# Altivar 12

# Variable speed drives for asynchronous motors

# **User manual**

07/2018





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

No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying, without express written permission of Schneider Electric.

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

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

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

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

© 2013 Schneider Electric. All rights reserved.

# **Contents**

Contents	3
Important information	4
Before you begin	5
Documentation structure	7
Software enhancements	8
Steps for setting up (also refer to Quick Start)	9
Setup - Preliminary recommendations	
Drive ratings	11
Dimensions and weights	12
Mounting	13
Wiring	16
Power terminals	20
Control terminals	23
Check list	29
Factory configuration	30
Basic functions	31
Programming	32
Structure of parameter tables	35
Function compatibility table	36
Reference Mode rEF	37
Monitoring mode MOn	38
Configuration Mode ConF	44
Configuration Mode - MyMenu	45
Configuration Mode - Complete menu (FULL)	47
Maintenance	100
Migration ATV11 - ATV12	101
Diagnostics and Troubleshooting	108
Application notes	114
Short-circuit rating and branch circuit protection	120
Organization tree	121
Parameter index	122



#### Energy savings

Speed control process regulating enables significant energy savings, particulary with pump and fan applications. Furthermore some ATV12 functions enable to enhance these savings: [Motor control type] (£ £ £) page 57, [Sleep/wake] (£ £ 5) page 74 and [PID feedback assignment] (P , F) page 72.

# Important information

#### **NOTICE**

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



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



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

# **A** 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.

# **A** 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 portion 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.

© 2013 Schneider Electric. All Rights Reserved.

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

# **A** A 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 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.

Failture to follow these instructions will result in death or seirious injury.

# **A** DANGER

#### UNINTENDED EQUIPMENT OPERATION

- Read and understand this manual before installing or operating the Altivar 12 drive.
- Any changes made to the parameter settings must be performed by qualified personnel.

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

# **A WARNING**

#### **DAMAGED DRIVE EQUIPMENT**

Do not operate or install any drive or drive accessory that appears damaged.

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

# **A** 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.<sup>a</sup>
- · 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."

# **A** CAUTION

#### **INCOMPATIBLE LINE VOLTAGE**

Before turning on and configuring the drive, ensure that the line voltage is compatible with the supply voltage range shown on the drive nameplate. The drive may be damaged if the line voltage is not compatible.

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

#### Using motors in parallel

Set Motor control type [ L L page 57] to 5 L d.

# NOTICE

#### **RISK OF DAMAGE TO THE MOTOR**

Motor thermal protection is no longer provided by the drive. Provide an alternative means of thermal protection on every motor

Failure to follow these instructions can result in equipment damage

#### **Documentation structure**

The following Altivar 12 technical documents are available on the Schneider Electric website (www.schneider-electric.com).

#### ATV12 Quick Start Guide (\$1A56146)

The Quick Start describes how to wire and configure the drive to start motor quickly and simply for simple applications. This document is delivered with the drive with an Annex (S1A58684) for Short Circuit Current Ratings (SCCR) and branch circuit protection.

#### ATV12 User manual (BBV28581)

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

#### ATV12 Modbus Communication manual (BBV28590)

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).

#### **ATV12P Installation manual (BBV28587)**

This manual describes how to install the drive ATV12 baseplate following the conditions of acceptability.

### ATV12 Parameters description file (BBV51917)

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.

#### Software enhancements

Since it was first marketed, the Altivar ATV 12 has been equipped with additional functions. Software version V1.2 has now been updated to V1.4. This documentation relates to version V1.4.

The software version appears on the rating plate attached to the side of the drive.

### Enhancements made to version V1.2 in comparison to V1.1

- · New parameters:
  - Sleep threshold Offset 5 L E. See page 75.
  - PI feedback supervision threshold LP , See page 76.
  - PI feedback supervision function time delay *L P* . See page <u>76</u>.
  - Maximum frequency detection hysteresis PP . See page 76.
  - PI feedback supervision ITP . See page 76.
  - Fallback speed L F F. See page 76.
  - Time delay before automatic start for the overload fault F L . See page 77.
  - Time delay before automatic start for the underload fault F L u. See page 78.

  - Starting frequency of the auxiliary pump F on. See page 78.
  - Time delay before starting the auxiliary pump £ on. See page 78.
  - Ramp for reaching the auxiliary pump nominal speed ron. See page 78.
  - Auxiliary pump stopping frequency F \_ F. See page 78.
  - Time delay before the auxiliary pump stop command *L* F. See page <u>79</u>.
  - Ramp for auxiliary pump stopping r p F. See page 79.
  - Zero flow detection period n F d. See page 79.
  - Zero flow detection activation threshold F F d. See page 79.
  - Zero flow detection offset L F d. See page 79.
- New menu Pump sub-menu P II P . See page 77. For pumping applications.
- New quick REMOTE/LOCAL configuration switching using the embedded buttons. See page 34.
- New wiring labels, LO+ and LO- instead of LO and CLO, see pages 18 and 19.

#### Enhancements made to version V1.4 in comparison to V1.2

- · New menu:
  - External fault E L F -. See page 97. For External fault management by logic input.
- · New parameters:
  - External fault assignment E L F. See page 97.
  - Stop type external fault *E P L* . See page <u>97</u>.
- New detected fault:
  - External detected fault by logic input *E P F I*. See page <u>111</u>.

These parameters are added to the standard ATV12 product offer.

# Steps for setting up (also refer to Quick Start)

# 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 Altivar 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 11).

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



#### 3. Mount the drive

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

### 4. Wire the drive (page 20)

- ☐ 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 32)

- ☐ 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

# **Setup - Preliminary recommendations**

### Before switching-on the drive

# **A** DANGER

#### UNINTENDED EQUIPMENT OPERATION

Ensure that all logic inputs are inactive to help prevent an accidental startup.

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

### Before configuring the drive

# **A DANGER**

#### UNINTENDED EQUIPMENT OPERATION

- · Read and understand this manual before installing or operating the Altivar 12 drive.
- · Any changes made to the parameter settings must be performed by qualified personnel.
- · Ensure that all logic inputs are inactive to help prevent an accidental startup when modifying parameters.

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

#### Using the drive with motor having a different size

The motor could have different rating than drive. In case of smaller motor, there is no specific calculation. The motor current has to be set on Motor thermal current **LH** parameter page 94. In case of higher size of motor, possible up to 2 sizes (example is using a 4 kW (5.5 HP) on a 2.2 kW (3 HP) drive) it is necessary to ensure motor current and actual motor power will not pass over nominal power of drive.

#### Line contactor

# **NOTICE**

#### **RISK OF DAMAGE TO THE DRIVE**

- · Avoid operating the contactor frequently to avoid premature aging of the filter capacitors.
- Power cycling must be MORE than 60 seconds.

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  $_{\mathcal{O}}$  PL page  $\underline{94}$  is active ( $_{\mathcal{O}}$  PL set to  $\underline{9E}$  5). To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (useful in the case of high power drives), deactivate Output Phase loss  $_{\mathcal{O}}$  PL ( $_{\mathcal{O}}$  PL set to  $_{\mathcal{O}}$   $_{\mathcal{O}}$ ).
- Set Motor control type [ L L page 57 to 5 L d in Motor control menu d r [ -.

# **NOTICE**

#### **RISK OF DAMAGE TO THE MOTOR**

Motor thermal protection will not be provided by the drive if the motor rating current is less than 20% of the rated drive current. Provide an alternative means of thermal protection.

Failure to follow these instructions can result in equipment damage.

# **Drive ratings**

#### 1-phase supply voltage: 100...120 V 50/60 Hz

For 3-phase Output 200/240 V motors

Motor		Line supp	ly (input)			Drive (ou	tput)		Reference	Size
Power	indicated	Maximum I	ine current	Apparent	Power	Nominal	Max. tr	ansient	(2)	(3)
on plate	e (1)			power	dissipated	current	current	for		
		at 100 V	at 120 V		at nominal	In	60 s	2 s		
					current (1)					
kW	HP	Α	Α	kVA	W	Α	Α	Α		
0.18	0.25	6	5	1	18	1.4	2.1	2.3	ATV12H018F1	1C1
0.37	0.5	11.4	9.3	1.9	29	2.4	3.6	4	ATV12H037F1	1C1
0.75	1	18.9	15.7	3.3	48	4.2	6.3	6.9	ATV12H075F1	2C1

#### 1-phase supply voltage: 200...240 V 50/60 Hz

For 3-phase Output 200/240 V motors

Motor		Line supp	ly (input)			Drive (ou	tput)		Reference	Size
Power i	indicated e (1)	Maximum	Maximum line current		Apparent Power power dissipated		Nominal Max. transient current current for		(2)	(3)
		at 200 V	at 240 V		at nominal current (1)	In	60 s	2 s		
kW	HP	Α	Α	kVA	W	Α	Α	Α		
0.18	0.25	3.4	2.8	1.2	18	1.4	2.1	2.3	ATV12H018M2	1C2
0.37	0.5	5.9	4.9	2	27	2.4	3.6	4	ATV12H037M2	1C2
0.55	0.75	8	6.7	2.8	34	3.5	5.3	5.8	ATV12H055M2	1C2
0.75	1	10.2	8.5	3.5	44	4.2	6.3	6.9	ATV12H075M2	1C2
1.5	2	17.8	14.9	6.2	72	7.5	11.2	12.4	ATV12HU15M2	2C2
2.2	3	24	20.2	8.4	93	10	15	16.5	ATV12HU22M2	2C2

#### 3-phase supply voltage: 200...240 V 50/60 Hz

For 3-phase Output 200/240 V motors

Motor		Line supp	ly (input)			Drive (ou	tput)		Reference	Size
Power i	ndicated e (1)			Apparent power	Power dissipated	Nominal current	Max. transient current for		- (2)	(3)
		at 200 V	at 240 V		at nominal current (1)	In	60 s	2 s		
kW	HP	Α	Α	kVA	W	Α	Α	Α		
0.18	0.25	2	1.7	0.7	16	1.4	2.1	2.3	ATV12H018M3	1C3
0.37	0.5	3.6	3	1.2	24	2.4	3.6	4	ATV12H037M3	1C3
0.75	1	6.3	5.3	2.2	41	4.2	6.3	6.9	ATV12H075M3	1C3
1.5	2	11.1	9.3	3.9	73	7.5	11.2	12.4	ATV12HU15M3	2F3
2.2	3	14.9	12.5	5.2	85	10	15	16.5	ATV12HU22M3	2F3
3	4	19	15.9	6.6	94	12.2	18.3	20.1	ATV12HU30M3	3F3
4	5.5	23.8	19.9	8.3	128	16.7	25	27.6	ATV12HU40M3	3F3

(1)These power ratings are for a switching frequency of 4 kHz, in continuous operation. The switching frequency is adjustable from 2 to 16 kHz.

Above 4 kHz, the drive will reduce the switching frequency if an excessive temperature rise occurs. The temperature rise is detected by a probe in the power module. Nonetheless, 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
- 30% derating for 16 kHz

(2) Reference description,

example: ATV12HU15M3

ATV12: Altivar 12;

H: product on heatsink;

**U15**: drive power rating,

see **L** u parameter page <u>41</u>; **M3**: drive voltage rating,

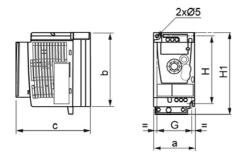
see u [ F L parameter page 41.

#### (3) Size description

possible values 1 physical size 1 possible values F Flat possible values 1 100 V 1-phase 2 physical size 2 C Compact 2 200 V 1-phase 3 physical size 3

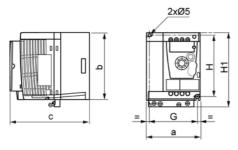
# **Dimensions and weights**

#### ATV12H018F1, 018M2, 037F1, 037M2, 037M3, 018M2, 018M3, 055M2, 075M2



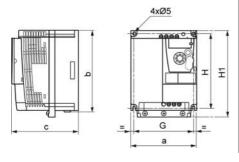
ATV12H	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	H mm (in.)	H1 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb)
018F1 018M2 018M3	72 (2.83)	142 (5.59)	102.2 (4.02)	60 (2.36)	131 (5.16)	143 (5.63)	2 x 5 (2 x 0.20)	M4	0.7 (1.5)
037F1 037M2 037M3	72 (2.83)	130 (5.12)	121.2 (4.77)	60 (2.36)	120 (4.72)	143 (5.63)	2 x 5 (2 x 0.20)	M4	0.8 (1.8)
055M2 075M2 075M3	72 (2.83)	130 (5.12)	131.2 (5.17)	60 (2.36)	120 (4.72)	143 (5.63)	2 x 5 (2 x 0.20)	M4	0.8 (1.8)

#### ATV12H075F1, U15M2, U22M2, U15M3, U22M3



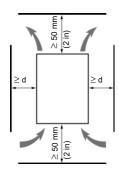
ATV12H	a mm (in.)	b mm (in.)	c mm (in.)	G mm (in.)	H mm (in.)	H1 mm (in.)	Ø mm (in.)	For screws	Weight kg (lb)
075F1	105 (4.13)	130 (5.12)	156.2 (6.15)	93 (3.66)	120 (4.72)	142 (5.59)	2 x 5 (2 x 0.20)	M4	1.3 (2.9)
U15M2	105	130	156.2	93	120	142	2 x 5	M4	1.4
U22M2	(4.13)	(5.12)	(6.15)	(3.66)	(4.72)	(5.59)	(2 x 0.20)		(3.1)
U15M3	105	130	131.2	93	120	143	2 x 5	M4	1.2
U22M3	(4.13)	(5.12)	(5.17)	(3.66)	(4.72)	(5.63)	(2 x 0.20)		(2.6)

### ATV12HU30M3, U40M3



ATV12H	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)
U30M3 U40M3	140 (5.51)	170 (6.69)	141.2 (5.56)	126 (4.96)	159 (6.26)	184 (7.24)	4 x 5 (2 x 0.20)	M4	2.0 (4.4)

### Mounting and temperature conditions



Install the unit vertically, at ± 10°.

Do not place it close to heating elements.

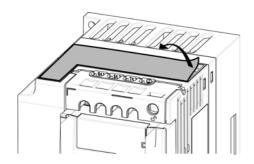
Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

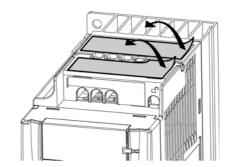
Free space in front of unit: 10 mm (0.4 in.) minimum.

Free space on each side (represented by the letter "d" on the graph): 50mm (2 in.) minimum. In Type B mounting (see below in mounting types), the free space is reduced to 0mm (0 in.).

It is recommended that the drive is installed on a dissipative surface.

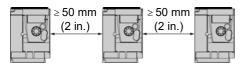
### Removing the vent cover(s)





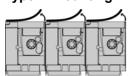
### **Mounting types**

#### Type A mounting



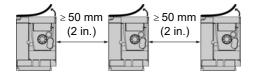
Free space  $\geq 50$  mm (2 in.) on each side, with vent cover fitted. Mounting type A is suitable for drive operation at surrounding air temperature less than or equal to  $50^{\circ}$ C ( $122^{\circ}$ F) and  $40^{\circ}$ C ( $104^{\circ}$ F) for UL.

#### Type B mounting



Drives mounted side-by-side, vent cover should be removed.

#### Type C mounting



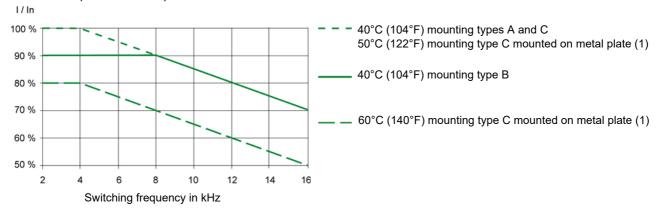
Free space  $\geq 50$  mm (2 in.) on each side. Vent cover should be removed for operation at surrounding air temperature above 50°C (122°F).

With these types of mounting, the drive can be used up to an ambient temperature of 50°C (122°F), with a switching frequency of 4 kHz. Fanless drives need derating.

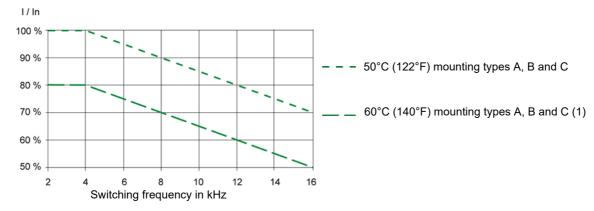
### **Derating curves**

Derating curves for the nominal drive current (In) as a function of temperature, switching frequency and mounting type.

#### ATV12H0eeM2, ATV12H0eeM3, ATV12H018F1 to ATV12H037F1



#### ATV12HU●●M2, ATV12H075F1, ATV12HU15M3 to ATV12HU40M3



For intermediate temperatures (for example 55°C (131°F)), interpolate between 2 curves. (1) Not UL recognized.

### Bus voltage measurement procedure

# **AADANGER**

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

Read and understand the precautions in "Before you begin" on page 5 before performing this procedure.

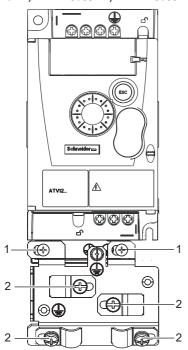
Failure to follow these instructions will result in death or serious injury.

### Installing the EMC plates

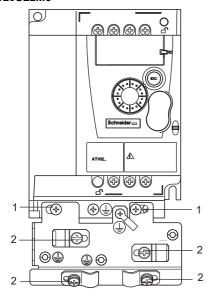
# EMC mounting plate: size 1 VW3A9523, size 2 VW3A9524 or size 3 VW3A9525 to be ordered separately

Mount the EMC mounting plate to the holes in the ATV12 using the 2 screws supplied, as shown in the drawings below.

Size 1, plate reference VW3A9523: ATV12H018F1, ATV12H037F1, ATV12P037F1, ATV12H018M2, ATV12•0••M2, ATV12•0••M3

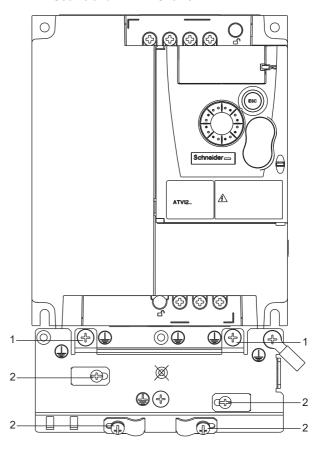


Size 2, plate reference VW3A9524: ATV12H075F1, ATV12HU••M2, ATV12•U15M3, ATV12•U22M3



- 1. 2 mounting screws
- 2. 4 x M4 screws for attaching EMC clamps

Size 3, plate reference VW3A9525: ATV12•U30M3 and ATV12•U40M3



#### Recommendations

Keep the power cables separate from control 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

Follow wire size recommendations according to local codes and standards.

Before wiring power terminals, connect the ground terminal to the grounding screws located below the output terminals (see Access to the motor terminals if you use ring terminals, page 21.

The drive must be grounded in accordance with the applicable safety standards. ATV12••••M2 drives have an internal EMC filter, and as such the leakage current is over 3.5 mA.

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 1-phase drives and type B for 3-phase drives. Choose a suitable model incorporating:

- · HF 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 30 mA
  devices. In this case, choose devices with immunity against accidental tripping, for example RCDs with SI type leakage current
  protection.

If the installation includes several drives, provide one "residual current device" per drive.

#### Control

For control and speed reference circuits, it is recommended to use shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.), connecting the shield to ground as outlined on page <u>26</u>.

#### Length of motor cables

For motor cable lengths longer than 50 m (164 ft) for shielded cables and longer than 100 m (328 ft) for unshielded cables, please use motor chokes.

For accessory part numbers, refer to the catalog.

#### **Equipment grounding**

Ground the drive according to local and national code requirements. A minimum wire size of 10 mm² (6 AWG) may be required to meet standards limiting leakage current.

# **A A** 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.

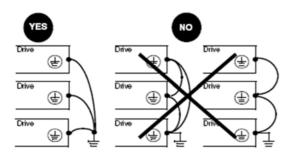
Failure to follow these instructions will result in death or serious injury.

# A A DANGER

#### ATV12H075F1, ATV12H075M2 AND ATV12H075M3 - 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.



- 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.

# **WARNING**

#### **RISK OF DRIVE DESTRUCTION**

- The drive will be damaged if input line voltage is applied to the output terminals (U/T1,V/T2,W/T3).
- · Check the power connections before energizing the drive.
- · If replacing another drive, verify that all wiring connections to the drive comply with wiring instructions in this manual.

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

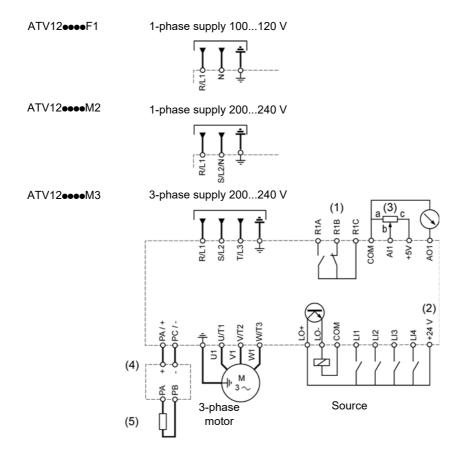
# **WARNING**

#### **INADEQUATE OVERCURRENT PROTECTION**

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electrical Code and the National Electrical Code require branch circuit protection. Use the fuses recommended in the Quick Start Annex (S1A58684) delivered with the drive.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed in the Quick Start Annex (S1A58684) delivered with the drive.

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

### General wiring diagram



(1)R1 relay contacts, for remote indication of the drive status, see page 52

If intermittent \_\_ 5 F code appear, set Relay R1 to \_F L \_E and it can be connected to upstream protection to avoid overvoltage in the drive. In this case \_L \_\_ I can be used for others drive status see page 53

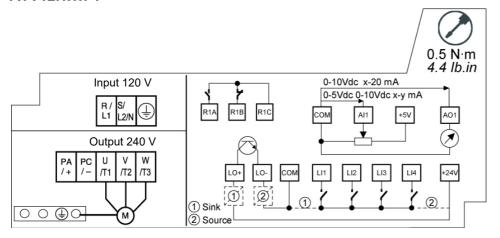
- (2) Internal + 24 V  $\pm$ . If an external source is used (+ 30 V  $\pm$  maximum), connect the 0 V of the source to the COM terminal, and do not use the + 24 V  $\pm$  terminal on the drive.
- (3) Reference potentiometer SZ1RV1202 (2.2 k $\Omega$ ) or similar (10 k $\Omega$  maximum).
- (4) Optional braking module VW3A7005
- (5) Optional braking resistor VW3A7••• or other acceptable resistor. See the possible resistor values in the catalog.

#### Note:

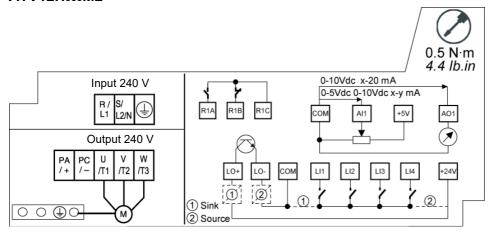
- Use transient voltage surge suppressors for all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc.).
- The ground terminal (green screw) is located on the opposite side in comparison with its position on the ATV11 (see wiring trap label).

### Wiring labels

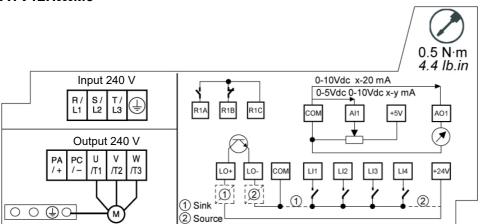
#### ATV12HoooF1



#### ATV12HoooM2



#### ATV12HoooM3

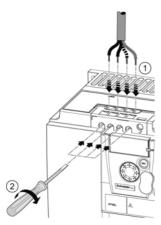


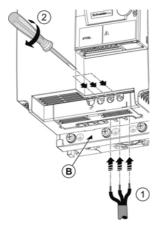
### **Power terminals**

Line supply is at the top of the drive, the motor power supply is 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





# **A** A DANGER

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

Replace the wiring trap before applying power.

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

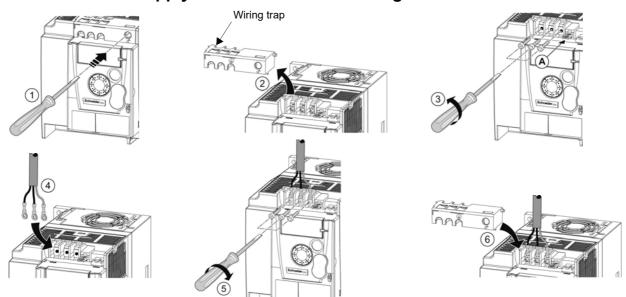
# **A** CAUTION

#### **RISK OF BODY INJURY**

Use pliers to remove snap-off of the wiring trap.

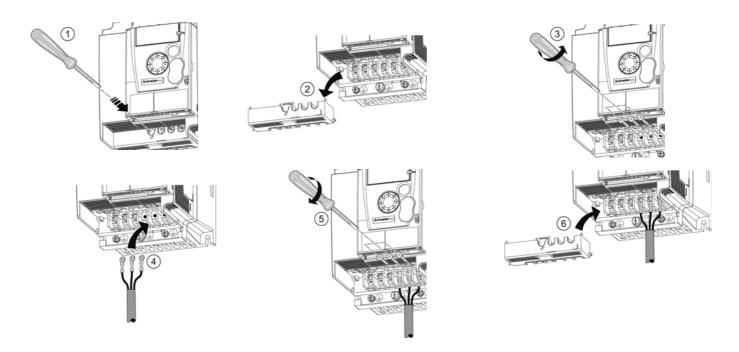
Failure to follow these instructions can result in injury or equipment damage.

# Access to the line supply terminals to connect ring terminals



- A) IT jumper on ATV12••••M2
- B) Grounding screws located below the output terminals.

# Access to the motor terminals if you use ring terminals

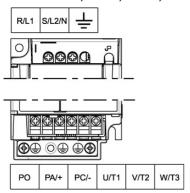


# Characteristics and functions of power terminals

Terminal	Function	For ATV12
Ť	Ground terminal	All ratings
R/L1 - S/L2/N	Power supply	1-phase 100120 V
R/L1 - S/L2/N		1-phase 200240 V
R/L1 - S/L2 - T/L3		3-phase 200240 V
PA/+	+ output (dc) to the braking module DC Bus (visible part on wiring trap)	All ratings
PC/-	- output (dc) to the braking module DC Bus (visible part on wiring trap)	All ratings
РО	Not used	
U/T1 - V/T2 - W/T3	Outputs to the motor	All ratings

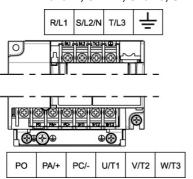
# Arrangement of the power terminals

#### ATV12H 018F1, 037F1, 0••M2, 0••M3



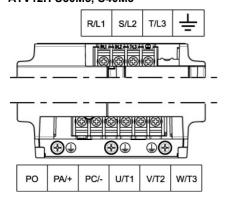
ATV12H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque (3) N·m (lb.in)
018F1 037F1 0••M2 0••M3	<b>2</b> to 3.5 ( <b>14</b> to 12)	2 (14)	0.8 to 1 (7.1 to 8.9)

#### ATV12H 075F1, U••M2, U15M3, U22M3



ATV12H	Applicable wire size (1) mm² (AWG)	Recommended wire size (2) mm² (AWG)	Tightening torque (3) N·m (lb.in)
075F1 U●●M2	<b>3.5</b> to 5.5 ( <b>12</b> to 10)	5.5 (10)	1.2 to 1.4
U15M3 U22M3	<b>2</b> to 5.5 ( <b>14</b> to 10)	2 (14) for U15M3 3.5 (12) for U22M3	(10.6 to 12.4)

#### ATV12H U30M3, U40M3



ATV12H	Applicable	Recommended	Tightening
	wire size (1)	wire size (2)	torque (3)
	mm² (AWG)	mm² (AWG)	N·m (lb.in)
U30M3 U40M3	5.5 (10)	5.5 (10)	1.2 to 1.4 (10.6 to 12.4)

- (1) The value in bold corresponds to the minimum wire gauge to permit secureness.
- (2)75°C (167 °F) copper cable (minimum wire size for rated use)
- $(3) Recommended \ to \ maximum \ value.$

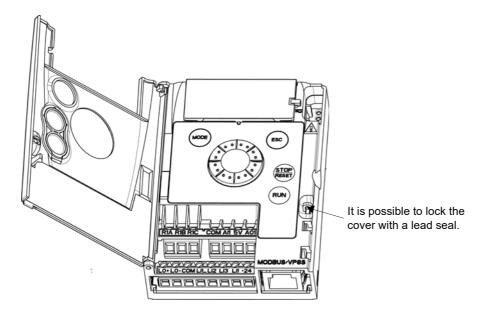
# **Control terminals**

Keep the control circuits away from the power cables. For control and speed reference circuits, it is recommended to use shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.), connecting the shielding as outlined on page 26.

#### 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 32.



# Arrangement of the control terminals

©	Normally open (NO) contact of the relay Normally closed (NC) contact of the relay Common pin of the relay COMmon of analog and logic I/Os Analog Input
SV AO1 LO+ LO+ LO- COM LI1 LI2 LI3 Note: To connect cables, use a slotted screwdriver 0.6 x 3.5.	+5VDC supply provided by the drive Analog Output Logic Output (collector) Common of the Logic Output (emitter) COMmon of analog and logic I/Os Logic Input Logic Input Logic Input Logic Input Logic Input Logic Input -24 VDC supply provided by the drive Connection for SoMove software, Modbus network or remote display.

ATV12 Control terminals	Applicable wire size (1)	Tightening torque (2)
	mm² (AWG)	N·m (lb.in)
R1A, R1B, R1C	<b>0.75</b> to 1.5 ( <b>18</b> to 16)	0.5 to 0.6 (4.4 to 5.3)
Other terminals	<b>0.14</b> to 1.5 ( <b>26</b> to 16)	0.5 to 0.6 (4.4 to 5.5)

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

# **Control terminals**

# **Characteristics and functions of the control terminals**

Terminal	Function	Electrical characteristics			
R1A	NO contact of the relay	Min. switching capacity: • 5 mA for 24 V —			
R1B	NC contact of the relay	Maximum switching capacity:  • 2 A for 250 V ∼ OVC II and for 30 V — on inductive load			
R1C	Common pin of the relay	(cos $\phi$ = 0.4 and L/R = 7 ms) • 3 A for 250 V $\sim$ OVC II and 4 A for 30 V $\longrightarrow$ on resistive load (cos $\phi$ = 1 and L/R = 0) • response time: 30 ms maximum.			
COM	Common of analog and logic I/Os				
Al1	Voltage or current analog input	<ul> <li>resolution: 10 bits</li> <li>precision: ± 1% at 25°C (77°F)</li> <li>linearity: ± 0.3% (of full scale)</li> <li>sampling time: 20 ms ± 1 ms</li> <li>Analog voltage input 0 to +5 V or 0 to +10 V (maximum voltage 30 V) impedance: 30 kΩ</li> <li>Analog current input x to y mA, impedance: 250 Ω</li> </ul>			
5V	+5 VDC power supply for reference potentiometer	precision: ± 5%     maximum current: 10 mA			
AO1	Voltage or current analog output (collector)	<ul> <li>resolution: 8 bits</li> <li>precision: ± 1% at 25°C (77°F)</li> <li>linearity: ± 0.3% (of full scale)</li> <li>refresh time: 4 ms (maximum 7 ms)</li> <li>Analog voltage output: 0 to +10 V (maximum voltage +1%)</li> <li>minimum output impedance: 470 Ω</li> <li>Analog current output: x to 20 mA</li> <li>maximum output impedance: 800 Ω</li> </ul>			
LO+	Logic output	• voltage: 24 V (maximum 30 V) • impedance: 1 k $\Omega$ , maximum 10 mA (100 mA in open collector) • linearity: ± 1% • refresh time: 20 ms ± 1 ms.			
LO-	Common of the logic output (emitter)				
LI1 LI2 LI3 LI4	Logic inputs	Programmable logic inputs  + +24 VDC power supply (maximum 30 V)  impedance: 3.5 kΩ minimum  state: 0 if < 5 V, state 1 if > 11 V in positive logic  state: 1 if < 10 V, state 0 if > 16 V or switched off (not connected) in negative logic  sampling time: < 20 ms ± 1 ms.			
+24V	+ 24 VDC supply provided by the drive	+ 24 VDC –15% +20% protected against short-circuits and overloads.  Maximum customer current available 100 mA			

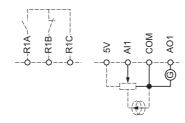
### **Control connection diagrams**

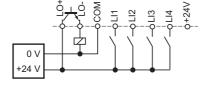
The Logic inputs type  $_{n}$   $_{n}$   $_{L}$  parameter page  $\underline{51}$  is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- Set the parameter to P 5 for Source operation.
- Set the parameter to  $\mathbf{n} \ \mathbf{E} \ \mathbf{G}$  for internal Sink operation.
- Set the parameter to  $E \cap E \subseteq$  for external Sink operation.

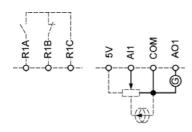
Note: The modification will be taken into account only at the next control power-on.

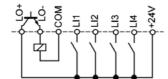
Source - using external supply



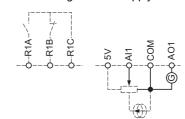


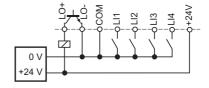
Source - using internal supply



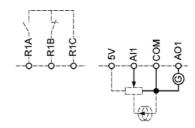


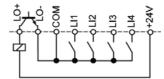
Sink - using external supply





Sink - using internal supply





# **A** DANGER

#### **UNINTENDED EQUIPMENT OPERATION**

- The accidental grounding of logic inputs configured for Sink Logic can result in unintended activation of drive functions.
- · Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper control circuit grounding practices.

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

#### **Electromagnetic Compatibility (EMC), wiring**

#### Principle and precautions

**IMPORTANT**: The high frequency equipotential ground connection between the drive, motor, and cable shielding does not eliminate the need to connect the ground (PE) conductors (green-yellow) to the appropriate terminals on each unit. To help accomplish this, the user must follow the following points:

- · Grounds between the drive, motor, and cable shielding must have high frequency equipotentiality.
- When using shielded cable for the motor, use a 4-conductor cable so that one wire will be the ground connection between the motor
  and the drive. Size of the ground conductor must be selected in compliance with local and national codes. The shield can then be
  grounded at both ends. Metal ducting or conduit can be used for part or all of the shielding length, provided there is no break in
  continuity.
- When using shielded cable for the Dynamic Brake (DB) resistors, use a 3-conductor cable so that one wire will be the ground connection between the DB resistor assembly and the drive. Size of the ground conductor must be selected in compliance with local and national codes. The shield can then be grounded at both ends. Metal ducting or conduit can be used for part or all of the shielding length, provided there is no break in continuity.
- When using shielded cable for control signals, if the cable is connecting equipment that is close together and the grounds are bonded together, then both ends of the shield can be grounded. If the cable is connected to equipment that may have a different ground potential, then ground the shield at one end only to prevent large currents from flowing in the shield. The shield on the ungrounded end may be tied to ground with a capacitor (for example: 10 nF, 100V or higher) in order to provide a path for the higher frequency noise.
- Keep the control circuits away from the power circuits. For control and speed reference circuits, use of shielded twisted cables with a pitch of between 25...50 mm (1 and 2 in.) is recommended.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable and also ensure maximum separation between the control cables and any power cables.
- The motor cables must be at least 0.5 m (20 in.) long.
- · Do not use surge arresters or power factor correction capacitors on the variable speed drive output.
- If using an additional input filter, it should be mounted as closed as possible to the drive and connected directly to the line supply via an unshielded cable. Link 1 on the drive is via the filter output cable.
- For installation of the optional EMC plate and instructions for meeting IEC 61800-3 standard, refer to the section entitled "Installing the EMC plates" and the instructions provided with the EMC plates.

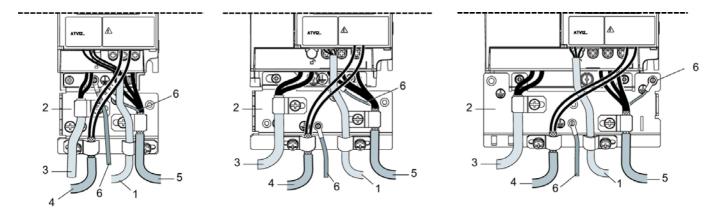
# **A A** DANGER

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

- Do not expose cable shielding except where connected to ground at the metal cable glands and underneath the grounding clamps.
- Ensure that there is no risk of the shielding coming into contact with live components.

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

#### Installation diagram (example)



- 1. Non-shielded wires for the output of the status relay contacts.
- 2. Sheet steel grounded casing not supplied with the drive, to be mounted as indicated on the diagram.
- 3. PA and PC terminals, to the braking module DC bus
- 4. Shielded cable for connecting the control/signalling wiring.
  For applications requiring several conductors, use small cross-sections (0.5 mm², 20 AWG).
  The shielding must be connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.
- 5. Shielded cable for motor connection with shielding connected to ground at both ends.

  This shielding must be continuous, and if there are any intermediate terminals, they must be in an EMC shielded metal box. The motor cable PE grounding conductor (green-yellow) must be connected to the grounded casing.
- Grounding conductor, cross-section 10 mm<sup>2</sup> (6 AWG) according to IEC 61800-5-1 standard.
- 7. Power input (non-shielded cable)

Attach and ground the shielding of cables 4 and 5 as close as possible to the drive:

- · Expose the shielding.
- Use cable clamps of an appropriate size on the parts from which the shielding has been exposed, to attach them to the casing. The shielding must be clamped tightly enough to the metal plate to ensure correct contact.
- Types of clamp: stainless steel (delivered with the optional EMC plate).

#### EMC conditions for ATV12

C1 EMC category is reached if length of shielded cable is 5 m (16.4 ft) maximum and Switching frequency 5 F r page 59 is 4, 8 or 12 kHz. C2 EMC category is reached if length of shielded cable is 10 m (32.8 ft) maximum and Switching frequency 5 F r is 4, 8 or 12 kHz and if length of shielded cable is 5 m (16.4 ft) maximum for all other values of Switching frequency 5 F r.

### Internal EMC filter on ATV12

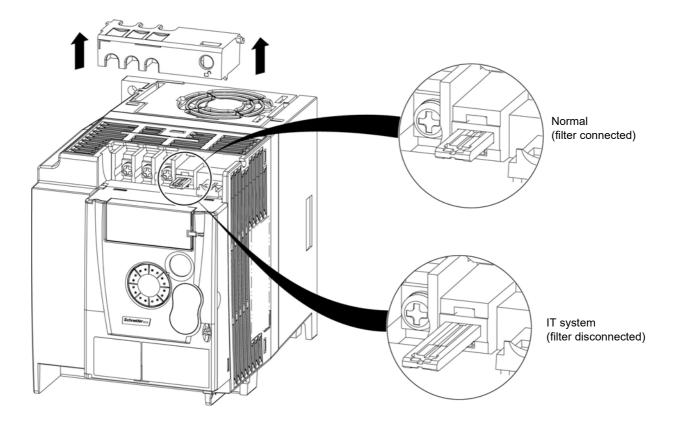
All ATV12••••M2 drives have a built-in EMC filter. As a result they exhibit leakage current to ground. If the leakage current creates compatibility problems with your installation (residual current device or other), then you can reduce the leakage current by opening the IT jumper as shown below. In this configuration EMC compliance is not guaranteed.

# **NOTICE**

#### **DRIVE LIFETIME REDUCTION**

On ATV12••••M2 ratings, if the filters are disconnected, the drive's switching frequency must not exceed 4 kHz. Refer to Switching frequency 5 F r page 59 for adjustment,

Failure to follow these instructions can result in equipment damage.



#### **Check list**

Read carefully the safety information in the user manual and the catalog. Before starting up the drive, please check the following points regarding mechanical and electrical installations, then use and run the drive. For complete documentation, refer to <a href="https://www.schneider-electric.com">www.schneider-electric.com</a>.

#### 1. Mechanical installation

- Refer to the Mounting and temperature conditions instructions on page <u>13</u> for drive mounting types and recommendations on the ambient temperature.
- · Mount the drive vertically as specified, see Mounting and temperature conditions instructions on page 13.
- The use of the drive must be in agreement with the environments defined by the standard 60721-3-3 and according to the levels
  defined in the catalog.
- · Mount the options required for your application, refer to the catalog.

#### 2. Electrical installation

- Connect the drive to the ground, see Equipment grounding on page 16.
- Ensure that the input power voltage corresponds to the drive nominal voltage and connect the line supply as shown in General wiring diagram on page 18.
- Ensure you use appropriate input power fuses and circuit breaker, see in the Annex (S1A58684) delivered with the drive.
- Wire the control terminals as required, see Control terminals on page <u>23</u>. Separate the power cable and the control cable according
  to the EMC compatibility rules on page <u>26</u>.
- The ATV12●●●●M2 range integrates an EMC filter. The leakage current can be reduced using the IT jumper as explained in the
  paragraph Internal EMC filter on ATV12●●●●M2 on page 28.
- Ensure that motor connections correspond to the voltage (star, delta).

#### 3. Use and run the drive

- Start the drive and you will see Standard motor frequency <u>b F r</u> page <u>45</u> at the first power-on. Check that the frequency defined by the frequency <u>b F r</u> (the factory setting is 50 Hz) is in accordance with the frequency of the motor, see First power-up on page <u>34</u>. For the following power-on, you will see <u>r d y</u> on the HMI.
- MyMenu (upper part of CONF mode) allows you to configure the drive for most applications (see page 45).
- Factory / recall customer parameter set F C 5 function page 46 allows you to reset the drive with factory settings.

# **Factory configuration**

### **Drive factory settings**

The Altivar 12 is factory-set for the most common operating conditions (motor rating according to drive rating):

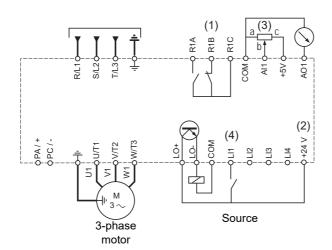
- Display: drive ready (r d y) motor stopped or motor frequency reference while running
- · Automatic adaptation of the deceleration ramp in the event of overvoltage on braking.
- · No automatic restarting after a detected fault is cleared
- · Logic inputs:
  - LI1: forward (2-wire transitional control)
  - LI2, LI3, LI4: no assignment
- · Logic output: LO1: no assignment
- Analog input: Al1 (0 to + 5 V) speed reference
- Relay R1: the contact opens in the event of a detected fault (or drive off)
- · Analog output AO1: no assignment

Code	Description	Value	page
bFr	Standard motor frequency	50 Hz	<u>45</u>
u n 5	Rated motor voltage	230 V	<u>57</u>
ACC	Acceleration	3 seconds	<u>64</u>
d E C	Deceleration	3 seconds	<u>64</u>
LSP	Low speed	0 Hz	<u>45</u> <u>89</u>
H S P	High speed	50 Hz	90
C E E	Motor control type	Standard law	<u>57</u>
шFг	IR compensation	100%	<u>58</u>
ı E h	Motor thermal current	equal to nominal motor current (value determined by drive rating)	94
SACI	Automatic DC injection current	0.7 x nominal drive current, for 0.5 seconds.	<u>67</u>
5 F r	Switching frequency	4 kHz	<u>59</u>

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

# Drive factory wiring diagram

ATV12



- (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 k $\Omega$ ) or similar (10 k $\Omega$  maximum).
- (4) Forward

### **Basic functions**

### 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 in the cases described in the "automatic restart" function, F L L menu, Automatic restart R L r page 91 set to Y E 5
- via a logic input when this input is assigned to the "drive reset" function, F L L menu, Detected fault reset assignment r 5 F page 91 set to L•H.

#### **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. The fan runs only when the drive thermal state requires ventilation.

#### Motor thermal detection

#### **Function:**

Thermal detection by calculating the I<sup>2</sup>t.

Note: The motor thermal state memory returns to zero when the drive power is cycled if Motor thermal state memo \(\Pi \) \(\Pi \) page \(\frac{94}{5}\) is not set to \(\Pi \) \(\Pi \) \(\Pi \).

# NOTICE

#### **RISK OF DAMAGE TO THE MOTOR**

The use of external overload protection is required under the following conditions:

- Repowering up the product since there is no motor thermal state memory.
- · Running multiple motors
- · Running motors rated at less than 20% of the nominal drive current
- · Using motor switching

Failure to follow these instructions can result in equipment damage.

# **NOTICE**

#### **MOTOR OVERHEATING**

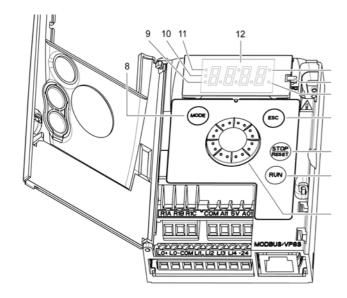
- · This drive does not provide direct thermal protection for the motor.
- · Use of a thermal sensor in the motor may be required for protection at all speeds or loading conditions.
- · Consult the motor manufacturer for the thermal capability of the motor when operated over the desired speed range

Failure to follow these instructions can result in equipment damage.

# **Programming**

### **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, 2 s press on ESC button switches between the control/programming modes.
- STOP button: stops the motor (could be hidden by door if function disabled). Note: See instructions for "RUN/STOP" cover removal.
- 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 dia
  - Acts as a potentiometer 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 this symbol
- 8. MODE button

Switches between the control/programming modes. 3s press on MODE button switches between the REMOTE/LOCAL configurations.

ENT

The MODE button is only accessible with the HMI door open.

- 9. CONFIGURATION mode LED (b)
- 10. MONITORING mode LED
- 11. REFERENCE mode LED
- 12. 4 x 7-segment displays

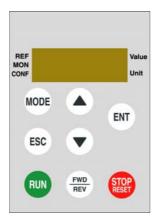
**Note:** In LOCAL configuration, the three Leds 9, 10, 11 are blinking simultaneously in programming mode and are working as a Led chaser in control mode.

- (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"

# **Programming**

#### Remote control

Remote operation and programming by HMI is possible using the optional remote HMI part VW3A1006. The dimensions are 70 mm  $(2.76 \text{ in}) \times 50 \text{ mm}$  (2.76 in).



**Note:** when connected, the remote control shows an exact copy of the drive display, it is totally interactive with the embedded keypad. **Note:** Set the remote keypad with

- Modbus rate = 19.2 Kbps, (see **b** r)
- Modbus format = 8E1, 8 bit, even parity, 1 stop bit (see **L F a**)

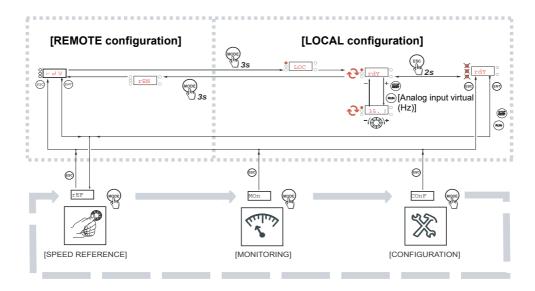
# **Programming**

#### First power-up

At first power-up you are prompted to set Standard motor frequency **b** F r page <u>45</u>. Next time power is applied r d y appears. Operating mode selection is then possible using the MODE key as detailed below.

#### Menus structure

Access to menus and parameters is possible through 3 modes: Reference r F page 37, Monitoring n page 38 and Configuration r page 44. Switching between these modes is possible at any time using the MODE key or Jog Dial on keyboard. The first press on the MODE key moves from the current position to the top of the branch. A second press switches to the next mode.



# Menu customization using SoMove

ATV12 factory settings enable drive operation with most applications. You can use SoMove software to customize the "MyMenu" and FULL menus of <code>[anf]</code> mode (see page 44), by selecting which menus and parameters will be hidden or accessible for the user. Once the configuration has been adjusted, it can be downloaded to the ATV12 by connecting the drive to the computer or by downloading the configuration through the multiloader or simpleloader.

SoMove can be used to operate the drive for testing and commissioning.



Description	References
SoMove	-
USB/RJ45 cable	TCSMCNAM3M002P
Simple-loader tool	VW3A8120
Multi-loader tool	VW3A8121
Bluetooth adapter	VW3A8114

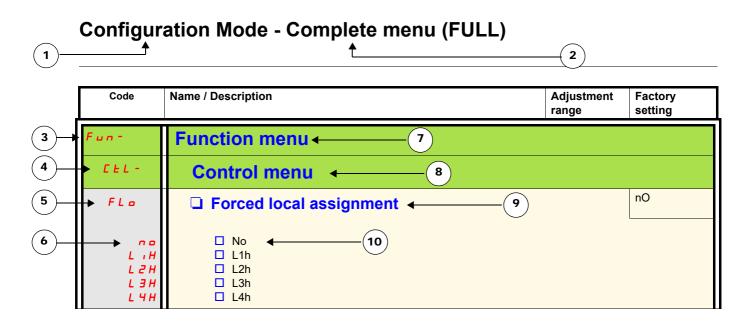
For further information, please consult the SoMove help.

# Structure of parameter tables

The modes, sections, menus, submenus and parameter tables description is organized as 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 display, followed by a "-"
- 4. Submenu code on 4-digit display, if any
- 5. Parameter code

- 6. Value code
- 7. Name of menu
- 8. Name of submenu
- 9. Parameter description
- **10.** Possible value(s) / state of parameter, if any.

# Function compatibility table

	Preset speed (page 70)	PI regulator (page <u>72</u> )	Jog operation (page <u>68</u> )	Auto DC injection (page 67)	Catch on the fly (page 92)	Fast stop (page <u>66</u> )	Freewheel (page <u>66</u> )
Preset speed (page <u>70</u> )			Ť				
PI regulator (page <u>72</u> )			•				
Jog operation (page <u>68</u> )	+	•		+			
Auto DC injection (page <u>67</u> )			t				1
Catch on the fly (page <u>92</u> )							+
Fast stop (page <u>66</u> )							t
Freewheel (page <u>66</u> )				+	Ť	ţ	

Incompatible functions	Compatible functions	Not applicable
Priority function (function	which can be active at the same time)	
← ↑ The function indicated	d by the arrow has priority over the other.	

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  $F \sim I$  page 45 = 1 = 1) adjust the actual reference value by rotating the jog dial.

When local control is enabled, the jog dial on the HMI acts as a potentiometer to change the reference value up and down within the limits preset by other parameters (LSP or HSP). 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 [ ] page 63, 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 depends on the choice made in Reference channel 1 F r I page 62.

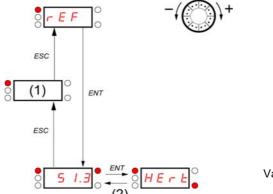
#### **Organization tree**

(1) Depending on the active reference channel Possible values:

L F r A 1 u l F r H r P i r P C

(2) 2s or ESC

Displayed parameter value and unit of the diagram is given as examples



Value - Unit

Code	Name/Description	Adjustment range	Factory settings		
(1)	Frequency reference value  Frequency reference visible if reference channel active is remote display.  Reference channel 1 Fr I page 62 set to L [ [ ]  or Forced local reference F L a [ ] page 63 set to L [ [ ]  This parameter allows to modify the frequency reference with the jog dial.				
ЯшІ	Visibility depends on the drive settings.  Analog input virtual	0 to 100 % of HSP	-		
(1)	This parameter allows to modify the frequency reference with an analog input.  Reference channel 1 Fr I page 62 set to R I I I or Forced local reference F L I page 63 set to R I I I or PID manual reference P I page 74 set to R I I I.  Visibility depends on the drive settings.				
FrH	☐ Speed reference	0 Hz to HSP	-		
Я . u . П d b Я . l	Actual frequency reference. This parameter is in read-only mode. Visibility depends on the drive settings.  Terminal Remote display Modbus Integrated display with Jog dial				
r P i	☐ Internal PID reference	0 to 100%	-		
(1)	This parameter allows to modify the PID internal reference with the jog dial.  Visibility depends on the drive settings.				
rPE	☐ PID reference value	0 to 100%	-		
	This parameter is the PID reference expressed as a %.				

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

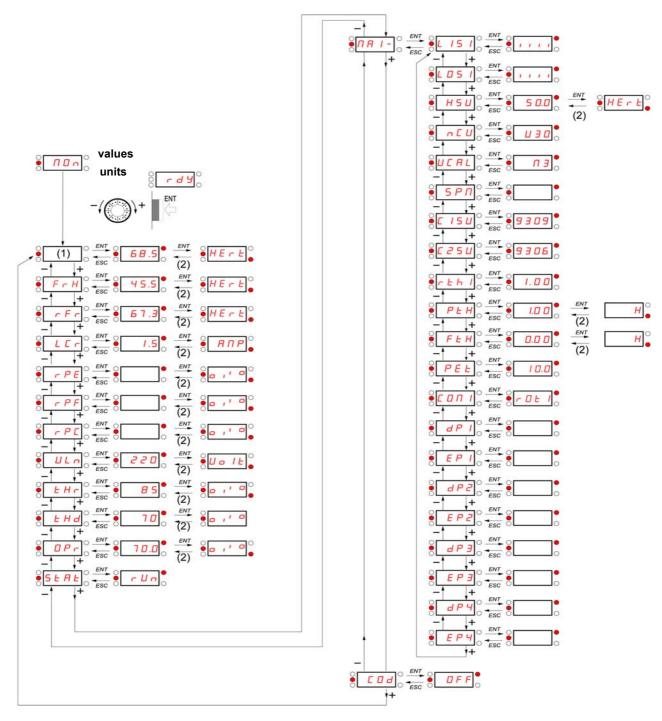
()

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 r F r page 39.

While the value of the desired new monitoring parameter is being displayed, press a second time on the jog dial button to display the units.

#### **Organization tree**



(1) Depending on reference channel active.

Possible values:

LFr A IU I

(2) 2 sec or ESC

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

Code	Name/Description	Unit
LFr	☐ External reference value	Hz
O	External keypad or local force mode configured. Forced local reference F L o L page 63 set Forced local assignment F L o page 63 different to o o.  Displays the speed reference coming from the remote keypad. This value is not visible in face.	
A iu l	☐ Analog input virtual	%
()	Embedded keypad active or local force mode configured, Forced local reference F L a C pa F ı u I and Forced local assignment F L a page 63 different to a a.  Displays the speed reference coming from the jog dial. This value is not visible in factory se	_
FrH	☐ Speed reference	Hz
	Actual frequency reference.	1
rFr	☐ Output frequency	Hz
	This function provides the estimated motor speed. It corresponds to the estimated motor frequency shaft). In Standard law 5 L d page 57, the Output frequency r F r is equal to stator In Performance law P E r F page 57, the Output frequency r F r motor speed is equal to t motor speed.  Range: -400 to 400 Hz	frequency.
LEr	☐ Motor current	Α
	Estimation of the effective motor current from phase current measurements with an accurace During DC injection, the current displayed is the maximum value of current injected in the m	
rPE	□ PID error	%
	Visible only if the PID function is configured (PID feedback assignment P, F page 72 set to 7 See PID diagram on page 71	۵).
rPF	□ PID Feedback	%
	Visible only if PID function configured (PID feedback assignment P , F page <u>72</u> set to n a). PID diagram on page <u>71</u>	See
rPE	□ PID reference	%
	Visible only if PID function configured (PID feedback assignment P , F page <u>72</u> set to n a). PID diagram on page <u>71</u>	See
u L n	☐ Main voltage	V
	Line voltage from the point of view of the DC bus, motor running or stopped.	<u> </u>
E H r	☐ Motor thermal state	%
	Display of the motor thermal state. Above 118%, the drive trips in Motor overload <u>L F</u> page	ge <u>110</u> .
E H d	☐ Drive thermal state	%
	Display of the drive thermal state. Above 118%, the drive trips in Drive overheat <u>Prive</u> page	<u>110</u> .
o P r	☐ Output power	%
	This parameter displays the motor power (on the shaft) that is estimated by the drive.	

()

Parameter that can be modified during operation or when stopped.

Code	Name/Description
SERE	☐ Product status
	This parameter shows the state of the drive and motor.
r d 9	☐ Drive ready
run	Drive running, the last 6 segments to the right of the code also indicate direction and speed.
ACC	Acceleration, the last 6 segments to the right of the code also indicate direction and speed.
d E c	☐ Deceleration, the last 6 segments to the right of the code also indicate direction and speed.
а с ь	☐ DC injection braking in progress
EL i	<ul><li>Current limit, the 4 segments located on right down of display are blinking.</li></ul>
n 5 E	☐ Freewheel stop control
obr	☐ Auto-adapted deceleration
C E L	☐ Controlled stop on mains phase loss
Eun	☐ Auto-tuning in progress
F 5 E	☐ Fast stop
nLP	No line power. When the control part is energized via the RJ45 connector and there is no power on the main input and no run order is present.
FrF	☐ Drive is running and using the withdrawal reference <i>L F F</i>
г Е П	☐ Remote configuration
LoC	☐ Local configuration

Code	Name/Description	Unit
ПЯ ;-	Maintenance menu Parameters of MAI menu cannot be selected for monitoring	
L ,5 1	☐ State of logic inputs LI1 to LI4	-
	Can be used to visualize the state of the 4 logic inputs LI.	
	State 1	
	State 0	
	LI1 LI2 LI3 LI4  Example above: LI1 and LI3 are at 1; LI2 and LI4 are at 0.	
L = 5 1	☐ State of the logic output LO1 and relay R1	-
	Can be used to visualize the state of the LO.	
	State 1	
	State 0	
	r1 LO1	
Н 5 и	☐ Display of high speed value	Hz
	Display of high-speed value. Range Low speed L 5 P page 45 to Maximum frequency L F Visible only if 2 HSP assignment 5 H 2 or 4 HSP assignment 5 H 4 page 90 is configured.	
nΕu	☐ Drive Power rating	-
	Indicates the drive rating. This value is part of the drive reference, see page 11. Possible value of the drive reference,	alues:
υCAL	☐ Drive voltage rating	-
	Drive rate supply voltage. This value is part of the drive reference, see page 11. Possible va F1 = 100-120 V 1-phase in, 200-240 V 3-phase out M2 = 200-240 V 1-phase in, 200-240 V 3-phase out M3 = 200-240 V 3-phase in, 200-240 V 3-phase out	alues:
5 P n	☐ Specific Product Number	-
	This parameter is used in order to identify the possible specification of the product.  Visible only if 5 P n is different to zero.	
C 15 u	☐ Card 1 Software Version	-
	Application software version. Example: 1105 for 1.1 ie 05. 1 (version, major). 1 (version, minor). 05 (ie, evolution number)	
C 2 5 u	☐ Card 2 Software Version	-
	Motor software version. Example: 1105 for 1.1 ie 05. 1 (version, major). 1 (version, minor). 05 (ie, evolution number)	

Code	Name/Description					Unit
ПЯ ;-	Maintenance n	nenu (continued	d)			
r E H ı		or has been poweremeter resettable by  Display  0.01  0.10  1.00  10.0	ed up. Range: 0 to	65535 hours. Value	e displayed is as de	0.01 escribed in the
PEH		me display drive has been pow e. Parameter reset		to 65535 hours. V	alue displayed is a	0.01 s described in
FEH	☐ Fan time dis Range: 0 to 68 customer.	<b>play</b> 5535 hours. Value o	displayed is as des	cribed in the table	above. Parameter	0.01 resettable by
PEL	☐ Process elaps	ed time				0.01
O	Range: 0 to 65 customer.	5535 hours. Value o	displayed is as des	cribed in the table	above. Parameter	resettable by
С оП І	☐ Modbus communication status -			-		
r 0 E 0 r o E 1 r 1 E 0 r 1 E 1	<ul> <li>☐ Modbus no reception, no transmission = communication idle</li> <li>☐ Modbus no reception, transmission</li> <li>☐ Modbus reception, no transmission</li> <li>☐ Modbus reception and transmission</li> </ul>					
dP I	☐ Last detecte	d fault 1				-
	This paramete	r describes the las	t detected fault.			
EP I	☐ State of driv			f the first detected	foult	-
	bit 0	r describes the sta		bit 3	tauit.	1
	ETA.1: Switched on	ETA.5: Quick stop	ETA.6: Switch on disabled	Forced local enabled	ETA.  Motor rotation in fo	15: orward direction
	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	3 - 14	bit 15
	ETI.10: Product in deceleration	ETI.11: Current limitation or torque limitation is running	Fast stop in progress	key ETI.14= 0 + Drive controlled b	y terminal or local pad + ETI.13=1: by remote keypad + ETI.13=0: ed by Modbus	ETI.15: Reverse direction applied to the ramp

()

Parameter that can be modified during operation or when stopped.

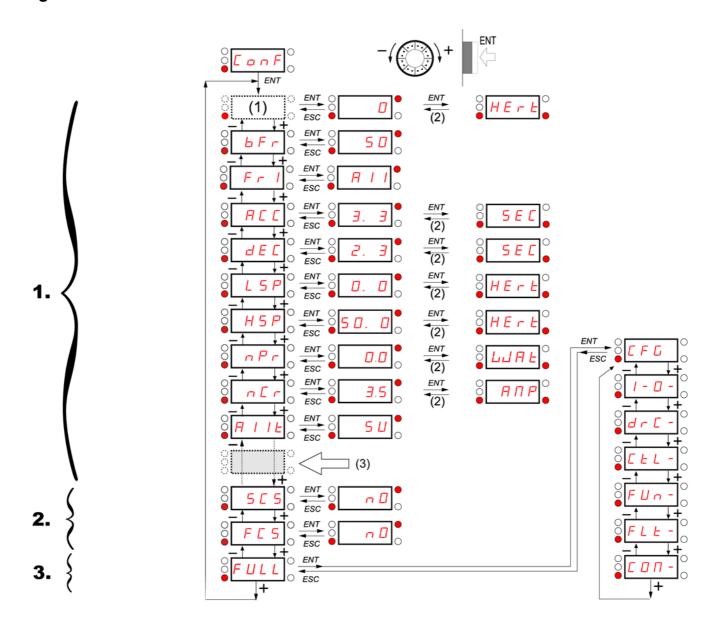
Code	Name/Description	Adjustment range	Factory setting
ПЯ ;-	Maintenance menu (continued)		
ap 2	☐ Last detected fault 2		-
	This parameter describes the second detected fault.		
EP2	☐ State of drive at detected fault 2		-
	This parameter describes the state at the moment of the second de	etected fault. See <i>E P</i>	<i>1</i> .
<i>dP3</i>	☐ Last detected fault 3		-
	This parameter describes the third detected fault.		
E P 3	☐ State of drive at detected fault 3		-
	This parameter describes the state at the moment of the third deter	cted fault. See <i>E P I</i>	
<i>а</i> РЧ	☐ Last detected fault 4		
	This parameter describes the fourth detected fault.		
ЕРЧ	☐ State of drive at detected fault 4		-
	This parameter describes the state at the moment of the fourth det	ected fault. See <i>E P</i>	I
C o d	☐ HMI Password	2 to 9999	OFF
a F F	Possible state value: Code disabled Code activated  Range 2 to 9999  If you have lost your code, please contact Schneider Electric.  This parameter is used to restrict access to the drive. To lock the drive, go to the HMI Password [ o d parameter, enter a code within the above range.  Once activated, the code state changes to o n: The protection enables only access to r E f (see page 37) and f o n (see page 38) modes, except when using SoMove. Return to factory settings or access to f u L L section are disabled, Download configuration from SoMove is possible, Upload configuration to SoMove is disabled. To unlock the drive, go to the [ o d parameter, enter the valid code, then press ENT. Code protection removal is then possible and carried out by entering o f f using the jog dial, then press ENT.		

#### **Configuration Mode ConF**

Configuration mode includes 3 parts:

- 1. MyMenu includes 11 factory set parameters (among them 9 visible by default). Up to 25 parameters are available for user customization using SoMove software.
- 2. store/recall parameter set: these 2 functions are used to store and recall customer settings.
- 3. FULL: This menu provides access to all other parameters. It includes 6 submenus:
  - Macro-configuration [ F [ page 47]
  - Input Output menu , \_ a page 48
  - Motor control menu dr [ page 58
  - Control menu [ L L page 62
  - Function menu F u n page 64
  - Fault detection management menu F L L page 91
  - Communication menu [□ □ Π page 98.

#### **Organization tree**



Displayed parameter values are given as examples only

(1) Depending on reference channel active.

(2) 2 seconds or ESC.

(3) plus 14 other customizable parameters selectable (in "FULL" list) using SoMove.

Possible values: LFr or R , u I

# **Configuration Mode - MyMenu**

Code	Name/Description	Adjustment range	Factory setting		
LFr	☐ External reference value	-400 Hz to 400 Hz	-		
()	This parameter allows to modify the frequency reference with the jog dial.  External keypad or local force mode configured. Forced local reference F L a C page 63 set to L C and Forced local assignment F L a page 63 different to a a. Visibility depends on the drive settings.				
A iu l	☐ Analog input virtual	0% to 100%	-		
()	This parameter allows to modify the frequency reference when  • Forced local reference F L o C page 63 is set to R v u I  • and Forced local assignment F L o page 63 is different to n o.  Visible if reference channel active is integrated display (Reference channel 1 F r I set to R v u I).				
ЬГг	☐ Standard motor frequency 50 Hz				
5 0 6 0	External keypad or local force mode configured (FLOC = LCC) (not visible in the factory setting).  50 Hz  60 Hz  Set to 50 Hz or 60 Hz, taken from the motor rating plate. Changing bFr sets back parameters:  Fr 5, Fbd and H5P: 50 Hz or 60 Hz  BH is set to nCr  Cr according to drive rating  CPr Watt or HP  CSP according to drive rating  BFR 60 Hz or 72 Hz				
FrI	☐ Reference channel 1		Al1		
A , I L C C N d b A , u ,	This parameter allows selection of the reference source.  Terminal Remote display Modbus Integrated display with Jog dial				
A C C	☐ Acceleration	0.0 s to 999.9 s	3.0 s		
()	Acceleration time between 0 Hz and the Rated motor frequence Make sure that this value is compatible with the inertia being of				
d E C	☐ Deceleration	0.0 s to 999.9 s	3.0 s		
()	Time to decelerate from the Rated motor frequency F - 5 page. Make sure that this value is compatible with the inertia being of				
LSP	☐ Low speed	0 Hz to HSP	0 Hz		
()	Motor frequency at minimum reference  If H5P, H5P2, H5P3 and H5P4 are already set then L5P is limited to the minimum of those values.				
H5P	☐ High speed	LSP to tFr (Hz)	50 or 60 Hz according to BFr, max TFr		
	<ul> <li>Motor frequency at maximum reference.</li> <li>Check that this setting is appropriate for the motor and the application. The values of H5P, H5P2, H5P3 and H5P4 are independent but each H5P value is linked to the values of Low speed L5P and Maximum frequency EFr page 57 according to the following rules:</li> <li>H5Px is limited to L5P and EFr (L5P≤H5Px≤EFr).</li> <li>If EFr is decreased below the current HSPx value, then HSPx automatically decreases to the new value of EFr.</li> <li>Once H5P, H5P3, H5P3 and H5P4 are set, L5P is limited to their minimum.</li> </ul>				

Parameter that can be modified during operation or when stopped.

### **Configuration Mode - MyMenu**

Code	Name/Description	Adjustment range	Factory setting
n P r	☐ Rated Motor Power	NCV -5 to NCV +2	According to drive rating
	Visible only if Motor parameter choice <code> IP                                  </code>		
5 C S	☐ Store customer parameter set	☐ Store customer parameter set	
5 E r 1	This function creates a backup of the present configuration:  Function inactive  Saves the current configuration in the drive memory. 5 [ 5 automatically switches to n a as soon as the save has been performed.  When a drive leaves the factory, the current configuration and the backup configuration are both		
	initialized with the factory configuration.		
F C 5	☐ Factory / recall customer parameter set	nO	
r E E I	This function permits to restore a configuration.  ☐ Function inactive.  ☐ £ automatically changes to ☐ as soon as one of the following actions has been performed.  ☐ The current configuration becomes identical to the backup configuration previously saved by 5 € 5.  ☐ £ automatically changes to ☐ as soon as this action has been performed. ☐ E € I is only visible		
10.1	if the backup has been carried out. If this value appears, In  The current configuration becomes identical to the factory setti		rs, ın ı l is not
inil	visible. ☐ The current configuration becomes identical to the backup configuration previously defined by SoMove software. If this value appears, lni and ¬ E [ / are not visible.		
₹ 2 s	▲ DANGER		
	UNINTENDED EQUIPMENT OPERATION Check that the modification of the current configuration is compatible with the wiring diagram used.		
	Failure to follow these instructions will result in death or serious in	ijury.	



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

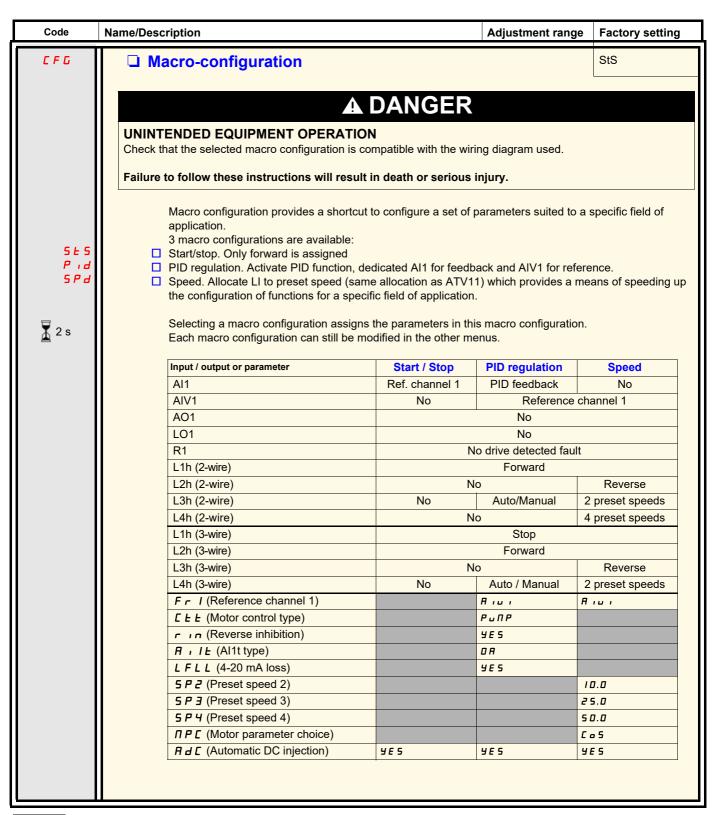
#### How to control the drive locally

In factory settings "RUN" and the jog dial are inactive. To control the drive locally, adjust the following parameter: set Reference channel 1 F r I page 45 to R I I I (Integrated display with jog dial).

#### LI assignment information

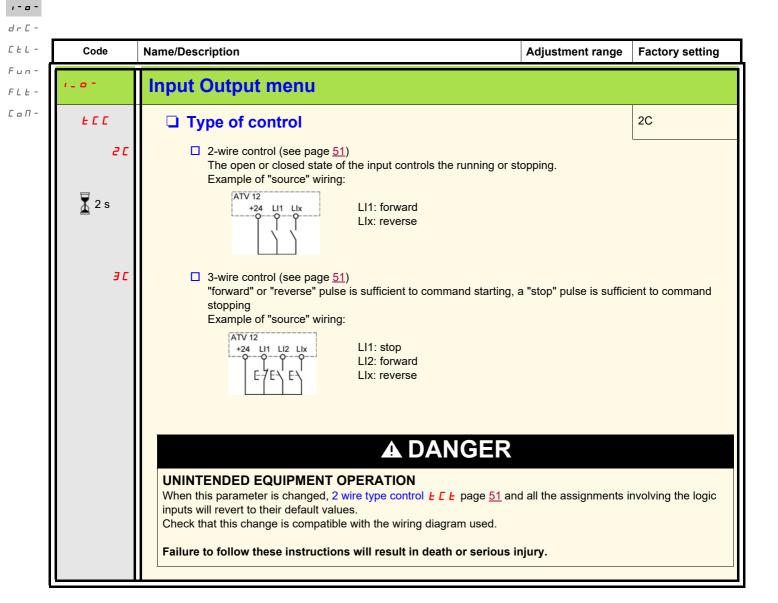
It is possible with ATV12 to use multi assignment function (ie: # [ 2 and r r 5 on the same LI).

It is also possible on some functions to assign LIH (high) or LII (low), which means that the assigned function will be activated to high (LIH) or low level (LII) of LI.





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



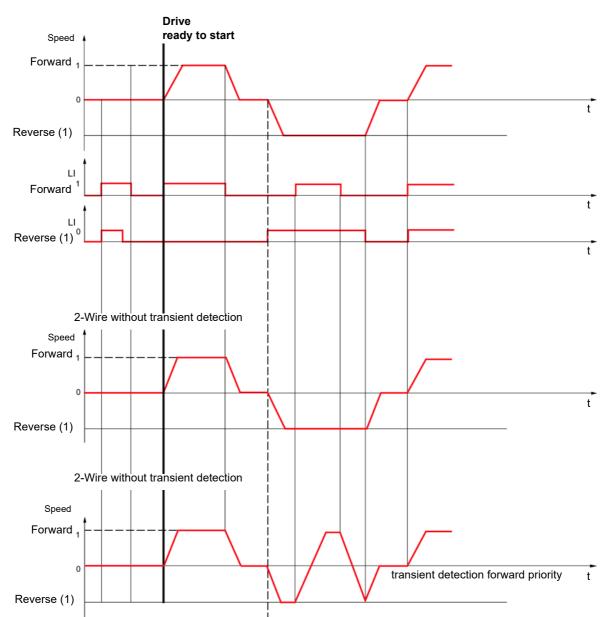


To change the assignment of this parameter press the "ENT" key for 2 s.

#### 2 wire control diagrams (see page 51)

Drive powered and ready

2-Wire with transient detection



(1) Reverse is not factory assigned. See Reverse direction \_ \_ \_ 5 page 66.

Forward and Reverse realized in same time provides motor starting in Forward direction.

BBV28581 07/2018 49

dr [

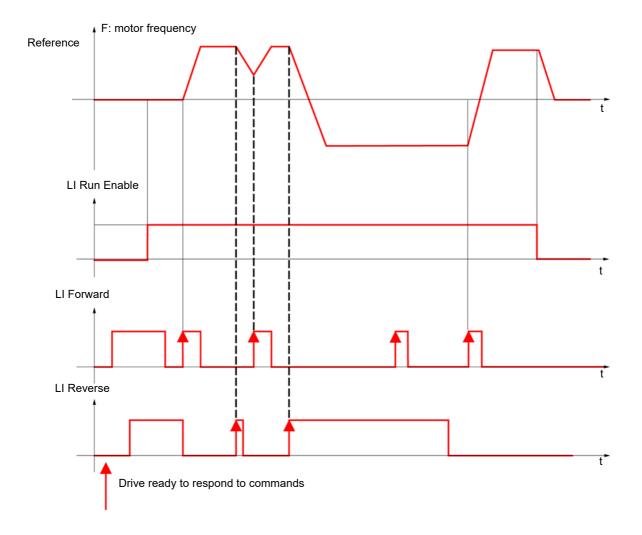
r L I -

Fun

rιε-[οΠ-



3-wire control diagram (see page 51)

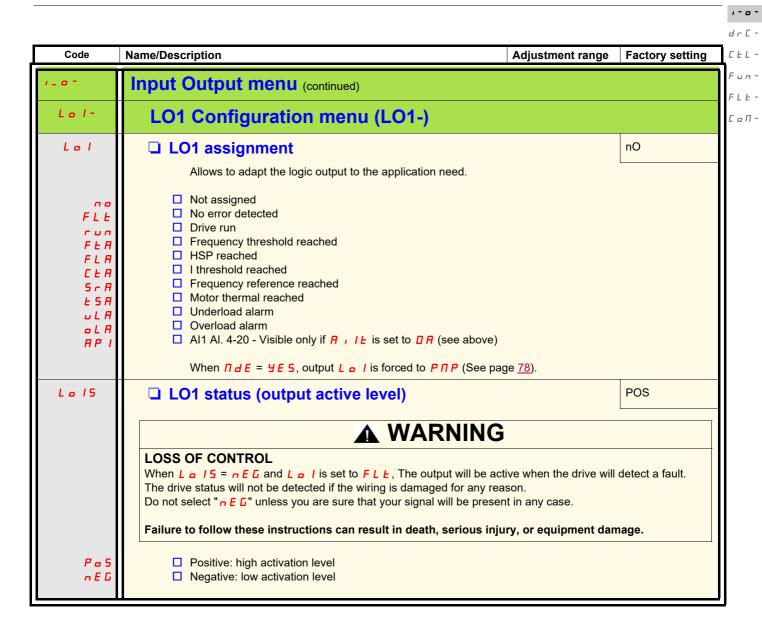


Code	Name/Description	Adjustment range	Factory setting
. 0 -	Input Output menu (continued)		
E C E	☐ 2 wire type control		trn
	<b>▲</b> DANGER		
	UNINTENDED EQUIPMENT OPERATION Check that the modification of the 2 wire type control is compatible with	the wiring diagram us	sed.
	Failure to follow these instructions will result in death or serious in	njury.	
	2-wire type control parameter can only be accessed if Type of control £ [ page 48] is set to 2 [.		
L E L	<ul> <li>Level: State 0 or 1 is taken into account for run or stop.</li> <li>Transition: A change of state (transition or edge) is necessary to initiate operation, to help prevent accidental restarts after a power supply interruption.</li> </ul>		
PFo	Priority FW: State 0 or 1 is taken into account for run or stop, the "reverse" input.	out the "forward" input	takes priority over
n P L	☐ Logic inputs type		POS
P o 5	<ul> <li>Positive: the inputs are active (state 1) at a voltage equal to or terminal). They are inactive (state 0) when the drive is disconn</li> </ul>		
n E G	<ul> <li>Negative using internal supply: the inputs are active (state 1) a         COM terminal). They are inactive (state 0) at a voltage equal to         disconnected.</li> </ul>	it a voltage lower than	10 V (for example
EnEG	<ul> <li>Negative using external supply: the inputs are active (state 1) common terminal). They are inactive (state 0) at a voltage equal to</li> </ul>	•	•
	Note: The modification will be taken into account only at the ne	ext control power-on.	
	See Control connection diagrams, page <u>25.</u>		

,-0-

dr C C E L F u n F L E C o N -

Code	Name/Description	Adjustment range	Factory setting	
1-0-	Input Output menu (continued)			
H + I =	Al1 configuration menu			
A , I E	☐ Al1 type		5U	
5 u 1 0 u 0 A	This function makes interface from the analog input signal to a drive internal value.  □ Voltage: 0-5 Vdc □ Voltage: 0-10 Vdc □ Current: x-y mA. Range determined by the Al1 current scaling parameter of 0% [r] I and Al1 current scaling parameter of 100% [r] I settings below, see page 52.			
ErL I	☐ Al1 current scaling parameter of 0%	0 to 20 mA	4 mA	
	Visible only if Al1 type <i>ਜ ,I ೬</i> is set to <i>□ ਜ</i>			
ErH I	☐ Al1 current scaling parameter of 100%	0 to 20 mA	20 mA	
	Visible only if Al1 type Ħ , I Ł is set to □ Ħ			
1-0-	Input Output menu (continued)			
r I	☐ R1 assignment		FLt	
n	<ul><li>□ Not assigned</li><li>□ No error detected</li></ul>			
run F L A	<ul><li>□ Drive run</li><li>□ Frequency threshold reached</li></ul>			
FLA	☐ HSP reached			
C	☐ I threshold reached☐ Frequency reference reached☐			
ESA ULA	☐ Motor thermal reached☐ Underload alarm			
o L A	☐ Underload alarm ☐ Overload alarm			
AP I	☐ Al1 Al. 4-20 - Visible only if # , I is set to ☐ # (see above)			
	<ul> <li>Note: Relay R1 can be assigned to upstream protection to avoid overvor.</li> <li>Connect fault relay R1 to the contactor, see schematic page 18.</li> </ul>	oltage in the drive:		
	• Use Relay R1 (R1 assignment - / ) with protection.			
	<ul> <li>Use LO1 assignment L a I (page <u>53</u>) for remote indication of th</li> </ul>	e drive status.		



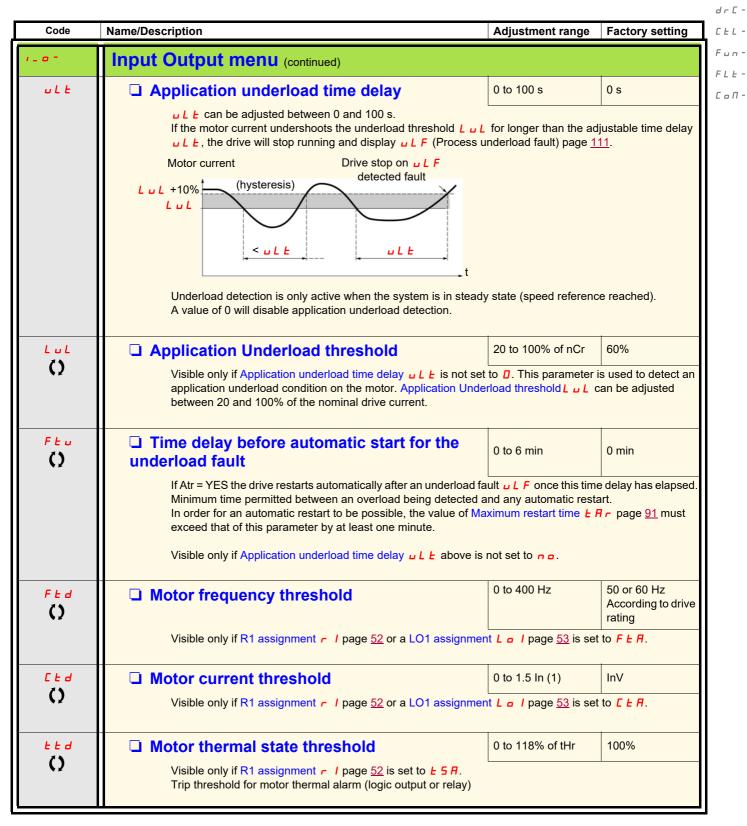
Parameter that can be modified during operation or when stopped.

dr[-

Code	Name/Description	Adjustment range	Factory setting			
1-0-	Input Output menu (continued)	Input Output menu (continued)				
Ł o L	☐ Application Overload time delay	0 to 100 s	0 s			
	This function can be used to stop the motor in the event of an addrive thermal overload. If the motor current exceeds the Application Overload time delay L a L is activated. Once this ties still greater than the overload threshold L a C -10%, the driver Process overload.  Overload detection is only active when the system is in steady A value of 0 will disable application overload detection.	ation Overload thresho me delay <code>L a L</code> has elave will stop running and	ld L a [, an apsed, if the currer I display a L [			
	Drive stop					
L = [	☐ Application Overload threshold	70 to 150% of nCr	90% of of nCr			
V2	Visible only if Application Overload time delay L above is not set to D.  This parameter is used to detect an "application overload". L a C can be adjusted between 70 and 150 of the nominal drive current. This is not a motor or drive thermal overload.					
F Ł ()	☐ Time delay before automatic start for the overload fault	0 to 6 min	0 min			
	If Atr = YES the drive restarts automatically after an overload fa Minimum time permitted between an overload being detected a In order for an automatic restart to be possible, the value of Ma exceed that of this parameter by at least one minute.	and any automatic resta	art.			

Visible only if Application Overload time delay  $L \circ L$  above is not set to  $\circ \circ$ .

Parameter that can be modified during operation or when stopped.



(1) In = nominal drive current

Parameter that can be modified during operation or when stopped.

dr C C E L F u n F L E C o N -

Code	Name/Description	Adjustment range	Factory setting	
1-0-	Input Output menu (continued)			
Ro I-	AO1 configuration menu			
Ao I	☐ AO1 assignment		nO	
	This parameter is used to set the value of an analog output.			
no	☐ Not assigned			
oΓr	☐ Motor current, between 0 and 2 In (In = rated drive current i	ndicated on the drive nam	neplate)	
o F r	Output frequency, from 0 to Max frequency <i>EF</i>			
or P	Ramp output, from 0 to Max frequency <i>E F r</i>	Galleta and all DID for all and		
o P S	☐ PID reference, between 0 and 100% of the PID set point - Visible only if PID feedback assignment P , F			
o P F	page <u>72</u> is not set to ¬□ □ PID feedback, between 0 and 100% of the PID feedback - Visible only if PID feedback assignment P□F			
5,,,	page 72 is not set to no	iololo orny n'i ib roodbao	it doolgiiiiont / //	
o P E	☐ PID error, between - 5 % and + 5 % of the PID feedback - Visible only if PID feedback assignment P , F			
	page <u>72</u> is not set to 🙃 🗈			
oPr	Output power, between 0 and 2.5 times Rated motor power			
EHr	Motor thermal state, between 0 and 200% of the rated therr			
FHA	☐ Drive thermal state, between 0 and 200% of the rated therm	nal state		
Ao IE	☐ AO1 type		0A	
	This parameter provides the interface between the drive inte	ernal value and an analog	output signal	
100	☐ Voltage: 0-10 Vdc	sa. raias and an analog	,	
o A	☐ Current: 0-20 mA			
ЧЯ	☐ Current: 4-20 mA			

Code	Name/Description	Adjustment range	Factory setting		
dr[-	Motor control menu				
b F r	See page 45.		50 Hz		
n P r	□ Rated motor power	NCV –5 to NCV +2	According to drive rating		
	See page <u>46</u> .				
C o 5	☐ Rated motor cos phi	0.5 to 1	According to drive rating		
	Visible only if Motor parameter choice \$\pi P \mathbb{\cappa}\$ page \$\frac{60}{60}\$ is s available Rated motor power \$n P \mathbb{\cappa}\$ disappears.  Motor nameplate power factor (pf).  Note: Do not confuse this with motor "Service Factor". Se unsatisfactory motor operation. If the motor power factor i parameter at the factory default (approximately 0.80)	etting [ a 5 to or ve	ery near to 1 may result in		
u n 5	☐ Rated motor voltage	100 to 480 V	230 V		
	Rated motor voltage given on the nameplate. If the line voltage un5 should be set to the value of the line	-	_		
n E r	☐ Rated motor current	0.25 In to 1.5 In (1)	According to drive rating		
	Rated motor current given on the nameplate. Rated moto	r current n [ r mo	difies Motor thermal current		
F r 5	☐ Rated motor frequency	10 to 400 Hz	50 Hz		
	Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if Standard	d motor frequency	<b>b F r</b> page <u>45</u> is set to 60 Hz.		
n 5 P	☐ Rated motor speed	0 to 24000 rpM	According to drive rating		
	Rated motor speed given on the nameplate.				
E F r	■ Maximum frequency	10 to 400 Hz	60 Hz		
	Maximum frequency <u>L</u> F r gives the upper value possible for High speed <u>H</u> 5 P page <u>90</u> .  The factory setting is 60 Hz, or preset to 72 Hz if Standard motor frequency <u>L</u> F r page <u>57</u> is set to 60 Hz.				
C E E	☐ Motor control type		Std		
PErF Std	Allows selection of the motor control type suitable for the application and the required performances.  Performance: SVCU; Sensorless vector control with internal speed loop based on voltage feedback calculation. For applications needing high performance during starting or operation.  Standard: Standard Motor Law.				
	For simple applications that do not require high performance. Simple motor control law keeping a constant Voltage Frequency ratio, with a possible adjustment of the curve bottom.  This law is generally used for motors connected in paralell. Some specific applications with motors in paralell and high performance levels may require PErF.				
РыПР	☐ Pump: U²/F; dedicated to variable torque pump and fan ap	plications that do n	ot require high starting torque.		

dr**[-**<u>dr[-</u>

FLE-CoN-

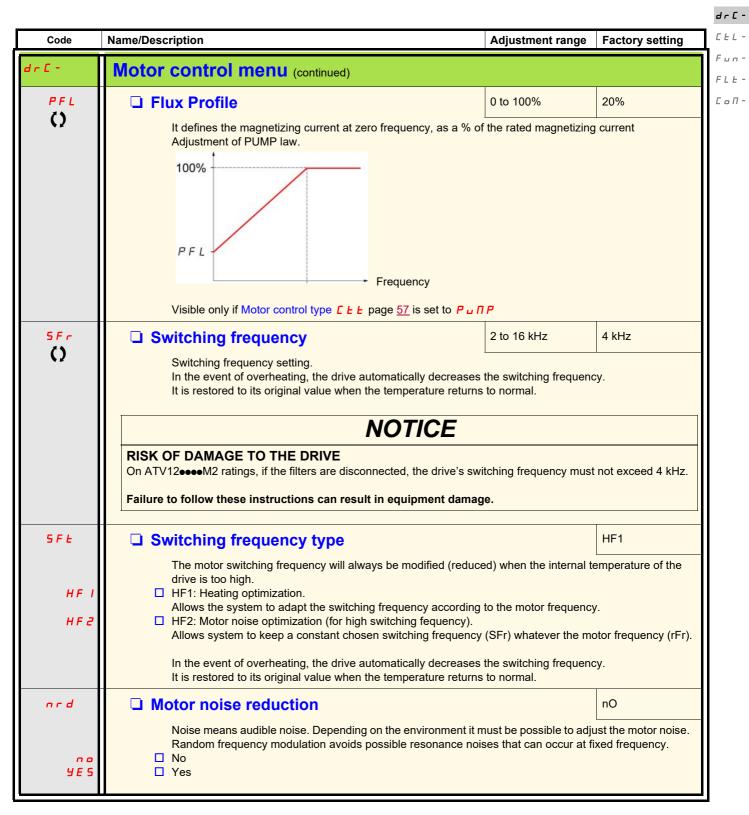
(1) In = nominal drive current

[ □П -

Code	Name/Description		Adjustment range	Factory setting	
dr [ -	Motor control menu (∞	ntinued)			
uFr	☐ IR compensation		25 to 200%	100%	
()	Used to optimize torque at very lo in parallel, decrease IR compensormers of the compensation u F r. Too high a limiting mode.	sation uFr). If there is insuffi	cient torque at low spe	ed, increase IR	
5 L P	☐ Slip compensation		0 to 150%	100%	
()	Visible only if Motor control type Used to adjust the slip compensa cases (example: for motors con If the set slip compensation is lo speed at steady state but at a sp If the set slip compensation is gr	ation around the value set by the nected in parallel, decrease Sli wer than the actual slip compe need lower than the reference.	e nominal motor slip, o ip compensation 5 <i>L P</i> ensation, the motor doe	). esn't run at nominal	
5 <i>E</i> A	☐ Frequency loop stability	,	0 to 100%	20%	
()	The <b>5</b> <i>E</i> <b>R</b> parameter can be use a period of acceleration or deceleration	eration, <b>5</b> <i>E FI</i> adapts the retuinended response time.	rn to a steady state to t High <b>5</b>	the dynamics of the	
	In this case, increase 5 £ A	Hz Å	In this case,	reduce 5 L A	
	50 40 30 20 10 0 0 0 0.1 0.2 0.3 0.4 0.5 t	50 40 30 20 10 0 0 0.1 0.2 0.3 0.4	50 40 30 20 10	i.2 0.3 0.4 0.5 t	
	Visible only if Motor control type	[ L L page 57 is set to PEr	F.	1	
F L G	☐ Frequency loop gain		0 to 100%	20%	
()	The F L C parameter adjusts the slope of the speed increase according to the inertia of the machine being driven.  Too high a value causes an overspeed, or even instability.  Too low a value causes an extended response time				
	Low <b>F L G</b> In this case, increase <b>F L G</b>	Correct F L G	High <i>F L G</i> In this case.	reduce F L G	
	Hz 4 50 40 . 30 . 20 . 10 . 0	Hz 4 50	Hz 50 40		
	Visible only if Motor control type	LE Page <u>57</u> is set to <u>PE</u> r		i.2 0.3 0.4 0.5 t	

Parameter that can be modified during operation or when stopped.

()



1-0-

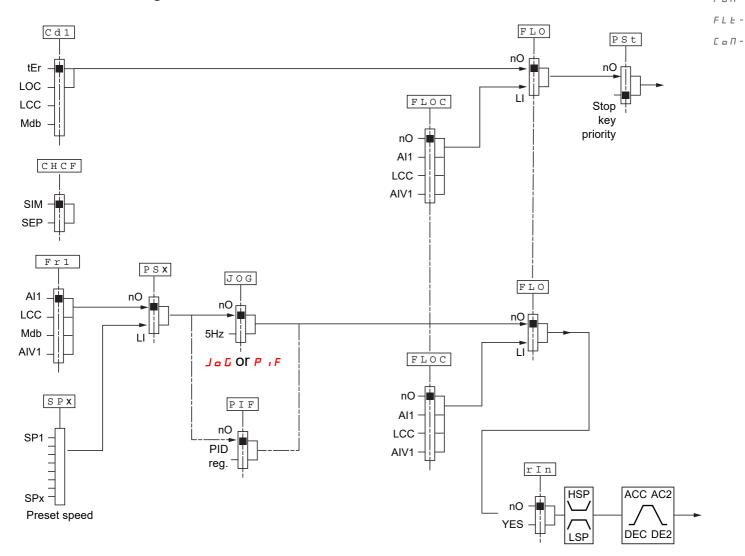
Parameter that can be modified during operation or when stopped.

dr[-

CEL-	Code	Name/Description	Adjustment range	Factory setting		
Fun- FLE-	dr[-	Motor control menu (continued)				
Г ₀ П -	Eun	☐ Auto-tuning		nO		
		A A DANGER				
		<ul> <li>HAZARD OF ELECTRIC SHOCK OR ARC FLASH</li> <li>During auto-tuning, the motor operates at rated current.</li> </ul>				
		Do not service the motor during auto-tuning.				
		Failure to follow these instructions will result in death or serious i	njury.			
		▲ WARNING	<b>)</b>			
		LOSS OF CONTROL		u u		
		• It is essential that the following parameters un5, Fr5, n[r, n5 configured before starting auto-tuning.				
		• When one or more of these parameters have been changed after auto-tuning has been performed, <b>b u n</b> will return <b>n u</b> and the procedure will have to be repeated.				
		Failure to follow these instructions can result in death, serious injury, or equipment damage.				
	n o	☐ No: When factory parameters of standard motors				
	9 E S d o n E	<ul><li>Yes: Launches auto-tuning</li><li>Done: If auto-tuning has already been performed</li></ul>				
		Attention:				
		<ul> <li>Auto-tuning must be performed with the motor connected ar</li> <li>Parameters Rated Motor Power Pr page 46 and Rated representations</li> </ul>		ge <u>57</u> must be		
		<ul> <li>consistent.</li> <li>Auto-tuning is performed only if no stop command has been function has been assigned to a logic input, this input must be</li> </ul>				
		<ul> <li>Auto-tuning takes priority over any run or prefluxing commanduning sequence.</li> </ul>				
		Auto-tuning may last for 1 to 2 seconds. Do not interrupt, wa	it for Łun value to cha	ange to donE or		
		<b>Note:</b> During auto-tuning the motor operates at rated current.				
	ПРС	☐ Motor parameter choice		nPr		
	nPr	This parameter allows to choose which motor parameter will b  Rated Motor Power n Pr page 46	e configured (  P  r or	C o 5).		
	[ -5	☐ Rated motor cos phi    □ 5 page 57				

#### **Control menu**

#### Control channel diagram



CEL-

dr [ -

Code	Name/Description	Adjustment range	Factory setting		
CFL-	Control menu				
Fr I A : I LCC Ndb A : u :	□ Reference channel 1 □ Terminal □ Remote display □ Modbus □ Integrated display with Jog dial This parameter is already included in "my menu" section, page	· 45	Al1		
LFr ()	This parameter is already included in "my menu" section, page	-			
# 10 1 ()	☐ Analog input virtual  This parameter is already included in "my menu" section, page	0% to 100%			
רוח	☐ Reverse inhibition		nO		
y e s	Inhibition of movement in reverse direction, does not apply to direction requests sent by logic inputs.  Reverse direction requests sent by logic inputs are taken into account.  Reverse direction requests sent by the display are not taken into account.  Reverse direction requests sent by the line are not taken into account.  Any reverse speed reference originating from the PID, etc., is interpreted as a zero reference (0 Hz).  No				
P 5 E	☐ Stop key priority YES				
₹ 2 s	This parameter can enable or disable the stop button located on the drive and remote display.  Disabling the stop button is effective if the active command channel is different from the drive keypad or remote display				
	<b>▲</b> WARNING				
	LOSS OF CONTROL  You are going to disable the stop button located on the drive and remote display  Do not select n o unless exterior stopping methods exist.  Failure to follow these instructions can result in death, serious injury, or equipment damage.				
9 E S	<ul> <li>No: Stop inactive</li> <li>Yes: Stop active</li> <li>It is advised in case this function is set to</li></ul>				
CHCF	☐ Channel configuration		SIM		
	Channel configuration [H[F] allows the selection of: - Not separate mode, (command and reference come from the - Separate mode (command and reference come from differen				
5 , N 5 E P	<ul><li>□ Not separate mode</li><li>□ Separate mode</li></ul>				



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 CEL-Name/Description Adjustment range **Factory setting** Control menu (continued) FLEtEr EdICommand channel 1 ГоП-This parameter allows selection of the command channel. Terminals *EEr* LoC Local □ Remote display LCC ■ Modbus ПЬЬ This parameter is available if Channel configuration [ H [ F page 62] is set to Separate FLo □ Forced local assignment nO □ Function inactive n o □ L1h to L4h: Forced local mode is active when the input is at state 1. LIH LYH FLoC □ Forced local reference nO Visible only if Forced local assignment F L a is not set to a a. Not assigned □ Terminal Ail □ Remote display LEE A IU I ☐ Integrated display with jog dial

,-odr[-

ГоП-

Į	Code	Name/Description	Adjustment range	Factory setting
	Fun-	Function menu		
	rPE-	Ramp menu		
	ЯСС	☐ Acceleration	0.0 s to 999.9 s	3.0 s
	()	Acceleration time between 0 Hz and the Rated motor frequen Make sure that this value is compatible with the inertia being		
	d E C	☐ Deceleration	0.0 s to 999.9 s	3.0 s
	()	Time to decelerate from the Rated motor frequency F r 5 parmake sure that this value is compatible with the inertia being	<del></del>	
	rPE	Ramp shape assignment		Lin
	Lin	☐ Linear ☐ S shape		
	u	☐ U shape f(Hz) f(Hz)		
	()	S shape  S shape	The rounding coeffice t1 = 0.6 set ramp time t2 = 0.4 set ramp time t3 = 1.4 set ramp time	ne (linear) ne (round)
		U shape	The rounding coeffice t1 = 0.5 set ramp time t2 = set ramp time (r t3 = 1.5 set ramp time	ie (linear) ound)
	r P 5	Ramp switching commutation		nO
	n	<ul><li>☐ Not assigned</li><li>☐ L1H: LI1 active High</li></ul>		
	L 2 H	☐ L2H: Ll2 active High☐ L3H: Ll3 active High		
	LHH	☐ L4H: LI4 active High		
	L ≥ L L + L	☐ L1L: LI1 active low ☐ L2L: LI2 active low		
	L 3 L L 4 L	☐ L3L: LI3 active low☐ L4L: LI4 active low		
	LTL	See LI assignment information on page <u>46</u> .		

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting	
Fun-	Function menu (continued)			
rPE-	Ramp menu (continued)			
яс г	☐ Acceleration 2	0.0 to 999.9 s	5.0 s	
O	Visible only if Ramp switching commutation r P 5 page 64 is not set to n c.  Second acceleration ramp time, adjustable from 0.0 to 999.9 s  This ramp will be the active ramp when using PID for the start and wake-up phases only, see PID wake up level page 75.			
4 E 2	☐ Deceleration 2	0.0 to 999.9 s	5.0 s	
()	Visible only if Ramp switching commutation r P 5 page 64 is not set to n c.  Second deceleration ramp time, adjustable from 0.0 to 999.9 s			
ЬгЯ	☐ Decel Ramp Adaptation assignment		YES	
no	☐ Function inactive. The drive will decelerate based on the	e normal deceleration adjustm	nent. This setting is	
<i>4 E S</i>	compatible with optional dynamic braking if used.  This function automatically increases deceleration time with the companion of the companion		speed of high inertia	
d Y n A	loads to help prevent DC bus overvoltage or overbraking  ☐ Motor Braking: This mode allows the drive to attempt the		hout the use of a	
dynamic brake resistor. It uses motor losses to dissipate energy from regeneration. This function incompatible with positioning. This function should not be used when an optional braking resistor module are being used.				
	Attention: When using a braking resistor set br # to no.			

Parameter that can be modified during operation or when stopped.

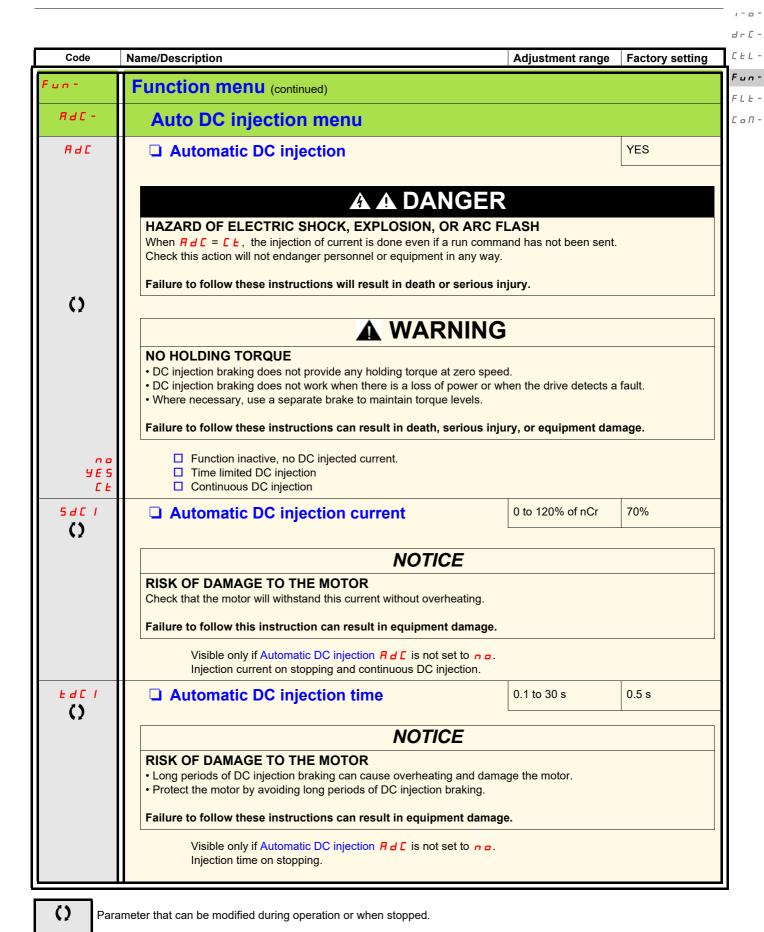
dr[-

[ □П -

Į	Code	Name/Description	Adjustment range	Factory setting
	Fun-	Function menu (continued)		
	5 E E -	Stop configuration menu		
	5 <i>E E</i>	☐ Type of stop		rMP
	r ПР F S L n S L	Stop mode on disappearance of the run command and appearance.  Ramp stop Fast stop Freewheel	ce of a stop comman	d
	n 5 Ł	☐ Freewheel stop assignment		nO
	L IL L 2L L 3L L 4L	The stop is activated when the input or the bit changes to 0. If the command is still active, the motor will only restart if Type of contro control <i>L L L</i> page 51 = <i>L E L</i> or <i>P F a</i> . If not, a new run comma Not assigned  L1L: L11 Active Low to stop  L2L: L12 Active Low to stop  L3L: L13 Active Low to stop  L4L: L14 Active Low to stop	ol <i>E [</i> [ page <u>48</u> = <i>E</i>	
	F5E	☐ Fast stop assignment		nO
	L IL L 2 L L 3 L L 4 L	<ul> <li>□ Not assigned</li> <li>□ L1L: L11 Active Low to stop</li> <li>□ L2L: L12 Active Low to stop</li> <li>□ L3L: L13 Active Low to stop</li> <li>□ L4L: L14 Active Low to stop</li> </ul>		
	d C F	☐ Ramp divider	1 to 10	4
	()	Visible only if Fast stop assignment F 5 L page 63 is not set to page 66.  The ramp that is enabled (Deceleration d E C page 45 or Deceleration by this coefficient when stop requests are sent.  Value 10 corresponds to a minimum ramp time.		

Code	Name/Description	Adjustment range	Factory setting
Fun-	Function menu (continued)		
rr5	☐ Reverse direction		nO
0.0	LI1 to LI4: choice of the input assigned to the reverse command ☐ Function inactive	I	
L iH	☐ L1h: L1 active high		
L 3 H	☐ L3h: L3 active high		
LЧH	☐ L4h: L4 active high		

Parameter that can be modified during operation or when stopped.



dr[-

Fun-

FLE-

ГоП-

Code Name/Description Adjustment range **Factory setting** Function menu (continued) J o G Jog assignment nO This parameter provides step by step control of motor running, using a logic input associated with a 2 and 3-wire control logic input. The jog frequency is fixed at 5 Hz. Acceleration and decelaration ramps taken into account in the Jog function are 0.1 s. Function inactive. no LIH ☐ L1h: LI1 active high L 2 H ☐ L2h: LI2 active high  $L \exists H$ ☐ L3h: LI2 active high LYH ■ L4h: LI4 active high 2-wire control Jog 🛔 Forward Reverse Motor Frequency Acceleration 3 wire control Jog Forward Reverse LI1 Run Motor Normal Frequency 5Hz Jog 5Hz ramp

#### **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 (PS8)	4 speeds LI (PS4)	2 speeds LI (PS2)	Speed reference
0	0	0	Reference
0	0	1	SP2
0	1	0	SP3
0	1	1	SP4
1	0	0	SP5
1	0	1	SP6
1	1	0	SP7
1	1	1	SP8

1-0-

dr[-

CEL-

Fun-

FLE-

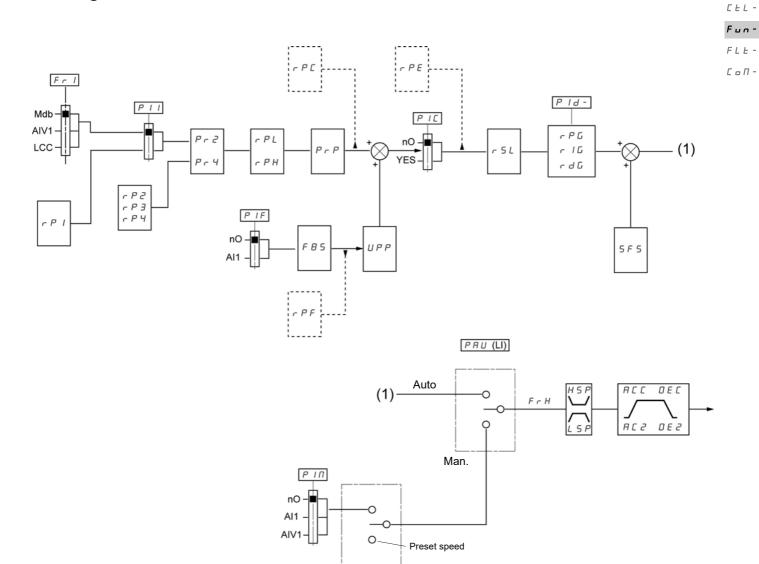
Г о П -

		art-
	Cod	CFL-
	Eug-	Fun-
. E -		FLE-
n - Р 5 !	P 5 !	[ ₀ П -
P S	P 5	

Code	Name/Description	Adjustment range	Factory setting
Fun-	Function menu (continued)		
P55-	Preset speed menu		
P 5 2	☐ 2 Preset speeds		nO
L IH L 2 H L 3 H L 4 H	☐ Function inactive ☐ L1h: L11 active high ☐ L2h: L12 active high ☐ L3h: L12 active high ☐ L4h: L14 active high		
P 5 4	☐ 4 Preset speeds as P52		nO
P 5 8	□ 8 Preset speeds as P52		nO
5 <i>P2</i> ()	☐ Preset speed 2  Visible only if 2 Preset speeds P 5 2 is not set to n □.	0 to 400 Hz	10 Hz
5 <i>P3</i> ()	☐ Preset speed 3  Visible only if 4 Preset speeds ₱ 5 4 is not set to n □.	0 to 400 Hz	15 Hz
5 <i>P</i> 4	☐ Preset speed 4  Visible only if 2 Preset speeds P 5 2 and 4 Preset speeds P 5	0 to 400 Hz	20 Hz
5 <i>P</i> 5	☐ Preset speed 5  Visible only if 8 Preset speeds ₱ 5 ॿ is not set to n a.	0 to 400 Hz	25 Hz
5 <i>P</i> 6 ()	☐ Preset speed 6  Visible only if 2 Preset speeds ₱52 and 8 Preset speeds ₱5	0 to 400 Hz  B are not set to no.	30 Hz
5 <i>P</i> 7	☐ Preset speed 7  Visible only if 4 Preset speeds P 5 4 and 8 Preset speeds P 5	0 to 400 Hz  B are not set to no.	35 Hz
5 <i>PB</i> ()	☐ Preset speed 8  Visible only if 2 Preset speeds ₱ 5 ₴ , 4 Preset speeds ₱ 5 ч and	0 to 400 Hz	40 Hz
JPF ()	☐ Skip frequency ☐ This parameter prevents prolonged operation around the regulatory to prevent a critical speed, which would cause resonance, being it inactive.		

Parameter that can be modified during operation or when stopped.

### **PID** diagram



dr[-

dr [ -[ t L - **F u n -**F L t -[ c σ Π -

Code	Name/Description	Adjustment range	Factory setting
Fun-	Function menu (continued)		
Pid-	PID menu		
PıF	☐ PID feedback assignment		nO
A I I	<ul><li>☐ Not assigned</li><li>☐ Terminal. Choice not possible if Fr1 is set to Al1</li></ul>		
r P G	☐ PID proportional gain	0.01 to 100	1
O	Visible only if PID feedback assignment P , F is not set to n a		
r 16	☐ PID integral gain	0.01 to 100	1
O	Visible only if PID feedback assignment P , F is not set to n o		
r d G	☐ PID derivative gain	0.00 to 100.00	0.00
()	Visible only if PID feedback assignment P , F is not set to n p		
F 6 5	□ PID feedback scale factor	0.1 to 100.0	1.0
()	This parameter gives the relation between process range and f Visible only if PID feedback assignment P , F is not set to n p	_	
Piri	☐ Activation internal PID reference		nO
na	Visible only if PID feedback assignment ₱ , ₱ is not set to n □ No		
9 E S	☐ Yes		
Pr2	☐ 2 preset PID assignment		nO
n a	Visible only if PID feedback assignment ₱ , ₱ is not set to n □ No		
L I H	☐ L1h ☐ L2h		
L 3 H L 4 H	□ L3h □ L4h		
2 111	2 5		

Parameter that can be modified during operation or when stopped.

Code Name/Description Adjustment range **Factory setting** Function menu (continued) Pid-PID menu (continued) nO Pr44 preset PID assignment Visible only if PID feedback assignment P , F page 72 is not set to n a. □ No no LIH ☐ L1h L2h LZH LBH ☐ L3h LYH L4h 2 preset PID assignment Pr 2 page 72 must be assigned before assigning 4 preset PID assignment 0 to 100% 25% rP2 2 preset PID reference () Visible only if PID feedback assignment P, F page 72 and 2 preset PID assignment P r ≥ page 72 are not set to no. rP30 to 100% 50% 3 preset PID reference () Visible only if PID feedback assignment P, F page 72 and 4 preset PID assignment P, 4 page 72 are not set to no. r P 4 4 preset PID reference 0 to 100% 75% () Visible only if PID feedback assignment P, F page 72 and 2 preset PID assignment P, 2 and 4 preset PID assignment Pr 4 page 72 are not set to no. ☐ Internal PID reference 0 to 100% **0%** () Visible only if PID feedback assignment P, F page 72 is not set to n a and if Activation internal PID reference P , , page 72 is set to 4 E 5 or Reference channel 1 F r / page 45 is set to L [ [ . P - P0 to 99,9 s 0 s PID reference ramp () Visible only if PID feedback assignment P , F page 72 is not set to no. rPL 0% □ PID min value reference 0 to 100% () Visible only if PID feedback assignment P IF page 72 is not set to no. r P H 0 to 100% 100% PID max value reference () Visible only if PID feedback assignment P , F page 72 is not set to n a 5 F S PID predictive speed 0.1 to 400 Hz nO This parameter allows to go directly to a set speed reference. Visible only if PID feedback assignment P , F page 72 is not set to no.

dr [ -

FLE -

ГоП-

Parameter that can be modified during operation or when stopped.

_	Γ	E	-
	Ŀ	L	-
=	u	n	-
-	L	Ŀ	-
		Е	

Į	Code	Name/Description	Adjustment range	Factory setting		
	Fun-	Function menu (continued)				
	Pid-	PID menu (continued)				
	AC S	☐ Acceleration 2	0.0 to 999.9 s	5.0 s		
	()	This parameter is active only when the system is starting.  Second acceleration ramp time, adjustable from 0.1 to 999.9 s  Time to accelerate from 0 to the Rated motor frequency F r 5 page 57. Make sure that this value is compatible with the inertia being driven.  Visible only if PID feedback assignment P r F page 72 and PID predictive speed 5 F 5 page 73 are not set to n a.				
	PIC	☐ PID correction reverse		nO		
	л в У Е 5	This parameter will reverse the internal error value of PID system.  □ No □ Yes  Visible only if PID feedback assignment P , F page 72 is not set to n □.				
	PAu	☐ PID auto/manual assignment		nO		
	C O L IH L 2 H L 3 H L 4 H	At state 0 of input, PID is active. At state 1 of input, manual run is active  No L1h: L11 active high L2h: L12 active high L3h: L13 active high				
	РіП	☐ PID manual reference		nO		
	по Я I I Я I u I	This parameter allows to disable the PID and to run on a standard manual system.				
	ŁL5	☐ Low speed operating time	0.1 to 999.9 s	nO		
	O					

Parameter that can be modified during operation or when stopped.

Code Name/Description Adjustment range **Factory setting** Function menu (continued) Pid-PID menu (continued) 0% 0 to 100% r 5 L PID wake up level **A** DANGER UNINTENDED EQUIPMENT OPERATION Check that unintended restarts will not present any danger. Failure to follow these instructions will result in death or serious injury. If PID functions and Low speed operating time L L 5 are set at the same time, the PID regulator may try to set a speed lower than LSP, resulting in unwanted operation consisting of start, running at LSP, stopping and so on Parameter PID wake up level r 5 L is used to set a minimum PID error threshold to restart after a prolonged stop at LSP. Visible only if PID feedback assignment P, F page 72 and Low speed operating time L L 5 page 74 are not set to no. u P P 0 to 100% 0% Wake-up threshold () A DANGER UNINTENDED EQUIPMENT OPERATION Check that unintended restarts will not endanger personnel or equipment in any way. Failure to follow these instructions will result in death or serious injury. If PID correction reverse P, L page 74 is set to nO, enables to set the PID feedback threshold beyond which the PID regulator is reactivated (wake-up), following a stop caused by exceeding the £ L 5 maximum time in low speed. If P, C is set to YE5, enables to set the PID feedback threshold above which the PID regulator is reactivated (wake-up), following a stop caused by exceeding the L L 5 maximum time in low speed. Visible only if PID feedback assignment P, F page 72 and Low speed operating time Ł L 5 page 89 are not set to no. 5 L E Sleep Threshold Offset 0 to HSP 1 Hz () Adjustable restart threshold (offset) following a stop after prolonged operation at Low speed L 5 P + Sleep Offset Threshold 5 L E, in Hz. The motor restarts if the reference rises above (L 5 P + 5 L E) and if a run command is still present. Visible only if Low speed time out £ L 5 page xx is not set to no and if PID feedback assignment P , F page 72 is not set to no.

dr [ -

FLE-

ГоП-

BBV28581 07/2018 75

Parameter that can be modified during operation or when stopped.

dr [

F L E

1	Code	Name/Description	Adjustment range	Factory setting
	Fun-	Function menu (continued)		
	Pid-	PID menu (continued)		
	()	□ PI feedback supervision threshold  For SPIF alarm management, see page 83. Adjustment range: □ No: Function inactive (it will not be possible to access the other □ between minimum and maximum PID feedback.  Visible only if PID feedback assignment P rF page 72 is not seem to see the page 72 is not seem to s		nO
	£ P ,	The coback supervision function time delay		0 s
	APO ()	☐ Maximum frequency detection hysteresis  Visible only if PI feedback supervision threshold L P , above is	0 to HSP not set to n a.	0 Hz
	ПРі	PI feedback supervision  Fallback mode for the PI feedback supervision function.  JE 5: freewheel stop  LFF: switch to fallback speed LFF as long as the fault is present and the run command is not disable Visible only if PI feedback supervision threshold LP, above is not set to np.		
	LFF	☐ Fallback speed  Fallback speed for PID regulator feedback supervision fault.	0 to HSP	0 Hz

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting			
Fun-	Function menu (continued)					
Pid-	PID menu (continued)	PID menu (continued)				
PNP-	Pump sub-menu					
E o L	☐ Application Overload time delay	0 to 100 s	0 s			
	See page <u>54</u>					
	Visible only if PID feedback assignment P , F page 72 is n	ot set to n a.				
LoC	☐ Application Overload threshold	70 to 150% of nCr	90%			
()	See page <u>54</u>					
	Visible only if Application Overload time delay £ o L above	is not set to no.				
FEO ()	☐ Time delay before automatic start for the overload fault	0 to 6 min	0 min			
	If ## c = ## 5 the drive restarts automatically after an overload fault ## C once this time delay has elapsed.  Minimum time permitted between an overload being detected and any automatic restart.  In order for an automatic restart to be possible, the value of Maximum restart time ### page 91 must exceed that of this parameter by at least one minute.					
	Visible only if Application Overload time delay Ł o L above	is not set to no.				
υLE	☐ Application underload time delay	0 to 100 s	0 s			
	See page <u>55</u>					
	Visible only if PID feedback assignment P , F page 72 is not set to n .					
LuL	☐ Application Underload threshold	20 to 100% of nCr	60%			
()	See page <u>55</u>					
	Visible only if Application underload time delay <u>u L Ł</u> above	is not set to no.				

Parameter that can be modified during operation or when stopped.

, - 0 dr[  $\Gamma$   $\vdash$  L

dr[-	Code	Name/Description	Adjustment range	Factory setting	
ELL-	Fun-	Function menu (continued)			
FLE-	Pid-	PID menu (continued)			
[ ₀П -	PNP-	Pump sub-menu (continued)			
	FEu ()	☐ Time delay before automatic start for the underload fault	0 to 6 min	0 min	
	If #Er = 9E5 the drive restarts automatically after an underload fault uLF once thi elapsed.  Minimum time permitted between an underload being detected and any automatic restart In order for an automatic restart to be possible, the value of Maximum restart time ER exceed that of this parameter by at least one minute.  Visible only if Application underload time delay uLE above is not set to np.				
	ПАЕ	☐ Selecting the operating mode		nO	
	□ no: single variable mode □ 9E5: single variable mode with auxiliary pump When ndE = 9E5, output LO1 is forced to PnP (see page 53).  Visible only if PID feedback assignment P rF page 72 is not set to no.				
	Fon	☐ Starting frequency of the auxiliary pump	0 to tFr	HSP	
	()	Above this frequency and after the pump starting time delay the auxiliary pump starts.  Visible only if Selecting the operating mode			
	()	☐ Time delay before starting the auxiliary pump	0 to 999.9 s	2 s	
		This time is necessary to avoid the effects of transient pressur (pump starting/stopping).  Visible only if Selecting the operating mode \$\Pi \delta E\$ above is no		prevent oscillation	
	Ramp for reaching the auxiliary pump nominal speed				
		Visible only if Selecting the operating mode \$\int d E\$ above is not set to \$n \int \text{.}\$			
	FoF ()	☐ Auxiliary pump stopping frequency  Below this frequency and after the time delay for stopping the	0 to tFr	0 Hz	
		Visible only if Selecting the operating mode $\Pi \dashv E$ above is no		pamp stopo.	

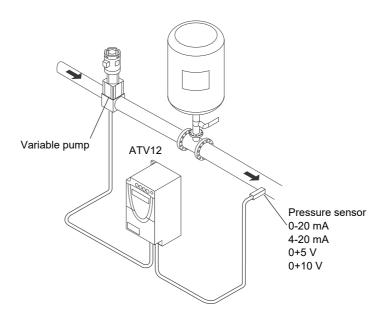
Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting			
un-	Function menu (continued)					
Pid-	PID menu (continued)	PID menu (continued)				
PNP-	Pump sub-menu (continued)					
E o F	☐ Time delay before the auxiliary pump stop command	0 to 999.9 s	2 s			
	This time is necessary to avoid the effects of transient pressure fluctuation and thus prevent oscillation (pump starting/stopping).					
	Visible only if Selecting the operating mode <i>□ d E</i> above is n	ot set to no.				
roF	☐ Ramp for auxiliary pump stopping	0 to 999.9 s	2 s			
()	Visible only if Selecting the operating mode ☐ d E above is n	ot set to no.				
n F d	☐ Zero flow detection period	nO to 20 min	nO			
	The value 0 deactivates zero flow detection.					
	Visible only if PID feedback assignment PIF page 70 is not se	et to nO.				
FFd	☐ Zero flow detection activation threshold	0 to 400 Hz	0 Hz			
()	Below this threshold, if n F d > 0 and the auxiliary pump is st zero flow detection is activated.	topped,				
	Visible only if Zero flow detection period ☐ F ☐ above is not s	et to 🙃 🙃 .				
LFd	☐ Zero flow detection offset	0 to 400 Hz	0 Hz			
()	Visible only if Zero flow detection period n F d above is not s	set to n a.	1			

Parameter that can be modified during operation or when stopped.

### 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 drC

#### First level adjustment parameters

**F C** Acceleration: 0.7 s

d E C Deceleration: 0.7 s

L 5 P Low speed: 30 Hz

H 5 P high-speed: 60 Hz

### Analog input menu Alt

F , I L Scale of analog input Al1: 0-20 mA

### Motor control menu drC

**5** *L P* Nominal motor slip: 0 Hz

F L G Frequency loop gain: 70%

□ F r IR compensation: 0%

### Application functions menu FUn

**L L L** 2-wire type control: LEL

#### PI sub-menu

P F Assignment of the PI function feedback: Al1

r P ☐ PI regulator proportional gain: 5.00

r ւն PI regulator integral gain: 8.00

r P ₁ Internal PI regulator reference: 39%

r 5 L Restart error threshold: 40%

□ P , Supervision of the PI regulator function: LFF

LP , PI feedback supervision threshold: 17%

₽ P PI feedback supervision function time delay: 1 s

L F F Fallback speed: 50 Hz

#### Pump sub-menu PMP

¬ F d Zero flow detection: 1 min

FF d Zero flow detection activation threshold: 50 Hz

L F d Zero flow detection offset: 5 Hz

**L L 5** Sleep threshold operating time: 3 s

5 F 5 Quick start threshold: 25 Hz

5 L E Sleep threshold offset: 10 Hz

#### Automatic DC injection sub-menu AdC

Ħ d [ Automatic DC injection assignment: nO

Automatic restart function Atr

FL - Automatic restart: YES

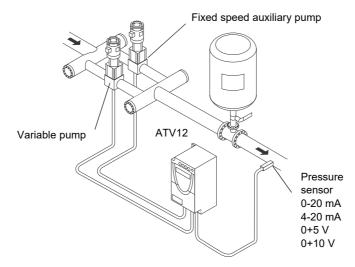
### Fault menu FLt

L o C Overload threshold: 11%

F L o Time delay before automatic start for the overload fault: 1

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 drC

### First level adjustment parameters

- F [ Acceleration: 0.1 s
- d E ☐ Deceleration: 0.1 s
- L 5 P Low speed: 35 Hz

### Analog input menu Alt

F , IL Scale of analog input Al1: 0-20 mA

#### Motor control menu drC

- 5 L P Nominal motor slip: 0 Hz
- F L G Frequency loop gain: 70%
- □ F r IR compensation: 0%

#### Application functions menu FUn

**L L L** 2-wire type control: LEL

#### PI sub-menu

- P , F Assignment of the PI function feedback: Al1
- ¬ Р 🖟 PI regulator proportional gain: 5.00
- r I PI regulator integral gain: 8.00
- r P ₁ Internal PI regulator reference: 51%
- r 5 L Restart error threshold: 42%

#### Pump sub-menu PMP

- □ d E Selecting the operating mode: YES
- F on Starting frequency of the auxiliary pump: 49 Hz
- Ł □ n Time delay before starting the auxiliary pump: 1 s
- Ramp for reaching the nominal speed of the auxiliary pump: 1 s
- F o F Stopping frequency of the auxiliary pump: 39.6 Hz
- **L** □ **F** Time delay before the auxiliary pump stop command: 1 s
- r o F Ramp for stopping the auxiliary pump: 1 s
- ☐ F d Zero flow detection: 1 min
- FF J Zero flow detection activation threshold: 42 Hz
- L F d Zero flow detection offset: 2 Hz
- L L 5 Sleep threshold operating time: 5 s
- 5 L E Sleep threshold offset: 3 Hz
- L o / Assignment as logic/analog output PMP

#### Automatic DC injection sub-menu AdC

Rd L Automatic DC injection assignment: nO

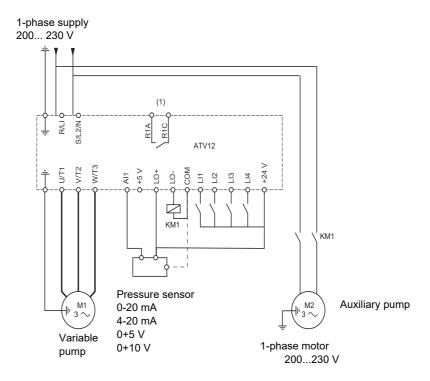
#### Automatic restart function Atr

FL - Automatic restart: YES

#### Fault menu FLt

- L u L Underload function time delay 5 s
- L u L Underload threshold: 59%
- F L u Time delay before automatic restart for the underload fault: 1

## **Connection diagram**



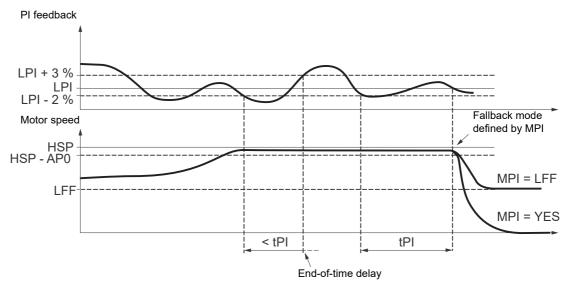
(1) Fault relay contacts, for remote indication of the drive status.

**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 (MPI)

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 HSP - APO) and at the same time the PI feedback is lower than the supervision threshold LPI - 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 LPI + 3%, the drive switches to fallback mode as defined by parameter MPI.

- MPI = YES:

The drive will perform a freewheel stop and will display fault code SPIF.

- MPI = LFF:

The drive will run at a fixed frequency LFF and will display fault code FrF.

In both cases the drive reverts to PI regulation mode as soon as the PI feedback is higher than the supervision threshold LPI + 3%. In single variable with auxiliary pump mode (MdE = YES), 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 ATV12 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.

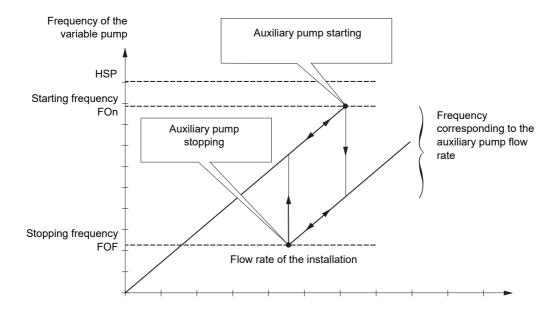
### Selecting the operating mode

The ATV12 offers 2 operating modes:

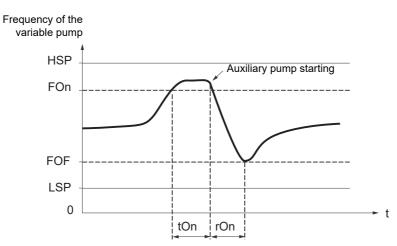
- Single variable mode: 1 single variable speed pump (variable pump).
- Single variable with auxiliary pump mode: 1 variable speed pump (variable pump) and one fixed speed pump (auxiliary pump).

### Control of the auxiliary pump

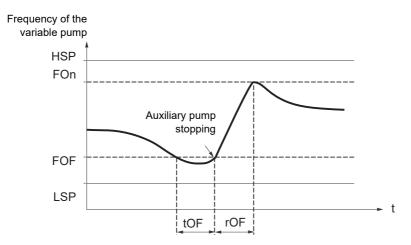
The PI regulator output (frequency reference of the variable pump) is used to control starting or stopping of the auxiliary pump with hysteresis, as shown in the figure below:



When the frequency exceeds the starting threshold (FOn), a time delay (tOn) 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 (FOF) following a ramp (rOn) 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.



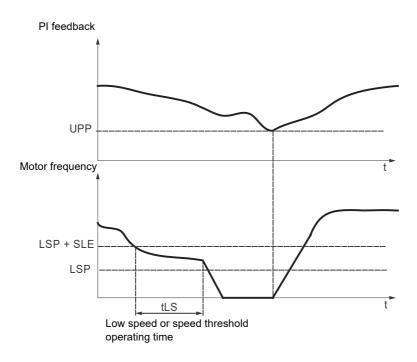
When the frequency is lower than the stopping threshold (FOF), a time delay is launched (tOF) to avoid the effects of transient flow fluctuations. If after this time delay, the frequency remains lower than the stopping threshold, the auxiliary pump is stopped. When the stop command is sent, the variable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



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

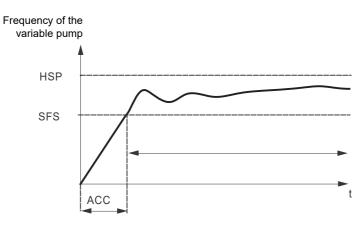
This function is used to stop the variable pump when there is zero flow (auxiliary pump stopped). In this case, if the frequency of the variable pump is lower than the "sleep" threshold (LSP + SLE), a time delay (tLS) is launched. If, after this time delay, the frequency remains lower than threshold LSP + SLE, 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 UPP. The variable pump is then started.



### **Quick start function**

The quick start function can be used to overcome problems linked to high rPG and rlG gains (instability on starting). The drive accelerates until it reaches the quick start threshold SFS following a ramp ACC. Once the threshold has been reached, the PI regulator is activated.

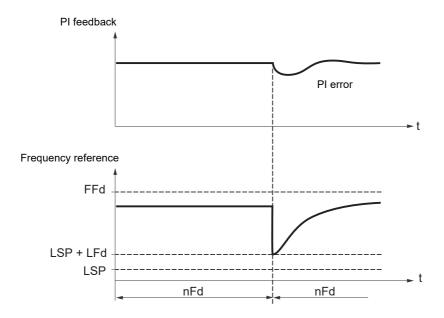


### Zero flow detection

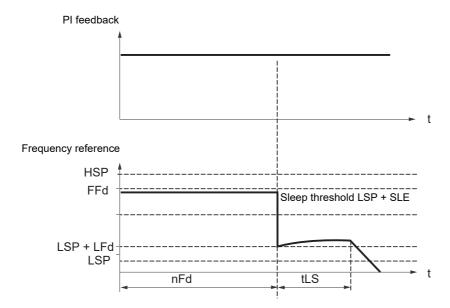
This function is only active when the auxiliary pump is stopped and the motor frequency is below threshold FFd.

This function is used in applications where zero flow cannot be detected by the sleep function alone. It forces the drive frequency reference to LSP + LFd periodically (at each time interval nFd) 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 (LFd ≤ SLE).

Code	Name/Description	Adjustment range	Factory setting			
Fun-	Function menu (continued)					
EL 1-	Current limitation menu					
L C ≥	☐ 2 <sup>nd</sup> current limitation commutation		nO			
C 0 L 1H L 3H L 4H L 1L L 3L L 4L	Assignment  Function inactive.  L1H: LI1 active high  L2H: LI2 active high  L3H: LI3 active high  L4H: LI4 active high  L1L: LI1 active low  L2L: LI2 active low  L3L: LI3 active low  L4L: LI4 active low  I 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 on page 46					
()						
	RISK OF DAMAGE TO THE MOTOR AND THE DRIVE Check that the motor will withstand this current. Check that the profile mission complies with the derating curve given in Failure to follow this instruction can result in equipment damage.	the installation manua	al.			
C L Z	☐ Current limitation 2	0.25 to 1.5 ln (1)	1.5 ln			
O						
	NOTICE					
	RISK OF DAMAGE TO THE MOTOR AND THE DRIVE Check that the motor will withstand this current. Check that the profile mission complies with the derating curve given in the installation manual.					
	Failure to follow this instruction can result in equipment damage.					

(1) In = nominal drive current

CEL-

ГоП-

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
Fun-	Function menu (continued)		
5 P L -	Speed limit menu		
L 5 <i>P</i> ()	Low speed  Motor frequency at minimum reference. This parameter is already included in "my menu" section, page	0 Hz to HSP 45.	0 Hz
£L5 ()	Following operating time  Following operation at Low speed L 5 P for a defined period, a motor restarts if the frequency reference is greater than Low speed.  Note: n p corresponds to an unlimited period.		

Parameter that can be modified during operation or when stopped.

## dr[-

## high-speed configuration

. . . .

[ ₀П -

H 5 P 4

The logic inputs enable selection of the desired high-speed.

assigned

assigned

Setting	
Parameter	State
5 H 2	no
5 H Y	no
5 H 2	assigned
5 H Y	no
5 H 2	no
5 H Y	assigned
	Parameter  5 H 2  5 H 4  5 H 2  5 H 7  5 H 2

5 H 2

5 H Y

Code	Name/Description	Adjustment range	Factory setting		
Fun-	Function menu (continued)				
5 <i>PL</i> -	Speed limit menu				
H5P ()	☐ High speed	LSP to tFr	50 or 60 Hz according to BFr, max TFr		
	Motor frequency at maximum reference, can be set between Low speed L 5 P and Maximum frequency L F r page 57.  If L F r is decreased below the value defined for H 5 P, then H 5 P automatically decreases to the new value of L F r.  This parameter is already included in "my menu" section, page 45.				
5 H 2	☐ 2 HSP assignment		nO		
C	□ No □ L1h: Ll1 active high □ L2h: Ll2 active high □ L3h: Ll3 active high □ L4h: Ll4 active high				
5 H Y	☐ 4 HSP assignment		nO		
C O L 1H L 2 H L 3 H L 4 H	<ul> <li>□ No</li> <li>□ L1h: LI1 active high</li> <li>□ L2h: LI2 active high</li> <li>□ L3h: LI3 active high</li> <li>□ L4h: LI4 active high</li> </ul>				
H5P2	☐ High speed 2	LSP to tFr	as HSP		
()	Visible only if 2 HSP assignment 5 H 2 is not set to n a.				
#5 <i>P3</i> <b>()</b>	☐ <b>High speed 3</b> Visible only if 4 HSP assignment 5 H 4 is not set to n □.	LSP to tFr	as HSP		
H 5 P 4	☐ High speed 4	LSP to tFr	as HSP		
()	Visible only if 2 HSP assignment 5 H ≥ and 4 HSP assignmen	t <b>5</b> H <b>4</b> are not set to	ם ר.		

()

Parameter that can be modified during operation or when stopped.

Code	Name/Description Adjustment range	Factory setting		
FLE-	Fault detection management menu			
r 5 F	☐ Detected fault reset assignment	nO		
 L IH L 2 H L 3 H L 4 H	Manual fault reset.  Function inactive  L1h: L11 active high  L2h: L12 active high  L3h: L13 active high  L4h: L14 active high  Seults are reset when the assigned input or bit changes to 1, if the cause of the fault The STOP/RESET button on the display terminal performs the same function.  See also Diagnostics and Troubleshooting on page 108.	has disappeared.		
Atr-	Automatic restart menu			
AFL	□ Automatic restart	nO		
YES	UNINTENDED EQUIPMENT OPERATION  *The automatic restart can only be used on machines or installations which do not pose any danger to either personnel or equipment.  *If the automatic restart is activated, R1 will only indicate a fault has been detected once the time-out period for the restart sequence has expired.  *The equipment must be used in compliance with national and regional safety regulations.  Failure to follow these instructions will result in death or serious injury.  This function defines drive behavior upon detection of a fault.  If validated, this function allows an automatic restart of the drive when the cause of the detected fault has disappeared and the other operating conditions permit the restart.  Function inactive			
E A r	☐ Max. automatic restart time	5 min		
5 10 30 1H 2H 3H C E	☐ 10 min ☐ 30 min ☐ 1 hour ☐ 2 hours ☐ 3 hours			

**FLE** -

CEL-	Code	Name/Description A	Adjustment range	Factory setting
Fun-	FLE-	Fault detection management menu (continued)		
Г о П -	FLr	☐ Catch on the fly		nO
	Used to enable a smooth restart if the run command is maintained after the following exposed by 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 follows the ramp to the reference speed.  This function requires 2-wire level control.			
	n o 4E 5	☐ Function inactive ☐ Function active		

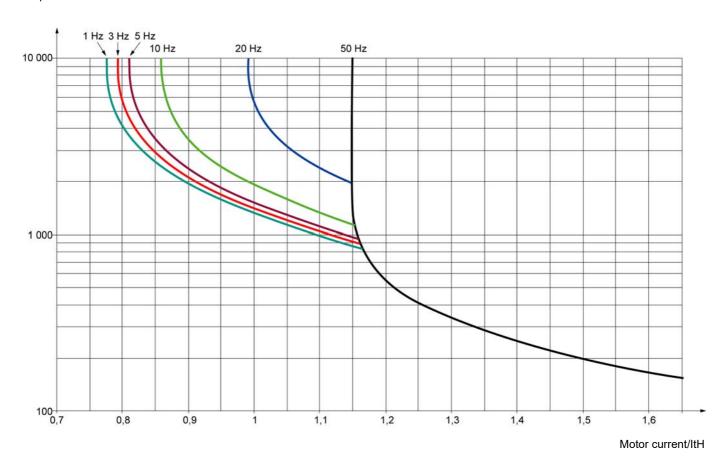
### **Motor thermal protection**

### **Function:**

Thermal protection by calculating the I<sup>2</sup>t.

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

Trip time in seconds



## **NOTICE**

#### **RISK OF DAMAGE TO THE MOTOR**

The use of external overload protection is required under the following conditions:

- Repowering up the product since there is no motor thermal state memory.
- · Running multiple motors
- Running motors rated at less than 0.2 times the nominal drive current
- · Using motor switching

Failure to follow these instructions can result in equipment damage

BBV28581 07/2018 93

1-0

dr[-

Fun-

**FLE** -

Code	Name/Description	Adjustment range	Factory setting						
FLE-	Fault detection management menu (continued	l)							
EHE-	Motor thermal protection menu								
()	Motor thermal current  0.2 to 1.5 ln (1)  According to drive rating								
<b>4</b> *	Current used for the motor thermal detection. Set ItH to the nominal current on the motor rating plate.								
EHE	☐ Motor protection type ACL								
ACL FCL	☐ Self-ventilated ☐ Motor-ventilated								
o L L	□ Overload fault management YES								
n o 4 E S	Type of stop in the event of a motor thermal fault.  ☐ Fault ignored ☐ Freewheel stop Setting Overload fault management ☐ L L to ☐ ☐ inhibits the Motor overload ☐ L F page 110.								
	NOTICE								
	RISK OF DAMAGE TO THE MOTOR  If a L L is set to n a, motor thermal protection is no longuer provided by the drive. Provide an alternative means of thermal protection.								
	Failure to follow these instructions can result in equipment damage.								
ПЕП	☐ Motor thermal state memo nO								
9 E S	☐ Motor thermal state not stored at power off. ☐ Motor thermal state is stored at power off.								
FLE-	Fault detection management menu (continued)								
o P L	□ Output Phase loss YES								
	HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH  If PL is set to po, loss of cable is not detected. Provide an alternative means of thermal protection.  Check this action will not endanger personnel or equipment in any way								
	Failure to follow these instructions will result in death or serious	mjury.							
9 E S	<ul><li>☐ Function inactive</li><li>☐ Tripping on OPF1 (1 phase loss) or OPF2 (3-phase loss) fault with freewheel stop.</li></ul>								
, PL	☐ Input Phase loss  According to drive rating								
	This parameter is only accessible in this menu on 3-phases drives.		-						
9 E S	<ul> <li>Fault ignored. To be used when the drive is supplied via a sing</li> <li>Fault with freewheel stop.</li> <li>If one phase disappears, the drive switches to fault mode Inpudisappear, the drive continues to operate until it trips on an un</li> </ul>	t Phase loss <b>, P L</b> but	if 2 or 3 phases						

(1) In = nominal drive current

F L E -

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting					
FLE-	Fault detection management menu (continued)							
u 5 b -	Undervoltage menu							
u 5 b	☐ Undervoltage fault management 0							
<u> </u>	Behavior of the drive in the event of an undervoltage ☐ Detected fault and R1 relay open. ☐ Detected fault and R1 relay closed.							
S Ł P	☐ Undervoltage prevention nO							
п	Behavior in the event of the undervoltage fault prevention level being reached  ☐ No action (freewheel)  ☐ Stop following an adjustable ramp Undervoltage ramp deceleration time 5 ₺ ∏.							
5 <i>E</i> П	☐ Undervoltage ramp deceleration time 0.0 to 10.0 s 1.0 s							
()	Ramp time if Undervoltage prevention 5 L P = ¬ П P.							
FLE-	Fault detection management menu (continued)							
5 t r t	□ IGBT test		nO					
y E S	<ul> <li>□ No test</li> <li>□ The IGBTs are tested on power up and every time a run command is sent. These tests cause a slight delay (a few ms). In the event of a fault, the drive will lock. The following faults can be detected:         <ul> <li>Drive output short-circuit (terminals U-V-W): SCF display</li> <li>IGBT: xtF, where x indicates the number of the IGBT concerned</li> </ul> </li> <li>IGBT short-circuited: x2F, where x indicates the number of the IGBT concerned</li> </ul>							
LFLI	□ 4-20 mA loss behavior							
n	□ Fault ignored. This configuration is the only one possible if Al1 current scaling parameter of 0% [ r L I page 52 is not greater than 3 mA or if Al1 type # ,   L =   □ □. □ Freewheel stop.							
ın H	☐ Detected fault inhibition assignment		nO					
L IH L ≥ H L ∃ H L Ч H	□ Detected fault inhibition assignment  To assign fault inhibit, press and hold down the "ENT" key for 2 s. □ Function inactive □ L1h: L11 active high □ L2h: L12 active high □ L3h: L13 active high □ L4h: L14 active high □ L4h: L14 active high □ L4h: L14 active high ■ L4h: L15 active high □ L4h: L15 active high ■ L4h: L16 active high ■ L4h: L17 active high ■ L4h: L18 active high ■ L4h: L19 active high ■ L4h: L							

**F L E -**С о П -

₹ 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.

FLE

Code	lame/Description Adjustment range Factory setting									
LE-	Fault detection management menu (continued)									
5 L L	☐ Modbus fault management		YES							
n	Behavior of the drive in the event of a communication fault with integrated Modbus.  Fault ignored Freewheel stop									
	<b>▲</b> WARNING									
	LOSS OF CONTROL  If Modbus fault mgt 5 L L is set to n D, communication control will be inhibited. For safety reasons, inhibition of communication fault should only be used for adjustment or special applications purpose.  Failure to follow these instructions can result in death, serious injury, or equipment damage.									
drn	□ Degraded line supply operation nO									
	NOTICE									
	RISK OF DAMAGE TO THE DRIVE When Derated operation = Yes, use a line choke.  Failure to follow these instructions can result in equipment damage.  Lowers the tripping threshold of the USF fault to operate on a line supply down to 50% of nominal line voltage. In this case, the performance of the drive cannot be guaranteed  no Yes									
л о У Е 5										
rPr	□ Reset power run									
() FEH	This reset will initialize the settings located on ☐ ☐ ☐ section, menu ☐ ☐ , -, page 41. ☐ nO ☐ Reset fan time display									

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	ΓŁL				
FLE-	Fault detection management menu (continued)							
EEF-	External fault			СоП				
ELF	☐ External fault assignment		nO					
C O L IH L 2 H L 3 H L IL L 2 L L 3 L L 4 L	Assignment of the external fault event to a logic input    Function inactive   LI1 active High   LI2 active High   LI3 active High   LI3 active High   LI4 active Iow   LI5 active Iow							
EPL	☐ Stop type - external fault							
9 E S L F F	Type of stop in the event of an external fault  ☐ External fault ignored ☐ Freewheel stop ☐ Switch to Fallback speed <i>L F F</i> as long as the external fault is present and the run command is not disabled.							
LFF	☐ Fallback speed	0 to HSP	0 Hz					
	Selection of the fallback speed in case of external fault event.  Visible only if Stop type - external fault <i>E P L</i> is not set to Fallback speed <i>L F F</i> .  Note: This parameter can also be accessed in the PID menu.							

-		Ξ	-	J	
0		ш	Ŀ	r	
П		п	L	Ε	_
-	-	-	-	-	

	Name/Description	Adjustment range	Factory setting						
<b>□</b> Π-	Communication menu Note: For following parameters, the modifications will be taken into account	nt only at the next cont	rol power-on.						
A 9	Modbus address	OFF to 247	OFF						
	Modbus address is adjustable from <u>a F F</u> to <u>2 4 7</u> . When <u>a F F</u> , communication is not active.								
Ebr	☐ Modbus baud rate		19.2						
4.8 9.6 19.2 38.4	☐ 4.8 kbps ☐ 9.6 kbps ☐ 19.2 kbps ☐ 38.4 kbps								
Ł F o	☐ Modbus format 8E1								
8	□ 8o1 □ 8E1 □ 8N1 □ 8N2								
t t o	☐ Modbus time out	10 s							
	The drive detects a Modbus fault if it does not receive any Mod predefined time period (time-out).	bus request at its addr	ess within a						
, E 5 -	Input scanner menu (values are expressed in hexadeci	mal)							
nПЯ I	☐ Com scanner read address parameter 1	0C81							
	Address of the first input word.								
n∏A2	☐ Com scanner read address parameter 2								
	Address of the second input word.								
оПЯЭ	□ Com scanner read address parameter 3 0								
	Address of the third input word.								
пПЯЧ	☐ Com scanner read address parameter 4 0								
	Address of the fourth input word.								
o C 5 -	Output scanner menu (values are expressed in hexad	lecimal)							
n C A I	☐ Com scanner write address parameter 1  Address of the first output word.		2135						
n C A 2	☐ Com scanner write address parameter 2		219A						
	Address of the second output word.								
п С Я Э	☐ Com scanner write address parameter 3								
	Address of the third output word.								
n E A 4	☐ Com scanner write address parameter 4		0						
	Address of the fourth output word.								

Code	Name/Description	Adjustment range	Factory setting				
С о П -	Communication menu (continued)						
, S A -	Input scanner access menu (values are expressed in hexadecimal)						
пПΙ	☐ Com scanner read address value 1  Value of the first input word		ETA VALUE				
n ∏ 2	☐ Com scanner read address value 2  Value of the second input word		RFRD value				
ЕΠα	☐ Com scanner read address value 3  Value of the third input word		8000				
л П Ч	☐ Com scanner read address value 4  Value of the 4rd input word		8000				
o 5 A -	Output scanner access menu (values are exp	pressed in hexadecimal)					
n E	☐ Com scanner write address value 1  Value of the first output word		CMD value				
()	☐ Com scanner write address value 2  Value of the second output word		LFRD value				
()	☐ Com scanner write address value 3  Value of the third output word		8000				
()	Com scanner write address value 4  Value of the fourth output word		8000				

Parameter that can be modified during operation or when stopped.

### **Maintenance**

### Servicing

The Altivar 12 does not require any preventive maintenance. However, it is advisable to perform the following checks regularly:

- · The condition 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.

### 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

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 14 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators 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.

### Display menu

Use the display menu to show the status of the drive and it's current values as an aid for finding the causes of detected faults.

#### Spares and repairs

Serviceable product: Refer to the catalog for replacement of spare parts.

### Procedure after a long time storage

### **NOTICE**

### RISK OF DEGRADED PERFORMANCE DUE TO CAPACITOR AGING

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

- · Use a variable AC supply connected between L1 and L2.
- Increase AC supply voltage to have:
  - 80% of rated voltage during 30 min
  - 100% of rated voltage for another 30 min

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

## Migration ATV11 - ATV12

The ATV12 is compatible with the ATV11 (latest version), nevertheless some differences can exist between both drives. Both models (ATV11 and ATV12) are available in heatsink or base plate versions.

Attention: ATV11 "E" Dimensions are given without potentiometer, add 7 mm depth for new dimension.

### **Dimensions**

Attention: these dimensions concern fixing holes.

Power ra	ating	ATV product	Drive	G (width)		H (height)		c (depth)	
kW	HP	<del>_</del>		mm	in.	mm	in.	mm	in.
0.18	0.25	12	018F1	60	2.36	131	5.16	102	4.01
0.18	0.25	11	U05F1U/A	60	2.36	131	5.16	101 (+7)	3.98 (+0.27)
0.18	0.25	12	018M2	60	2.36	131	5.16	102	4.01
0.18	0.25	11	U05M2 E/U/A	60	2.36	131	5.16	101 (+7)	3.98 (+0.27)
0.18	0.25	12	018M3	60	2.36	131	5.16	102	4.01
0.18	0.25	11	U05M3 U/A	60	2.36	131	5.16	101 (+7)	3.98 (+0.27)
0.37	0.5	12	037F1	60	2.36	120	4.72	121	4.76
0.37	0.5	11	U09F1 U/A	60	2.36	131	5.16	125 (+7)	4.92 (+0.27)
0.37	0.5	12	037M2	60	2.36	120	4.72	121	4.76
0.37	0.5	11	U09M2 E	60	2.36	120	4.72	125	4.92
0.37	0.5	11	U09M2 U/A	60	2.36	131	5.16	125 (+7)	4.92 (+0.27)
0.37	0.5	12	037M3	60	2.36	120	4.72	121	4.76
0.37	0.5	11	U09M3 U/A	60	2.36	131	5.16	125 (+7)	4.92 (+0.27)
0.55	0.75	12	055M2	60	2.36	120	4.72	131	5.16
0.55	0.75	11	U12M2 E	60	2.36	120	4.72	138	5.43
0.75	1	12	075M2	60	2.36	120	4.72	131	5.16
0.75	1	11	U18M2E	60	2.36	120	4.72	138	5.43
0.75	1	11	U18M2 U/A	60	2.36	131	5.16	138 (+7)	5.43 (+0.27)
0.75	1	12	075M3	60	2.36	120	4.72	131	5.16
0.75	1	11	U18M3 U/A	60	2.36	131	5.16	138 (+7)	5.43 (+0.27)
0.75	1	12	075F1	93	3.66	120	4.72	156	6.14
0.75	1	11	U18F1 U/A	106	4.17	131	5.16	156 (+7)	6.14 (+0.27)
1.5	2	12	U15M2	93	3.66	120	4.72	156	6.14
1.5	2	11	U29M2	106	4.17	131	5.16	156 (+7)	6.14 (+0.27)
2.2	3	12	U22M2	93	3.66	120	4.72	156	6.14
2.2	3	11	U41M2 E/U/A	106	4.17	131	5.16	156 (+7)	6.14 (+0.27)
1.5	2	12	U15M3	93	3.66	120	4.72	131	5.16
1.5	2	11	U29M3 U/A	106	4.17	131	5.16	156 (+7)	6.14 (+0.27)
2.2	3	12	U22M3	93	3.66	120	4.72	131	5.16
2.2	3	11	U41M3 U/A	106	4.17	131	5.16	156 (+7)	6.14 (+0.27)
3	4	12	U30M3	126	4.96	159	6.26	141	5.55
3	4	11	-	-	-	-	-	-	-
4	5.5	12	U40M3	126	4.96	159	6.26	141	5.55
4	5.5	11	-	-	-	-	-	-	-

### **Terminals**

#### **Power**

- Before wiring power terminals, connect the ground terminal of the grounding screws located below the output terminals to the protective ground (see indicator B page 20).
- The power connections are available without removing the power terminal cover. Nevertheless, if necessary, it is possible to remove them using an adapted tool (IP20 protection requirement). Cover to be removed in case of using ring terminals (pressure stress is 14 N for size 1 and 20 N for sizes 2 and 3).
- Pay attention to the input ground terminal located <u>on the right of the connector</u> (was on left on ATV11). The ground connection is clearly indicated on the input power terminal cover and the screw colour is green.

#### Control

### WARNING

#### **IMPROPER CONTROL WIRING PRACTICES**

- The ATV12 drive internal supply is 24 V rather than 15 V on ATV11. When replacing ATV11 drive with an ATV12, a voltage adaptor, reference VW3A9317 must be connected to the 24 V supply if it is used to supply external automation systems. Using the 24 V to supply the LI does not require any adaptor.
- When replacing ATV11 drive with an ATV12 drive, verify that all wiring connections to the ATV12 drive comply with all wiring instructions in this manual.

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

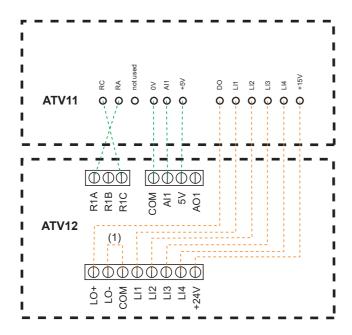
### A A DANGER

#### 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. The ground terminal (green screw) is at the opposite location it was on the ATV11.

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

Note: The control terminals are arranged and marked differently:



(1) if "DO" has been used on ATV11

(1) On ATV11 DO is an analog output that can be configured as a logic output. On ATV12, depending on your configuration, DO can be linked to LO1 or AO1.

The ATV11 integrates an internal supply voltage of 15V, ATV12 now integrates an internal supply of 24V.

### **Settings**

The information below explains the differences between the ATV11 and ATV12 to assist with replacement. This information is helpful for the management of drive embedded HMI (RUN, STOP keypad and potentiometer to dial).

### Replacing an ATV11...E

The ATV11E does not have RUN / STOP buttons neither potentiometer.

The ATV12 in factory settings is equivalent to ATV11E.

LI2 to LI4 and AO1 are not assigned on ATV12.

### Replacing an ATV11...U

The main change is on the bFr and HSP settings. It is now 50 Hz as factory setting on ATV12.

EMC filters are now integrated in ATV12 •• •• M2.

LI2 to LI4 and AO1 are not assigned on ATV12.

### Replacing an ATV11...A

EMC filters are now integrated in ATV12 •• •• M2.

LI2 to LI4 and AO1 are not assigned on ATV12.

The active command channel is on terminals for ATV12 (was front keypad on ATV11...A).

To make embedded HMI active, it is necessary to set Reference channel 1 F r I page 45 to F I u I

#### Replacing an ATV11...E327

LI2 to LI4 and AO1 are not assigned on ATV12.

The active command channel is on terminal for ATV12 (was front keypad on ATV11...A).

ATV12 factory setting characteristics: see page 30.

## Functions - Comparison with ATV11●●● E versions

Function	ATV11		ATV12		Comments, Action	
	Code Value		Code	Value		
Frequency	bFr	50	bFr	50	No change.	
high-speed	H 5 P	50	H 5 P	50	No change.	
LI operation Logic	-	(Positive)	nPL	POS	"Depend on LI assignment on each function (LI1 to LI4 L or H).  See function assignment page 51"	
Integrated EMC filter	-	Yes	-	Yes	No change.	
LI assignment	Lil	Forward	Lil	Forward	No change.	
	L i2	Reverse	Lie	-	Change rrS (COnF, FULL, Fun, rrS), LI2.	
	L i 3	2 Preset speed	L · 3	-	Change PS2 (COnF, FULL, Fun, PSS, Pr2), LI3.	
	L 14	4 Preset speed	Li4	-	Change PS4 (COnF, FULL, Fun, PSS, Pr4), LI4.	
Speed reference	5 P 2	10	5 P 2	10	No change.	
	5 P 3	25	5 P 3	15	Change SP3 (COnF, FULL, Fun, PSS, SP3), 25.	
	5 P 4	50	5 P 4	20	Change SP4 (COnF, FULL, Fun, PSS, SP4), 50.	
AO assignment	(do, ACE), rfr	Motor frequency	A o I	-	Change AO1 (COnF, FULL, I-O, AO1-,AO1), OFr.	
Al assignment	(A , E, ACE), Su	Speed ref. 5V	A , I E	Speed ref. 5V	No change.	
Command channel	L 5 r	-	FrI	-	No change.	
	55r	-	FLo	-	No change. (possible setting on FLO & FLOC)	
			FLoC	-		
Motor parameter choice	C = 5	According to rating	<i>C a</i> 5	-	COS is visible only if Motor parameter choice "MPC" is set to COS. Change MPC (COnF, FULL, drC-, MPC), COS. Change COS (COnF, FULL, drC-, COS), According to rating.	
Motor control type	unchangeabl e	SVC	CFF	STD	Change CTT (COnF, FULL, drC-, CTT), PERF (SVCU).	
Application Underload time delay	FuL	5	uLE	0	The function is deactivated in factory setting.	
Application Overload time delay	FoL	5	oLE	0	The function is deactivated in factory setting.	

## Functions - Comparison with ATV11•••U versions

Function	ATV11		ATV12		Comments, Action	
	Code	Value	Code	Value		
Frequency	bFr	60	b F r	50	Change bFr (COnF, bFr), 50.	
high-speed	H 5 P	60	H 5 P	50	Change HSP (COnF, HSP), 50.	
LI operation Logic	-	(Positive)	nPL	POS	"Depend on LI assignment on each function (LI1 to LI4 L or H).  See function assignment page 51"	
Integrated EMC filter	-	Yes	-	Yes	"Possible to disable filter using IT jumper. See page 28."	
LI assignment	Lil	Forward	Lil	Forward	No change.	
	Lie	Reverse	Lie	-	Change rrS (COnF, FULL, Fun, rrS), LI2.	
	L , 3	2 Preset speeds	L , 3	-	Change PS2 (COnF, FULL, Fun, PSS, Pr2), LI3.	
	L 14	4 Preset speeds	L 14	-	Change PS4 (COnF, FULL, Fun, PSS, Pr4), LI4.	
Speed reference	5 P 2	10	5 <i>P 2</i>	10	No change.	
	5 <i>P</i> 3	25	5 <i>P</i> 3	15	Change SP3 (COnF, FULL, Fun, PSS, SP3), 25.	
	5 P 4	50	5 P 4	20	Change SP4 (COnF, FULL, Fun, PSS, SP4), 50.	
AO assignment	(do, ACE), rFr	Motor frequency	Ao I	-	Change AO1 (COnF, FULL, I-O, AO1-,AO1), OFr.	
Al assignment	(A , E, ACE), 5 u	Speed ref. 5V	A , IE	Speed ref. 5V	No change.	
Command channel	L 5 r	-	FrI	-	No change.	
	55r	-	FLo	-	No change. (possible setting on FLO & FLOC)	
			FLoC	-		
Motor parameter choice	C = 5	According to rating	C a 5	-	COS is visible only if Motor parameter choice "MPC" is set to COS. Change MPC (COnF, FULL, drC-, MPC), COS. Change COS (COnF, FULL, drC-, COS), According to rating.	
Motor control type	unchangeabl e	SVC	C E E	STD	Change CTT (COnF, FULL, drC-, CTT), PERF (SVCU).	
Application Underload time delay	FuL	5	uLE	0	The function is deactivated in factory setting.	
Application Overload time delay	FoL	5	oLE	0	The function is deactivated in factory setting.	

## Functions - Comparison with ATV11•••A versions

Function	ATV11		ATV12		Comments, Action	
	Code	Value	Code	Value		
Frequency	bFr	50	bFr	50	No change.	
high-speed	H 5 P	50	H 5 P	50	No change.	
LI operation Logic	-	(Positive)	n P L	POS	"Depend on LI assignment on each function (LI1 to LI4 L or H).  See function assignment page 51"	
Integrated EMC filter	-	No	-	Yes	"Possible to disable filter using IT jumper. See page $\underline{28}$ ."	
LI assignment	Lil	Forward	Lil	Forward	No change.	
	Lie	Reverse	LiZ	-	Change rrS (COnF, FULL, Fun, rrS), LI2.	
	L 13	2 Preset speeds	L 13	-	Change PS2 (COnF, FULL, Fun, PSS, Pr2), LI3.	
	L 14	4 Preset speeds	L 14	-	Change PS4 (COnF, FULL, Fun, PSS, Pr4), LI4.	
Speed reference	5 <i>P 2</i>	10	5 P 2	10	No change.	
	5 P 3	25	5 P 3	15	Change SP3 (COnF, FULL, Fun, PSS, SP3), 25.	
	5 P 4	50	5 P 4	20	Change SP4 (COnF, FULL, Fun, PSS, SP4), 50.	
AO assignment	(do, ACE), rFr	Motor frequency	A o I	-	Change AO1 (COnF, FULL, I-O, AO1-,AO1), OFr.	
Al assignment	(A , E, ACE), 5 u	Speed ref. 5V	A . I E	Speed ref. 5V	No change.	
Command channel	L 5 r	LOC	FrI	Al1	Change FR1 (COnF, FULL, CtL-, FR1), AIU1.	
	(FCC,		CHCF	SIM	No change.	
	Act), LoC	(RUN / STOP)	САІ	-		
Motor parameter choice	C a 5	According to rating	C o 5	-	COS is visible only if Motor parameter choice "MPC" is set to COS. Change MPC (COnF, FULL, drC-, MPC), COS. Change COS (COnF, FULL, drC-, COS), According to rating.	
Motor control type	unchangeabl e	SVC	CFF	STD	Change CTT (COnF, FULL, drC-, CTT), PERF (SVCU).	
Application Underload time delay	FuL	5	пГF	0	The function is deactivated in factory setting.	
Application Overload time delay	FoL	5	oLE	0	The function is deactivated in factory setting.	

## Functions - Comparison with ATV11•••E327 versions

Function	ATV11		ATV12		Comments, Action	
	Code	value	Code	value		
Frequency	bFr	50	bFr	50	No change.	
high-speed	H 5 P	50	H 5 P	50	No change.	
LI operation Logic	-	(Positive)	nPL	POS	"Depend on LI assignment on each function (LI1 to LI4 L or H). See function assignment page <u>51</u> "	
Integrated EMC filter	-	Yes	-	Yes	"Possible to disable filter using IT jumper. See page 28."	
Li assignment	Lil	Forward	Lil	Forward	No change.	
	LiZ	Reverse	Lie	-	Change rrS (COnF, FULL, Fun, rrS), Ll2.	
	L , 3	2 Preset speeds	L i3	-	Change PS2 (COnF, FULL, Fun, PSS, Pr2), Ll3.	
	L 14	4 Preset speeds	Li4	-	Change PS4 (COnF, FULL, Fun, PSS, Pr4), Ll4.	
Speed reference	5 P 2	10	5 P 2	10	No change.	
	5 <i>P</i> 3	25	5 <i>P 3</i>	15	Change SP3 (COnF, FULL, Fun, PSS, SP3), 25.	
	5 P 4	50	5 P 4	20	Change SP4 (COnF, FULL, Fun, PSS, SP4), 50.	
AO assignment	(do, ACE), rFr	Motor frequency	A o I	-	Change AO1 (COnF, FULL, I-O, AO1-,AO1), OFr.	
Al assignment	(A , E, ACE), S u	Speed ref. 5V	A , I E	Speed ref. 5V	No change.	
Command channel	L 5 r	LOC	FrI	Al1	Change FR1 (COnF, FULL, CtL-, FR1), AIU1.	
	(ECC,		CHCF	SIM	No change.	
	Act), LoC	(RUN / STOP)	Гаі	-		
Motor parameter choice	C a 5	Acc. to rating	C = 5	-	COS is visible only if Motor parameter choice "MPC" is set to COS. Change MPC (COnF, FULL, drC-, MPC), COS. Change COS (COnF, FULL, drC-, COS), Acc. To rating.	
Motor control type	unchangeabl e	SVC	CFF	STD	Change CTT (COnF, FULL, drC-, CTT), PERF (SVCU).	
Application Underload time delay	FuL	5	пГF	0	The function is deactivated in factory setting.	
Application Overload time delay	F o L	5	o L E	0	The function is deactivated in factory setting.	

### **Diagnostics and Troubleshooting**

### 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 phases connection, see page 20).
- Make sure that the run command input(s) is activated in accordance with the selected control mode (parameters Type of control <u>L C L</u> page 48 and 2 wire type control <u>L C L</u> page 51, in <u>C a n F/F u L L / I a n menu</u>).
- If the reference channel or command channel is assigned to Modbus, when the power supply is connected, the drive displays "n 5 L" freewheel and remain in stop mode until the communication bus sends a command.
- In factory setting "RUN" button is inactive. Adjust parameters Reference channel 1 F r I page 62 and Command channel 1 L d I page 63 to control the drive locally (L a r F/F u L L/L L menu). See How to control the drive locally page 46.

### Fault detection codes that cannot be cleared automatically

The cause of the detected fault must be removed before clearing by turning off and then on.

5 p F and L p F faults can also be cleared remotely by means of a logic input (parameter Detected fault reset assignment p 5 F page 91 in C p p F/F p L L/F L L - menu).

Code	Name	Possible causes	Remedy
ErF I	Precharge	Charging relay control fault or charging resistor damaged	Turn the drive off and then back on again Check the connections Check the stability of the main supply Contact your local Schneider Electric representative
inF i	Unknown drive rating	The power card is different from the card stored	Contact your local Schneider Electric representative
inF2	Unknown or incompatible power board	The power card is incompatible with the control card	Contact your local Schneider Electric representative
ınF3	Internal serial link	Communication interruption between the internal cards	Contact your local Schneider Electric representative
10F4	Invalid industrialization zone	Inconsistent internal data	Contact your local Schneider Electric representative
inF9	Current measurement circuit	Current measurement is not correct due to hardware circuit	Contact your local Schneider Electric representative
	Problem of application Firmware	Invalid application firmware update using the Multi-Loader tool	Flash again the application firmware of the product
infb	Internal thermal sensor detected fault	The drive temperature sensor is not operating correctly The drive is in short circuit or open	Contact your local Schneider Electric representative
inFE	Internal CPU	Internal microprocessor	Turn the drive off and then back on again Contact local Schneider Electric representative

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

Code	Name	Possible causes	Remedy
o C F	Overcurrent	Parameters in the Motor control menu dr [ - page 57 are not correct Inertia or load too high Mechanical locking	<ul> <li>Check the parameters</li> <li>Check the size of the motor/drive/load</li> <li>Check the state of the mechanism</li> <li>Connect line chokes</li> <li>Reduce the Switching frequency 5 F r page 59</li> <li>Check the ground connection of drive, motor cable and motor insulation.</li> </ul>
SCF I	Motor or Ground short circuit	Short-circuit or grounding at the drive output	Check the cables connecting the drive to the motor, and the motor insulation
5 C F 3	Ground short circuit	<ul> <li>Ground fault during running status</li> <li>Commutation of motors during running status</li> <li>Significant current leakage to ground if several motors are connected in parallel</li> </ul>	Connect motor chokes
5 C F 4	IGBT short circuit	Internal power component short circuit detected at power-on	Contact your local Schneider Electric representative
5 a F	Overspeed	Instability     Overspeed associated with the inertia of the application	<ul> <li>Check the motor</li> <li>Overspeed is 10% more than Maximum frequency £ F r page 57 so adjust this parameter if necessary</li> <li>Add a braking resistor</li> <li>Check the size of the motor/drive/load</li> <li>Check parameters of the speed loop (gain and stability)</li> </ul>
EnF	Auto-tuning	<ul> <li>Motor not connected to the drive</li> <li>One motor phase loss</li> <li>Special motor</li> <li>Motor is rotating (being driven by the load, for example)</li> </ul>	Check that the motor/drive are compatible     Check that the motor is present during autotuning     If an output contactor is being used, close it during auto-tuning     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 detected faults can also be cleared by turning on and off or remotely by means of a logic input (parameter Detected fault reset assignment r = 5 F page 91).

Code	Name	Possible causes	Remedy
LFFI	Al current lost fault	Detection if: Analog input Al1 is configured as current Al1 current scaling parameter of 0% [r] I page 52 is greater than 3 mA Analog input current is lower than 2 mA	Check the terminal connection
aЬF	Overbraking	Braking too sudden or driving load too high	Increase the deceleration time     Install a module unit with a braking resistor if necessary     Check the line supply voltage, to be sure that it is under the maximum acceptable (20% over maximum line supply during run status)
o H F	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 page 13.
o L C	Process overload	Process overload	Check the process and the parameters of the drive to be in phase
a L F	Motor overload	Triggered by excessive motor current	Check the setting of the motor thermal protection, check the motor load.
oPF I	1 output phase loss	Loss of one phase at drive output	Check the connections from the drive to the motor     In case of using downstream contactor, check the right connection, cable and contactor
oPF2	3 output phase loss	Motor not connected     Motor power too low, below 6% of the drive nominal current     Output contactor open     Instantaneous instability in the motor current	<ul> <li>Check the connections from the drive to the motor</li> <li>Test on a low-power motor or without a motor: In factory settings mode, motor phase loss detection is active Output Phase loss detection a P L page 94 = 9 E 5. 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 a P L = n a</li> <li>Check and optimize the following parameters: IR compensation u F r page 58, Rated motor voltage u n 5 page 57 and Rated motor current n C r page 57 and perform an Auto-tuning L u n page 60.</li> </ul>
a 5 F	Main overvoltage	Line voltage too high: At drive power-on only, the supply is 10% over the maximum acceptable voltage level Power with no run order, 20% over the maximum line supply Disturbed line supply	• Turn Off the Drive. Check and adjust the line voltage.  After line come back to nominal voltage (within tolerance) do power On.  If intermittent

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

Code	Name	Possible causes	Remedy
PHF	Input phase loss	<ul> <li>Drive incorrectly supplied or a fuse blown</li> <li>Failure of one phase</li> <li>3-phase ATV12 used on a 1-phase line supply</li> <li>Unbalanced load</li> <li>This protection only operates with the drive on load</li> </ul>	<ul> <li>Check the power connection and the fuses.</li> <li>Use a 3-phase line supply.</li> <li>Disable the fault by setting Input Phase loss detection  PL page 94 = na.</li> </ul>
SCFS	Load short circuit	Short-circuit at drive output Short circuit detection at the run order or DC injection order if parameter IGBT test 5 £ r £ page 95 is set to 9 £ 5	Check the cables connecting the drive to the motor, and the motor's insulation
SLFI	Modbus communication	Interruption in communication on the Modbus network	<ul> <li>Check the connections of communication bus.</li> <li>Check the time-out (Modbus time out  page 98)</li> <li>Refer to the Modbus user manual</li> </ul>
SLF2	SoMove communication	Communication interruption with SoMove	Check the SoMove connecting cable.     Check the time-out
5 L F 3	HMI communication	Communication interruption with the external display terminal	Check the terminal connection
5 <i>P</i> , F	PI Feedback detected fault	PID feedback below lower limit	<ul> <li>Check the PID function feedback</li> <li>Check the PI feedback supervision threshold <i>L P</i>, and time delay <i>L P</i>, page <u>76</u>.</li> </ul>
υLF	Process underload fault	Process underload  Motor current below the Application Underload threshold LuL parameter page 55 during a period set by Application underload time delay uLE parameter page 55 to protect the application.	Check the process and the parameters of the drive to be in phase
Ł JF	IGBT overheat	Drive overheated     IGBT internal temperature is too high according to ambient temperature and load	<ul> <li>Check the size of the load/motor/drive.</li> <li>Reduce the Switching frequency 5 F r page 59.</li> <li>Wait for the drive to cool before restarting</li> </ul>
EPF I	External detected fault by logic input	Event triggered by an external device, depending on user	Check the device which caused the trip and reset.

#### Faults codes that will be cleared as soon as their causes disappear

The USF fault can be cleared remotely by means of a logic input (parameter Detected fault reset assignment \_ 5 F page 91).

Code	Name	Possible causes	Remedy
CFF	Incorrect configuration	HMI block replaced by an HMI block configured on a drive with a different rating     The current configuration of customer parameters is inconsistent	Return to factory settings or retrieve the backup configuration, if it is valid.     If the fault remains after reverting to the factory settings, contact your local Schneider Electric representative
[ F , (1)	Invalid configuration	Invalid configuration     The configuration loaded in the drive via the bus or communication network is inconsistent. The configuration upload has been interrupted or is not fully finished.	Check the configuration loaded previously.     Load a compatible configuration
CF 12	Download invalid configuration	Interruption of download operation with Loader or SoMove	Check connection with Loader or SoMove.     To reset the default re-start the download operation or restore the factory setting
υ 5 F	Undervoltage	Line supply too low     Transient voltage dip	• Check the voltage and the parameters of Undervoltage Phase Loss Menu <u>u 5 b</u> - page <u>95</u> .

<sup>(1)</sup> When the CFI is present in the past fault menu, it means the configuration has been interrupted or is not fully finished.

#### **HMI block changed**

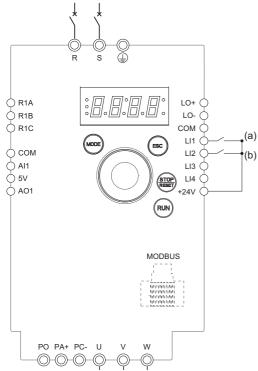
When an HMI block is replaced by an HMI block configured on a drive with a different rating, the drive locks in Incorrect configuration *LFF* fault mode on power-up. If the card has been deliberately changed, the fault can be cleared by returning to factory setting.

# Fault detection codes displayed on the remote display terminal

Code	Name	Description
in iE	On initializing itself	Micro controller initializing     Communication configuration search
<b>Г □ П</b> . <b>Е</b> (1)	Communication error	It has 50ms time-out error.     This message is shown after 220 retry attempts.
<b>H - 17</b> (1)	Key alarm	<ul> <li>Key has been pressed consecutively for more than 10 seconds.</li> <li>Membrane switch disconnected.</li> <li>Keypad woken up while a key is being pressed.</li> </ul>
c L r (1)	Confirm Fault reset	This message appears if the STOP key is pressed when there is a keypad fault.
<b>d E □.E</b> (1)	Drive mismatch	Drive type (brand) did not match with keypad type (brand)
г <b>о</b> П. <b>Е</b> (1)	ROM abnormality	Keypad ROM abnormality detected by the checksum calculation.
г <b>Я</b> П. <b>Е</b> (1)	RAM abnormality	Keypad RAM abnormality detected.
[ P u . E (1)	The other defect	The other detected fault.

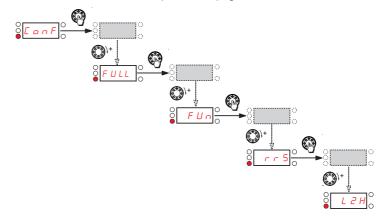
<sup>(1)</sup> Flashing

#### 2-wire control (source)



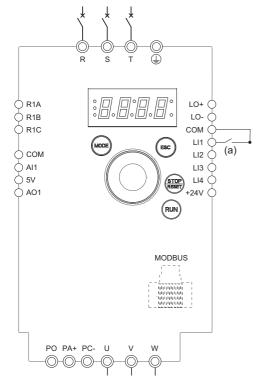
(a): Run Forward (b): Run Reverse

- 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, Factory / recall customer parameter set F [ 5 page 46 set to 10 ].
- 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 Reverse direction r r 5 parameter page 66 to L 12 H



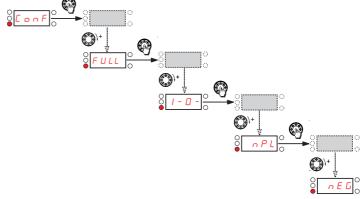
9. Start

#### 3-wire control (sink)



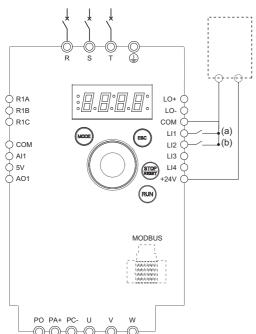
(a): Run Forward

- 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, Factory / recall customer parameter set F [ 5 page 46 set to 10 ].
- 6. Set Ł [ [ to ∃ [ see page 48
- 7. Set the motor parameters (in [ a n F mode) only if the factory configuration of the drive is not suitable.
- 8. Perform an auto-tuning.
- 9. Set Logic inputs type PL parameter page 51 to PL

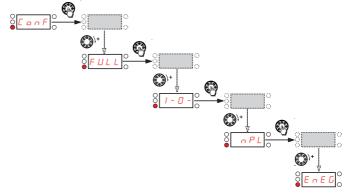


**10**. Start

#### 2-wire control (sink)



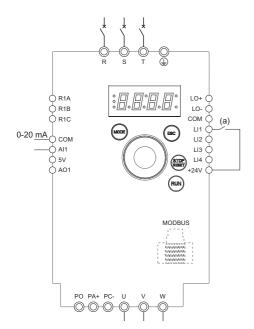
- Connect the ground terminal to the grounding screws located below the output terminals.
- 2. Connect the power terminals.
- 3. Connect the logic inputs.
- **4.** Turn on the drive without giving a run command.
- 5. Assign factory settings to the drive, Factory / recall customer parameter set F C 5 page 46 set to 10 10 10
- 6. Set Ł [ [ to ∃ [ see page 48]
- Set the motor parameters (in mode) only if the factory configuration of the drive is not suitable.
- 8. Perform an auto-tuning.
- 9. Set Logic inputs type n P L parameter page 51 to E n E G



(a): Run Forward

**10**. Start

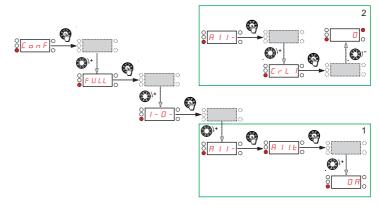
#### Speed control 0-20 mA (source)



(a) Run Forward

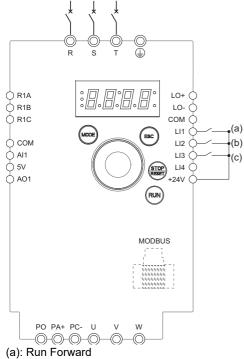
- Connect the ground terminal to the grounding screws located below the output terminals.
- 2. Connect the power terminals.
- 3. Connect the logic input LI1 and analog input AI1.
- **4.** Turn on the drive without giving a run command.
- 5. Assign factory settings to the drive, Factory / recall customer parameter set F [ 5 page 46 set to 1 n ].
- **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 Al1 type # , I L page 52 to Al and Al1 current scaling parameter of 0% [r L I page 52 to 0 A.

Check that Al1 current scaling parameter of 100% [ r H I page 52 is set to 20 mA.



9. Start.

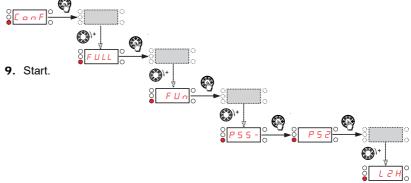
### 4 Preset speeds (source)



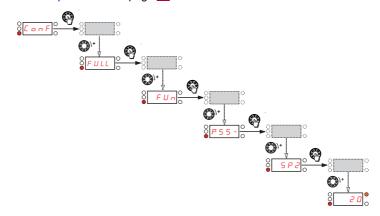
(b): 2 preset speeds (c): 4 preset speeds

Note: Refer to Function compatibility table page 36.

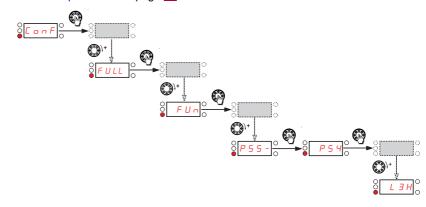
- Connect the ground terminal to the grounding screws located below the output terminals.
- 2. Connect the power terminals.
- 3. Connect the logic inputs.
- **4.** Turn on the drive without giving a run command.
- 5. Assign factory settings to the drive, Factory / recall customer parameter set F [ 5 page 46 set to 10 ].
- **6.** Set the motor parameters (in COnF mode) only if the factory configuration of the drive is not suitable.
- (b) **7.** Perform an auto-tuning.
- (c) 8. Set 2 Preset speeds P 5 2 page 70 to L 2 H.



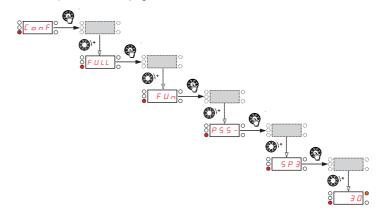
Set Preset speed 2 5 P ≥ page 70 to 20 Hz.



Set 4 Preset speeds P 5 4 page 70 to L 3 H.

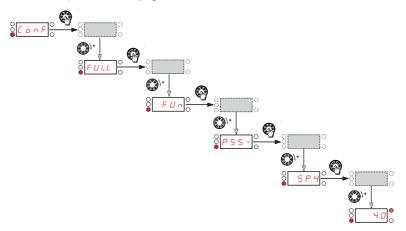


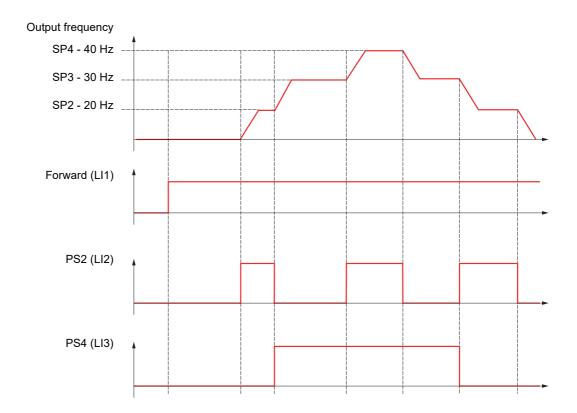
Set Preset speed 3 **5** *P* **3** page <u>70</u> to 30 Hz.



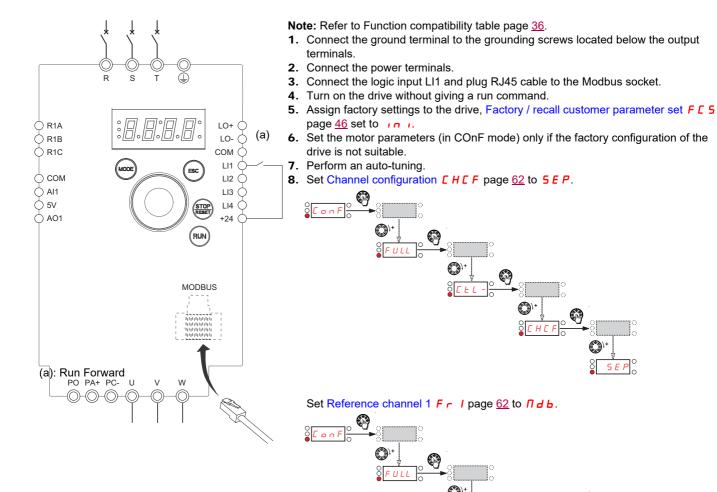
# 4 Preset speeds (source) continued

Set Preset speed 4 5 P 4 page 70 to 40 Hz.



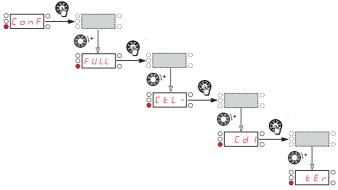


#### Terminals command channel with Modbus reference channel



Check that Command channel 1  $\[ \[ \[ \] \]$  d  $\[ \]$  page  $\[ \[ \[ \] \]$  is set to  $\[ \[ \] \[ \] \]$   $\[ \[ \] \[ \] \]$  .

Паь



9. Start

# Short-circuit rating and branch circuit protection

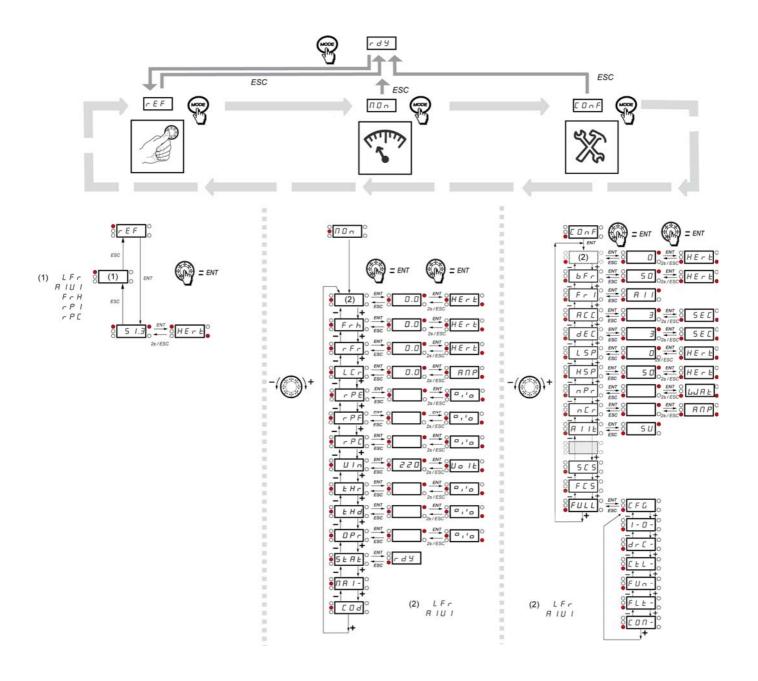
### Recommended fuse ratings for UL and CSA requirements

Use the fuses recommended in the Quick Start Annex (S1A58684) delivered with the product as well as on the Schneider Electric website www.schneider-electric.com.

#### 1-phase wiring

See the ATV12 Quick Start annex (S1A58684) available with the product as well as on the Schneider Electric website www.schneiderelectric.com.

# **Organization tree**



Code	Page	Name	Unit	Possible	e value / Function	Factory setting	User setting
AC 2	65 74	Acceleration 2	s	0.0 to 999.9	-	5 s	
ЯСС	<u>45</u> <u>64</u>	Acceleration	s	0.0 to 999.9	-	3.0 s	
A 9 C	<u>67</u>	Automatic DC injection		п	No Yes Continuous	YES	
Add	<u>98</u>	Modbus address		o F F to 247	_	Off	
A , , E	<u>52</u>	Al1 type	_	5 u 10 u 0 R	Voltage Voltage Current	5U	
A iu l	37 39 45 62	Analog input virtual	%	0 to 100	-	-	
A o I	<u>56</u>	AO1 assignment		n a o [ r o F r o P S o P F o P E o P r E H r E H d	No Motor current Output frequency Ramp output PID reference PID feedback PID error Output power Motor thermal state Drive thermal state	nO	
Ao I E	<u>56</u>	AO1 type		10 u o A 4 A	Voltage Current Current	0A	
Atr	<u>91</u>	Automatic restart		n a 9 E 5	No Yes	nO	
ЬЕг	<u>45</u> <u>57</u>	Standard motor frequency	Hz	5 0 6 0	-	50 Hz	
ЬгЯ	<u>65</u>	Decel Ramp Adaptation assignment		п	No Yes Motor braking	YES	
C 15 u	<u>41</u>	Card 1 Software Version	-	_	-	_	_
C 25 u	<u>41</u>	Card 2 Software Version	-	_	-	-	-
ЕНІ	<u>63</u>	Command channel 1		E E r L o C L C C N d b	Terminals Local Remote display Modbus		
C F G	<u>47</u>	Macro-configuration	_	_	_	_	_
CHEF	<u>62</u>	Channel configuration		5 , N 5 E P	Simultaneous mode Separate mode	SIM	
EL,	<u>88</u>	Current limitation	А	0.25 to 1.5	_	1.5 A	

Code	Page	Name	Unit	Possibl	e value / Function	Factory setting	User setting
C L 2	<u>88</u>	Current limitation 2	Α	0.25 to 1.5	_	1.5 A	
C o d	43	HMI Password	_	o F F on	Code disabled Code activated	OFF	
С оП І	<u>42</u>	Modbus communication status	_	r 0 E 0 r o E 1 r 1 E 0 r 1 E 1	_	-	
C o 5	<u>57</u>	Rated motor cos phi	-	0.5 to 1	-	according to drive rating	
ErH I	<u>52</u>	Al1 current scaling parameter of 100%	mA	0 to 20	-	20 mA	
ErL I	<u>52</u>	Al1 current scaling parameter of 0%	mA	0 to 20	-	4 mA	
ГĿЫ	<u>55</u>	Motor current threshold	In	□ to 1.5	_	InV	
C E E	<u>57</u>	Motor control type	-	5	Standard Performance Pump	Std	
d C F	<u>66</u>	Ramp divider		/ to / 🛮	-	4	
4 E 2	<u>65</u>	Deceleration 2	s	0.0 to 999.9	-	5 s	
d E C	<u>45</u> <u>64</u>	Deceleration	s	0.0 to 999.9	-	3.0 s	
dP I	<u>42</u>	Last detected fault 1	-	see page <u>108</u>		_	_
d P 2	<u>42</u>	Last detected fault 2	-	see page 108		_	_
d P 3	<u>43</u>	Last detected fault 3	-	see page 108		_	-
<i>d</i> P 4	<u>43</u>	Last detected fault 4	I	see page 108		_	_
drn	<u>96</u>	Degraded line supply operation		n	No Yes	nO	
EP I	<u>42</u>	State of drive at detected fault 1	ı	_	-	_	_
EP2	<u>43</u>	State of drive at detected fault 2	-	_	_	_	_
EP3	<u>43</u>	State of drive at detected fault 3	_	_	_	_	_
ЕРЧ	<u>43</u>	State of drive at detected fault 4	-	_	_	_	_
EPL	<u>97</u>	Stop type - external fault	_	9ES LFF	No Yes LFF	YES	_
ELF	97	External fault assignment	-	C O L IH L 2 H L 3 H L 4 H L IL L 2 L L 3 L L 4 L	Non active L1h: L11 active high L2h: L12 active high L3h: L13 active high L4h: L14 active high L1L: L11 active low L2L: L12 active low L3L: L13 active low L4L: L14 active low	nO	_

Code	Page	Name	Unit	Possible	e value / Function	Factory setting	User setting
F	<u>72</u>	PID feedback scale factor	PID	0. I to I 0 0.0	-	1.0	
F C 5	<u>46</u>	Factory / recall customer parameter set	_	n o r E C	No REC IN INI	nO	
FFd	<u>79</u>	Zero flow detection activation threshold	Hz	0 to 400	_	0 Hz	
FLG	<u>58</u>	Frequency loop gain	%	□ to /□□	-	20%	
FLo	<u>63</u>	Forced local assignment		00 L 1H L 2 H L 3 H L 4 H	No L1h L2h L3h L4h	nO	
FLoC	<u>63</u>	Forced local reference		по Я : I L C C Я : u I	No Terminal HMI Jog dial	nO	
FLr	<u>92</u>	Catch on the fly		n	No Yes	nO	
Fon	<u>78</u>	Starting frequency of the auxiliary pump	Hz	0 à L F r	_	HSP	
FoF	<u>78</u>	Auxiliary pump stopping frequency	Hz	□à Ł F r	_	0 Hz	
Frl	<u>45</u> <u>62</u>	Reference channel 1		A , I L C C N d b A , u I	Terminal HMI Modbus Jog dial	Al1	
FrH	<u>37</u>	Speed reference		A , I L C C N d b A , u	Terminal HMI Modbus Jog dial		
F r 5	<u>57</u>	Rated motor frequency	Hz	10 to 400	_	50 or 60 Hz (to bFr)	
FSE	<u>66</u>	Fast stop assignment		n o L IL L 2 L L 3 L L 4 L	No L1L: LI1 active low L2L: LI2 active low L3L: LI3 active low L4L: LI4 active low	nO	
FEd	<u>55</u>	Motor frequency threshold	Hz	0 to 400	-	50 or 60 Hz	
FEH	<u>42</u>	Fan time display		0.0 / to 999	_	_	_
FŁo	<u>54</u> <u>77</u>	Time delay before automatic start for the overload fault	min			0 min	
FŁu	<u>55</u> <u>78</u>	Time delay before automatic start for the underload fault	min			0 min	
H S P	45 90	High speed	Hz	L S P to Ł F r	-	50 or 60 Hz	
H 5 P ≥	<u>90</u>	High speed 2	Hz	LSP to EFr	-	50 or 60 Hz according to BFr, max TFr	
H 5 P 3	90	High speed 3	Hz	as <i>H</i> <b>5</b> <i>P</i> <b>2</b>	as HS2	as H 5 P 2	

Code	Page	age Name Unit Possible value / Function		alue / Function	Factory setting	User setting	
H 5 P 4	90	High speed 4	Hz	as <i>H 5 P 2</i>	as HS2	as <i>H 5 P 2</i>	
Н 5 и	<u>41</u>	Display of high speed value	_	-	_	-	_
ın H	<u>95</u>	Detected fault inhibition assignment		C O L IH L 2 H L 3 H L 4 H	Non active L1h: L11 active high L2h: L12 active high L3h: L13 active high L4h: L14 active high	nO	
ı P L	94	Input Phase loss	-	n	No Yes	YES	
ı E h	<u>94</u>	Motor thermal current	Α	□.2 to 1.5	-	according to drive rating	
J o G	<u>68</u>	Jog assignment		 L IH L 2 H L 3 H L 4 H	No L1h: L11 active high L2h: L12 active high L3h: L12 active high L4h: L14 active high	nO	
JPF	<u>70</u>	Skip frequency	Hz	□ to 4□□	_	0 Hz	
L C ≥	88	2 <sup>nd</sup> current limitation commutation		C O L IH L 2 H L 3 H L IL L 2 L L 3 L L 4 L	No L1h: L11 active high L2h: L12 active high L3h: L13 active high L4h: L14 active high L1L: L11 active low L2L: L12 active low L3L: L13 active low L4L: L14 active low	nO	
LEr	<u>39</u>	Motor current	Α	_	_	-	_
LFd	<u>79</u>	Zero flow detection offset	Hz			0 Hz	
LFF	<u>76</u> <u>97</u>	Fallback speed	Hz	□ to <i>H</i> 5 <i>P</i>	_	0 Hz	
LFLI	<u>95</u>	4-20 mA loss behavior		7	No Yes	nO	
LFr	39 45 62	External reference value	-	- 4 🛮 🛈 to 4 🗷 🛈	_	0	
L ,5 1	<u>41</u>	State of logic inputs LI1 to LI4	-	-	-	-	_
LoC	<u>54</u> <u>77</u>	Application Overload threshold	% of NCR	70 to /50	_	90 %	
Lo I	<u>53</u>	LO1 assignment		as r l	as r I	nO	
L o 15	<u>53</u>	LO1 status (output active level)		P = 5 n E G	Positive Negative	POS	
L 0 5 1	<u>41</u>	State of the logic output LO1 and relay R1	_	_	_	-	_
LP i	<u>76</u>	PI feedback supervision threshold				nO	
L 5 P	<u>45</u> 89	Low speed	Hz	□ to H 5 P	_	0 Hz	

Code	Page	Name	Unit	Possible	value / Function	Factory setting	User setting
LuL	<u>55</u> 77	Application Underload threshold	% of In	20 to 100	-	60 %	
ПаЕ	<u>78</u>	Selecting the operating mode				nO	
ПРС	<u>60</u>	Motor parameter choice	-	nPr [a5	nPr COS	nPr	
ПР	<u>76</u>	Maximum frequency detection hysteresis				YES	
ПЕП	<u>94</u>	Motor thermal state memo	_	7	No Yes	nO	
n E I	<u>99</u>	Com scanner write address value 1					
n [ 2	<u>99</u>	Com scanner write address value 2					
n E 3 n	<u>99</u>	Com scanner write address value 3					
n E 4	<u>99</u>	Com scanner write address value 4					
n E A I	<u>98</u>	Com scanner write address parameter 1				2135	
n C A 2	<u>98</u>	Com scanner write address parameter 2				219C	
n E R 3 n	98	Com scanner write address parameter 3				0	
n E A 4	<u>98</u>	Com scanner write address parameter 4					

Code	Page	Name	Unit	Possible	e value / Function	Factory setting	User setting
n E r	<u>57</u>	Rated motor current	A (1)	0.25 to 1.5	_	according to drive rating	
nΓu	<u>41</u>	Drive Power rating					
n F d	<u>79</u>	Zero flow detection period				nO	
пПΙ	<u>99</u>	Com scanner read address value 1					
n∏2	<u>99</u>	Com scanner read address value 2					
оП∃	<u>99</u>	Com scanner read address value 3					
лПЧ	<u>99</u>	Com scanner read address value 4					
оПЯ І	<u>98</u>	Com scanner read address parameter 1	-			0C81	
nΠ#2	<u>98</u>	Com scanner read address parameter 2	-			219C	
пПЯ Э	<u>98</u>	Com scanner read address parameter 3	-			0	
∩ПЯЧ	<u>98</u>	Com scanner read address parameter 4	_			0	
n P L	<u>51</u>	Logic inputs type	-	P = 5 n E G	Positive Negative	POS	
n P r	<u>46</u> <u>57</u>	Rated Motor Power	kW or HP	_	-	according to drive rating	
nrd	<u>59</u>	Motor noise reduction		7 0 9 E 5	No Yes	nO	
n 5 P	<u>57</u>	Rated motor speed	rpm	0 to 32767	-	according to drive rating	
n 5 E	<u>66</u>	Freewheel stop assignment		n	No L1L: LI1 active low L2L: LI2 active low L3L: LI3 active low L4L: LI4 active low	nO	
o L L	<u>94</u>	Overload fault management	_	7	No Yes	YES	
o P L	<u>94</u>	Output Phase loss	_	7	No Yes	YES	
o P r	<u>39</u>	Output power	%	_	-	_	-
PAu	<u>74</u>	PID auto/manual assignment		 L   H L ≥ H L ∃ H L Ч H	No L1h: L11 active high L2h: L12 active high L3h: L13 active high L4h: L14 active high	nO	
PEL	<u>42</u>	Process elapsed time	0.01	_	_	_	_
PFL	<u>59</u>	Flux Profile	%	0 to 100		20%	
PIC	<u>74</u>	PID correction reverse	_	9 E 5	No Yes	nO	

(1) In = nominal drive current

Code	Page	Name	Unit	Pos	sible value / Function	Factory setting	User setting
PıF	<u>72</u>	PID feedback assignment		n o A I I	No Terminal	nO	
P , ,	<u>72</u>	Activation internal PID reference		7 0 9 E 5	No Yes	nO	
РіП	<u>74</u>	PID manual reference		n o A I I A I u	No Terminal AIV	nO	
Pr2	<u>72</u>	2 preset PID assignment	_	 L IH L 2 H L 3 H L 4 H	No L1h L2h L3h L4h	nO	
Pr4	<u>73</u>	4 preset PID assignment		Pr2	as Pr2	nO	
PrP	<u>73</u>	PID reference ramp	s	0 to 99.9	-	0 s	
P 5 2	<u>70</u>	2 Preset speeds		 L IH L 2 H L 3 H L 4 H	No L1h: L11 active high L2h: L12 active high L3h: L12 active high L4h: L14 active high	nO	
P 5 4	<u>70</u>	4 Preset speeds		P 5 2	as <i>P 5 2</i>	nO	
P 5 8	<u>70</u>	8 Preset speeds		P 5 2	as <i>P 5 2</i>	nO	
PSE	<u>62</u>	Stop key priority		7 0 9 E 5	No Yes	YES	
PEH	<u>42</u>	Power On time display		0.0 I to 999	_	_	_
r I	<u>52</u>	R1 assignment	-	 FLE CUN FLA CLA SCA LSA ULA API	Not assigned No detected error Drive run Frequency threshold reached HSP reached I threshold reached Frequency reference reached Motor thermal reached Underload alarm Overload alarm Al1 Al. 4-20	FLt	
r d G	<u>72</u>	PID derivative gain		0.00 to	_	0.00	
rFr	<u>39</u>	Output frequency	Hz	-	-	_	
r 16	<u>72</u>	PID integral gain		0.0 / to	_	1	
r 10	<u>62</u>	Reverse inhibition		7 0 9 E 5	No Yes	nO	
roF	<u>79</u>	Ramp for auxiliary pump stopping	S			2 s	
ron	<u>78</u>	Ramp for reaching the auxiliary pump nominal speed	s			2 s	

Code	Page           73	Name 2 preset PID reference	Unit %	Possible	Factory setting	User setting	
r P 2				□ to  □□	_	25%	
r P 3	<u>73</u>	3 preset PID reference	%	□ to  □□	-	50%	
r P 4	<u>73</u>	4 preset PID reference	%	□ to  □□	_	75%	
rPE	<u>39</u>	PID reference	_	_	-	-	_
rPE	<u>39</u>	PID error	_	_	-	-	_
rPF	<u>39</u>	PID Feedback	_	_	-	-	_
r P G	<u>72</u>	PID proportional gain		0.0 / to / 0	-	1	
r P H	<u>73</u>	PID max value reference	% PID	□ to  □□	_	100%	
rP i	<u>73</u>	Internal PID reference	% PID	□ to  □□	-	0%	
rPL	<u>73</u>	PID min value reference	% PID	□ to  □□	-	0%	
r P r	<u>96</u>	Reset power run		n o F E H	Function inactive Reset fan time display	nO	
r P 5	64	Ramp switching commutation		C P L I H L 2 H L 3 H L 4 H L I L L 2 L L 3 L L 4 L	No L1h: LI1 active high L2h: LI2 active high L3h: LI3 active high L4h: LI4 active high L1L: LI1 active low L2L: LI2 active low L3L: LI3 active low L4L: LI4 active low	nO	
rPE	<u>64</u>	Ramp shape assignment		L in 5	S shape		
rr5	<u>66</u>	Reverse direction	_	n	Function inactive L1h active high L2h active high L3h active high L4h active high	nO	
r 5 F	<u>91</u>	Detected fault reset assignment	-	 L IH L 2 H L 3 H L 4 H	No L1h: LI1 active high L2h: LI2 active high L3h: LI3 active high L4h: LI4 active high	nO	
r 5 L	<u>75</u>	PID wake up level	%	□ to   □ □	-	0%	
r E H i	<u>42</u>	Run elapsed time display	0.01h	0.0 I to 999	-	-	-
5 C 5	<u>46</u>	Store customer parameter set	_	na Str I	No Yes	nO	
S d C I	<u>67</u>	Automatic DC injection current	А	□ to 1.2		0.7 A	
5 <i>F</i> r	<u>59</u>	Switching frequency	kHz	<b>∂</b> to 16	_	4	
5 F 5	<u>73</u>	PID predictive speed	_	n o to 400	_	nO	
5 F Ł	<u>59</u>	Switching frequency type	_	HF I HF 2	HF1 HF2	HF1	

Code	Page	Name	Unit	Possible	value / Function	Factory setting	User setting
S H 2	<u>90</u>	2 HSP assignment	-	 L IH L 2H L 3H L 4H	No L1h: LI1 active high L2h: LI2 active high L3h: LI3 active high L4h: LI4 active high	nO	
5 H Y	90	4 HSP assignment	_	as 5 <i>H2</i>	as 5 H 2	nO	
S L E	<u>75</u>	Sleep Threshold Offset	Hz			1 Hz	
5 L L	<u>96</u>	Modbus fault management		7 B 9 E S	No Yes	YES	
5 L P	<u>58</u>	Slip compensation	% of nSL	0 to 150	_	100%	
5 P 2	<u>70</u>	Preset speed 2	-	_	_	_	ĺ
5 P 3	<u>70</u>	Preset speed 3	_	_	_	_	ĺ
5 P 4	<u>70</u>	Preset speed 4	_	_	_	_	_
5 P S	<u>70</u>	Preset speed 5	Hz	□ to 4□□	-	25 Hz	
5 P 6	<u>70</u>	Preset speed 6	Hz	□ to 4□□	-	30 Hz	
5 <i>P</i> 7	<u>70</u>	Preset speed 7	Hz	0 to 400	_	35 Hz	
5 P B	<u>70</u>	Preset speed 8	Hz	□ to 4□□	_	40 Hz	
5 P n	<u>41</u>	Specific Product Number	_	_	-	_	-
5 <i>E R</i>	<u>58</u>	Frequency loop stability	%	□ to  □□		20%	
SERE	<u>40</u>	Product status	_	_	_	_	-
5 <i>E</i> П	<u>95</u>	Undervoltage ramp deceleration time	s	0.0 to 10.0	-	1.0 s	
5 <i>E P</i>	<u>95</u>	Undervoltage prevention	_	n o r N P	No Ramp stop	nO	
SErE	<u>95</u>	IGBT test		7 E S	No Yes	nO	
5 £ £	<u>66</u>	Type of stop		r ПР F 5 L n 5 L	Ramp stop Fast stop Freewheel	rMP	
Ł A r	<u>91</u>	Max. automatic restart time		5 10 30 1H 2H 3H C E	5 min 10 min 30 min 1 h 2 h 3 h Infinite	5 min	
Ebr	<u>98</u>	Modbus baud rate		4.8 9.6 19.2 38.4	4.8 kbps 9.6 kbps 19.2 kbps 38.4 kbps	19.2 kbps	
FCC	<u>48</u>	Type of control	-	2 C	2 wire control 3 wire control	2C	
FCF	<u>51</u>	2 wire type control	-	LEL Ern PFO	Level Transition Priority FW	trn	

Code Page		Name	Unit	Possible value / Function		Factory setting	User setting
E d C I	<u>67</u>	Automatic DC injection time	S	□. I to ∃□		0.5 s	
Ł F o	<u>98</u>	Modbus format	-	8 o I 8 E I 8 o I 8 o 2	8o1 8E1 8n1 8n2	8E1	
£ F r	<u>57</u>	Maximum frequency	Hz	10 to 400		60 or 72 Hz (to bFr)	
ĿНd	<u>39</u>	Drive thermal state	-	_	-	_	_
Ł H r	<u>39</u>	Motor thermal state	%	_	_	_	_
E H E	94	Motor protection type	-	ACL FCL	Self-ventilated Moto-ventilated	ACL	
ŁL5	<u>74</u> <u>89</u>	Low speed operating time	s	0. I to 999.9	-	nO	
t o F	<u>79</u>	Time delay before the auxiliary pump stop command	s			2 s	
t o L	<u>54</u> <u>77</u>	Application Overload time delay	S	0 to 100	-	5 s	
E o n	<u>78</u>	Time delay before starting the auxiliary pump	s			2 s	
EP i	<u>76</u>	PI feedback supervision function time delay	s			0 s	
FFd	<u>55</u>	Motor thermal state threshold	% of tHr	□ to     □		100%	
E E o	98	Modbus time out	_	□. I to ∃□	_	10	
Eun	<u>60</u>	Auto-tuning	_	no YES donE	No Yes Done	nO	
uFг	<u>58</u>	IR compensation	%	25 to 200	_	100%	
шLп	<u>39</u>	Main voltage	V	_	_	_	_
uLE	<u>55</u> <u>77</u>	Application underload time delay	s	0 to 100	_	5 s	
u n 5	<u>57</u>	Rated motor voltage	V	100 to 480	_	230 V	
u P P	<u>75</u>	Wake-up threshold	%	0 to 100	_	0	
υ 5 b	<u>95</u>	Undervoltage fault management	_	- 1	Detected fault + R1 open Detected fault + R1 closed	0	
υCAL	<u>41</u>	Drive voltage rating	_	_	_	_	_