LUL ☐ LUL: LIU active Low to stop | | |
| 502.2 | **❑ Fast stop assignment** | | 00 |
| | 00 ☐ Not assigned<br>L1L ☐ L1L: LI1 active Low to stop<br>L2L ☐ L2L: LI2 active Low to stop<br>L3L ☐ L3L: LI3 active Low to stop<br>L4L ☐ L4L: LI4 active Low to stop<br>LUL ☐ LUL: LIU active Low to stop | | |
| 502.3 ( ) | **❑ Ramp divider** | 1 to 10 | 4 |
| | Visible only if Fast stop assignment 502.2 (page 62) is not set to 00 or 502.2 is set to 08 Fast stop (page 62).<br>When stop requests are sent the active ramp time [Deceleration 501.1 (page 60) or Deceleration 2 501.5 (page 61)] is divided by this coefficient. | | |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 503 | **❑ Reverse direction** | | 00 |
| | LI1 - LI4: choice of the input assigned to the reverse command<br>00 ☐ Function inactive<br>L1H ☐ L1h: L1 active high<br>L2H ☐ L2h: L2 active high<br>L3H ☐ L3h: L3 active high<br>L4H ☐ L4h: L4 active high<br>LUH ☐ LUh: LIU active high | | |

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

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 504 - | **AUTO DC INJECTION MENU** | | |
| 504.0 | **❑ Automatic DC injection** | | 01 |

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

If the parameter 504.0 Automatic DC injection is set to 02, 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.**

**⚠ 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.**

00 ☐ No DC injected current
01 ☐ Time limited DC injection
02 ☐ Continuous DC injection

| | | | |
|---|---|---|---|
| 504.1 | **❑ Automatic DC injection current** | 0 to 120% of nominal motor current | 70% |

**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 this instruction can result in equipment damage.**

Visible only if Automatic DC injection 504.0 is not set to 00.
Injection current on stopping and continuous DC injection.

| | | | |
|---|---|---|---|
| 504.2 | **❑ Automatic DC injection time** | 0.1 to 30 s | 0.5 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 this instruction can result in equipment damage.**

Visible only if Automatic DC injection 504.0 is not set to 00.
Injection time on stopping.

Parameter that can be modified during operation or when stopped.

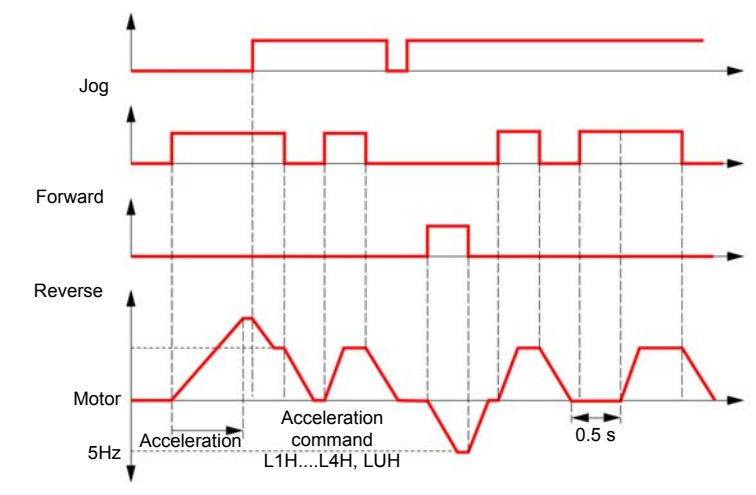
200 -
300 -
400 -
500 -
600 -
700 -

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 505 | **❑ Jog assignment** | | 00 |

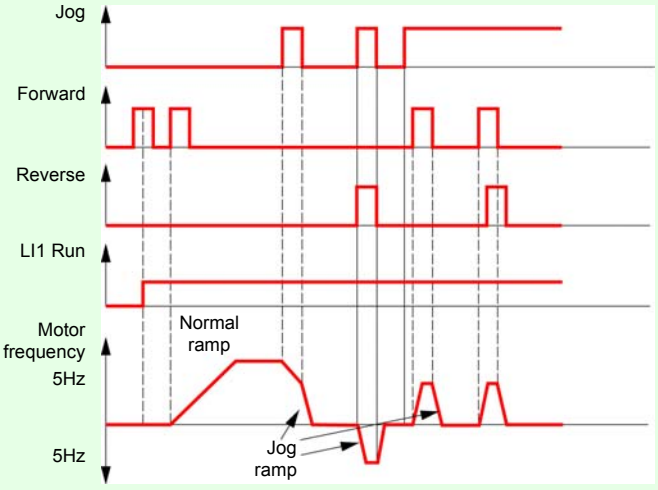
This parameter employs a 2 or 3-wire control related logic input, providing step by step control of motor running. The jog frequency is fixed at 5 Hz. Acceleration and deceleration ramps taken into account in the Jog function are 0.1 s.

- 00 ☐ Function inactive
- L1H ☐ L1h: L1 active high
- L2H ☐ L2H: LI2 active high
- L3H ☐ L3h: LI3 active high
- L4H ☐ L4h: LI4 active high
- LUH ☐ LUh: LIU active high

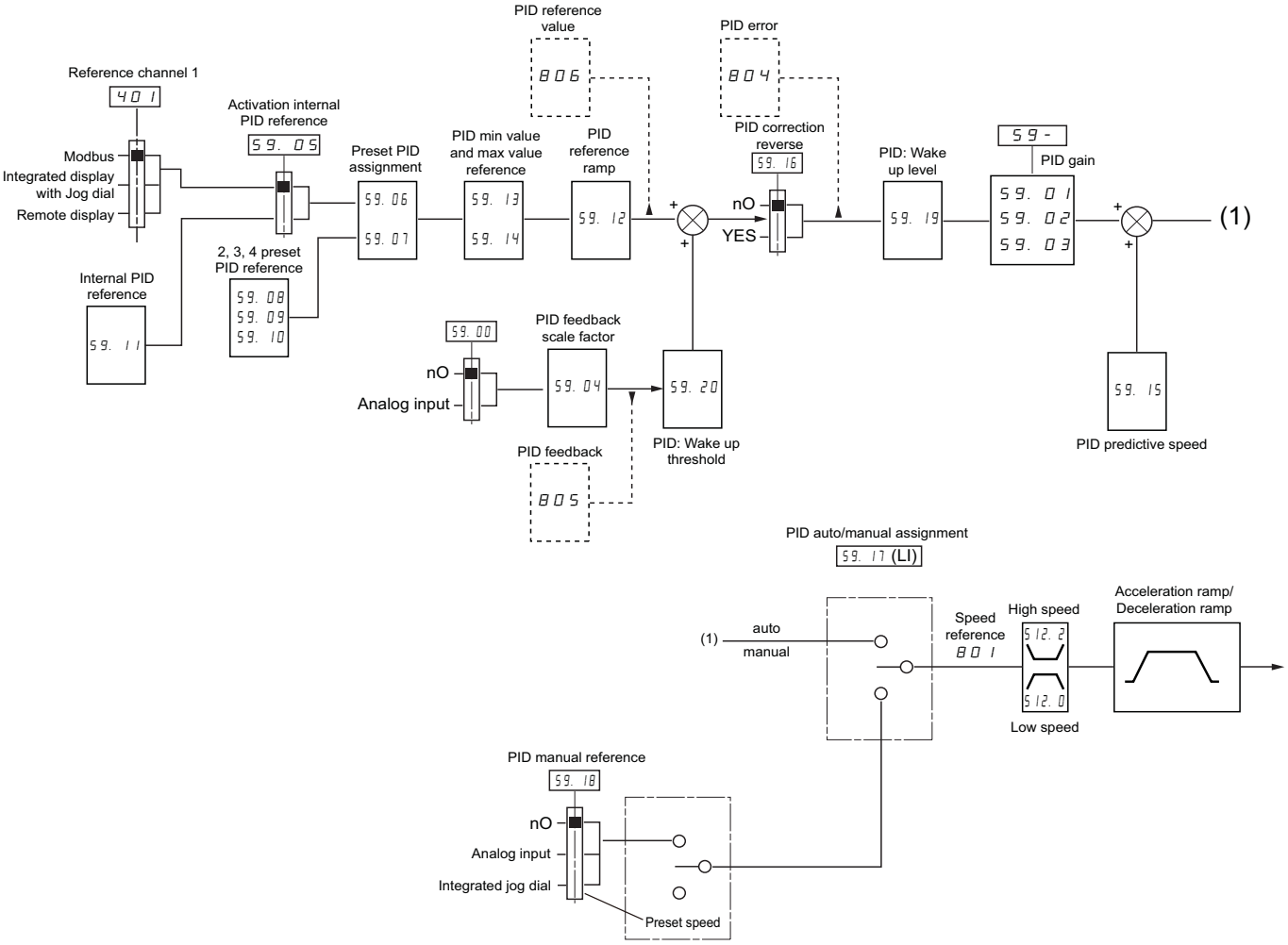
2 wire type control




**3-wire control**



## PID diagram


PID reference value
806
PID error
804
Reference channel 1
401
Activation internal PID reference
59. 05
PID min value and max value reference
PID reference ramp
PID correction reverse
59. 16
PID: Wake up level
59. 19
59 -
PID gain
59. 01
59. 02
59. 03
Modbus
Integrated display with Jog dial
Remote display
Preset PID assignment
59. 06
59. 07
59. 13
59. 14
59. 12
nO
YES
(1)
Internal PID reference
59. 11
2, 3, 4 preset PID reference
59. 08
59. 09
59. 10
59. 00
PID feedback scale factor
nO
Analog input
59. 04
59. 20
PID: Wake up threshold
59. 15
PID predictive speed
PID feedback
805
PID auto/manual assignment
59. 17 (LI)
(1)
auto
manual
Speed reference
801
High speed
512. 2
512. 0
Low speed
Acceleration ramp/ Deceleration ramp
PID manual reference
59. 18
nO
Analog input
Integrated jog dial
Preset speed

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu** (continued) | | |
| 59 - | **PID menu** | | |
| 59.00 | **❑ PID feedback assignment** | | 00 |
| 00 | ☐ Not assigned. | | |
| 01 | ☐ Analog terminal. Choice not possible if 401 is set to 01. | | |
| 59.01 ↻ | **❑ PID proportional gain** | 0.01 to 100 | 1 |
| | Visible only if PID feedback assignment 59.00 is not set to 00. | | |
| 59.02 ↻ | **❑ PID integral gain** | 0.01 to 100 | 1 |
| | Visible only if PID feedback assignment 59.00 is not set to 00. | | |
| 59.03 ↻ | **❑ PID derivative gain** | 0.00 to 100.00 | 0.00 |
| | Visible only if PID feedback assignment 59.00 is not set to 00. | | |
| 59.04 ↻ | **❑ PID feedback scale factor** | 0.1 to 100.0 | 1.0 |
| | This parameter gives the relation between process range and feedback range.<br>Visible only if PID feedback assignment 59.00 is not set to 00. | | |
| 59.05 | **❑ Activation internal PID reference value** | | 00 |
| | Visible only if PID feedback assignment 59.00 is not set to 00. | | |
| 00 | ☐ No | | |
| 01 | ☐ Yes | | |
| 59.06 | **❑ 2 preset PID assignment** | | 00 |
| | Visible only if PID feedback assignment 59.00 is not set to 00. | | |
| 00 | ☐ None | | |
| L1H | ☐ L1h | | |
| L2H | ☐ L2h | | |
| L3H | ☐ L3h | | |
| L4H | ☐ L4h | | |
| LUH | ☐ LUH | | |

↻ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 59 - | **PID menu (continued)** | | |
| 59.07 | **❑ 4 preset PID assignment** | | 00 |
| | Visible only if PID feedback assignment 59.00 (page 66) is not set to 00.<br>00 ☐ None<br>L1H ☐ L1h<br>L2H ☐ L2h<br>L3H ☐ L3h<br>L4H ☐ L4h<br>LuH ☐ LUH<br>Before assigning 4 preset PID assignment 59.07, 2 preset PID assignment 59.06 (page 66) must be assigned. | | |
| 59.08 ( ) | **❑ 2 preset PID reference value** | 0 to 100% | 25% |
| | Visible only if PID feedback assignment 59.00 (page 66) and 2 preset PID assignment 59.06 (page 66) are not set to 00. | | |
| 59.09 ( ) | **❑ 3 preset PID reference value** | 0 to 100% | 50% |
| | Visible only if PID feedback assignment 59.00 (page 66) and 4 preset PID assignment 59.07 (page 66) are not set to 00. | | |
| 59.10 ( ) | **❑ 4 preset PID reference value** | 0 to 100% | 75% |
| | Visible only if PID feedback assignment 59.00 (page 66), 2 preset PID assignment 59.06 and 4 preset PID assignment 59.07 (page 66) are not set to 00. | | |
| 59.11 ( ) | **❑ Internal PID reference value** | 0 to 100% | 0% |
| | Visible only if PID feedback assignment 59.00 (page 66) is not set to 00 and Activation internal PID reference value 59.05 (page 66) is set to 01 or Reference channel 1 401 (page 58) is set to 163. | | |
| 59.12 ( ) | **❑ PID reference value ramp** | 0 to 99.9 s | 0 s |
| | Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | | |
| 59.13 ( ) | **❑ PID min value reference** | 0 to 100% | 0% |
| | Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | | |
| 59.14 ( ) | **❑ PID max value reference** | 0 to 100% | 100% |
| | Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | | |
| 59.15 | **❑ PID predictive speed** | 0.1 to 400 Hz | nO |
| | This parameter allows direct attainment of a set speed reference.<br>Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | | |

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

200 -
300 -
400 -
500 -
600 -
700 -

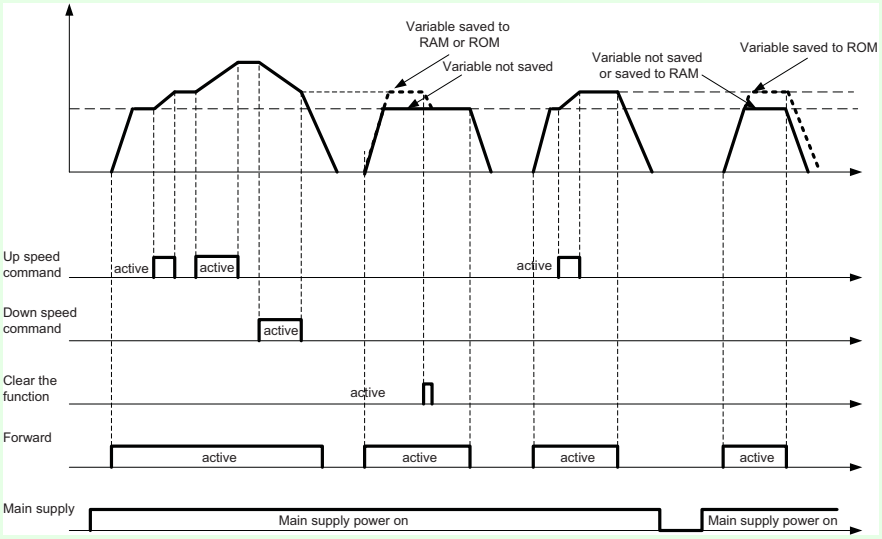
| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 59 - | **PID menu (continued)** | | |
| 501.4 ↻ | **❑ Acceleration 2**<br>This parameter only can be activated when the system is starting.<br>Second acceleration ramp time, adjustable from 0.1 to 999.9 s.<br>The time required to accelerate from 0 to Rated motor frequency 306 (page 52). Make sure that this value is compatible with the inertia being driven.<br><br>Visible only if PID feedback assignment 59.00 (page 66) and PID predictive speed 59.15 (page 67) are not set to 00. | 0.0 to 999.9 s | 5.0 s |
| 59.16<br>00<br>01 | **❑ PID correction reverse**<br>This parameter will reverse the internal error value of PID system.<br>☐ No<br>☐ Yes<br><br>Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | | 00 |
| 59.17<br>00<br>L1H<br>L2H<br>L3H<br>L4H<br>LUH | **❑ PID auto/manual assignment**<br>At state 0 of input, PID is active.<br>At state 1 of input, manual run is active.<br>☐ No<br>☐ L1h: LI1 active high<br>☐ L2h: LI2 active high<br>☐ L3h: LI3 active high<br>☐ L4h: LI4 active high<br>☐ LUh: LIU active high<br><br>Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | | 00 |
| 59.18<br>00<br>01<br>02 | **❑ PID manual reference**<br>This parameter can disable the PID and enable the standard manual reference.<br>☐ No<br>☐ Anolog terminal<br>☐ Integrated display with Jog dial<br><br>Visible only if PID feedback assignment 59.00 (page 66) and PID auto/manual assignment 59.17 (page 68) are not set to 00. | | 00 |
| 512.1 ↻ | **❑ Low speed operating time**<br>A motor stop is requested automatically following a defined period of operation at Low speed 512.0 (page 85). The motor restarts if the frequency reference is greater than Low speed 512.0 and if a run command is still present.<br>Note: 00 value corresponds to an unlimited period.<br><br>Visible only if PID feedback assignment 59.00 (page 66) is not set to 00. | 0.1 to 999.9 s | 00 |

↻ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| S00- | **Function menu (continued)** | | |
| S9- | **PID menu (continued)** | | |
| S9.19 | **❑ PID: wake up level** | 0 to 100% | 0% |
| | If PID functions and Low speed operating time S12.1 are set at the same time, the PID regulator may try to set a speed lower than Low speed S12.0. This will result in unwanted operations consisting of starting, running at Low speed S12.0, stopping and so on. Parameter PID: wake up level S9.19 can be used to set a minimum PID error threshold to restart after a prolonged stop below Low speed S12.0.<br><br>Visible only if PID feedback assignment S9.00 (page 66) and Low speed operating time S12.1 (page 68) are not set to 00. | | |
| S9.20 ( ) | **❑ PID: Wake up threshold** | 0 to 100% | 0% |
| | If PID correction reverse S9.16 (page 68) is set to nO, this parameter can be used to set the PID feedback threshold. Following a stop caused by exceeding the maximum time at low speed S12.1, the PID regulator is reactivated (wake-up) when this threshold is exceeded.<br>If S9.16 is set to 01, the PID regulator is reactivated (wake-up) when this threshold is exceeded, following a stop caused by exceeding the maximum time at low speed S12.1.<br><br>Visible only if PID feedback assignment S9.00 (page 66) and Low speed operating time S12.1 (page 85) is not set to 00. | | |

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

200 -
300 -
400 -
500 -
600 -
700 -

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500- | **Function menu (continued)** | | |
| 506- | **Speed up and down** | | |
| 506.0 | **❑ Up speed command** | | 00 |
| 00 | 00: Function inactive | | |
| L1H | L1H: LI1 active high | | |
| L2H | L2H: LI2 active high | | |
| L3H | L3H: LI3 active high | | |
| L4H | L4H: LI4 active high | | |
| LuH | LUH: LIU active high | | |
| 506.1 | **❑ Down speed command** | | 00 |
| 00 | 00: Function inactive | | |
| L1H | L1H: LI1 active high | | |
| L2H | L2H: LI2 active high | | |
| L3H | L3H: LI3 active high | | |
| L4H | L4H: LI4 active high | | |
| LuH | LUH: LIU active high | | |
| |  | | |
| 506.2 | **❑ Store** | | 00 |
| | Up speed/down speed command will change the initial speed reference. Eventually it produces an overall "speed increment". This speed increment accumulates over time depending on the actions of Lix and Liy. It is therefore necessary to keep a record of speed incrementation when changing speed reference. Visible only if parameter 506.0 and 506.1 are configured. | | |
| 00 | ☐ Do not save. Variables not saved after the RUN command has disappeared. | | |
| 01 | ☐ Save to RAM. Variables saved to RAM after STOP command ends and disappear when power off. | | |
| 02 | ☐ Save to ROM. Variables saved to ROM when power off. | | |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 506 - | **Speed up and down (continued)** | | |
| 506.3 | **❑ Clear the function**<br>When the CLEAR command is activated, acceleration and deceleration commands are deactivated. All speed increments are reset when the CLEAR command is activated, regardless of the save method used.<br>Visible only if parameter 506.0 and 506. 1 are configured.<br>☐ 00, [00], Function inactive<br>☐ L1H, [L1H], LI1 active high<br>☐ L2H, [L2H], LI2 active high<br>☐ L3H, [L3H], LI3 active high<br>☐ L4H, [L4H], LI4 active high<br>☐ LUH, [LUH], LIU active high<br>☐ 159, The function is cleared when [159] acceleration and deceleration commands activate simultaneously. | 0 - 100% | 00 |
| 506.4 | **❑ Reactivity of +/- speed around ref.**<br>An experience value between 0 to 100% is used to change the rapidity of response for acceleration and deceleration command inputs.<br>Visible only if parameters 506.0 and 506. 1 are configured.<br>☐ 0 ~ 100%(0) | 0 - 100% | 0% |

## Preset speeds

2, 4, or 8 speeds can be preset, requiring 1, 2 or 3 logic inputs respectively.

**Combination table for preset speed inputs**

| 8 speeds LI (507.2) | 4 speeds LI (507.1) | 2 speeds LI (507.0) | Speed reference |
|---|---|---|---|
| 0 | 0 | 0 | Preset speed |
| 0 | 0 | 1 | Preset speed 2 |
| 0 | 1 | 0 | Preset speed 3 |
| 0 | 1 | 1 | Preset speed 4 |
| 1 | 0 | 0 | Preset speed 5 |
| 1 | 0 | 1 | Preset speed 6 |
| 1 | 1 | 0 | Preset speed 7 |
| 1 | 1 | 1 | Preset speed 9 |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 507 - | **Preset speed menu** | | |
| 507.0 | **❑ 2 preset speeds**<br>☐ Function inactive<br>☐ L1h: L1 high activation level<br>☐ L2h: LI2 active high<br>☐ L3h: LI3 active high<br>☐ L4h: LI4 active high<br>☐ LUh: active high | | 00 |
| 507.1 | **❑ 4 preset speeds**<br>As 507.0 | | 00 |
| 507.2 | **❑ 8 preset speeds**<br>As 507.0 | | 00 |
| 507.3 ↻ | **❑ Preset speed 2**<br>Visible only if 2 preset speeds 507.0 is not set to 00. | 0 to 400 Hz | 10 Hz |
| 507.4 ↻ | **❑ Preset speed 3**<br>Visible only if 4 preset speeds 507.1 is not set to 00. | 0 to 400 Hz | 15 Hz |
| 507.5 ↻ | **❑ Preset speed 4**<br>Visible only if 2 preset speeds 507.0 and 4 preset speeds 507.1 are not set to 00. | 0 to 400 Hz | 20 Hz |
| 507.6 ↻ | **❑ Preset speed 5**<br>Visible only if 8 preset speeds 507.2 is not set to 00. | 0 to 400 Hz | 25 Hz |
| 507.7 ↻ | **❑ Preset speed 6**<br>Visible only if 2 preset speeds 507.0 and 8 preset speeds 507.2 are not set to 00. | 0 to 400 Hz | 30 Hz |
| 507.8 ↻ | **❑ Preset speed 7**<br>Visible only if 4 preset speeds 507.1 and 8 preset speeds 507.2 are not set to 00. | 0 to 400 Hz | 35 Hz |
| 507.9 ↻ | **❑ Preset speed 8**<br>Visible only if 2 preset speeds 507.0, 4 preset speeds 507.1 and 8 preset speeds 507.2 are not set to 00. | 0 to 400 Hz | 40 Hz |
| 508 ↻ | **❑ Skip frequency**<br>☐ This parameter prevents prolonged operation within an adjustable range around 508 frequency of ±1 Hz. This function can be used to prevent a critical speed which would cause resonance being reached. Setting the function to 0 renders it inactive. | 0 to 400 Hz | 0 Hz |

↻ Parameter that can be modified during operation or when stopped.

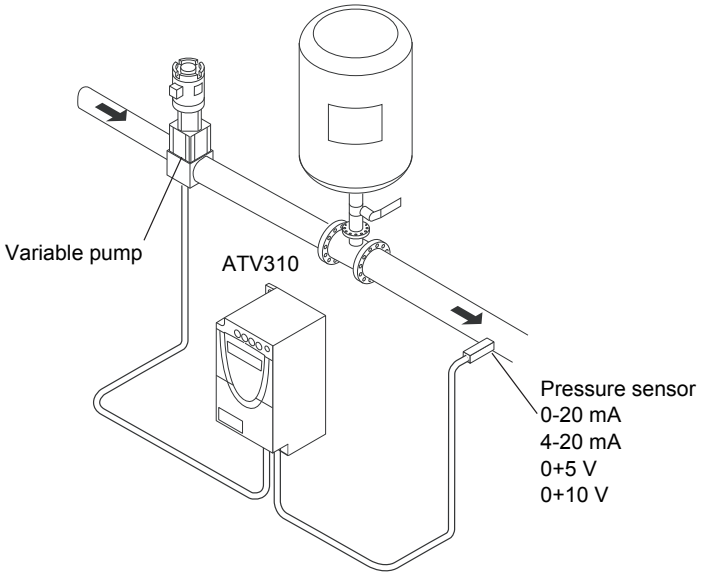
| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 59.21 | ❑ **Sleep offset threshold**<br>0 ~ 512.2 (*0) | 0 to 512.2 | 0 Hz |
| 59.22 | ❑ **PID feedback supervision threshold**<br>0 - 100% (*0) | 0 - 100% | 0 (No) |
| 59.23 | ❑ **PID supervision function time delay**<br>0 - 300s (*0) | 0 - 300s | 0 s |
| 59.24 | ❑ **Maximum frequency detection Hysteresis** | 0 to 512.2 | 0 Hz |
| 59.25 | ❑ **PID feedback supervision**<br>00 ☐ Alarm ignore<br>01 ☐ Freewheel stop<br>04 ☐ Fall back speed | | 00 |
| 59.26 | ❑ **Fall back speed**<br>0~ high speed frequency (*0). | 0 to 512.2 | 0 Hz |
| 510- | **PUMP SUB-MENU** | | |
| 207 | ❑ **Application Overload time delay**<br>☐ Overload detection time delay<br>☐ Value of zero will inactivate the function and make other parameters unaccessable.<br>☐ 0 - 100s (*0) | 0-100 s | 5 s |
| 208 | ❑ **Application Overload threshold**<br>The overload detection threshold is expressed as a percentage of [Nominal motor current] (nCr). To activate the function, this value must be smaller than the limit current. | 70 - 150 % In | 90% |
| 209 | ❑ **Time delay before automatic start for the overload fault**<br>If [Overload fault management] (604.2) = [alarm ignore], then this parameter will be unaccessable.<br>Minimum time allowed between overload detection and any automatic restart.<br>To perform an automatic restart, the value of the [Automatic restart] (602.1) must exceed this parameter by at least one minute. | 0-6 min. | 0 min. |
| 210 | ❑ **Application underload time delay**<br>Value of zero will inactivate the function and make other parameters unaccessable. | 0-100 s | 0 s |
| 211 | ❑ **Application Underload threshold**<br>The underload threshold at zero frequency is expressed as a percentage of rated motor torque. | 20%-100% | 60% |

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 2 12 | ❑ **Underload fault duration**<br>Minimum time allowed between underload detection and any automatic restart.<br>To perform an automatic restart, the value of the [Automatic restart] (6 0 2. 1) must exceed this parameter by at least one minute. | 0-6 min. | - |
| S 10.0<br>0 0<br>0 1 | ❑ **Selecting operating mode**<br>☐ No: single frequency conversion mode<br>☐ Yes: single frequency conversion combined with auxiliary pump mode<br>If S 10.0 = [0 1], digital output L o will automatically assign value pump switching. | | |
| S 10. 1 | ❑ **Starting frequency of the auxiliary pump**<br>The auxiliary pump will start if this frequency is exceeded and after the pump start time delay (value of S 10.2). | 0- 3 0 8 parameter value | S 12.2 parameter value |
| S 10.2 | ❑ **Time delay before starting auxiliary pump**<br>This time avoids the effects of transient pressure fluctuations and so avoids vibrations generated during pump starting and stopping. | 0-999.9s | 2 s |
| S 10.3 | ❑ **Auxiliary pump ramp reaching** | 0-999.9s | 2 s |
| S 10.4 | ❑ **Auxiliary pump stop frequency**<br>The auxiliary pump will stop below this frequency after the auxiliary pump stop delay (value of S 10.5). | 0- 3 0 8 parameter value | 0Hz |
| S 10.5 | ❑ **Auxiliary pump stop time delay**<br>This time avoids the effects of transient pressure fluctuations and so avoids vibrations generated during pump starting and stopping. | 0-999.9s | 2 s |
| S 10.6 | ❑ **Auxiliary pump stop ramp** | 0-999.9s | 2 s |
| S 10.7 | ❑ **Zero flow detection period**<br>Function inactive if value is 0. | 0-20 min. | 0 min. |
| S 10.8 | ❑ **Zero flow detection activation threshold**<br>Below this threshold function activated if S 10.7 value >0 and the auxiliary pump is stopped. | 0-400Hz | 0Hz |
| S 10.9 | ❑ **Zero flow detection offset** | 0-400Hz | 0Hz |

# Architecture of the pumping installation

## Single variable mode - 1 single variable speed pump




Enter the values given on the motor rating plate in the Motor control menu 300-

**First level adjustment parameters**
50 1.0 Acceleration: 0.7 s
50 1. 1 Deceleration: 0.7 s
5 12.0 Low speed: 30 Hz
5 12.2 high-speed: 50 Hz

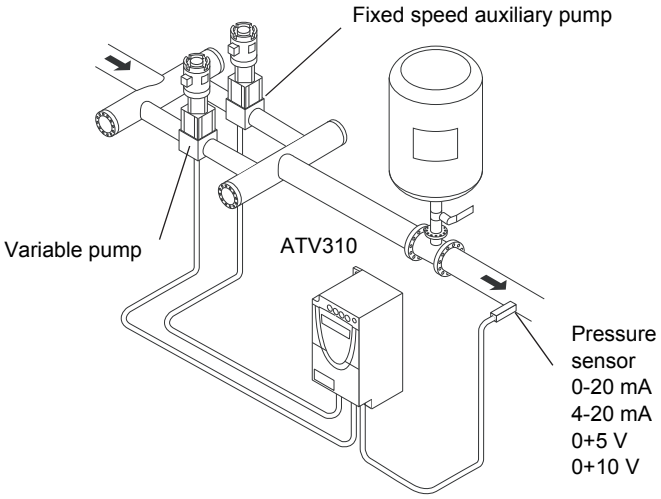
**Analog input menu AIt**
204.0 Scale of analog input AI1: 0-20 mA

**Motor control menu drC**
3 1 1 Nominal motor slip: 0 Hz
3 13 Frequency loop gain: 70%
3 10 IR compensation: 0%

**Application functions menu FUn**
202 2-wire type control: LEL
PI sub-menu
59.00 Assignment of the PI function feedback: AI1
59.0 1 PI regulator proportional gain: 5.00
59.02 PI regulator integral gain: 8.00
59. 1 1 Internal PI regulator reference: 39%
59. 19 Restart error threshold: 40%
59.25 Supervision of the PI regulator function: LFF
59.22 PI feedback supervision threshold: 17%
59.23 PI feedback supervision function time delay: 1 s
59.26 Fallback speed: 50 Hz
Pump sub-menu PMP
5 10. 7 Zero flow detection: 1 min
5 10.8 Zero flow detection activation threshold: 50 Hz
5 10.9 Zero flow detection offset: 5 Hz
5 12. 1 Sleep threshold operating time: 3 s
59. 15 Quick start threshold: 25 Hz
59.2 1 Sleep threshold offset: 10 Hz
Automatic DC injection sub-menu AdC
5 12.0 Automatic DC injection assignment: nO
Automatic restart function Atr
602.0 Automatic restart: YES

**Fault menu 600-**
208 Overload threshold: 11%
209 Time delay before automatic start for the overload fault: 1
59.24 Frequency hysteresis reached: 2 Hz

## Single variable with auxiliary pump mode - 1 variable speed pump (variable pump) and one fixed speed pump (auxiliary pump)




The auxiliary pump is controlled by the Altivar 12 via logic output LO.

Enter the values given on the motor rating plate in the Motor control menu 300-

**First level adjustment parameters**
50 1.0 Acceleration: 0.1 s
50 1. 1 Deceleration: 0.1 s
5 12.0 Low speed: 35 Hz

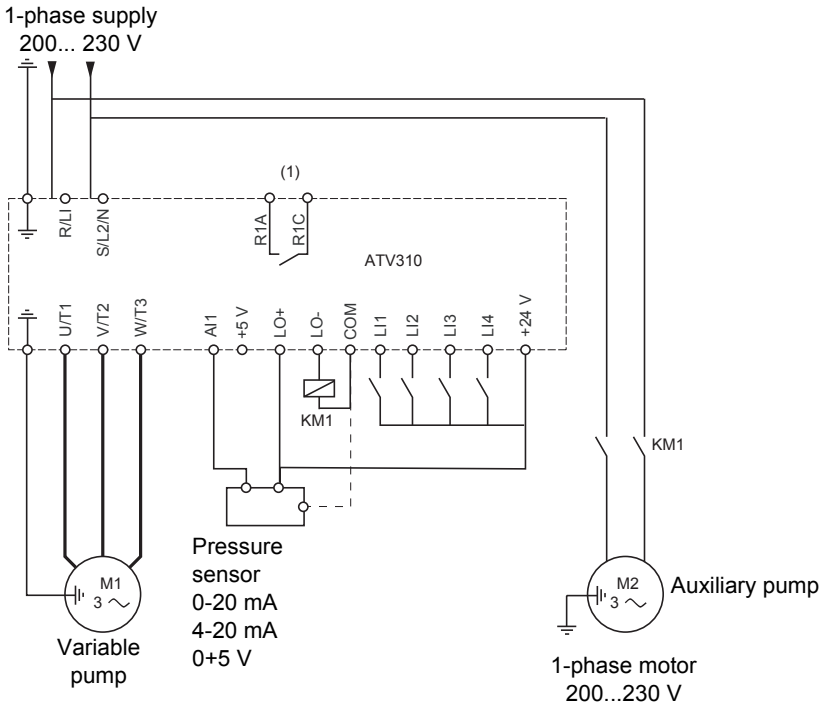
**Analog input menu 204-**
204.0 Scale of analog input AI1: 0-20 mA

**Motor control menu 300-**
3 1 1 Nominal motor slip: 0 Hz
3 13 Frequency loop gain: 70%
3 10 IR compensation: 0%

**Application functions menu FUn**
202 2-wire type control: 00
PI sub-menu
59.00 Assignment of the PI function feedback: 01
59.0 1 PI regulator proportional gain: 5.00
59.02 PI regulator integral gain: 8.00
59. 1 1 Internal PI regulator reference: 51%
59. 19 Restart error threshold: 42%
Pump sub-menu PMP
5 10.0 Selecting the operating mode: 01 (Yes)
5 10. 1 Starting frequency of the auxiliary pump: 49 Hz
5 10.2 Time delay before starting the auxiliary pump: 1 s
5 10.3 Ramp for reaching the nominal speed of the auxiliary pump: 1 s
5 10.4 Stopping frequency of the auxiliary pump: 39.6 Hz
5 10.5 Time delay before the auxiliary pump stop command: 1 s
5 10.6 Ramp for stopping the auxiliary pump: 1 s
5 10.7 Zero flow detection: 1 min
5 10.8 Zero flow detection activation threshold: 42 Hz
5 10.9 Zero flow detection offset: 2 Hz
5 12. 1 Sleep threshold operating time: 5 s
59.2 1 Sleep threshold offset: 3 Hz
206. 1 Assignment as logic/analog output PMP
Automatic DC injection sub-menu 504-
5 12.0 Automatic DC injection assignment: 00
Automatic restart function 602-
602.0 Automatic restart: 01 (active)

**Fault menu 600-**
2 10 Underload function time delay 5 s
2 1 1 Underload threshold: 59%
2 12 Time delay before automatic restart for the underload fault: 1

## Connection diagram



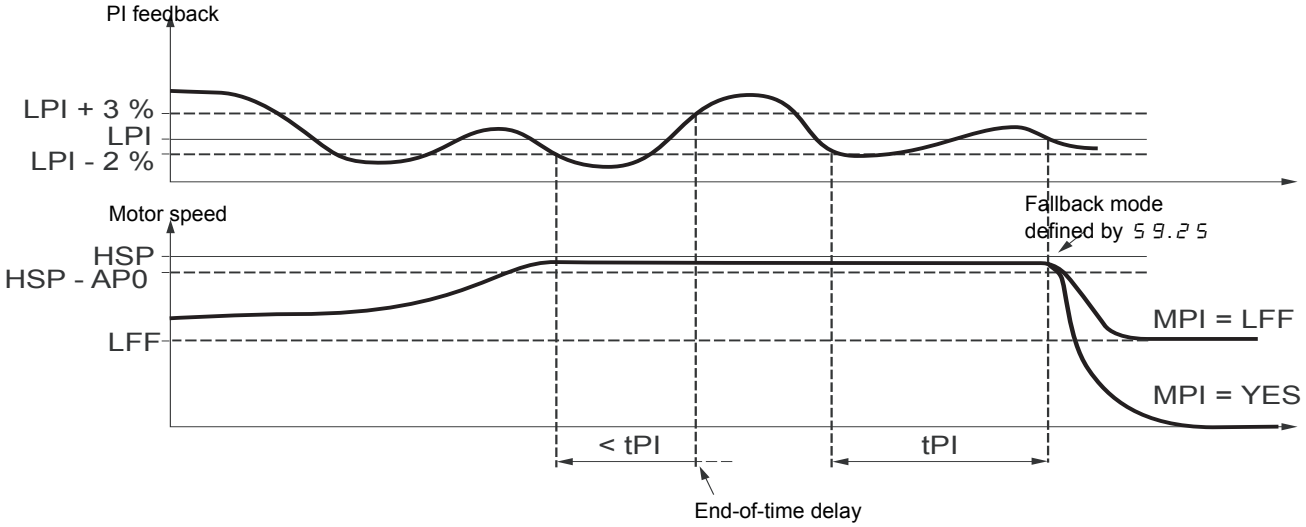

(1) Fault relay contacts, for remote indication of the drive status.

**Note:** Fit interference suppressors to all inductive circuits near the drive or connected to the same circuit (relays, contactors, solenoid valves, etc.).

**Note:** This wiring example is in source using internal supply.

## PI feedback supervision (59.25)

Used to define the operating mode in the event of detection of a PI feedback lower than the limit set.




Once the variable pump is running at maximum speed (higher than 512.2 – 59.24) and at the same time the PI feedback is lower than the supervision threshold 59.22 – 2%, a time delay tPI is launched. If at the end of this time delay the value of the PI feedback is still lower than the supervision threshold 59.22 + 3%, the drive switches to fallback mode as defined by parameter 59.25.

- 59.25 = 01:

The drive will perform a freewheel stop.

- 59.25 = 04:

The drive will run at a fixed frequency 59.26 and will display fault code --12.

In both cases the drive reverts to PI regulation mode as soon as the PI feedback is higher than the supervision threshold 59.22 + 3%.

In single variable with auxiliary pump mode (510.0 = 01), the PI feedback supervision function is only active when both pumps are operating.

# Pump submenu PMP

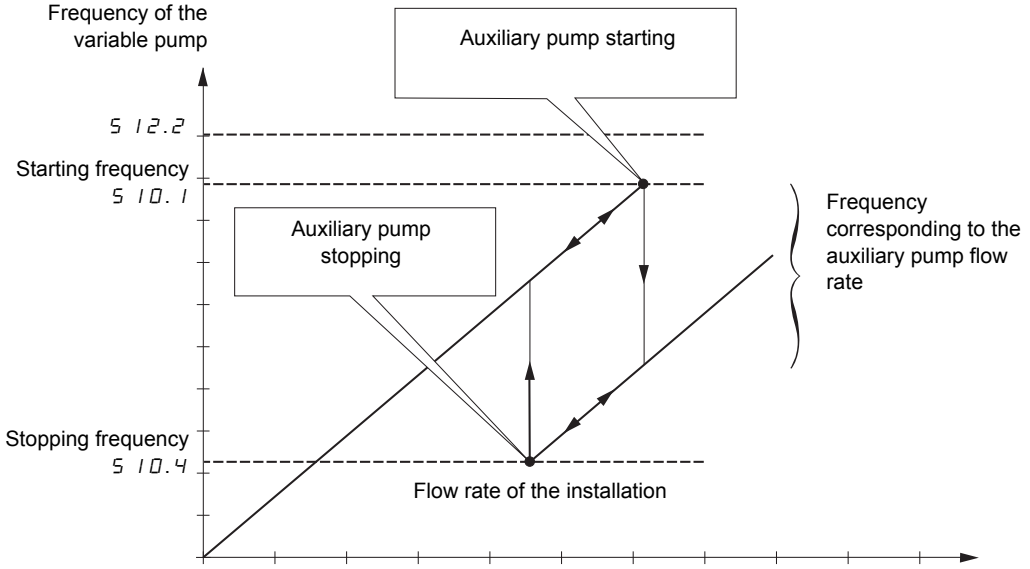
The principal objective is to control a complete pumping installation using a single drive by providing constant pressure whatever the flow rate.
The system is operated using an auxiliary fixed speed pump, and one variable speed pump, which is unable to provide the full flow range required on its own. A PI regulator is used for drive control. The pressure sensor provides system feedback.
The variable speed pump is called a variable pump.
The fixed speed pump is called an auxiliary pump.

## Selecting the operating mode

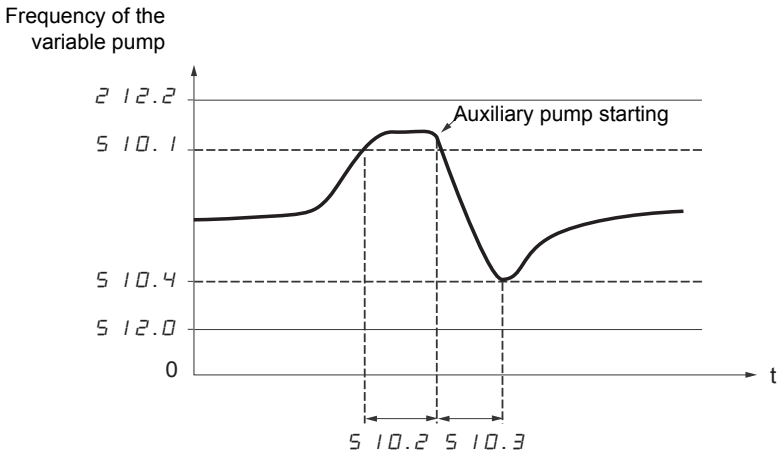
The ATV310 offers 2 operating modes:
- Single variable mode: 1 single variable speed pump (variable pump).
- Single variable with auxiliary pump mode: 1 variable speed pump (variable pump) and one fixed speed pump (auxiliary pump).

### Control of the auxiliary pump

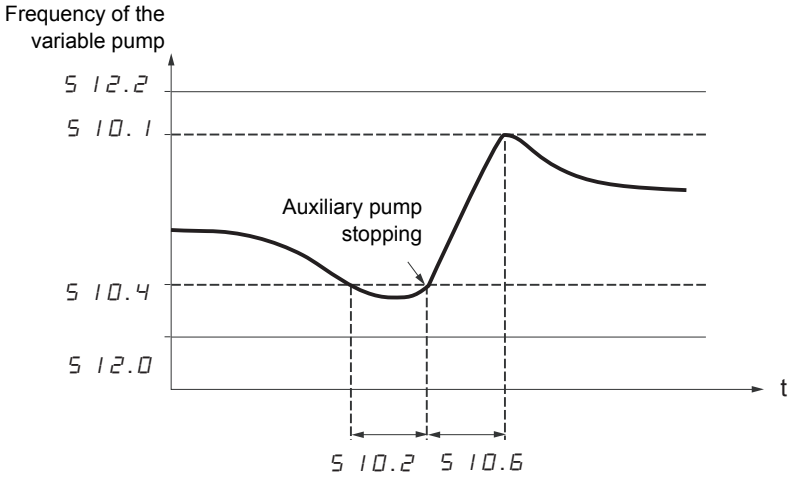
The PI regulator output (frequency reference of the variable pump) is used to control starting or stopping of the auxiliary pump with hysteresis, as shown in the figure below:




When the frequency exceeds the starting threshold (S 10. 1), a time delay (S 10.2) is launched to avoid the effects of transient flow fluctuations. If after this time delay, the frequency remains higher than the starting threshold, the auxiliary pump is started. When the start command is sent, the variable pump will go from its current speed reference to the auxiliary pump stopping frequency (S 10.4) following a ramp (S 10.3) that equals the time taken for the auxiliary pump to reach its nominal speed. Parameter rOn is used to minimize the booster effect on starting the auxiliary pump.

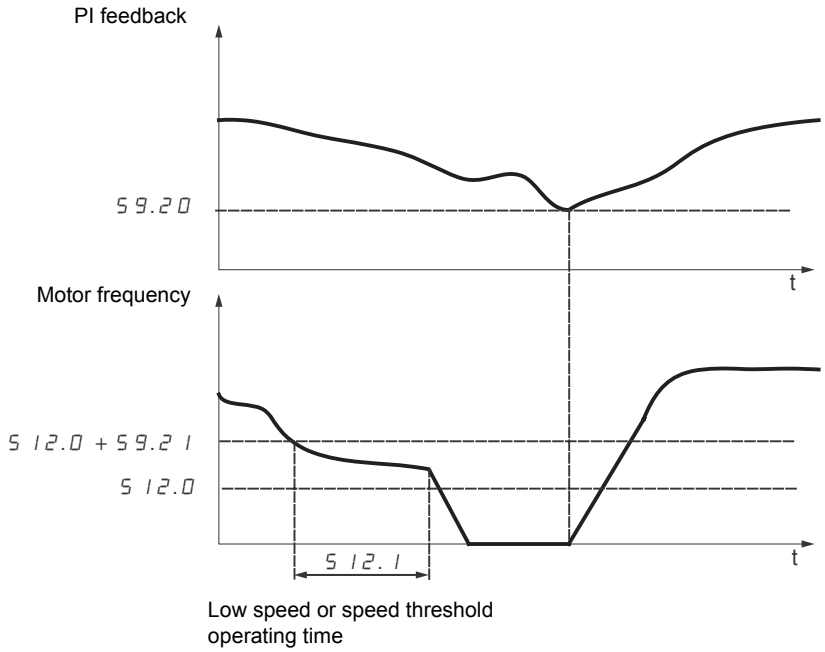


When the frequency is lower than the stopping threshold (S 10.4), a time delay is launched (S 10.2) to avoid the effects of transient flow fluctuations. If after this time delay, the frequency remains lower than the stopping threshold, the auxiliary pump is stopped. When the stop command is sent, the variable pump will go from its current speed reference to the auxiliary pump starting frequency (S 10. 1) following a ramp (S 10.6) that equals the auxiliary pump stopping time. Parameter S 10.6 is used to minimize the booster effect on stopping the auxiliary pump.



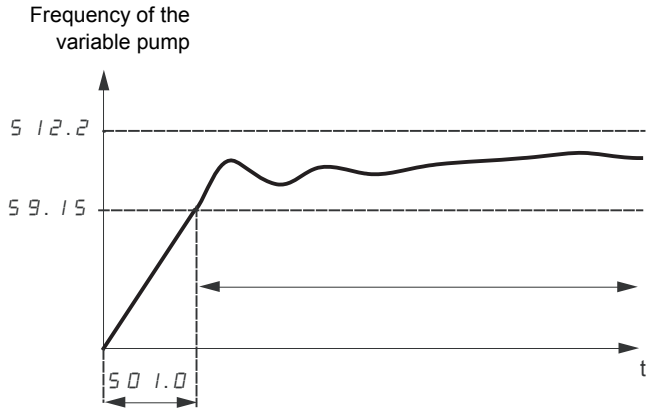
## "Sleep" function/"Wake-up" function

This function is used to stop the variable pump when there is zero flow (auxiliary pump stopped). In this case, if the frequency of the variable pump is lower than the "sleep" threshold (5 12.0 + 5 9.2 1), a time delay (5 12. 1) is launched. If, after this time delay, the frequency remains lower than threshold 5 12.0 + 5 9.2 1, the variable pump then stops. The installation is in "sleep" mode.
To switch to "wake-up" mode, the pressure feedback must drop to below the "wake-up" threshold 5 9.20. The variable pump is then started.




## Quick start function

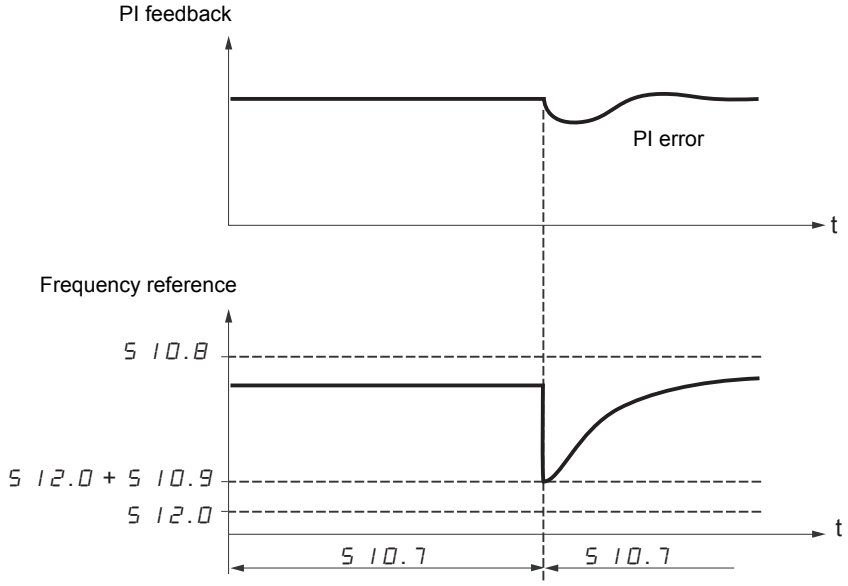
The quick start function can be used to overcome problems linked to high 5 9.0 1 and 5 9.02 gains (instability on starting). The drive accelerates until it reaches the quick start threshold 5 9. 15 following a ramp 5 0 1.0. Once the threshold has been reached, the PI regulator is activated.



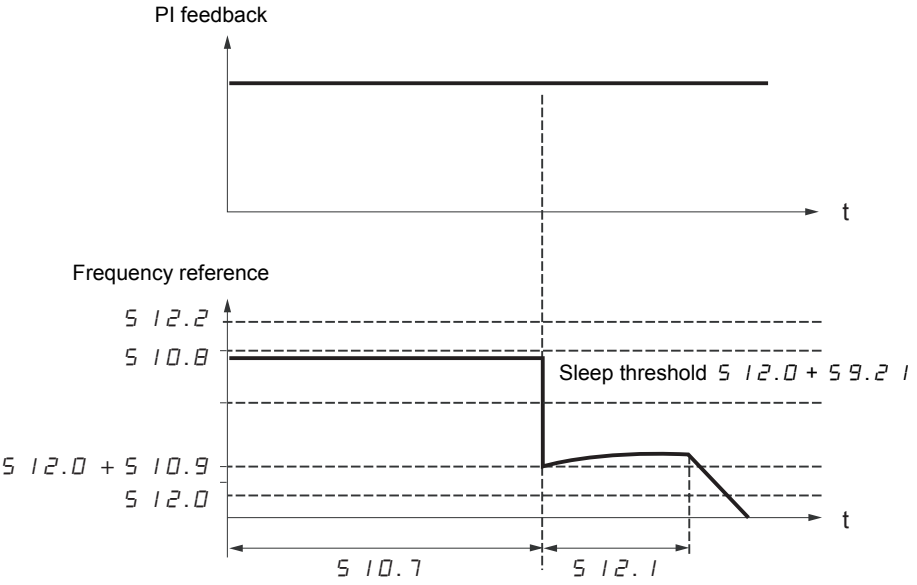
## Zero flow detection

This function is only active when the auxiliary pump is stopped and the motor frequency is below threshold S 10.8.
This function is used in applications where zero flow cannot be detected by the sleep function alone. It forces the drive frequency reference to S 12.0 + S 10.9 periodically (at each time interval S 10.7) in order to test for zero flow.

- If the request is still present, the PI error increases, causing the drive to restart.




- If the request is no longer present (zero flow), the PI error will not increase.




- Set the sleep function so that the drive switches to sleep mode when zero flow is detected (S 9.2 1 ≤ S 9.2 1).

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 511 - | **CURRENT LIMITATION MENU** | | |
| 511.0 | **❑ 2nd current limitation commutation** | | 00 |

Assignment
- ☐ 00: Function inactive
- ☐ L1H: LI1 active high
- ☐ L2H: LI2 active high
- ☐ L3H: LI3 active high
- ☐ L4H: LI4 active high
- ☐ LUH: LIU active high
- ☐ L1L: LI1 active low
- ☐ L2L: LI2 active low
- ☐ L3L: LI3 active low
- ☐ L4L: LI4 active low
- ☐ LUL: LIU active low

If the assigned input is at 0, the first current limitation is active.
If the assigned input is at 1, the second current limitation is active.
See LI assignment information (page 42).

| | | | |
|---|---|---|---|
| 511.1 ❮❯ | **❑ Current limitation** | 0.25 to 1.5 In (1) | 1.5 In |

First current limitation.

**NOTICE**

**OVERHEATING AND DAMAGE TO THE MOTOR**
Verify that the connected motor is properly rated for the maximum 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.**

| | | | |
|---|---|---|---|
| 511.2 ❮❯ | **❑ Current limitation 2** | 0.25 to 1.5 In (1) | 1.5 In |

Second current limitation.
This function allows reduction of the drive current limit.

Visible only if 2nd current limitation commutation 511.0 (page 84) is not set to 00.

**NOTICE**

**OVERHEATING AND DAMAGE TO THE MOTOR**
Verify that the connected motor is properly rated for the maximum 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.**

(1) In = rated drive current

❮❯ Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| 512 - | **Speed limit menu** | | |
| 512.0 | **❑ Low speed**<br>Motor frequency at minimum reference. | 0 Hz to 512.2 parameter value | 0 Hz |
| 512.1 | **❑ Low speed operating time**<br>Following operation at Low speed 512.0 for a defined period, a motor stop is requested automatically. The motor restarts if the reference value is greater than Low speed 512.0 and if a run command is still present.<br>Note: 00 corresponds to an unlimited period. | 0.1 to 999.9 s | 00 |

## High speed configuration

The logic inputs enable selection of the desired high speed.

| Desired High speed | Setting | |
|---|---|---|
| | Parameter | State |
| S 12.2 | S 12.3 | 00 |
| | S 12.4 | 00 |
| S 12.5 | S 12.3 | assigned |
| | S 12.4 | 00 |

| Desired High speed | Setting | |
|---|---|---|
| | Parameter | State |
| S 12.6 | S 12.3 | 00 |
| | S 12.4 | assigned |
| S 12.7 | S 12.3 | assigned |
| | S 12.4 | assigned |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 500 - | **Function menu (continued)** | | |
| S 12 - | **Speed limit menu** | | |
| S 12.2 | **❑ High speed** | 512.0 to 308 parameter value | 50 Hz |
| | Motor frequency at maximum reference can be set in the range Low speed S 12.0 to Maximum frequency 308 (page 52).<br>If 308 falls below the value defined for S 12.2, S 12.2 automatically drops to the new value of 308. | | |
| S 12.3 | **❑ 2 High speed assignment** | | 00 |
| 00<br>LI1H<br>LI2H<br>LI3H<br>LI4H<br>LUH | ☐ None<br>☐ L1h: LI1 active high<br>☐ L2h: LI2 active high<br>☐ L3h: LI3 active high<br>☐ L4h: LI4 active high<br>☐ LUh: LIU active high | | |
| S 12.4 | **❑ 4 High speed assignment** | | 00 |
| 00<br>LI1H<br>LI2H<br>LI3H<br>LI4H<br>LUH | ☐ None<br>☐ L1h: LI1 active high<br>☐ L2h: LI2 active high<br>☐ L3h: LI3 active high<br>☐ L4h: LI4 active high<br>☐ LUh: LIU active high | | |
| S 12.5 | **❑ High speed 2** | 512.0 to 308 | As 512.2 parameter value |
| | Visible only if 2 High speed assignment S 12.3 is not set to 00. | | |
| S 12.6 | **❑ High speed 3** | 512.0 to 308 | As 512.2 parameter value |
| | Visible only if 4 High speed assignment S 12.4 is not set to 00. | | |
| S 12.7 | **❑ High speed 4** | 512.0 to 308 | As with 512.2 parameter value |
| | Visible only if 2 High speed assignment S 12.3 and 4 High speed assignment S 12.4 are not set to 00. | | |
| S 13 | **❑ Cooling fan control** | | 01 |
| 00<br>01 | ☐ Fan runs while drive is running<br>☐ Temperature control mode, fan starting and stopping controlled on basis of IGBT temperature | | |

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 600- | **FAULT DETECTION MANAGEMENT MENU** | | |
| 601 | **❑ Detected fault reset assignment** | | 00 |

Manual fault reset.

- 00 ☐ Function inactive
- L1H ☐ L1h: LI1 active high
- L2H ☐ L2h: LI2 active high
- L3H ☐ L3h: LI3 active high
- L4H ☐ L4h: LI4 active high
- LUH ☐ LUH: LIU active high

Faults are reset when the assigned input or bit changes to 1, if the cause of the fault has disappeared.
The STOP/RESET button on the graphic display terminal performs the same function.
See also Diagnostics and Troubleshooting (page 98).

## 602- Automatic restart menu

### 602.0 ❑ Automatic restart — 00

This function can be used to automatically perform individual or multiple Fault Resets. If the cause of the error that has triggered the transition to the operating state Fault disappears within while this function is active, the drive resumes normal operation. While the Fault Reset attempts are performed automatically, the output signal "Operating state Fault" is not available. If the attempts to perform the Fault Reset are not successful, the drive remains in the operating state Fault and the output signal "Operating state Fault" becomes active.

**⚠ WARNING**

**UNANTICIPATED EQUIPMENT OPERATION**

- Verify that activating this function does not result in unsafe conditions.
- Verify that the fact that the output signal "Operating state Fault" is not available while this function is active does not result in unsafe conditions.

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

- 00 ☐ Function inactive.
- 01 ☐ Automatic restart after locking on a detected fault, if the cause has disappeared and the other operating conditions permit the restart.
  The restart is performed by a series of automatic attempts separated by increasingly longer waiting periods: 1 s, 5 s, 10 s, then 1 minute for subsequent attempts. The drive status relay remains activated if this function is active. The speed reference and the operating direction must be maintained.
  Use 2 wire type control (Type of control 201 (page 44) = 00 and 2-wire type control 202 (page 47) = 00). If the restart has not taken place once the Max. automatic restart 602.1 has elapsed, the procedure is aborted and the drive remains locked until it is turned off and then on again.
  The detected faults which permit use of this function are listed on page 100.

### 602.1 ❑ Max. automatic restart — 5 min.

- 00 ☐ 5 min.
- 01 ☐ 10 min.
- 02 ☐ 30 min.
- 03 ☐ 1 hr
- 04 ☐ 2 hr
- 05 ☐ 3 hr
- 06 ☐ Infinite

Visible only if Automatic restart 602.0 is not set to 00. This parameter can be used to limit the number of consecutive restarts on a recurrent fault.

200 -
300 -
400 -
500 -
600 -
700 -

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 603 | **❑ Catch on the fly** | | 00 |

This function is used to enable a smooth restart if the run command is maintained after the following events:
- Loss of line supply or disconnection
- Reset of current fault or automatic restart
- Freewheel stop

The speed given by the drive resumes from the estimated speed of the motor at the time of the restart, then follows the ramp to the reference speed.
This function requires 2-wire level control.

00 ☐ Function inactive
01 ☐ Function active

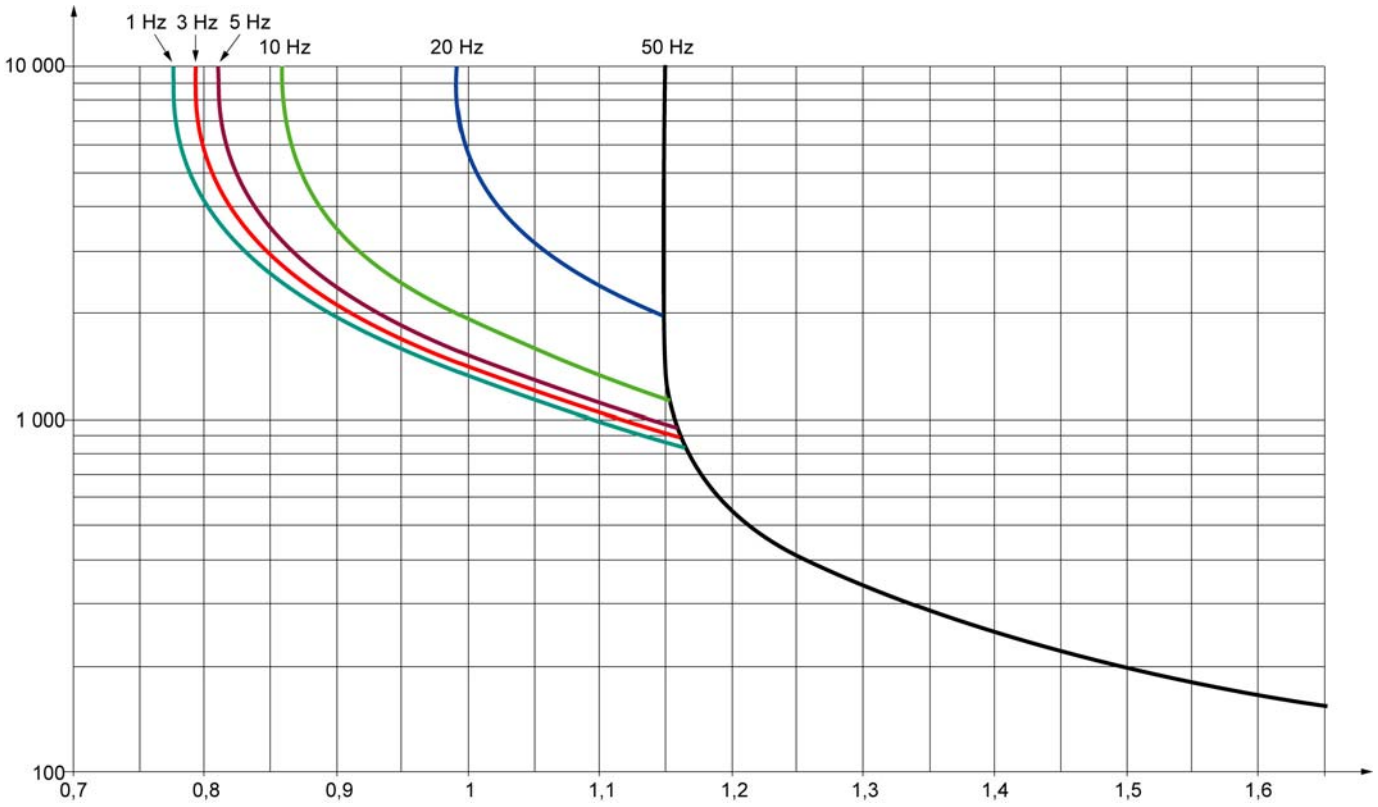
# Motor thermal protection

## Function:

Thermal protection by calculating the $I^2t$.

- Naturally-cooled motors:
  The tripping curves depend on the motor frequency.
- Force-cooled motors:
  Only the 50 Hz tripping curve need be considered, regardless of the motor frequency.

Trip time in seconds




Motor current/604.0 parameter value

200 -
300 -
400 -
500 -
600 -
700 -

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 604 - | **Motor Thermal Protection menu** | | |
| 604.0 | **❑ Motor thermal current** | 0.2 to 1.5 In (1) | Determined by drive rating |
| | Current used for motor thermal detection. Set ItH to the nominal current on the motor rating plate. | | |
| 604.1 | **❑ Motor protection type** | | 01 |
| 01 | ☐ Self-ventilated | | |
| 02 | ☐ Motor-ventilated | | |
| 604.2 | **❑ Overload fault management** | | 01 |
| | Type of stop in the event of a motor thermal fault. | | |
| 00 | ☐ Fault ignored | | |
| 01 | ☐ Freewheel stop | | |
| | Overload fault management Setting 604.2 to 00 inhibits the Motor overload fault F013 (page 100). | | |
| | **NOTICE**<br>**OVERHEATING AND DAMAGE TO THE MOTOR**<br>If this parameter is set to 00, the error response to detected errors is disabled and the transition to the operating state Fault is suppressed.<br>• Verify that the settings of this parameter do not result in equipment damage.<br>• Implement alternative monitoring functions for disabled monitoring functions.<br>**Failure to follow these instructions can result in equipment damage.** | | |
| 604.3 | **❑ Motor thermal state memo** | | 00 |
| 00 | ☐ Motor thermal state not stored at power off | | |
| 01 | ☐ Motor thermal state is stored at power off | | |
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 605 | **❑ Output Phase loss** | | 01 |
| | **⚠ ⚠ DANGER**<br>**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**<br>If output phase monitoring is disabled, phase loss and, by implication, accidental disconnection of cables, are not detected.<br>Verify that the setting of this parameter does not result in unsafe conditions.<br>**Failure to follow these instructions will result in death or serious injury.** | | |
| 00 | ☐ Function inactive | | |
| 01 | ☐ Tripping on F014 (1 phase loss) or F015 (3 phase loss) fault with freewheel stop. | | |
| 606 | **❑ Input Phase loss** | | 01 |
| | This parameter is only accessible in this menu on 3-phases drives. | | |
| 00 | ☐ Fault ignored | | |
| 01 | ☐ Fault with freewheel stop<br>If one phase disappears, the drive switches to fault mode, but if 2 or 3 phases disappear, the drive continues to operate until it trips on an undervoltage fault. | | |

(1) In = rated drive current

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 607 - | **Undervoltage menu** | | |
| 607.0 | **❑ Undervoltage detected fault management**<br>Behaviour of the drive in the event of an undervoltage<br>00 ☐ Detected fault and R1 relay open<br>01 ☐ Detected fault and R1 relay closed | | 00 |
| 607.1 | **❑ Undervoltage prevention**<br>Behaviour in the event of the undervoltage fault prevention level being reached<br>00 ☐ No action (freewheel)<br>02 ☐ Stop following an adjustable ramp Undervoltage ramp deceleration time 607.2. | | 00 |
| 607.2 ( ) | **❑ Undervoltage ramp deceleration time**<br>Undervoltage prevention 607.1 = 02 gives this ramp time. | 0.0 to 10.0 s | 1.0 s |
| 607.3 ( ) | **❑ Precharge resistor protection level** | 430 to 560 Vdc | 0 V with protection removed |
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 608 | **❑ IGBT Test**<br>00 ☐ No test<br>01 ☐ The IGBTs are tested on power up and every time a run command is sent. These tests cause a slight delay (a few ms).<br>In the event of a fault, the drive will lock. The following faults can be detected:<br>- Drive output short-circuit (terminals U-V-W): F018, F019, F021 display<br>- IGBT faulty: F020 display, where x indicates the number of the IGBT concerned<br>IGBT short-circuited: x2F, where x indicates the number of the IGBT concerned | | 00 |
| 609 | **❑ 4-20mA loss Behaviour**<br>00 ☐ Fault ignored. This configuration is only possible if AI1 current scaling parameter of 0% 204.1 (page 48) is not greater than 3 mA or AI1 type 204.0 = 0A.<br>01 ☐ Freewheel stop | | 00 |

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

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

200 -
300 -
400 -
500 -
600 -
700 -

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 610 | **❑ Detected fault inhibition assignment** | | 00 |

In rare cases, the monitoring functions of the drive may be unwanted because they impede the purpose of the application. A typical example is a smoke extractor fan operating as a part of a fire protection system. If a fire occurs, the smoke extractor fan should operate as long as possible, even if, for example, the permissible ambient temperature of the drive is exceeded. In such applications, damage to or destruction of the device may be acceptable as collateral damage, for example, to keep other damage from occurring whose hazard potential is assessed to be more severe.

A parameter is provided to disable certain monitoring functions in such applications so that automatic error detection and automatic error responses of the device are no longer active. You must implement alternative monitoring functions for disabled monitoring functions that allow operators and/or master control systems to adequately respond to conditions which correspond to detected errors. For example, if overtemperature monitoring of the drive is disabled, the drive of a smoke extractor fan may itself cause a fire if errors go undetected. An overtemperature condition can be, for example, signaled in a control room without the drive being stopped immediately and automatically by its internal monitoring functions.

**⚠ DANGER**

**MONITORING FUNCTIONS DISABLED, NO ERROR DETECTION**

- Only use this parameter after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement alternative monitoring functions for disabled monitoring functions that do not trigger automatic error responses of the drive, but allow for adequate, equivalent responses by other means in compliance with all applicable regulations and standards as well as the risk assessment.
- Commission and test the system with the monitoring functions enabled.
- During commissioning, verify that the drive and the system operate as intended by performing tests and simulations in a controlled environment under controlled conditions.

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

To assign fault inhibit, press and hold down the ENT key for 2 s.

00
L1H
L2H
L3H
L4H
LUH

- ☐ Function inactive
- ☐ L1h: LI1 active high
- ☐ L2h: LI2 active high
- ☐ L3h: LI3 active high
- ☐ L4h: LI4 active high
- ☐ LUh: LIU active high

Following detected faults can be inhibited:
F008, F025, F028, F011, F013, F014, F015, F016, F022, F024, F027, and F030.

2 s

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

Parameter that can be modified during operation or when stopped.

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 600 - | **FAULT DETECTION MANAGEMENT MENU (continued)** | | |
| 611<br>00<br>01 | **❑ Modbus detected fault management**<br>Behaviour of the drive in the event of a communication fault with integrated Modbus.<br>☐ Fault ignored<br>☐ Freewheel stop<br>**⚠ WARNING**<br>**LOSS OF CONTROL**<br>If this parameter is set to 00, Modbus communication monitoring is disabled.<br>• Only use this setting after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.<br>• Only use this setting for tests during commissioning.<br>• Verify that communication monitoring has been re-enabled before completing the commissioning procedure and performing the final commissioning test.<br>**Failure to follow these instructions can result in death, serious injury, or equipment damage.** | | 01 |
| 612<br>00<br>01 | **❑ Degraded line supply operation**<br>Lowers the tripping threshold of the F030 fault to operate on a line supply down to 50% of nominal line voltage. In this case, a line choke must be used and the performance of the drive controller cannot be guaranteed.<br>☐ No<br>☐ Yes<br>**NOTICE**<br>**RISK OF DAMAGE TO THE DRIVE**<br>A line choke must be used when the parameter 612 is set to 01.<br>**Failure to follow these instructions can result in equipment damage.** | | 00 |
| 613<br>00<br>07 | **❑ Reset power run**<br>This function will initialize the settings in the Monitor (800 -) section, menu 900 - (page 37).<br>☐ No<br>☐ Reset fan time display | | 00 |
| 614<br>00<br>01<br>2 s | **❑ Reset all previous detected faults via Run key**<br>If this function is active and the RUN key on the equipment panel is pressed for at least 2 s, some detected faults (1) can be reset.<br>This function is only effective for 2-wire or 3-wire control.<br>If type of control 201 (page 44) = 00 and 2 wire type control 202 (page 47) = 00 and the RUN command is still valid, the drive will run the motor after the fault is reset.<br>To change the assignment of this parameter, press the ENT key for 2 s.<br>(1) These errors include: F001, F002, F006, F008, F010, F014, F015, F017, F018, F019, F020, F021, F025, F027 and F028.<br>☐ Inactive<br>☐ Active<br>**⚠ WARNING**<br>**UNANTICIPATED EQUIPMENT OPERATION**<br>If parameter 614 is set to 1, pressing the RUN key for 2 s with clear and some detected errors (1).<br>• Verify that activating this function does not result in unsafe conditions.<br>• Only use this parameter after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.<br>**Failure to follow these instructions can result in death, serious injury, or equipment damage.** | | 00 |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 700 - | **Communication menu**<br>**Note:** For following parameters, the modifications will be taken into account only at the next control power on. | | |
| 701 | ❑ **Modbus address** | OFF to 247 | OFF |
| | Modbus address is adjustable in the range oFF to 247. When oFF, communication is not active. | | |
| 702 | ❑ **Modbus baud rate** | | 19.2 |
| 24 | ☐ 4.8 kbps | | |
| 28 | ☐ 9.6 kbps | | |
| 32 | ☐ 19.2 kbps | | |
| 36 | ☐ 38.4 kbps | | |
| 703 | ❑ **Modbus format** | | 8E1 |
| 02 | ☐ 8o1 | | |
| 03 | ☐ 8E1 | | |
| 04 | ☐ 8N1 | | |
| 05 | ☐ 8N2 | | |
| 704 | ❑ **Modbus time out** | 0.1 to 30 s | 10 s |
| | The drive detects a Modbus fault if the drive does not receive a Modbus request within a predefined time period (time out). | | |
| 705 - | **Input scanner menu** (values are expressed in hexadecimal) | | |
| 705.0 | ❑ **Com scanner read address parameter 1** | | 0C81 |
| | Address of the 1st input word. | | |
| 705.1 | ❑ **Com scanner read address parameter 2** | | 219C |
| | Address of the 2nd input word. | | |
| 705.2 | ❑ **Com scanner read address parameter 3** | | 8000 |
| | Address of the 3rd input word. | | |
| 705.3 | ❑ **Com scanner read address parameter 4** | | 8000 |
| | Address of the 4th input word. | | |
| 706 - | **Output scanner menu** (values are expressed in hexadecimal) | | |
| 706.0 | ❑ **Com scanner write address parameter 1** | | 2135 |
| | Address of the 1st input word. | | |
| 706.1 | ❑ **Com scanner write address parameter 2** | | 219A |
| | Address of the 2nd input word. | | |
| 706.2 | ❑ **Com scanner write address parameter 3** | | 8000 |
| | Address of the 3rd input word. | | |
| 706.3 | ❑ **Com scanner write address parameter 4** | | 8000 |
| | Address of the 4th input word. | | |

| Code | Name/Description | Adjustment range | Factory setting |
|---|---|---|---|
| 700 - | **Communication menu (continued)** | | |
| 707 - | **Input scanner access menu** (values are expressed in hexadecimal) | | |
| 707.0 | ❑ **Com scanner read address value 1**<br>Value of the 1st input word. | | ETA value |
| 707.1 | ❑ **Com scanner read address value 2**<br>Value of the 2nd input word. | | RFRD value |
| 707.2 | ❑ **Com scanner read address value 3**<br>Value of the 3rd input word. | | 0 |
| 707.3 | ❑ **Com scanner read address value 4**<br>Value of the 4th input word. | | 0 |
| 708 - | **Output scanner access menu** (values are expressed in hexadecimal) | | |
| 708.0 ( ) | ❑ **Com scanner write address value 1**<br>Value of the 1st output word. | | CMD value |
| 708.1 ( ) | ❑ **Com scanner write address value 2**<br>Value of the 2nd output word. | | LFRD value |
| 708.2 ( ) | ❑ **Com scanner write address value 3**<br>Value of the 3rd output word. | | 0 |
| 708.3 ( ) | ❑ **Com scanner write address value 4**<br>Value of the 4th output word. | | 0 |

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

## Servicing

**⚠ ⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

Read and understand the instructions in "**Before your begin**" chapter before performing any procedure in this chapter.

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

The ATV310 does not require any preventive maintenance. However, it is advisable to perform the following checks regularly:

- Check environment and tightness of connections
- Ensure that the temperature around the unit remains at an acceptable level and that ventilation is effective. Average service life of fans: 10 years
- Remove any dust from the drive
- Ensure proper fan operation

Physical damage to covers

## Services

**NOTICE**

**RISK OF DAMAGE TO DRIVE**

Perform the following activities.

**Failure to follow these instructions can result in equipment damage.**

| Environment | Related parts | Actions | Periodicity |
|---|---|---|---|
| Product impact | Enclosure - Control panel (LED display) | Check drive display part | Once per month |
| Corrosion | Terminals - connectors - screws | Check and clean | |
| Dust | Terminals - fans - vents | | |
| Temperature | Product setting | Check and optimize | |
| Cooling | Fan | Check fan operation | |
| | | Replace fan | As required |
| Vibration | Terminal connections | Check connection torque | Once per month |

## Prolonged storage

For products that have been stored for more than 2 years, voltage should be gradually increased in product capacitors.

**NOTICE**

**RISK OF DERATED PERFORMANCE DUE TO CAPACITOR AGING**

The product capacitor performances after a long time storage above 2 years can be degraded. In that case, before using the product, apply the following procedure:

- Use a variable AC voltage supply, connected between L1 and L2 (even for ATV●●●●●N4 references).
- Increase AC supply voltage to have:
  - 80% of rated voltage for 30 min
  - 100% of rated voltage for 30 min

**Failure to follow these instructions can result in equipment damage.**

## Display menu

Use the status of the drive and its current values shown on the display menu as an aid for finding the causes of detected faults.

## Assistance with maintenance, detected fault display

If a problem arises during setup or operation, ensure that the recommendations relating to the environment, mounting and connections have been observed.

The first fault detected is stored and displayed, flashing, on the screen. The drive locks and the status relay R1 contact opens.

## Clearing the detected fault

Disconnect the drive power supply in the event of a non-resettable fault.
Wait for the display to go off completely.
Find the cause of the detected fault and correct it.
Restore power to the drive.
The detected fault will no longer be present if its cause has been corrected.
In the event of a non resettable detected fault:

- Remove/cut the power to the drive.
- WAIT 15 MINUTES to allow the DC bus capacitors to discharge, then follow the "Bus Voltage Measurement Procedure" (page 5) to verify that the DC voltage is less than 42 V. The drive LED is not an accurate indicator of the absence of DC bus voltage.
- Find and correct the detected fault.
- Restore power to the drive to confirm the detected fault has been rectified.
- **Certain detected faults can be programmed for automatic restart after the cause has disappeared.**

These detected faults can also be reset by cycling power to the drive or by means of a logic input or control bit.

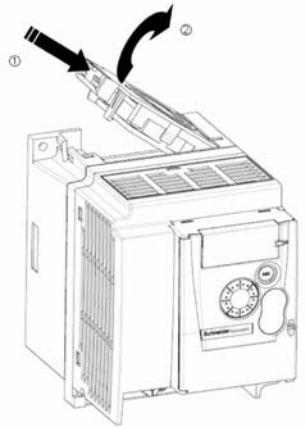
## Spares and repairs:

Serviceable product. Refer to spares replacement catalogue.

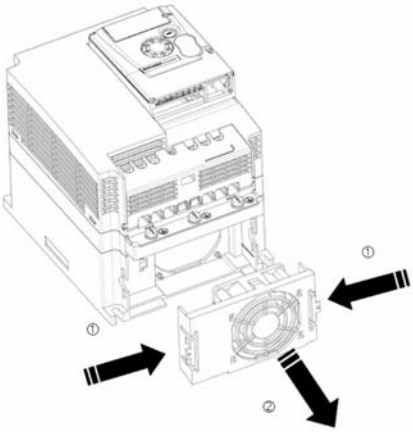
## Fan replacement

Fan spares can be ordered for the ATV310. Contact the Schneider Electric Customer Care Center for details.

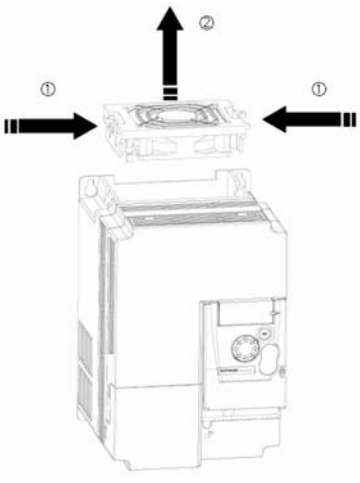
① Grasp the protruding part of fan bayonet mount ② Uncouple the connected parts and remove the fan




ATV310HU15N4
ATV310HU22N4




ATV310HU30N4
ATV310HU40N4
ATV310HU55N4




ATV310HU75N4
ATV310HD11N4

## Drive does not start, no error code displayed

- If the display does not light up, check the power supply to the drive (ground and input phase connections, see page 18).
- The assignment of the "Fast stop" or "Freewheel" functions will prevent the drive starting if the corresponding logic inputs are not powered up. The ATV310 then displays SO2.1 in freewheel stop mode and --01 in fast stop mode. --00 is displayed at freewheel stop end. This is normal, since these functions are active at zero so drive can safely stop in case of wire break. Assignment of LI to be checked in the ConF/FULL/SOO-/SO2- menu.
- Make sure that the run command input(s) is activated in accordance with the selected control mode (parameters in ConF/FULL/200- menu Type of control 201 (page 44) and 2-wire type control 202 (page 47).
- If the reference channel or command channel is assigned to Modbus, the drive displays "SO2.1" freewheel stop when the power supply is connected and remains in stop mode until the communication bus sends a command.
- "RUN" key is inactive in factory setting. Adjust parameters Reference channel 1 401 (page 58) and Command channel 1 407 (page 59) to control the drive locally (ConF/FULL/400- menu). See "How to control the drive locally" (page 45).

## Fault detection codes which cannot be cleared automatically

The cause of the detected fault must be removed before resetting by cycling power to the drive.

F025 and F028 faults can also be reset remotely by means of a logic input (in ConF/FULL/600- menu, parameter Detected fault reset assignment 601 (page 87).

F007, F025 and F028 faults can be inhibited and cleared remotely by means of a logic input (parameter Detected fault inhibition assignment 610 (page 92).

| Code | Name | Possible causes | Remedy |
|---|---|---|---|
| F001 | Precharge | • Charging relay control fault or charging resistor damaged | • Turn the drive off and then back on again.<br>• Check the connections.<br>• Check the stability of the main supply.<br>• Contact local Schneider Electric representative. |
| F002 | Unknown drive rating | • Power card and stored card versions different | • Contact local Schneider Electric representative. |
| F003 | Unknown or incompatible power board | • The power card is incompatible with the control card | • Contact local Schneider Electric representative. |
| F004 | Internal serial link fault | • Communication interruption between the internal cards | • Contact local Schneider Electric representative. |
| F005 | Invalid industrialization zone | • Internal data inconsistent | • Contact local Schneider Electric representative. |
| F006 | Current measurement circuit | • Current measurement is not correct due to hardware circuit fault | • Contact local Schneider Electric representative. |
| ---- | Problem with application firmware | • Invalid application firmware update using the Multi-Loader tool | • Re-download application firmware. |
| F007 | Internal thermal sensor detected fault | • The drive temperature sensor is not operating correctly<br>• The drive is in short circuit or open | • Contact local Schneider Electric representative. |
| F008 | Internal CPU | • Internal microprocessor fault | • Turn the drive off and then back on again.<br>• Contact local Schneider Electric representative. |

## Fault detection codes that cannot be cleared automatically (continued)

| Code | Name | Possible causes | Remedy |
|---|---|---|---|
| F 0 1 0 | Overcurrent | • Parameters in the Motor control menu 3 0 0 - page 52 are not correct<br>• Inertia or load too high<br>• Mechanical locking | • Check the parameters.<br>• Check the size of the motor/drive/load.<br>• Check the state of the mechanism.<br>• Connect line motor chokes.<br>• Reduce the Switching frequency range 3 1 5 page 54.<br>• Check the ground connection of drive, motor cable and motor insolation. |
| F 0 1 8 | Motor short-circuit | • Short-circuit or grounding at the drive output<br>• Ground fault while in run state<br>• Motor switching while in run state<br>• Significant current leakage to ground while several motors are connected in parallel | • Check the cables connecting the drive to the motor and the motor insulation.<br>• Connect line motor chokes. |
| F 0 1 9 | Ground short-circuit | | |
| F 0 2 0 | IGBT short circuit | • Internal power component short circuit detected at power on | • Contact local Schneider Electric representative. |
| F 0 2 5 | Overspeed | • Instability<br>• Overspeed associated with the inertia of the application | • Check the motor.<br>• If overspeed is 10% more than Top frequency 3 0 8 (page 52) adjust this parameter if necessary.<br>• Add a braking resistor.<br>• Check the size of the motor/drive/load.<br>• Check parameters of the speed loop (gain and stability). |
| F 0 2 8 | Autotuning fault | • Motor not connected to the drive<br>• Motor phase loss<br>• Special motor<br>• Motor is rotating (being driven by the load, for example) | • Check that the motor/drive are compatible.<br>• Check that the motor is present during autotuning.<br>• If an output contactor is being used downstream, close it during auto-tuning.<br>• Check that the motor is completely stopped. |

## Fault detection codes that can be cleared with the automatic restart function, after the cause has disappeared

These faults can also be cleared by turning on and off or by means of a logic input (parameter Detected fault reset assignment 601 (page 87). F011, F013, F014, F015, F016, F022, F024 and F027 faults can be inhibited and cleared by means of a logic input [Detected fault inhibition assignment 610 (page 92)].

| Code | Name | Possible causes | Remedy |
|---|---|---|---|
| F033 | AI1 current loss | Detected if:<br>• Analog input AI1 is configured as current<br>• AI1 current scaling parameter of 0% 204.1 (page 48) is greater than 3 mA<br>• Analog input current is lower than 2 mA | • Check the terminal connection. |
| F009 | Overbraking | • Sudden braking or load inertia too high | • Increase the deceleration time.<br>• Install a module unit with a braking resistor if necessary.<br>• Check the main supply voltage to ensure it is under the maximum acceptable (20% over maximum main supply during run status). |
| F011 | Drive overheat | • Drive temperature too high | • Check the motor load, the drive ventilation and the ambient temperature. Wait for the drive to cool down before restarting. See Mounting and temperature conditions on page 12. |
| F012 | Process overload | • Process overload | • Check that drive parameters and application processes are compatible. |
| F013 | Motor overload | • Triggered by excessive motor current | • Check configuration of motor thermal protection and motor load. |
| F014 | 1 Output phase loss | • Loss of one phase on drive output | • Check the connections from the drive to the motor.<br>• If using a downstream contactor, make sure the connection, cable and contactor are right. |
| F015 | 3 Output phases loss | • Motor not connected<br>• Motor power too low, below 6% of the rated drive current<br>• Output contactor open<br>• Transient instability in the motor current | • Check the connections from the drive to the motor.<br>• Test on a low power motor or without a motor. In factory settings mode, motor phase loss detection is active Output Phase loss detection 605 page 90 = 01. To check the drive in a test or maintenance environment, without having to use a motor with the same rating as the drive, deactivate motor phase loss detection Output Phase loss detection 605 = 00.<br>• Check and optimize IR compensation 310 page 53, Rated motor voltage 304 page 52 and Rated motor voltage 305 page 52 and then perform Auto-tuning 318 page 55. |
| F016 | Main overvoltage | • Line voltage too high:<br>- At drive power on, supply is 10% over the maximum acceptable voltage level<br>- At power with no run command, 20% over maximal line supply<br>• Disturbed mains supply | • Turn Off the Drive. Check and adjust the line voltage. After line come back to nominal voltage (within tolerance) do power On.<br>If intermittent F016 code appear, set R1 assignment 205 to 01 and it can be connected to upstream protection to avoid overvoltage in the drive. In this case LO1 can be used for others drive status see page 48 |

## Fault detection codes that can be cleared with the automatic restart function, after the cause has disappeared (continued)

| Code | Name | Possible causes | Remedy |
|---|---|---|---|
| F017 | Input phase loss | • Drive incorrectly supplied or a fuse blown<br>• Failure of one phase<br>• 3-phase ATV310 used on a single-phase line supply<br>• Unbalanced load<br>• This protection only operates with the drive on load | • Check the power connection and the fuses.<br>• Use a 3-phase line supply.<br>• Disable reporting of this fault type by setting Input Phase loss detection detection 606 (page 90) to 00. |
| F021 | Load short circuit | • Short-circuit at drive output<br>• Short circuit detection at the run command or DC injection command if parameter IGBT Test 608 (page 91) is set to 01 | • Check the cables connecting the drive to the motor and the condition of motor insulation. |
| F022 | Modbus interruption | • Interrupted communication on the Modbus network | • Check the connections of communication bus.<br>• Check the time-out (parameter Modbus time out 704 page 94).<br>• Refer to the Modbus user manual. |
| F024 | HMI communication | • Communication interruption with the external display terminal | • Check the terminal connection. |
| F029 | Process underload | • Process underload<br>• Time that motor current is below the Application Underload threshold 211 (page 50) exceeds the Application underload time delay 210 (page 50) to protect the application | • Check that drive parameters and application processes are compatible. |
| F027 | IGBT overheat | • Drive overheated<br>• IGBT internal temperature is too high for the ambient temperature and load . | • Check the size of the load/motor/drive.<br>• Reduce the Switching frequency 315 page 54.<br>• Wait for the drive to cool down before restarting. |

## Fault detection codes that will be cleared as soon as their causes disappear

USF faults can be inhibited and cleared remotely by means of a logic input parameter Detected fault inhibition assignment **6 10** (page 92).

| Code | Name | Possible causes | Remedy |
|---|---|---|---|
| **F031** | Incorrect configuration | • HMI block replaced by an HMI block configured on a drive with a different rating<br>• The current configuration of customer parameters is inconsistent | • Return to factory settings or retrieve the backup configuration, if it is valid.<br>• If the fault remains after reverting to the factory settings, contact your local Schneider Electric representative. |
| **F032** (1) | Invalid configuration | • Invalid configuration<br>The configuration loaded in the drive via the bus or communication network is inconsistent.<br>The configuration upload has been interrupted or is not fully finished | • Check the configuration loaded previously.<br>• Load a compatible configuration. |
| **F030** | Undervoltage | • Line supply too low<br>• Transient voltage dip | • Check the voltage and parameters on the Undervoltage phase loss menu **607-** (page 91). |

(1) When the CFI is present in the previous fault menu, it means the configuration has been interrupted or is not fully finished.

## Some detected faults that are reset by pressing the RUN key

See Reset all previous detected faults via Run key **F614** parameter (page 93).

### HMI block changed

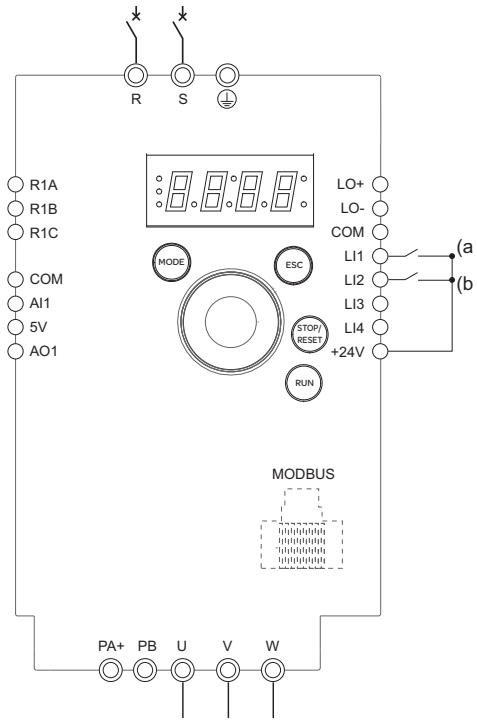
When an HMI block is replaced by an HMI block configured on a drive with a different rating, the drive locks in Incorrect configuration **F031** fault mode on power-up. If the card has been deliberately changed, the fault can be cleared by returning to factory setting.

## Fault detection codes displayed on the remote display terminal

| Code | Name | Description |
|---|---|---|
| init: | Auto-initialization on start | • Macro controller initialization<br>• Searching communication configuration |
| CoM.E (1) | Communication error | • 50 ms time out error<br>• This message appears after 220 retry attempts |
| A - 17 (1) | Key alarm | • Key pressed down for longer than 10 seconds<br>• Membrane switch disconnected<br>• Display terminal woken up while a key is being pressed |
| clr (1) | Confirm fault reset | • This message appears if the STOP key is pressed while the display terminal is displaying a fault |
| dEv.E (1) | Drive mismatch | • Drive type (brand) does not match display terminal type (brand) |
| roM.E **(1)** | ROM abnormality | • ROM abnormality detected by checksum calculation |
| rAM.E (1) | RAM abnormality | • Display terminal RAM abnormality detected |
| CPu.E (1) | Other fault | • The other detected fault |

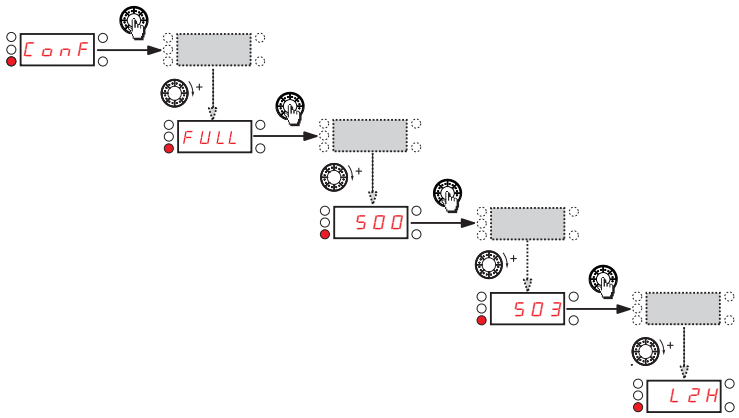
(1) Flashing

## 2-wire type control (source)



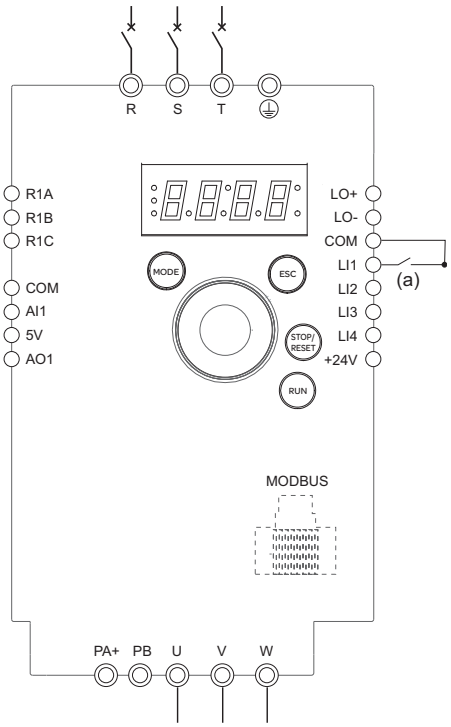

(a): Run Forward (b): Run Reverse

1. Connect the ground terminal to the grounding screws located below the output terminals.
2. Connect the power terminals.
3. Connect the logic inputs.
4. Turn on the drive without giving a run command.
5. Assign factory settings to the drive, i.e. Factory / recall customer parameter set `102` (page 42) = `64`.
6. Set the motor parameters (in COnF mode) only if the factory configuration of the drive is not suitable.
7. Perform an auto-tuning.
8. Set parameter Reverse direction `503` (page 62) to `L i2H`.



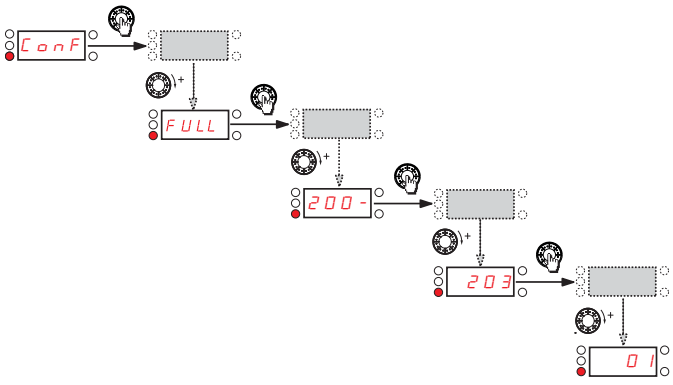

9. Start

## 2-wire control (sink)



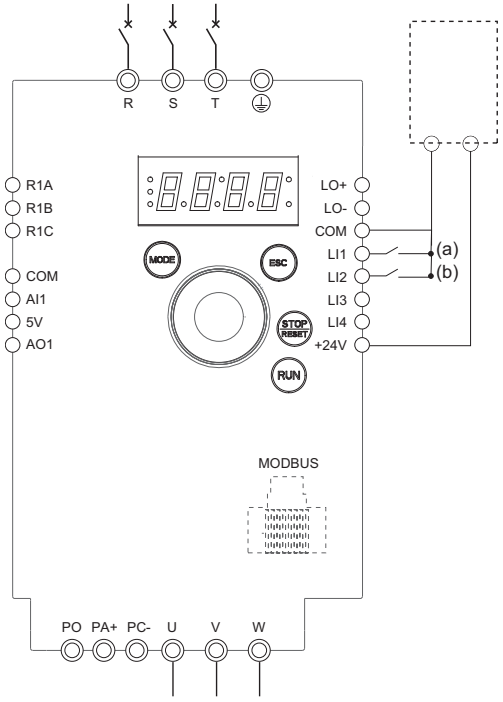

(a): Run Forward

1. Connect the ground terminal to the grounding screws located below the output terminals.
2. Connect the power terminals.
3. Connect the logic inputs.
4. Turn on the drive without giving a run command.
5. Assign factory settings to the drive, i.e. Factory / recall customer parameter set `102` (page 42) = `64`.
6. Set `201` to `00` (see page 44).
7. Set the motor parameters (in `COnF` mode) only if the factory configuration of the drive is not suitable.
8. Perform an auto-tuning.
9. Set parameter Logic inputs type `203` (page 47) to `01`.



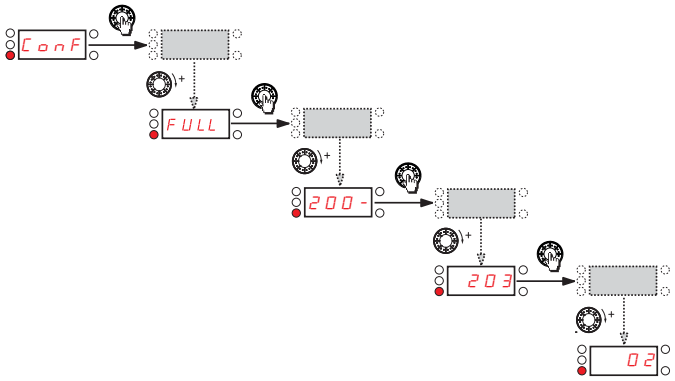

10. Start

## 3-wire control (sink)



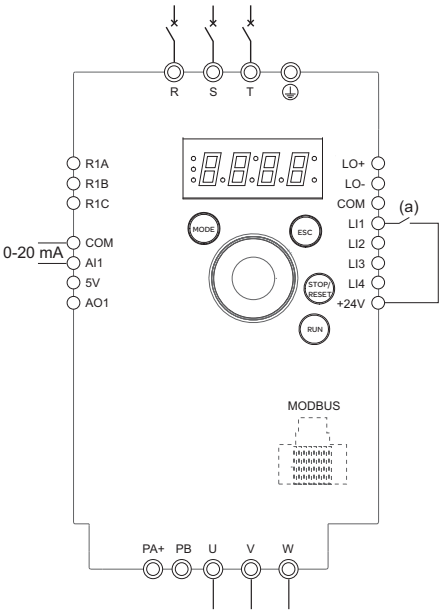

(a): Run Forward (b): Run Reverse

1. Connect the ground terminal to the grounding screws located below the output terminals.
2. Connect the power terminals.
3. Connect the logic inputs.
4. Turn on the drive without giving a run command.
5. Assign factory settings to the drive, i.e. Factory / recall customer parameter set `102` (page 42) = `64`.
6. Set `201` to `01` (see page 44).
7. Set the motor parameters (in `conF` mode) only if the factory configuration of the drive is not suitable.
8. Perform an auto-tuning.
9. Set parameter Logic inputs type `203` (page 47) to `02`.



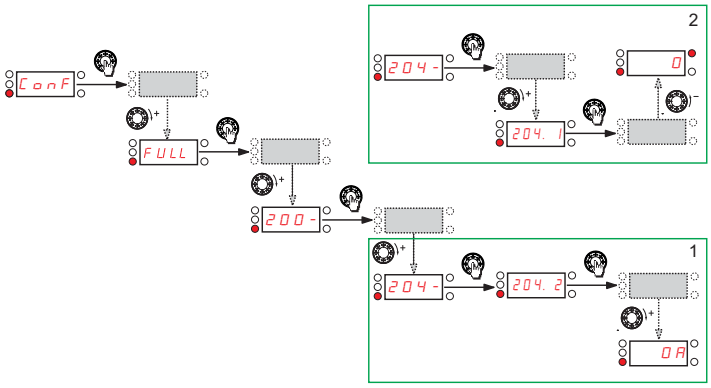

10. Start

## Speed control 0-20 mA (source)



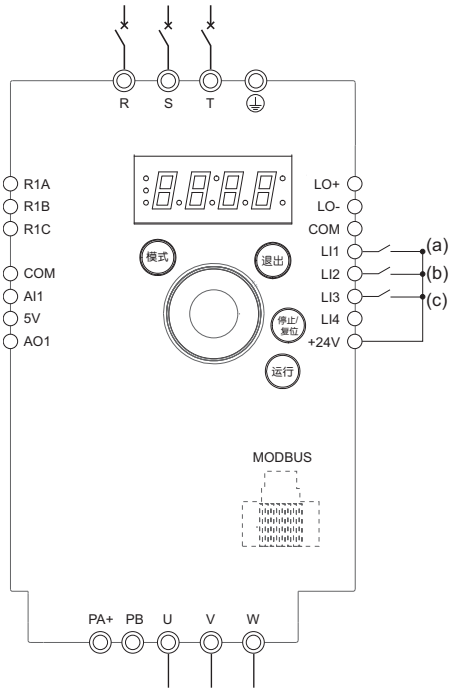

(a) Run Forward

1. Connect the ground terminal to the grounding screws located below the output terminals.
2. Connect the power terminals.
3. Connect the logic input LI1 and analog input AI1.
4. Turn on the drive without giving a run command.
5. Assign factory settings to the drive, i.e. Factory / recall customer parameter set `102` (page 42) = `64`.
6. Set the motor parameters (in `conF` mode) only if the factory configuration of the drive is not suitable.
7. Perform an auto-tuning.
8. Set AI1 type `204.0` (page 48) to `0A`, AI1 current scaling parameter of 0% `204.1` (page 48) to 0 A.
   Check that AI1 current scaling parameter of 100% `204.2` (page 48) is set to 20 mA.




9. Start

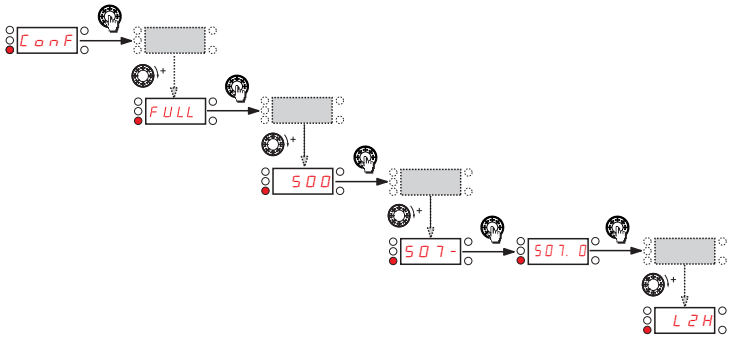
# 4 preset speeds (source)



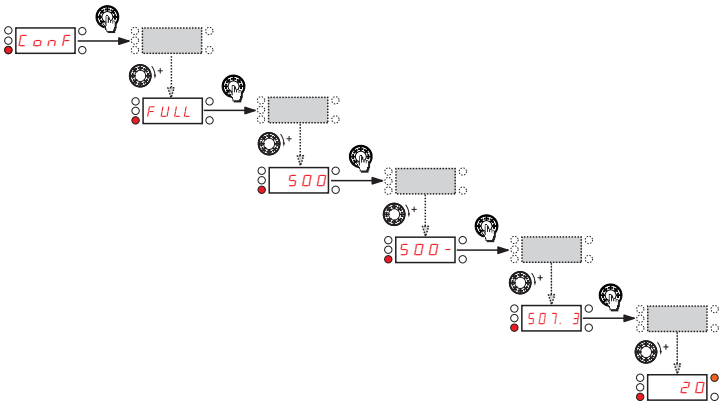

(a): Run Forward
(b): 2 preset speeds (c): 4 preset speeds

**Important**: Please refer to Function compatibility table (page 32).

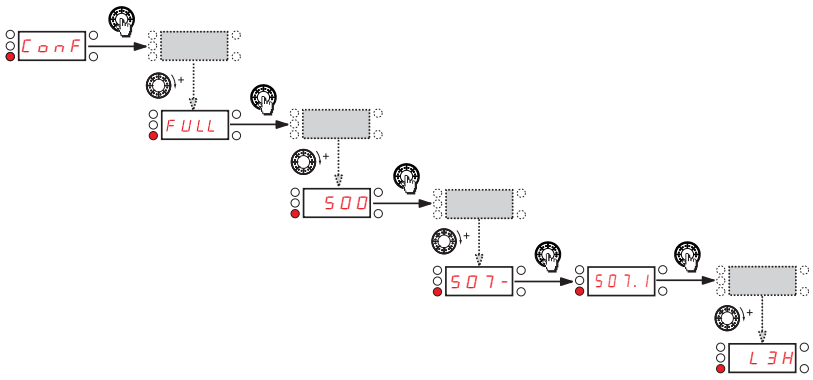
1. Connect the ground terminal to the grounding screws located below the output terminals.
2. Connect the power terminals.
3. Connect the logic inputs.
4. Turn on the drive without giving a run command.
5. Assign factory settings to the drive, i.e. Factory / recall customer parameter set `102` (page 42) = `64`.
6. Set the motor parameters (in COnF mode) only if the factory configuration of the drive is not suitable.
7. Perform an auto-tuning.
8. Set 2 preset speeds `507.0` (page 72) to `L2H`.



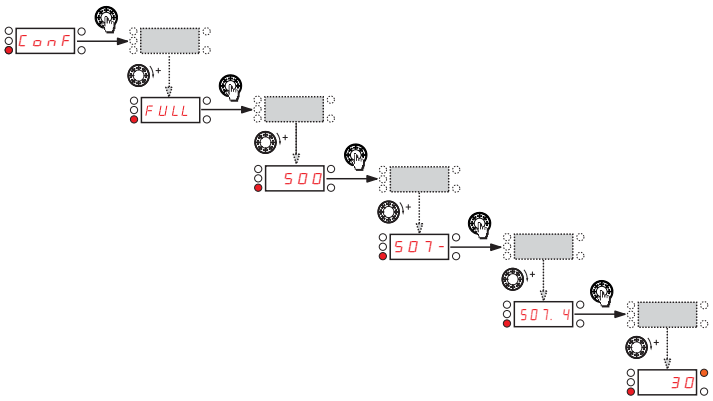

9. Set Preset speed 2 `507.3` (page 72) to 20 Hz.




Set preset speed 4 `507.1` (page 72) to `L3H`.

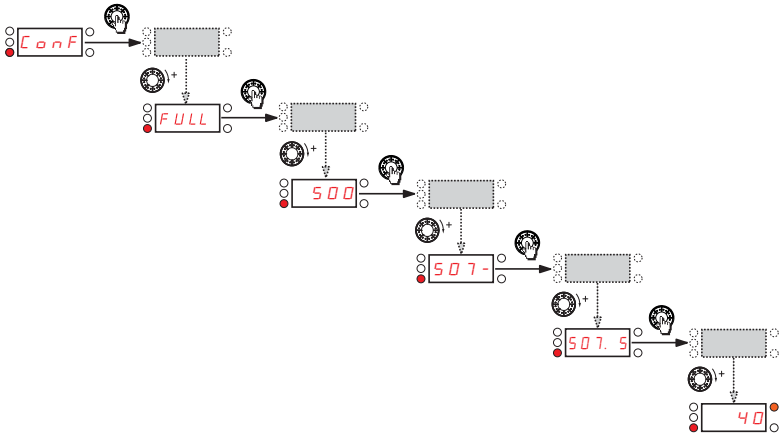


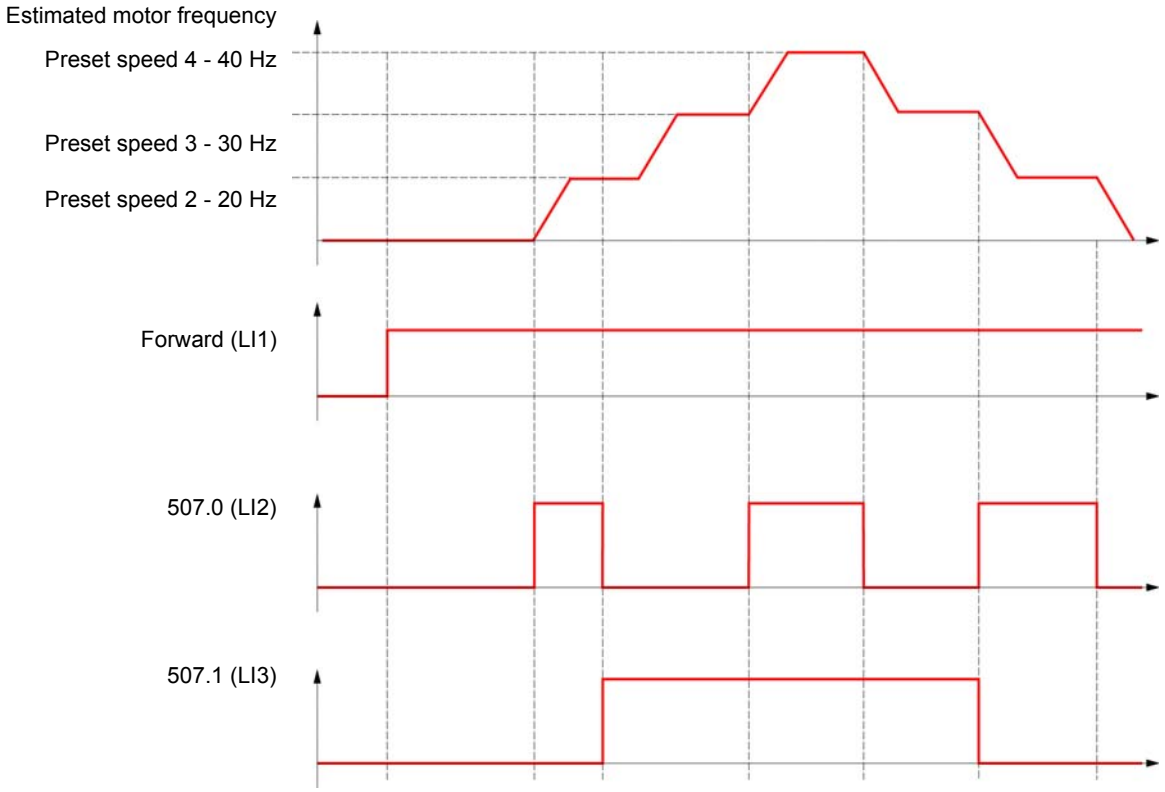
Set Preset speed 3 507.4 (page 72) to 30 Hz.



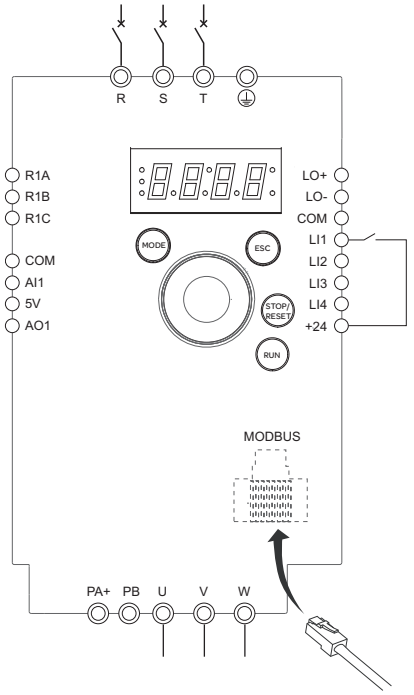
## 4 preset speeds (source) continued

Set Preset speed 4 507.5 (page 72) to 40 Hz.



# Terminal command channel and Modbus reference channel

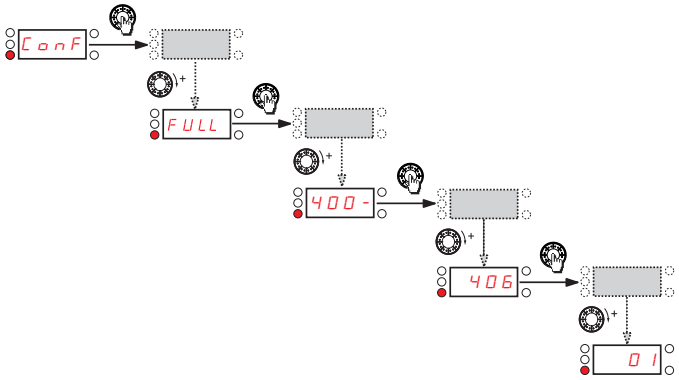



(a): Run Forward

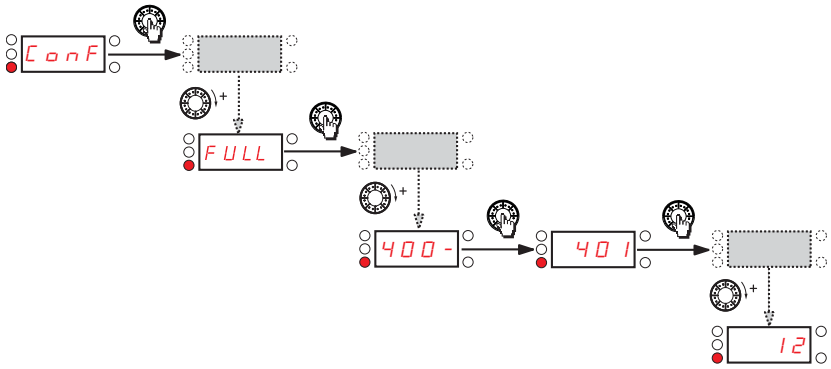
(a)

**Important**: Please refer to the Function compatibility table (page 32).

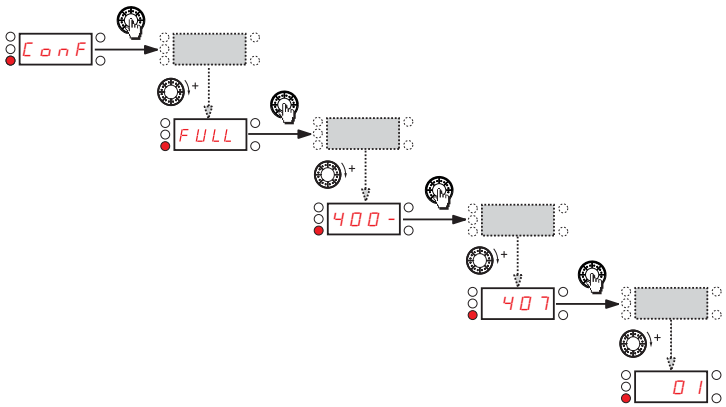
1. Connect the ground terminal to the grounding screws located below the output terminals.
2. Connect the power terminals.
3. Connect the logic input LI1 and plug RJ45 cable connector to the Modbus socket.
4. Turn on the drive without giving a run command.
5. Assign factory settings to the drive, i.e. set Factory / recall customer parameter set 102 (page 42) to 64.
6. Set the motor parameters (in COnF mode) only if the factory configuration of the drive is not suitable.
7. Perform an auto-tuning.
8. Set Channel configuration 406 (page 58) to 01.




Set Reference channel 1 401 (page 58) to 12.




Check that Command channel 1 407 (page 59) is set to 01.




9. Start

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| 501.4 | 61<br>68 | Acceleration 2 | s | 0.0 to<br>999.9 | - | 5 s | |
| 501.0 | 60 | Acceleration | s | 0.0 to<br>999.9 | - | 3.0 s | |
| 504.0 | 63 | Automatic DC injection | | 00<br>01<br>02 | No<br>Yes<br>Continuous | Yes | |
| 701 | 94 | Modbus address | | oFF to 247 | - | Off | |
| 403 | 33<br>35<br>58 | Analog input virtual | % | 0 to 100 | - | - | |
| 216.0 | 51 | AO1 assignment | | 00<br>129<br>130<br>131<br>135<br>136<br>137<br>139<br>140<br>141 | None<br>Motor current<br>Estimated motor frequency<br>Ramp output<br>PID reference value<br>PID feedback<br>PID error<br>Output power<br>Motor thermal state<br>Drive thermal state | 00 | |
| 216.1 | 51 | AO1 type | | 10u<br>oA<br>4A | Voltage<br>Current<br>Current | 0A | |
| 217 | 51 | Reference Template | | 00<br>02 | Standard<br>Deadband | 00 | |
| 602.0 | 87 | Automatic restart | | 00<br>01 | No<br>Yes | 00 | |
| 301 | 52 | Standard motor frequency | Hz | 00<br>01 | - | 50 Hz | |
| 501.6 | 61 | Decel Ramp Adaptation assignment | | 00<br>01<br>02 | No<br>Yes<br>Motor braking | Yes | |
| 907 | 37 | Card 1 Software Version | - | - | - | - | - |
| 908 | 37 | Card 2 Software Version | - | - | - | - | - |
| 407 | 59 | Command channel 1 | | 01<br>02<br>03<br>10 | Terminals<br>Local<br>Remote display<br>Modbus | | |
| 100 | 43 | Macro-configuration | - | - | - | - | - |
| 406 | 58 | Channel configuration | | 01<br>02 | Simultaneous mode<br>Separate mode | 01 | |
| 511.1 | 84 | CURRENT LIMITATION MENU | A | 0.25 to 1.5 | - | 1.5 In | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| S I I.2 | 84 | Current limitation 2 | A | 0.25 to I.5 | - | 1.5 In | |
| 999 | 40 | HMI Password | - | oFF<br>on | Password disabled<br>Password activated | OFF | |
| 9 I 3 | 38 | Modbus communication status | - | rOtO<br>rot I<br>r ItO<br>r It I | - | - | |
| 303 | 52 | Rated motor cos phi | - | 0.5 to I | - | Determined by drive rating | |
| 204.2 | 48 | AI1 current scaling parameter of 100% | mA | 0 to 20 | - | 20 mA | |
| 204.3 | 48 | AI1 filter | s | 0 to I0 | - | 0 s | |
| CrL I | 48 | AI1 current scaling parameter of 0% | mA | 0 to 20 | - | 0 s | |
| 2 I4 | 50 | Motor current threshold | In | 0 to I.5 | - | InV | |
| 309 | 52 | Motor control type | - | 00<br>03<br>06 | Standard<br>High performance<br>Pump | 00 | |
| S02.3 | 62 | Ramp divider | | I to I0 | - | 4 | |
| S0 I.5 | 61 | Deceleration 2 | s | 0.0 to 999.9 | - | 5 s | |
| 9 I4 | 38 | Last fault 1 | - | See page 103 | | - | - |
| 9 I6 | 39 | Last fault 2 | - | See page 103 | | - | - |
| 9 I8 | 39 | Last fault 3 | - | See page 103 | | - | - |
| 920 | 39 | Last fault 4 | - | See page 103 | | - | - |
| 6 I2 | 93 | Degraded line supply operation | | 00<br>0 I | No<br>Yes | 00 | |
| 9 I5 | 39 | State of drive at fault 1 | - | - | - | - | - |
| 9 I7 | 39 | State of drive at fault 2 | - | - | - | - | - |
| 9 I9 | 39 | State of drive at fault 3 | - | - | - | - | - |
| 92 I | 39 | State of drive at fault 4 | - | - | - | - | - |
| I02 | 42 | Factory / recall customer parameter set | - | 00<br>64<br>02 | No<br>REC<br>IN<br>INI | 00 | |
| 3 I3 | 53 | Frequency loop gain | % | 0 to I00 | - | 20% | |
| 408 | 59 | Forced local assignment | | 00<br>L IH<br>L2H<br>L3H<br>L4H | No<br>L1h<br>L2h<br>L3h<br>L4h | 00 | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| 409 | 59 | Forced local reference | | 00<br>01<br>163<br>183 | None<br>Terminal<br>HMI<br>Jog Dial | 00 | |
| 603 | 88 | Catch on the fly | | 00<br>01 | No<br>Yes | 00 | |
| 401 | 58 | Reference channel 1 | | 01<br>163<br>164<br>183 | Terminal<br>HMI<br>Modbus<br>Jog Dial | 01 | |
| 801 | 33 | Speed reference | | 01<br>163<br>164<br>183 | Terminal<br>HMI<br>Modbus<br>Jog Dial | | |
| 306 | 52 | Rated motor frequency | Hz | 10 to 400 | - | 50 or 60 Hz (301) | |
| 502.2 | 62 | Fast stop assignment | | 00<br>L1L<br>L2L<br>L3L<br>L4L | NONE<br>L1L: LI1 active low<br>L2L: LI2 active low<br>L3L: LI3 active low<br>L4L: LI4 active low | 00 | |
| 213 | 50 | Motor frequency threshold | Hz | 0 to 400 | - | 50 or 60 Hz | |
| 911 | 38 | Fan time display | | 0.01 to 999 | - | - | - |
| 512.2 | 86 | High speed | Hz | 512.0 to 308 | - | 50 Hz | |
| 512.5 | 86 | High speed 2 | Hz | 512.0 to 308 | - | 50 or 60 Hz determined by 301 and max. 308 | |
| 512.6 | 86 | High speed 3 | Hz | As 512.5 | As HS2 | As 512.5 | |
| 512.7 | 86 | High speed 4 | Hz | As 512.5 | As HS2 | As 512.5 | |
| 903 | 37 | Display of high speed value | - | - | - | - | - |
| 610 | 92 | Detected fault inhibition assignment | | 00<br>L1H<br>L2H<br>L3H<br>L4H | NONE<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI3 active high<br>L4h: LI4 active high | 00 | |
| 606 | 90 | Input Phase loss | - | 00<br>01 | No<br>Yes | Yes | |
| 604 | 90 | Motor thermal current | A | 0.2 to 1.5 | - | Determined by drive rating | |
| 505 | 64 | Jog assignment | | 00<br>L1H<br>L2H<br>L3H<br>L4H | None<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI2 active high<br>L4h: LI4 active high | 00 | |
| 508 | 72 | Skip frequency | Hz | 0 to 400 | - | 0 Hz | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| 511.0 | 84 | 2nd current limitation commutation | | 00<br>L1H<br>L2H<br>L3H<br>L4H<br>L1L<br>L2L<br>L3L<br>L4L | NONE<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI3 active high<br>L4h: LI4 active high<br>L1L: LI1 active low<br>L2L: LI2 active low<br>L3L: LI3 active low<br>L4L: LI4 active low | 00 | |
| 803 | 35 | Motor current | A | - | - | - | - |
| 609 | 91 | 4-20mA loss Behaviour | | 00<br>01 | 00<br>01 | 00 | |
| 402 | 35<br>58 | External reference value | - | -400 to 400 | - | 0 | |
| 901 | 37 | State of logic inputs LI1 to LI4 | - | - | - | - | - |
| 208 | 49 | Application Overload threshold | % of In | 70 to 150 | - | 90 % | |
| 902 | 37 | State of the logic output LO1 and relay R1 | - | - | - | - | - |
| 512 | 85 | Low speed | Hz | 0 to 512.2 | - | 0 Hz | |
| 211 | 50 | Application Underload threshold | % of In | 20 to 100 | - | 60 % | |
| 319 | 55 | Motor parameter choice | - | 00<br>01 | 00<br>01 | 00 | |
| 604.3 | 90 | Motor thermal state memo | - | 00<br>01 | 00<br>01 | nO | |
| 708.0 | 95 | Com scanner write address value 1 | | | | | |
| 708.1 | 95 | Com scanner write address value 2 | | | | | |
| 708.2 | 95 | Com scanner write address value 3 | | | | | |
| 708.3 | 95 | Com scanner write address value 4 | | | | | |
| 706.0 | 94 | Com scanner write address parameter 1 | | | | 2135 | |
| 706.1 | 94 | Com scanner write address parameter 2 | | | | 219 A | |
| 706.2 | 94 | Com scanner write address parameter 3 | | | | 0 | |
| 706.3 | 94 | Com scanner write address parameter 4 | | | | | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| 305 | 52 | Rated motor current | A (1) | 0.25 to 1.5 | - | Determined by drive rating | |
| 904 | 37 | Drive Power rating | | | | | |
| 707.0 | 95 | Com scanner read address value 1 | | | | | |
| 707.1 | 95 | Com scanner read address value 2 | | | | | |
| 707.2 | 95 | Com scanner read address value 3 | | | | | |
| 707.3 | 95 | Com scanner read address value 4 | | | | | |
| 705.0 | 94 | Com scanner read address parameter 1 | - | | | 0C81 | |
| 705.1 | 94 | Com scanner read address parameter 2 | - | | | 219C | |
| 705.2 | 94 | Com scanner read address parameter 3 | - | | | 0 | |
| 705.3 | 94 | Com scanner read address parameter 4 | - | | | 0 | |
| 203 | 47 | Logic inputs type | - | 00<br>01<br>02 | Positive<br>Negative internal supply<br>Negative external supply | 00 | |
| 302 | 52 | Rated Motor Power | kW or HP | - | - | Determined by drive rating | |
| 317 | 54 | Motor noise reduction | | 00<br>01 | No<br>Yes | 00 | |
| 307 | 52 | Rated motor speed | rpm | 0 to 32767 | - | Determined by drive rating | |
| 502.1 | 62 | Freewheel stop assignment | | 00<br>L1L<br>L2L<br>L3L<br>L4L | No<br>L1L: LI1 active low<br>L2L: LI2 active low<br>L3L: LI3 active low<br>L4L: LI4 active low | 00 | |
| 604.2 | 90 | Overload fault management | - | 00<br>01 | No<br>Yes | Yes | |
| 605 | 90 | Output Phase loss | - | 00<br>01 | No<br>Yes | Yes | |
| 810 | 35 | Output power | % | - | - | - | - |
| 59.17 | 68 | PID auto/manual assignment | | 00<br>L1H<br>L2H<br>L3H<br>L4H | No<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI3 active high<br>L4h: LI4 active high | 00 | |
| 912 | 38 | | 0.01 | - | - | - | - |
| 314 | 54 | Flux Profile | % | 0 to 100 | | 20% | |
| 59.16 | 68 | PID correction reverse | - | 00<br>01 | No<br>Yes | 00 | |

(1) In = rated drive current

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| 59.00 | 66 | PID feedback assignment | | 00<br>01 | None<br>Terminal | 00 | |
| 59.05 | 66 | Activation internal PID reference value | | 00<br>01 | No<br>Yes | 00 | |
| 59.18 | 68 | PID manual reference | | 00<br>01<br>02 | No<br>Terminal<br>AIV | 00 | |
| 59.06 | 66 | 2 preset PID assignment | - | 00<br>LI1H<br>LI2H<br>LI3H<br>LI4H | None<br>L1h<br>L2h<br>L3h<br>L4h | 00 | |
| 59.07 | 67 | 4 preset PID assignment | | 59.06 | As 59.06 | 00 | |
| 59.12 | 67 | PID reference value ramp | s | 0 to 99.9 | - | 0 s | |
| 507.0 | 72 | 2 preset speeds | | 00<br>LI1H<br>LI2H<br>LI3H<br>LI4H | None<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI2 active high<br>L4h: LI4 active high | 00 | |
| 507.1 | 72 | 4 preset speeds | | 507.0 | As 507.0 | 00 | |
| 507.2 | 72 | 8 preset speeds | | 507.0 | As 507.0 | 00 | |
| 405 | 58 | Stop key priority | | 00<br>01 | No<br>Yes | Yes | |
| 910 | 38 | Power On time display | | 0.01 to 999 | - | - | - |
| 205 | 48 | R1 assignment | - | 00<br>01<br>02<br>04<br>05<br>06<br>07<br>08<br>21<br>22<br>123 | Not assigned<br>No error detected<br>Drive run<br>Frequency threshold reached<br>512.2 reached<br>I threshold reached<br>Frequency reference reached<br>Motor thermal state reached<br>Underload alarm<br>Overload alarm<br>AI1 AI. 4-20 | 01 | |
| 59.03 | 66 | PID derivative gain | | 0.00 to 100.00 | - | 0.00 | |
| 802 | 35 | Output frequency | Hz | - | - | - | |
| 59.02 | 66 | PID integral gain | | 0.01 to 100 | - | 1 | |
| 404 | 58 | Reverse inhibition | | 00<br>01 | No<br>Yes | 00 | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| S9.08 | 67 | 2 preset PID reference value | % | 0 to 100 | - | 25% | |
| S9.09 | 67 | 3 preset PID reference value | % | 0 to 100 | - | 50% | |
| S9.10 | 67 | 4 preset PID reference value | % | 0 to 100 | - | 75% | |
| 806 | 35 | PID reference | - | - | - | - | - |
| 804 | 35 | PID error | - | - | - | - | - |
| 805 | 35 | PID feedback | - | - | - | - | - |
| S9.01 | 66 | PID proportional gain | | 0.01 to 100 | - | 1 | |
| S9.14 | 67 | PID max value reference | % PID | 0 to 100 | - | 100% | |
| S9.11 | 67 | Internal PID reference value | % PID | 0 to 100 | - | 0% | |
| S9.13 | 67 | PID min value reference | % PID | 0 to 100 | - | 0% | |
| 613 | 93 | Reset power run | | 00<br>01 | Function inactive<br>Reset fan time display | 00 | |
| S01.3 | 60 | Ramp switching commutation | | 00<br>L1H<br>L2H<br>L3H<br>L4H<br>L1L<br>L2L<br>L3L<br>L4L | None<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI3 active high<br>L4h: LI4 active high<br>L1L: LI1 active low<br>L2L: LI2 active low<br>L3L: LI3 active low<br>L4L: LI4 active low | 00 | |
| S01.2 | 60 | Ramp shape assignment | | 00<br>01<br>02 | Linear<br>S-shape<br>U-shape | 00 | |
| S03 | 62 | Reverse direction | - | 00<br>L1h<br>L2H<br>L3H<br>L4H | Function inactive<br>L1h active high<br>L2h active high<br>L3h active high<br>L4h active high | 00 | |
| 601 | 87 | Detected fault reset assignment | - | 00<br>L1H<br>L2H<br>L3H<br>L4H | None<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI3 active high<br>L4h: LI4 active high | 00 | |
| S9.19 | 69 | PID: wake up level | % | 0 to 100 | - | 0% | |
| 909 | 38 | Run elapsed time display | 0.01h | 0.01 to 999 | - | - | - |
| 101 | 42 | Store customer parameter set | - | 00<br>01 | No<br>Yes | 00 | |
| S04.1 | 63 | Automatic DC injection current | A | 0 to 1.2 | | 0.7 A | |
| 315 | 54 | Switching frequency | kHz | 2 to 16 | - | 12 | |
| S9.15 | 67 | PID predictive speed | - | no to 400 | - | 00 | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| S12.3 | 86 | 2 High speed assignment | - | 00<br>L1H<br>L2H<br>L3H<br>L4H | None<br>L1h: LI1 active high<br>L2h: LI2 active high<br>L3h: LI3 active high<br>L4h: LI4 active high | 00 | |
| S12.4 | 86 | 4 High speed assignment | - | As S12.3 | As S12.3 | 00 | |
| 611 | 93 | Modbus detected fault management | | 00<br>01 | No<br>Yes | Yes | |
| 311 | 53 | Slip compensation | % of nSL | 0 to 150 | - | 100% | |
| S07.3 | 72 | Preset speed 2 | - | - | - | - | - |
| S07.4 | 72 | Preset speed 3 | - | - | - | - | - |
| S07.5 | 72 | Preset speed 4 | - | - | - | - | - |
| S07.6 | 72 | Preset speed 5 | Hz | 0 to 400 | - | 25 Hz | |
| S07.7 | 72 | Preset speed 6 | Hz | 0 to 400 | - | 30 Hz | |
| S07.8 | 72 | Preset speed 7 | Hz | 0 to 400 | - | 35 Hz | |
| S07.9 | 72 | Preset speed 8 | Hz | 0 to 400 | - | 40 Hz | |
| 906 | 37 | Specific Product Number | - | - | - | - | - |
| 312 | 53 | Frequency loop stability | % | 0 to 100 | - | 20% | |
| 811 | 36 | Product status | - | - | - | - | - |
| 607.1 | 91 | Undervoltage prevention | - | 00<br>02 | No<br>Ramp stop | 00 | |
| 607.2 | 91 | Undervoltage ramp deceleration time | s | 0.0 to 10.0 | - | 1.0 s | |
| 607.3 | 91 | Precharge resistor protection level | Vdc | 430 to 560 | - | 0 V with protection removed | |
| 608 | 91 | IGBT Test | | 00<br>01 | No<br>Yes | 00 | |
| S02.0 | 62 | Type of stop | | 00<br>01<br>02 | Ramp stop<br>Fast stop<br>Freewheel stop | 00 | |
| 602.1 | 87 | Max. automatic restart | | 0<br>1<br>2<br>3<br>4<br>5<br>6 | 5 min.<br>10 min.<br>30 min.<br>1 hr<br>2 hr<br>3 hr<br>Infinite | 5 min. | |
| 702 | 94 | Modbus baud rate | | 24<br>28<br>32<br>36 | 4.8 kbps<br>9.6 kbps<br>19.2 kbps<br>38.4 kbps | 19.2 kbps | |
| 201 | 44 | Type of control | - | 00<br>01 | 2 wire type control<br>3-wire control | 00 | |
| 202 | 47 | 2-wire type control | - | 00<br>01<br>02 | 0/1 level<br>Transition<br>Priority FW | 00 | |

| Code | Page | Name | Unit | Possible value / Function | | Factory setting | User setting |
|---|---|---|---|---|---|---|---|
| 504.2 | 63 | Automatic DC injection time | s | 0.1 to 30 | | 0.5 s | |
| 703 | 94 | Modbus format | - | 00<br>01<br>02<br>03 | 8o1<br>8E1<br>8n1<br>8n2 | 8E1 | |
| 308 | 52 | Maximum frequency | Hz | 10 to 400 | | 60 or 72 Hz (to 301) | |
| 809 | 35 | Drive thermal state | - | - | - | - | - |
| 808 | 35 | Motor thermal state | % | - | - | - | - |
| 604.1 | 90 | Motor protection type | - | 01<br>02 | Self-ventilated<br>Motor-ventilated | ACL | |
| 512.1 | 68<br>85 | Low speed operating time | s | 0.1 to 999.9 | - | nO | |
| 207 | 49 | Application Overload time delay | s | 0 to 100 | - | 5 s | |
| 215 | 50 | Motor thermal state threshold | % of tHr | 0 to 118 | | 100% | |
| 704 | 94 | Modbus time out | - | 0.1 to 30 | - | 10 | |
| 318 | 55 | Auto-tuning | - | 00<br>01<br>02 | No<br>Yes<br>Complete | 00 | |
| 310 | 53 | IR compensation | % | 25 to 200 | - | 100% | |
| 807 | 35 | Main voltage | V | - | - | - | - |
| 210 | 50 | Application underload time delay | s | 0 to 100 | - | 5 s | |
| 304 | 52 | Rated motor voltage | V | 100 to 480 | - | 230 V | |
| 59.20 | 69 | PID: Wake up threshold | % | 0 to 100 | - | 0 | |
| 607.0 | 91 | Undervoltage detected fault management | - | o<br>1 | Detected fault + R1 open<br>Detected fault + R1 closed | 0 | |
| 905 | 37 | Drive voltage rating | - | oo | - | - | - |
| 614 | 93 | Reset all previous detected faults via Run key | - | oo<br>o1 | Inactive<br>Active | oo | - |

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