Altivar 58F
Telemecanique

Guide de programmation
Programming Manual
Programmieranleitung
Guía de programación

Variateurs de vitesse CVF pour moteurs asynchrones,
Variable speed controllers FVC for asynchronous motors,
FVC Frequenzumrichter für Drehstrom-Asynchronmotoren,
Variadores de velocidad CVF para motores asíncronos

Square D
Telemecanique

Schneider Electric

Altivar 58F

Warning

This document relates to use of the Altivar 58F exclusively with:

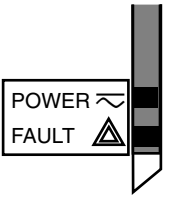
- the VW3A58101 display module
- a VW3A58201 or VW3A58202 I/O extension card if applicable.

Some modes, menus and types of operation can be modified if the speed controller is equipped with other options. Please refer to the relevant documentation for each of these options.

For installation, connection, setup and maintenance instructions, please refer to the User's Manual for the Altivar 58F and for the I/O extension card if applicable.

Contents

Signalling on the front panel of the Altivar



} Other LEDs indicate status with communication option cards.

Green POWER LED ~ on: Altivar powered up

Red FAULT LED ⚠
- on: Altivar faulty
- flashing: Altivar locked once the “STOP” key has been pressed on the display module or after a change to the configuration. The motor can then only be supplied with power after resetting prior to the “forward”, “reverse”, and “injection stop” commands.

The display module is used for:

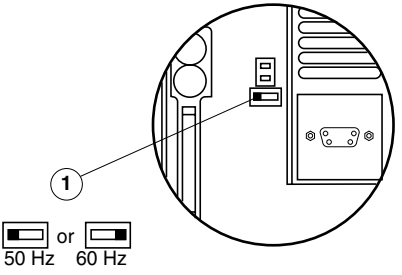
- Displaying the drive identification, electrical values, operating or fault parameters
- Altering the Altivar settings and the configuration
- Operating in local control mode via the keypad
- Saving and restoring the configuration in a non-volatile memory in the display module

Remote mounting of the display module:

Use the kit, reference VW3A58103, comprising 1 cable with connectors, the kit for mounting on an enclosure door and the installation guide.

The display module may be connected and disconnected with the power on. If the display module is disconnected when control of the speed controller via the display module is enabled, the speed controller locks in fault mode **SLF**.

☞ Before switching the Altivar on:



Unlock and open the cover of the Altivar to access the 50/60 Hz selector switch ① on the control card. Position the selector switch on 50 or 60 Hz, whichever corresponds to your motor.

Preset operating point:

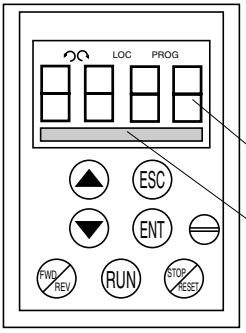
50 Hz position (factory setting):
- 400 V (UnS) 50 Hz (FrS)

60 Hz position:
- 460 V (UnS) 60 Hz (FrS)

⚠ **Warning : changing the position of this switch will return the following parameters to their factory set values the next time the Altivar is powered up:**
- Adjust menu: HSP - ItH - IdC -Ctd - Ftd - SdC - F2d.
- Drive menu: SFt - SFr - tFr - FrS - nCr - UnS - nSP - COS - tUn - SPC - CLI
- Control menu: tbr

Introduction

Front panel



Use of keys and meaning of displays

Flashing:
indicates the selected direction of rotation.
Steady:
indicates the direction of motor rotation.

LOC Indicates control via the display module

PROG Appears in setup and programming mode
Flashing:
indicates that a value has been modified but not saved

4-character display:
displays numeric values and codes

One line of 16 characters:
displays messages in plain text

Scroll through menus or parameters and set a value.

ESC Return to the previous menu or abort the current adjustment and return to the original value

ENT Select a menu, confirm and save a selection or setting

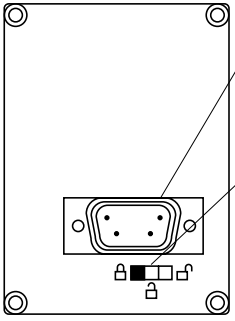
If control via the display module is selected:

FWD/REV Reverses the direction of rotation

RUN Command to start the motor running.

STOP/RESET Command to stop the motor or reset the fault. The key's "STOP" function can be inhibited via the program ("CONTROL" menu).

Rear view



Connector:
- for direct connection of the display module to the speed controller
- for remote operation, the display module can be connected via a cable provided in the VW3A58103 kit.

Access locking switch:

- position Settings and configuration not accessible
- position Settings accessible
- position Settings and configuration accessible

ENGLISH

Software evolutions

Since its launch the Altivar ATV58F has contained some additional functions which were not included in the documentation. This document takes all of these additions into account. The software version referred to is V3. This documentation can be used with older versions of products but in this case it is normal to see described parameters which are do not appear in the Altivar.

New parameters introduced in V3

Adjust Menu

- dtd : ATV Th. fault

I/O Menu

- LI Assign. : EDD : Ext flt.
- R2 Assign. : TAD : ATV th. Alarm
- LO Assign. : TAD : ATV th. Alarm

Fault Menu

- LossFollower : LFL : RLS (Maintain speed on the loss of 4-20mA)

Practical Advice - Minimum Setup

Practical advice:

Before starting your programming, first fill in the configuration and settings record tables (at the end of this document).

Programming the Altivar 58F is made easier by the use of internal sequence selections and interlocks. In order to maximize this ease of use, we recommend that you access the menus in the following order. **Not all steps are essential in every case.**

LANGUAGE
MACRO-CONFIG
CONTROL (for 3-wire control only)
I/O
CONTROL
DRIVE
FAULT
COMMUNICATION or APPLICATION if a card is used
ADJUST

CAUTION: The user must ensure that the programmed functions are compatible with the wiring diagram used. This check is particularly important if the factory configuration is modified; the diagram may also require modification.

Minimum setup:

This procedure can be used:

- in simple applications where the speed controller factory settings are suitable, in open loop mode.
- during commissioning where it is necessary to rotate the motor initially before fully commissioning.

Procedure:

1 Follow the recommendations in the User's Manual supplied with the speed controller, most importantly setting the **50/60 Hz selector switch** to the nominal frequency of the motor.

2 Ensure that the factory **macro-configuration** is suitable, otherwise change it in the **"MACRO-CONFIG"** menu.

3 To ensure the required level of safety, check that the **wiring diagram** is compatible with the macro-configuration, otherwise modify the diagram.

4 Check in the **"DRIVE"** menu that the factory parameters are compatible with those given on the **motor rating plate**.

5 Check in the **"DRIVE"** menu that the control mode is set to open loop (Ctr = SVC).

6 In the **"DRIVE"** menu, perform an **auto tune** (parameter tUn).

7 If necessary, **adjust the parameters** in the **"ADJUST"** menu (ramps, motor current, etc).

Performance optimization

Operating modes

The Altivar ATV-58F has two operating modes:

- Open loop mode (SVC), with no speed feedback from the encoder. Speed correction is still possible in this operating mode, using tachogenerator feedback (option card VW3-A58201).
- Closed loop mode with flux vector control (FVC) using speed feedback by incremental encoder. In this mode high-performance speed and torque accuracy at very low speed can be achieved.

The required operating mode can be selected by configuration (parameter CTR) or by an assignable logic input. In both cases the change of mode only takes effect once the motor has stopped, with the speed controller locked.

Encoder test, FVC setup procedure (closed loop)

1 The following steps (2 to 7) must be carried out in SVC open loop mode. Follow steps 1, 2 and 3 from the previous page.

2 Configure the motor rating plate parameters in the DRIVE menu.

3 Perform an auto tune in the DRIVE menu. The auto tune adapts the speed controller to the motor. An auto tune performed in one operating mode remains valid in the other; there is no need to repeat if the mode is changed.

4 Configure the number of encoder pulses (PGI) and select the “encoder test” function (EnC = YES) in the DRIVE menu to test the entire feedback sequence.

5 Exit the DRIVE menu and go to the DISPLAY menu.

6 Start the motor and keep it running for at least 3 seconds at a stabilized speed over 10 Hz, ensure that the motor is running correctly.
If fault SPF is displayed, check that the mechanical and electrical components of the encoder are operating correctly, that it is connected, switched on and rotating in the correct direction (if necessary reverse 2 motor phases or A and A-) and that the number of pulses has been configured correctly.
Correct and reset, then keep trying until the fault has been rectified.

7 Return to the DRIVE menu; parameter EnC should automatically be set to “DONE”.

8 Finally configure the FVC operating mode (Ctr = FVC) in the DRIVE menu.

Performance optimization

Manual optimization of the FVC parameters

Manual adjustment is recommended if the auto-tuning procedure cannot be performed or if it does not perform as expected. The essential parameters in FVC mode are the no-load current and the nominal slip.
The DISPLAY menu can be used to view current, voltage, frequency, etc. on the display module without the need for measuring devices.

No-load current (adjusted by cos φ, DRIVE menu)

Run the motor at no load with frequency = nominal frequency / 2, then adjust cos φ until the motor voltage = nominal voltage / 2 (parameter UOP in the DISPLAY menu).
Example: motor 400 V 50 Hz – adjust cos φ to obtain 200 V at 25 Hz.
- if UOP is less than 200 V, reduce cos φ
- if UOP is greater than 200 V, increase cos φ

Nominal motor slip (adjusted by nominal speed nSP, DRIVE menu and SLP, ADJUST menu)

- nominal speed: configure the value shown on the motor rating plate.
- run the motor at approximately nominal torque, with frequency = nominal frequency / 2, then adjust SLP to obtain the lowest motor current (parameter LCr in the DISPLAY menu close to nominal current).

Loop adjustment

The DRIVE menu offers a choice between two types of speed loop (see page106):

- IP loop (adjusts gain and stability)
- PI loop (adjusts proportional gain and integral gain)

Procedure

With the ramps set to the minimum, apply a speed reference of 5 to 10 Hz then start and stop the motor, observing the change in speed (response time, stability, overspeed). Depending on the results observed, follow the steps below until the optimum performance is obtained.

IP loop adjustment

1 gradually increase FLG (gain) to improve the loop response time (passband); reduce in the event of instability
2 gradually increase StA (stability) to avoid any overspeed.

PI loop adjustment

1 set SIG (integral gain) to 0
2 gradually increase SPG (proportional gain) as far as possible before oscillation begins and note the value obtained: SPGmax
3 adjust SPG to 0.7 x SPGmax
4 gradually increase SIG (to reduce the speed error) as far as possible before oscillation begins.

Motor fluxing

The Motor Flux function **FLU** (ADJUST menu) is used to achieve and maintain nominal flux in the motor when no FW or RV movement has been requested. The presence of flux before the motor is started ensures maximum performance in the starting dynamics. This function applies to both the SVC and FVC operating modes.

With FLU = FNC, non-continuous flux:

With a run command and the motor stopped:

The motor is fluxed before rotation begins.
The speed starts to increase as soon as the flux reaches its nominal level.

With a run command and the motor already turning (freewheeling):

The motor is fluxed before increasing to the setpoint speed. The command to increase to the setpoint speed is given as soon as the flux reaches its nominal level.

At the end of a stop cycle:

When at zero speed, at the end of deceleration, zero speed is maintained for the period TDC. At the end of TDC the motor is no longer controlled and the flux disappears automatically.

If a logic input is assigned to the motor fluxing function:

When this input is operated, it functions in the same way as with FLU = FCT, continuous flux.

With FLU = FCT, continuous flux:

When the motor is stopped:

The motor is continuously fluxed and zero speed is maintained. It is important to ensure that the motor can withstand the heat of the fluxing current when it is stopped (equal to the no-load current) and that this type of operation is compatible with the application.

With a run command:

The motor is already fluxed and in ideal conditions begins to rotate immediately.

Note:
- The prefluxing period depends on the motor power.
- The functions Freewheel stop by LI or Freewheel stop by pressing the STOP button have priority over the Motor fluxing function.
- The value of the prefluxing current will always be that of the speed controller limiting current, to minimize the prefluxing period.

Unlocking menus before programming

Level of access / Operating mode

The position of the selector switch offers three levels of access to the menus according to the operation of your machine. Access to the menus can also be locked using an access code (see the Files menu).

Position 🔒 Display: Used during normal operation

- **LANGUAGE** menu: To select the dialogue language
- **MACRO-CONFIG** menu: To display the macro-configuration
- **IDENTIFICATION** menu: To display the speed controller voltage and power
- **DISPLAY** menu: To display the electrical values, the operation or a fault

Position 🔒 Display and settings: Used during setup

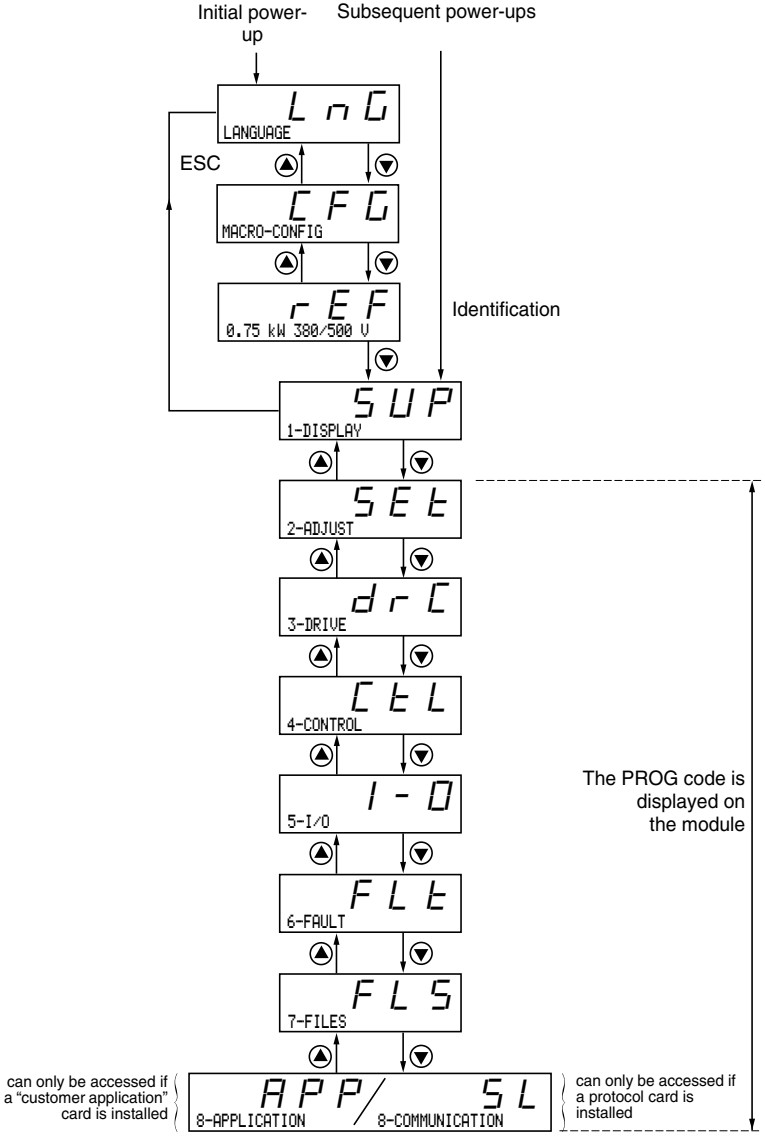
- To perform all the operations which are possible in the previous position
- **ADJUST** menu: To set all the parameters which can be accessed while the motor is rotating

Position 🔓 Total unlock: Used during programming

- To perform all the operations which are possible in the previous positions
- **MACRO-CONFIG** menu: To change the macro-configuration
- **DRIVE** menu: To adjust the performance of the motor-speed controller
- **CONTROL** menu: To configure control of the speed controller, for control via the terminals, the display module or the integrated RS485 serial link
- **I/O** menu: To change the I/O assignment
- **FAULT** menu: To configure the motor and speed controller protection and operation in the event of a fault.
- **FILES** menu: To save and restore the speed controller configurations stored in the display module, return to the factory settings or protect your configuration
- **COMMUNICATION** menu, if a communication card is installed: To adjust the parameters of a communication protocol
- **APPLICATION** menu, if a “customer application” card is installed. Please refer to the documentation specific to this card.

Access to menus

The number of menus which can be accessed depends on the position of the access locking switch.
Each menu is made up of a number of parameters.



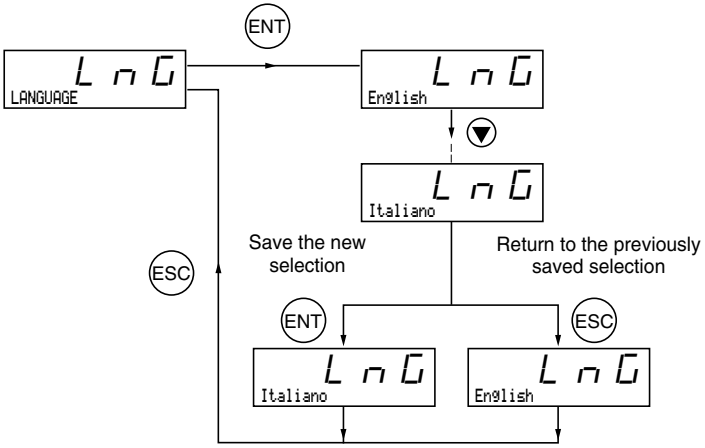
Note:
If an access code has already been programmed, it may be impossible to modify some menus; these may not even be visible. In this case, see the section entitled "FILES menu" explaining how to enter the access code.

Access to Menus - Programming Principle

Language:

This menu can be accessed whatever position the access switch is in, and can be modified in stop or run mode.

Example:

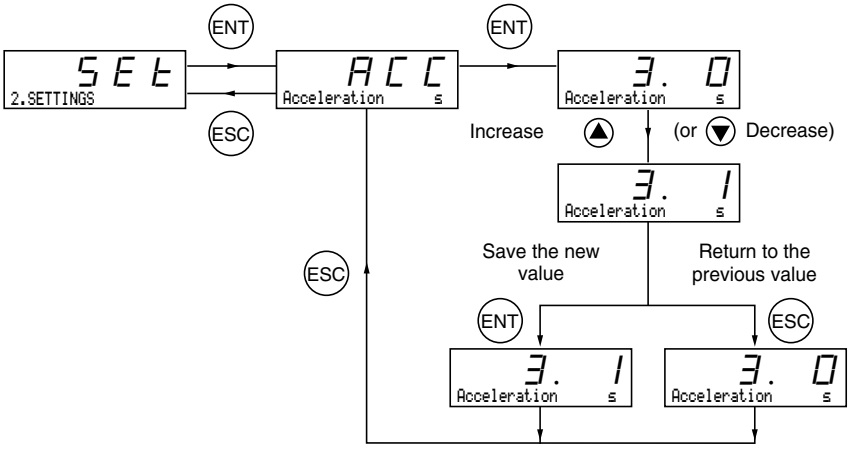


Possible selections: English (factory setting), French, German, Spanish, Italian.

Programming principle:

The principle is always the same, with 1 or 2 levels:

- 1 level: see the “language” example above.
- 2 levels: see the “acceleration ramp” example below.



Macro-Configurations

This parameter can always be displayed but can only be modified in programming mode (switch in position) and in stop mode with the speed controller locked.

It can be used to automatically configure an application-specific function. Two application-specific functions are available.
- Handling (Hdg)
- General use (GEn)

A macro-configuration automatically assigns the I/O and parameters, activating the functions required for the application. Parameters related to the programming functions are available.

Factory setting: Handling

Speed controller:

I/O assignment according to the macro-configuration		
	Hdg: Handling	GEn: Gen Use
Logic input LI1	forward	forward
Logic input LI2	reverse	reverse
Logic input LI3	2 preset speeds	jog operation
Logic input LI4	4 preset speeds	freewheel stop (1)
Analog input AI1	speed ref.	speed ref.
Analog input AI2	summing ref.	summing ref.
Relay R1	controller fault	controller fault
Relay R2	not assigned	not assigned
Analog output AO1	motor frequency	motor frequency

Extension cards:

I/O assignment according to the macro-configuration		
	Hdg: Handling	GEn: Gen Use
Logic input LI5	8 preset speeds	clear fault
Logic input LI6	clear fault	limit torque
Analog input AI3 or Inputs A, A+, B, B+	summing ref.	summing ref.
Logic output LO	current threshold reached	downstr. contactor ctrl
Analog output AO	motor current	motor current

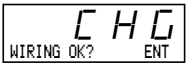
(1) In order to start, the logic input must be linked to the + 24 V (function active at 0)

Caution:
Ensure that the programmed macro-configuration is compatible with the wiring diagram used. This check is particularly important if the factory configuration is modified; the circuit diagram may also require modification.

Macro-Configurations
Drive identification

Modification of the macro-configuration requires double confirmation as it results in automatic assignment of functions and a return to factory settings.

The following screen is displayed:



ENT to confirm the modification
ESC to return to the previous configuration

Customizing the configuration:

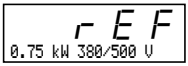
The configuration of the speed controller can be customized by changing the I/O assignment in the I/O menu which can be accessed in programming mode (access switch in position).

This customization modifies the displayed macro-configuration value:

is displayed

Drive identification

This parameter can always be displayed. It indicates the speed controller power and voltage as indicated on the identification label.



The power is displayed in kW if the 50/60 Hz selector switch on the speed controller is set to 50 Hz, and in HP if it is set to 60 Hz.

Display Menu

Display menu (selection of parameter displayed during operation)

The following parameters can be accessed whatever position the access switch is in, in stop or run mode.

Name	Code	Function	Unit
Drive State	- - -	State of the speed controller: indicates a fault or the motor operating phase:	–
	rdY	rdY = speed controller ready	
	rUn	rUn = motor in steady state or run command present and zero reference	
	ACC	ACC = accelerating	
	dEC	dEC = decelerating	
	CLI	CLI = current limit	
	dCb	dCb = injection braking	
	nSt	nSt = freewheel stop control	
	Obr	Obr = braking by adapting the deceleration ramp (see the “drive” menu)	
	FLU	FLU = flux active	
Freq. Ref.	LFr	This adjustment parameter appears instead of the FrH parameter when the speed controller control via the display module is activated: LCC parameter in the control menu	Hz
Freq. Ref.	FrH	Frequency reference	Hz
Output Freq.	rFr	Output frequency applied to the motor	Hz
Motor Speed	SPd	Motor speed estimated by the speed controller	RPM
MotorCurrent	LCr	Motor current	A
Machine SPd.	USP	Machine speed estimated by the speed controller. This is proportional to rFr, according to a coefficient USC which can be regulated in the adjust menu. Displays a value corresponding to the application (metres / second, for example). Caution, if USP becomes greater than 9999 the display is divided by 1000.	–
Output Power	OPr	Power supplied by the motor, estimated by the controller. 100 % corresponds to nominal power.	%
MainsVoltage	ULn	Line voltage	V
MotorThermal	tHr	Thermal state: 100 % corresponds to the nominal thermal state of the motor. Above 118 %, the speed controller triggers an OLF fault (motor overload)	%
DriveThermal	tHd	Thermal state of the speed controller: 100 % corresponds to the nominal thermal state of the speed controller. Above 118 %, the speed controller triggers an OHF fault (speed controller overheating). It can be reset below 70 %.	%
Last Fault	LFt	Displays the last fault which occurred.	–
Motor volt.	UOP	Voltage applied to the motor	V
Consumption	APH	Energy consumed	kWh or MWh
Run time	rtH	Operating time (motor powered up) in hours	hrs

Adjust Menu

This menu can be accessed when the switch is in positions and . Adjustment parameters can be modified in stop mode OR during operation. **Ensure that any changes made during operation are not dangerous; changes should preferably be made in stop mode.**

The list of adjustment parameters is made up of a fixed part and a changeable part (shaded parameters) which varies according to:

- the selected macro-configuration
- the presence of an I/O extension card
- the reassignment of I/O
- the selection of certain functions.

Name	Code	Description	Adjustment range	Factory setting
Freq. Ref. - Hz	LFr	Appears when control via the display module is activated: parameter LCC in the control menu	LSP to HSP	
Ramp Incr. - s	Inr	(Fine) increment in the ramp settings. This parameter affects all ACC, dEC, AC2, dE2 settings	0.1s – 0.01s	0.1s
Acceleration - s Deceleration - s	ACC dEC	Acceleration and deceleration ramp times Range 0 to motor nominal frequency (FrS). If Inr = 0.01s the adjustment range is from 0.01 to 99.99 s. If Inr = 0.1s the adjustment range is from 0.1 to 999.9 s.	0.01 to 999.9 0.01 to 999.9	3 s 3 s
Accelerate2 - s Decelerate2 - s	AC2 dE2	2nd acceleration ramp 2nd deceleration ramp If Inr = 0.01s the adjustment range is from 0.01 to 99.99 s. If Inr = 0.1s the adjustment range is from 0.1 to 999.9 s. Parameters AC2 and dE2 can be accessed in the following cases: - the ramp switching threshold (parameter Frt, DRIVE menu) is other than 0 Hz - a logic input is assigned to ramp switching - a logic input is assigned to slower with Str configured = SRE (DRIVE menu) - an analog input is assigned to the PID feedback.	0.01 to 999.9 0.01 to 999.9	5 s 5 s
Beg ACC Rnd. - %	tA1	Start of CUS-type acceleration ramp rounded as % of total ramp time (parameter rPt = CUS, DRIVE menu)	0 to 100	10 %
End ACC Rnd. - %	tA2	End of CUS-type acceleration ramp rounded as % of total ramp time	0 to (100-tA1)	10 %
Beg DEC Rnd. - %	tA3	Start of CUS-type deceleration ramp rounded as % of total ramp time	0 to 100	10 %
End DEC Rnd. - %	tA4	End of CUS-type deceleration ramp rounded as % of total ramp time	0 to (100-tA3)	10 %
Low SPeed - Hz	LSP	Low speed	0 to HSP	0 Hz
High SPeed - Hz	HSP	High speed: ensure that this setting is suitable for the motor and the application.	LSP to tFr	50 / 60 Hz acc. to the switch

Name	Code	Description	Adjustment range	Factory setting
Gain - %	FLG	Frequency loop gain for IP-type loop (SSL = IP in DRIVE menu):	0 to 100	20 %
		used to adapt the response of the machine speed according to the dynamics. For high resistive torque, high inertia or fast cycle machines, increase the gain gradually.		
Stability - %	StA	For IP-type loop (SSL = IP in DRIVE menu):	0 to 100	20 %
		used to adapt the return to steady state after a speed transient, according to the dynamics of the machine. Gradually increase the stability to avoid any overspeed.		
SPeed Prop.g - %	SPG	Proportional speed loop gain for PI-type loop (SSL = PI in DRIVE menu)	0 to 1000	40 %
SPeed int.g. - %	SIG	Integral speed loop gain for PI-type loop (SSL = PI in DRIVE menu)	0 to 1000	40 %
ThermCurrent - A	ItH	Current used for motor thermal protection. Set ItH to the nominal current on the motor rating plate.	0.25 to 1.36 In (1)	Acc. to controller rating
DC Inj. Curr. - A	IdC	DC injection braking current.	0.10 to 1.36 In (1)	Acc. to controller rating
		After 30 seconds the injection current is limited to 0.5 Ith if set to a higher value. This parameter only appears if a logic input has been assigned to DC injection braking.		
DC Inj. Time - s	tdC	If Ctr = SVC (DRIVE menu): DC injection braking time on stopping. If Ctr = FVC: zero speed holding time on stopping.	0 to 30 s Cont	0.5 s
		If this is increased to more than 30 s, “Cont” is displayed: permanent braking. If Ctr = SVC, the injection current becomes equal to SdC after 30 seconds.		
dc I at rest - A	SdC	Injection braking current applied after 30 seconds if Ctr = SVC (DRIVE menu) and if tdC = Cont.	0.1 to 1.36 In (1)	Acc. to controller rating
		⚠ Check that the motor will withstand this current without overheating.		
IR Compens. - %	UFr	Used to adjust the default value or the value measured during auto-tuning.	0 to 150 %	100 %
Slip Comp. - %	SLP	Used to adjust the slip compensation value fixed by motor nominal speed.	0 to 150 %	100 %

(1) In corresponds to the speed controller nominal current indicated in the catalogue and on the speed controller identification label.

Name	Code	Description	Adjustment range	Factory setting
Preset SP.2 - Hz	SP2	2nd preset speed	LSP to HSP	10 Hz
Preset SP.3 - Hz	SP3	3rd preset speed	LSP to HSP	15 Hz
Preset SP.4 - Hz	SP4	4th preset speed	LSP to HSP	20 Hz
Preset SP.5 - Hz	SP5	5th preset speed	LSP to HSP	25 Hz
Preset SP.6 - Hz	SP6	6th preset speed	LSP to HSP	30 Hz
Preset SP.7 - Hz	SP7	7th preset speed	LSP to HSP	35 Hz
Jog Freq. - Hz	JOG	Jog frequency	0 to 10 Hz	10 Hz
Jog Delay - s	JGt	Anti-repeat delay between two consecutive jog operations	0 to 2 s	0.5 s
BrRelease I - A	Ibr	Brake release current	0 to 1.36 In (1)	0 A
BrReleasTime- s	brt	Brake release time	0 to 5 s	0 s
BrEngage Lev- Hz	bEn	Brake engage frequency (in open loop only, Ctr = SVC, DRIVE menu)	0 to LSP	0 Hz
BrEngageTime- Hz	bEt	Brake engage time	0 to 5 s	0 s
Brake impul.	b IP	YES: while the brake is released the torque is always in the FW (forward) direction, regardless of the direction requested. ⚠ Check that the motor torque direction for FW (forward) control corresponds to the direction of increase in load; if necessary reverse 2 motor phases. no: while the brake is released the torque is in the requested direction of rotation.	no-YES	no
Tacho Coeff.	dtS	Multiplication coefficient of the feedback associated with the tachogenerator function: $dtS = \frac{9}{\text{feedback voltage at HSP}}$	1 to 2	1
PI Prop.Gain	rPG	Proportional gain of the PID regulator	0.01 to 100	1
PI Int.Gain	r IG	Integral gain of the PID regulator	0.01 to 100 / s	1 / s
PID der.g.	rdG	Derivative gain of the PID regulator	0.00 to 100.0	0.00
PI Inversion	P IC	Reversal of the direction of correction of the PID regulator no: normal YES: reverse	no - YES	no

(1) In corresponds to the speed controller nominal current indicated in the catalogue and on the speed controller identification label.

Adjust Menu

Name	Code	Description	Adjustment range	Factory setting
Freq.Lev.Att- Hz	Ftd	Motor frequency threshold above which the logic output changes to 1	LSP to HSP	50/60 Hz
Freq.Lev.2-Hz	F2d	Second frequency threshold: Same function as Ftd, for a second frequency value	LSP to HSP	50/60 Hz
Curr.Lev.Att - A	Ctd	Current threshold above which the logic output or the relay changes to 1	0 to 1.36 In (1)	1.36 In (1)
ThermLev.Att - %	ttd	Motor thermal state threshold above which the logic output or the relay changes to 1	0 to 118%	100 %
Trq. Limit 2 - %	tL2	Second torque limit level activated by a logic input	0 to 200% (2)	200 %
Trip Thresh.- Hz	FFt	Freewheel stop trip threshold: When a stop on ramp or fast stop is requested, the type of stop selected is activated until the speed falls below this threshold. Below this threshold, freewheel stop is activated. This parameter can only be accessed if the R2 relay is not assigned to the “BLC: Brake Logic” function, and if an “on ramp” or “fast” type stop has been selected in the drive menu.	0 to HSP	0 Hz
Jump Freq. - Hz	JPF	Skip frequency: prohibits prolonged operation over a frequency range of +/-2.5 Hz around JPF. This function can be used to prevent a critical speed which causes resonance.	0 to HSP	0 Hz
Jump Freq.2 - Hz	JF2	Second skip frequency: Same function as JPF, for a second frequency value	0 to HSP	0 Hz
Jump Freq.3 - Hz	JF3	Third skip frequency: Same function as JPF, for a third frequency value	0 to HSP	0 Hz
Machine Coef	USC	Coefficient applied to parameter rFr (output frequency applied to the motor), the machine speed is displayed via parameter USP in the DISPLAY menu. USP = rFr x USC	0.01 to 100	1
LSP Time - s	tLS	Operating time at low speed. After operating at LSP for a given time, the motor is stopped automatically. The motor restarts if the frequency reference is greater than LSP and if a run command is still present. Caution: value 0 corresponds to an unlimited time	0 to 999.9	0 (no time limit)
+/-Speed lim -%	SrP	Limits the range of operation of + speed / - speed commands around the reference as a percentage. This parameter appears if two inputs have been assigned to the “+ speed” “- speed” functions and if parameter Str = SRE in the CONTROL menu	0 to 50 %	10 %

(1) In corresponds to the speed controller nominal current indicated in the catalogue and on the speed controller identification label.

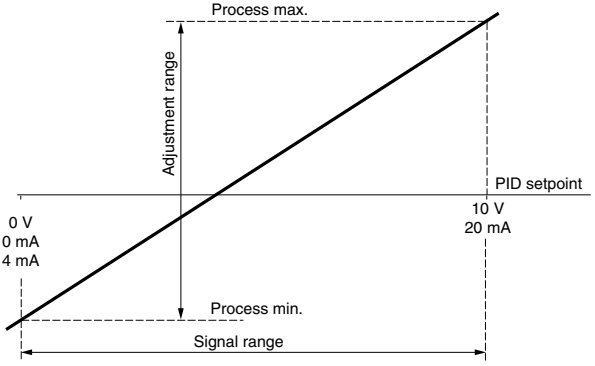
(2) 100% corresponds to the nominal torque of a motor with power equal to that associated with the speed controller.

Name	Code	Description	Adjustment range	Factory setting
PID ref. off.	rEO	Used to adjust the process range. Should be calculated by the user: $rEO = \frac{\text{Process min - Min feedback}}{\text{Max feedback - Min feedback}} \times 999$ (in customer units)	-999 to 999	0
PID Ref.Gain	PrG	Used to adjust the sensor range to match the process range. Should be calculated by the user: $PrG = \frac{\text{Process max - Process min}}{\text{Max feedback - Min feedback}} \times 999$	-999 to 999	999

Process max and Process min correspond to the customer's adjustment range in customer units.
Example: set between 5 bar and 12 bar.

Process max: process value to be set when the signal is maximum (10 V, 20 mA) on the analog input selected for the PID setpoint. Example: 12 bar for 10 V on 0-10 V input.

Process min: process value to be set when the signal is minimum (0 V, 0 mA, 4 mA) on the analog input selected for the PID setpoint. Example: 5 bar for 0 V on 0-10 V input.

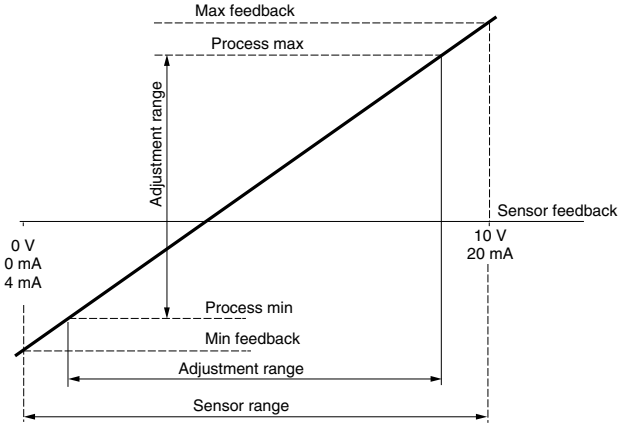


Note:
The reference value and the feedback value should always be positive, even if a bipolar analog input is used, for example AI1 or AI3 (-10 V, +10 V). Negative values are not taken into consideration.

Min feedback and Max feedback correspond to the sensor feedback range in customer units.

Min feedback: value measured for the minimum signal on the analog input (0 V, 0 mA, 4 mA) selected for the PID feedback. Example: 0 bar measured at 4 mA on 4-20 mA input.

Max feedback: value measured for the maximum signal on the analog input (10 V, 20 mA) selected for the PID feedback. Example: 15 bar measured at 20 mA on 4-20 mA input.



Note: The adjustment range (Process min and Process max) should be included within the sensor range [Min feedback and Max feedback]

Example of how to calculate Gain and Offset:
The user wishes to set the volume of a tank to between 100 m^3 and 10 m^3

1 The sensor supplies a current signal 0 mA -> 5 m^3 / 20 mA -> 200 m^3
Select input AI2: min signal = 0 mA, max signal = 20 mA
Find the process value corresponding to the min and max input signal to define Min feedback and Max feedback:

Signal set by input AI2	Corresponding process value
Min signal 0 mA Max signal 20 mA	5 m^3 = Min feedback 200 m^3 = Max feedback

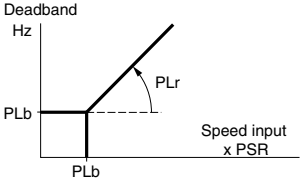
2 The user selects the desired input AI1: min signal = 0 V, max signal = 10 V
The user wishes to set the volume to between 100 m^3 and 10 m^3.

Signal set by input AI1	Corresponding process value
Min signal 0 V Max signal 10 V	10 m^3 = Min process reference 100 m^3 = Max process reference

3 Scaling.

$$RefGain = \left(\frac{100-10}{200-5}\right) x999 = (0,4615) x999 = 461$$

$$Offset = \left(\frac{10-5}{200-5}\right) x999 = (0,0256) x999 = 26$$

Name	Code	Description	Adjustment range	Factory setting
PID SPeed r.	PSr	PID speed input ratio. Used to adjust the influence of this input on the regulator, for example, to define the relationship between a linear speed and an angular speed.	0 to 100	0
PID Filter - s	PSP	Used to adjust the filter time constant on the PID feedback.	0.0 to 10.0	0 s
Min.feed.PID - %	PAL	Feedback value above which the output assigned to PID Feed alarm changes to 1. 100 % = max feedback 0 % = min feedback	0 to 100 %	0 %
Max.feed.PID - %	PAH	Feedback value above which the output assigned to PID Feed alarm changes to 1. 100 % = max feedback 0 % = min feedback	0 to 100 %	0 %
PID error - %	PEr	Error value above which the output assigned to PID error changes to 1. 100 % = max feedback - min feedback 0 % = 0	0 to 100 %	100 %
PID Preset 2 - %	P I2	2nd preset PID setpoint, when a logic input has been assigned to the function 4 preset PID setpoints. 100 % = process max 0 % = process min	0 to 100 %	30 %
PID Preset 3 - %	P I3	3rd preset PID setpoint, when a logic input has been assigned to the function 4 preset PID setpoints. 100 % = process max 0 % = process min	0 to 100 %	60 %
PID Limit r. -%	PLr	Limiting of the output from the PID regulator as a % of the output signal from the speed input multiplier. 	0 to 100 %	20 %
PID base lim - Hz	PLb	Base limit for the output from the PID regulator	0.0 Hz to HSP	HSP
Motor fluxing	FLU	Selects motor fluxing mode (see page 87) FNC : non-continuous FCT : continuous	FNC-FCT	FNC
ATV Th. fault	dtd	Level of drive thermal state above which the logic output or relay change to state 1.	0 à 118 %	105 %

Drive Menu

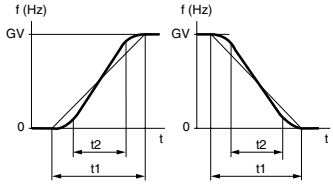
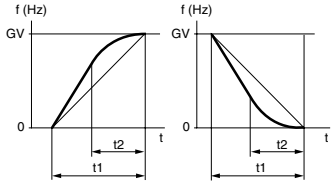
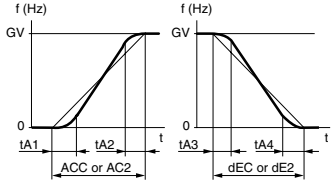
This menu can be accessed when the switch is in position  .
The parameters can only be modified in stop mode with the speed controller locked.

Drive performance can be optimized by:
- **entering the values given on the rating plate in the drive menu**
- **performing an auto-tune operation (on a standard asynchronous motor).**

Name	Code	Description	Adjustment range	Factory setting
Nom.Mot.Volt -V	UnS	Nominal motor voltage given on the rating plate	200 to 500 V	400/460 V according to position of 50/ 60 Hz switch
Nom.Mot.Freq - Hz	FrS	Nominal motor frequency given on the rating plate	10 to 500 Hz	50/60 Hz according to position of 50/ 60 Hz switch
Nom.Mot.Curr - A	nCr	Nominal motor current given on the rating plate	0.25 to 1.36 In (1)	according to controller rating
Nom.MotSPeed - RPM	nSP	Nominal motor speed given on the rating plate	0 to 9999 RPM	according to controller rating
Mot. Cos Phi	CoS	Motor Cos Phi given on the rating plate	0.5 to 1	according to controller rating
Control mode	Ctr	Selects the control mode: - Open loop SVC - Closed loop FVC	SVC - FVC	SVC
Enc Pulse No	PGI	Number of pulses per encoder revolution (control card)	100 to 5000	1024
Auto Tuning	tUn	Used to auto-tune motor control once this parameter has been set to “YES”.	no - YES	no
		Once auto-tuning is complete, the parameter automatically returns to “DONE” or “no” in the event of a fault. **Caution:** • Auto-tuning is only performed if no command has been activated. If a “freewheel stop” or “fast stop” function is assigned to a logic input, this input must be set to 1 (active at 0). • Auto-tuning may last for 1 minute. Do not interrupt; wait for the display to change to “DONE” or “no”. • It is essential that all the motor parameters (UnS, FrS, nCr, nSP, COS) are correctly configured before performing the auto-tuning. • During auto-tuning the motor is under nominal current.		

(1) In corresponds to the speed controller nominal current indicated in the catalogue and on the speed controller identification label.

Name	Code	Description	Adjustment range	Factory setting
Encoder chk	EnC	Check the encoder feedback (see page 85). “DONE” is displayed if the check has already been performed.	no YES	no
Max. Freq. - Hz	tFr	Maximum output frequency. **The maximum value depends on the switching frequency.**	10 to 450 Hz	60/72 Hz according to position of 50/60 Hz switch
DecRampAdapt	brA	Activation of this function is used to increase the deceleration time automatically if this has been set to too low a value for the inertia of the load, thus avoiding an ObF fault. This function may be incompatible with positioning on a ramp and with the use of a braking resistor. The factory setting depends on the macro-configuration used: no for handling, YES for general use. If relay R2 is assigned to the brake sequence function, the parameter brA remains locked on no.	no-YES	no
SwitchRamp2 - Hz	Frt	Ramp switching frequency. Once the output frequency exceeds Frt, the ramp times taken into account are AC2 and dE2.	0 to HSP	0 Hz
Type of stop	Stt	Type of stop: When a stop is requested, the type of stop is activated until the FFt threshold (adjust menu) is reached. Below this threshold, freewheel stop is activated. STN: On ramp FST: Fast stop NST: Freewheel stop DCI: DC injection stop This parameter cannot be accessed if the R2 relay or a logic output is assigned to the “BLC: Brake Logic” function.	STN - FST NST - DCI	STN

Name	Code	Description	Adjustment range	Factory setting
Ramp Type	rPt	Defines the shape of the acceleration and deceleration ramps. LIN : linear S : S-shape ramp U : U-shape ramp CUS : customized S-shape ramps  The curve coefficient is fixed, with t2 = 0.6 x t1 with t1 = set ramp time. U-shape  The curve coefficient is fixed, with t2 = 0.5 x t1 with t1 = set ramp time. Customized ramps  tA1: can be set between 0 and 100 % (of ACC or AC2) tA2: can be set between 0 and (100 % - tA1) (of ACC or AC2) tA3: can be set between 0 and 100 % (of dEC or dE2) tA4: can be set between 0 and (100 % - tA3) (of dEC or dE2) Parameters tA1, tA2, tA3 and tA4 can be set in the ADJUST menu	LIN - S - U - CUS	LIN

<table>
<tr><th>Name</th><th>Code</th><th>Description</th><th>Adjustment range</th><th>Factory setting</th></tr>
<tr><td>DECRAmpCoeff</td><td>dCF</td><td>Deceleration ramp time reduction coefficient when the fast stop function is active.</td><td>1 to 10</td><td>4</td></tr>
<tr><td>Trq.Limit. 1 _ %</td><td>tL1</td><td>The torque limit is used to limit the maximum motor torque.</td><td>0 to 200% (1)</td><td>200%</td></tr>
<tr><td>Int. I Lim - A</td><td>CL1</td><td>The current limit is used to limit motor overheating.</td><td>0 to 1.36 In (2)</td><td>1.36 In</td></tr>
<tr><td>Auto DC Inj.</td><td>AdC</td><td>Used to deactivate DC injection braking when holding zero speed (see parameter tdC on page 96)</td><td>no-YES</td><td>YES</td></tr>
<tr><td>Sw Freq. Type</td><td>SFt</td><td>Used to select a low switching frequency (LF) or a high switching frequency (HF1 or HF2).

HF1 switching is designed for applications with a low load factor without derating the speed controller. If the thermal state of the speed controller exceeds 95 %, the frequency automatically changes to 2 or 4 kHz depending on the speed controller rating. When the thermal state of the speed controller drops back to 70 %, the selected switching frequency is re-established. HF2 switching is designed for applications with a high load factor with derating of the speed controller by one rating: the drive parameters are scaled automatically (torque limit, thermal current, etc).

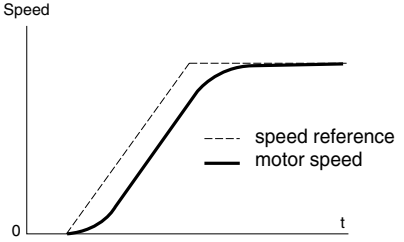
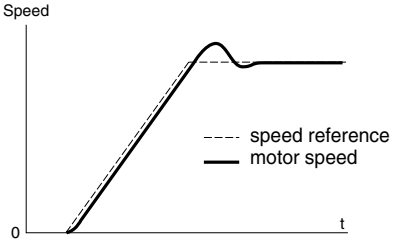
Modifying this parameter results in the following parameters returning to factory settings:
• nCr, CLI, Sfr, nrd (Drive menu)
• ItH, IdC, Ibr, Ctd (Adjust menu).</td><td>LF-HF1-HF2</td><td>LF</td></tr>
<tr><td>Sw Freq - kHz</td><td>SFr</td><td>Used to select the switching frequency. The adjustment range depends on the SFt parameter.

If SFt = LF: 0.5 to 2 or 4 kHz according to the controller rating
If SFt = HF1 or HF2: 2 or 4 to 16 kHz according to the controller rating

The maximum operating frequency (tFr) is limited according to the switching frequency:

<table><tr><td>SFr(kHz)</td><td>0.5</td><td>1</td><td>2</td><td>4</td><td>8</td><td>12</td><td>16</td></tr><tr><td>tFr (Hz)</td><td>62</td><td>125</td><td>250</td><td>450</td><td>450</td><td>450</td><td>450</td></tr></table></td><td>0.5-1-2-4 -8-12-16 kHz</td><td>Acc. to controller rating</td></tr>
<tr><td>Noise Reduct</td><td>nrd</td><td>This function modulates the switching frequency randomly to reduce motor noise.</td><td>no-YES</td><td>YES (3)
no (4)</td></tr>
</table>

(1) 100% corresponds to the nominal torque of a motor of a power equal to that associated with the speed controller.
(2) In corresponds to the speed controller nominal current indicated in the catalogue and on the speed controller identification label.
(3) if SF = LF,
(4) if SFt = HF1 or HF2

Name	Code	Description	Adjustment range	Factory setting
SPecial Motor	SPC	Cette fonction inhibe la détection de la coupure aval non contrôlée (utile pour les petits moteurs notamment) No: Normal motor Yes: Special motor PSM: Small motor For PSM: Inhibits detection of “uncontrolled loss downstream” (used particularly for small motors).	no-yes-PSM	no
PG TyPe	PGt	Defines the type of sensor used when an encoder feedback I/O option card is installed: INC: incremental encoder (A, A+, B, B+ are hard-wired) DET: detector (only A is hard-wired)	INC-DET	DET
Num. Pulses	PLS	Defines the number of pulses for one rotation of the sensor (encoder feedback I/O option card).	1 to 1024	1024
SPeed Reg.	SSL	Used to select the type of speed loop: IP: IP structure PI: PI structure IP loop: - not possible to exceed reference level - response time longer than for the PI loop  PI loop: - response time very short - possible to exceed reference level  	IP-PI	IP

Control Menu

This menu can be accessed when the switch is in position . The parameters can only be modified in stop mode with the speed controller locked.

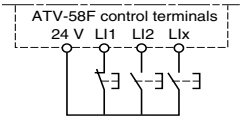
Name	Code	Description	Adjustment range	Factory setting
TermStripCon	tCC	Configuration of terminal control: 2-wire or 3-wire control.	2W- 3W (2-wire / 3-wire)	2W

Modification of this parameter requires double confirmation as it results in reassignment of the logic inputs. By changing from 2-wire control to 3-wire control, the logic input assignments are shifted by one input. The LI3 assignment in 2-wire control becomes the LI4 assignment in 3-wire control. In 3-wire control, inputs LI1 and LI2 cannot be reassigned.

I/O	Handling	General use
LI1	STOP	STOP
LI2	RUN forward	RUN forward
LI3	RUN reverse	RUN reverse
LI4	2 preset speeds	jog operation
LI5	4 preset speeds	freewheel stop
LI6	8 preset speeds	clear faults

The I/O with a grey background can be accessed if an I/O extension card has been installed.
3-wire control (pulse control: one pulse is sufficient to control start-up). This option inhibits the “automatic restart” function.
Wiring example:

LI1: stop
LI2: forward
LIx: reverse



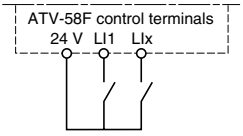
This option only appears if 2-wire control is configured:

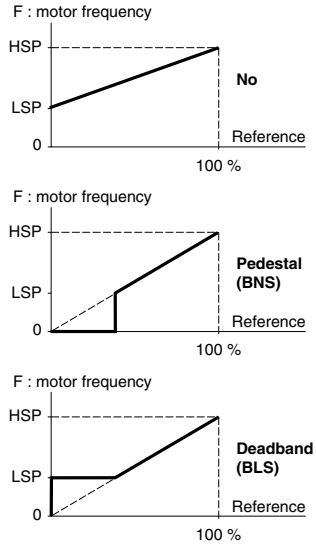
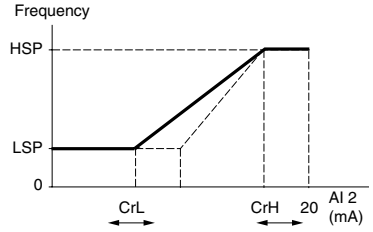
Name	Code	Description	Adjustment range	Factory setting
Type 2 Wire	tCt	Defines 2-wire control:	LEL-TRN-PFo	LEL

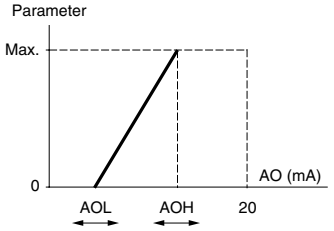
- according to the state of the logic inputs (LEL: 2-wire)
- according to a change in state of the logic inputs (TRN: 2-wire trans.)
- according to the state of the logic inputs with forward always having priority over reverse (PFo: Priorit. FW)

Wiring example:

LI1: forward
LIx: reverse



Name	Code	Description	Adjustment range	Factory setting
RV inhibit	rIn	Inhibition of operation in the opposite direction to that controlled by the logic inputs, even if this reversal is required by a summing or process control function. Inhibition of reverse if it is controlled by the FWD/REV key on the display module.	no - YES	no
deadb./Pedst	bSP	Management of operation at low speed:  This parameter appears only when an analog input is assigned to the PID feedback.	No BNS: Pedestal BLS: Deadband	No
AI2 min Ref. - mA AI2 Max Ref. - mA	CrL CrH	Minimum value of the signal on input AI2. Maximum value of the signal on input AI2. These two parameters are used to define the signal sent to AI2. There are several configuration possibilities, one of which is to configure the input for a 0-20 mA, 4-20 mA, 20-4 mA, etc signal. 	0 to 20 mA 4 to 20 mA	4 mA 20 mA

Name	Code	Description	Adjustment range	Factory setting
Min Val AO - mA	AOL	Min. value of the signal on outputs AO and AO1	0 to 20 mA	0 mA
Max Val AO - mA	AOH	Max. value of the signal on outputs AO and AO1 These two parameters are used to define the output signal on AO and AO1. Eg: 0-20 mA, 4-20 mA, 20-4mA, etc  	0 to 20 mA	20 mA
Save Ref.	Str	Associated with the - speed function, this function is used as follows: • If Str = RAM or EEP, to save the reference when the run commands disappear (RAM: save in RAM) or when the line supply disappears (EEP: save in EEPROM). On the next start-up, the speed reference is the last reference saved. • If Str = NO: no reference saved • If Str = SRE: no reference saved, the max. speed is limited to HSP and the speed adjustment by + speed and - speed is limited to the adjustment parameter SRP around the reference (see page 98)	NO-RAM EEP-SRE	NO
Keypad Comm.	LCC	Used to activate speed controller control via the display module. The STOP/RESET, RUN and FWD/REV keys are active. The speed reference is given by parameter LFr. Only the freewheel stop, fast stop and DC injection stop commands remain active at the terminals. If the speed controller/display module connection is cut, the speed controller locks in an SLF fault.	no-YES	no
Stop Priorit	PSt	This function gives priority to the STOP key irrespective of the control mode (terminals or fieldbus). To set the PSt parameter to “no”: 1 - Display “no” 2 - Press the “ENT” key 3 - The speed controller displays “See manual” 4 - Press ▲ then ▼ then “ENT” For applications with continuous processes, it is advisable to configure the key as inactive (set to “no”).	no-YES	YES
DriveAddress	Add	Address of the speed controller when it is controlled via the connector port (with the display module removed).	0 to 31	0

Name	Code	Description	Adjustment range	Factory setting
Bd Rate RS485	tbr	Transmission speed via the RS485 serial link (effective on the next power-up) 9600 bps 19200 bps ⚠ **If tbr ≠ 19200, the terminal can no longer be used. To reactivate the terminal, reconfigure tbr as 19200 via the serial link or revert to partial factory settings (see below).**	9600- 19200	19200
Reset counters	rPr	KWh or operating time reset to 0 No: No APH: KWh reset to 0 RTH: Operating time reset to 0 APH and RTH are active immediately. The parameter then automatically returns to NO. Press “ENT” to confirm the reset to 0 command.	NO- APH - RTH	No

☞ Return to partial factory settings without using the display module:

- Switch off the drive
- Unlock and open the Altivar cover in order to access the 50/60 Hz switch (1) on the control card. If an option card is present, the selector switch can be accessed through it.
- Change the position of the 50/60 Hz switch (1) on the control card
- Switch on the drive
- Switch off the drive again
- Reset the 50/60 Hz switch (1) on the control card to its initial position (nominal motor frequency)
- Switch on the drive, and it reverts to its factory configuration.

⚠ **Warning : This procedure will return the following parameters to their factory set values:**

- Adjust menu: HSP - ItH - IdC -Ctd - Ftd - SdC - F2d.
- Drive menu: SFt - SFr - tFr - FrS - nCr - UnS - nSP - COS - tUn - SPC - CLI
- Control menu : tbr

I/O Menu

This menu can be accessed when the switch is in position .
The assignments can only be modified in stop mode with the speed controller locked.

Name	Code	Function
LI2 Assign.	L I2	See the summary table and description of the functions.

The inputs and outputs available in the menu depend on the I/O cards installed (if any) in the speed controller, as well as the selections made previously in the control menu.
The "factory" configurations are preassigned by the selected macro-configuration.

Summary table of the logic input assignments (exc. 2-wire / 3-wire option)

I/O extension option cards		2 logic inputs LI5-LI6
Speed controller without option		3 logic inputs LI2 to LI4
NO :Not assigned	(Not assigned)	X
RV :Reverse	(Reverse)	X
RP2:Switch ramp2	(Ramp switching)	X
JOG	(Jog operation)	X
+SP:+ Speed	(+ speed)	X
-SP:- Speed	(- speed)	X
PS2:2 Preset SP	(2 preset speeds)	X
PS4:4 Preset SP	(4 preset speeds)	X
PS8:8 Preset SP	(8 preset speeds)	X
NST:Freewhl Stop	(Freewheel stop)	X
DCI:DC inject.	(Injection stop)	X
FST:Fast stop	(Fast stop)	X
CHP:Multi. Motor	(Open / closed loop switching) If Ctr = FVC	X
TL2:Trq.Limit 2	(Second torque limit)	X
FLO:Forced Local	(Forced local mode)	X
RST:Fault Reset	(Fault reset)	X
RFC:Auto/Manu	(Reference switching)	X
ATN:Auto Tuning	(Auto-tuning)	X
SPM:Ref.memory	(Reference saved)	X
FLI:Motor fluxing	(Motor fluxing)	X
PAU:PID Auto/Man	(PID Auto/Manu) If one AI = PIF	X
PIS:PIDint.reset	(PID integral shunting) If one AI = PIF	X
PR2:PID 2 Preset	(2 preset PID setpoints) If one AI = PIF	X
PR4:PID 4 Preset	(4 preset PID setpoints) If one AI = PIF	X
TLA:Torque limit	(Torque limitation by AI) If one AI = AtL	X
EDD:Ext flt.	(external fault)	X

If a logic input is assigned to "Freewheel stop" or "Fast stop", start-up can only be performed by linking this input to the +24V, as these stop functions are active when inputs are at state 0.

Summary table of the analog and encoder input assignments

I/O extension option cards			Analog input AI3	Encoder input A+, A-, B+, B-(1)
Speed controller without option		Analog input AI2		
NO :Not assigned	(Not assigned)	X	X	X
FR2:Speed Ref2	(Speed reference 2)	X		
SAI:Summed Ref.	(Summing reference)	X	X	X
PIF:PI regulator	(PID regulator feedback)	X	X	
SFB:Tacho feedbk	(Tachogenerator)		X	
PTC:Therm.Sensor	(PTC probes)		X	
ATL:Torque limit	(Torque limit)	X	X	
DAI:Subtract ref	(Subtracting reference)	X	X	
PIM:PID Man.ref.	(Manual PID speed reference) If one AI = PIF		X	
FPI:PID Spd inP.	(PID speed reference) If one AI = PIF		X	

(1) NB: The menu for assigning encoder input A+, A-, B+, B- is called “Assign AI3”.

Summary table for logic output assignments

I/O extension option cards			Logic output LO
Speed controller without option		Relay R2	
NO :Not assigned	(Not assigned)	X	X
RUN:DriveRunning	(Speed controller running)	X	X
OCC:Output Cont.	(Downstream contactor control)	X	X
FTA:Freq Attain.	(Frequency threshold reached)	X	X
FLA:HSP Attained	(HSP reached)	X	X
CTA:I Attained	(Current threshold reached)	X	X
SRA:FRH Attained	(Frequency reference reached)	X	X
TSA:MtrTherm Lvl	(Motor thermal threshold reached)	X	X
BLC:Brk Logic	(Brake sequence)	X	
PEE:PID error	(PID error) If one AI = PIF	X	X
PFA:PID Feed alm	(PID feedback alarm) If one AI = PIF	X	X
APL:4-20 mA loss	(Loss of 4-20 mA signal)	X	X
F2A:F2 Attained	(Second frequency threshold reached)	X	X
TAD:ATV th. Alarm	(Drive thermal threshold reached)	X	X

Summary table for analog output assignments

I/O extension option cards		Analog output AO
Speed controller without option		Analog output AO1
NO :Not assigned	(Not assigned)	X
OCR:Motor Curr.	(Motor current)	X
OFR:Motor Freq	(Motor speed)	X
ORP:Output ramp	(Ramp output)	X
TRQ:Motor torque	(Motor torque)	X
STQ:Signed Torq.	(Signed motor torque)	X
ORS:Signed ramp	(Signed ramp output)	X
OPS:PID ref.	(PID setpoint output) If one AI = PIF	X
OPF:PID Feedback	(PID feedback output) If one AI = PIF	X
OPE:PID Error	(PID error output) If one AI = PIF	X
OPI:PID Integral	(PID integral output) If one AI = PIF	X
OPR:Motor Power	(Motor power)	X
THR:Motor Thermal	(Motor thermal state)	X
THD:Drive Thermal	(Drive thermal state)	X

Once the I/O have been reassigned, the parameters related to the function automatically appear in the menus, and the macro-configuration indicates “CUS: Customized”.

I/O Menu

Some reassignments result in new adjustment parameters which the user must not forget to set in the adjust menu:

I/O		Assignments	Parameters to set
LI	RP2	Ramp switching	rC2 - dE2
LI	JOG	Jog operation	JOG - JGt
LI	PS4	4 preset speeds	SP2 - SP3
LI	PS8	8 preset speeds	SP4 - SP5 - SP6 - SP7
LI	DCI	Injection stop	IdC
LI	TL2	Second torque limit	tL2
LI	PR4	4 preset PID setpoints	P I2 - P I3
AI	PIF	PID regulator feedback	rPG - r IG - P IC - rdG - rE0 - PrG - PSr - PSP - PLr - PLb
AI	SFB	Tachogenerator	dtS
R2	BLC	Brake sequence	Ibr - brt - bEn - bEt - FFt - b IP
LO/R2	FTA	Frequency threshold reached	Ftd
LO/R2	F2A	2nd frequency threshold reached	F2d
LO/R2	CTA	Current threshold reached	Ctd
LO/R2	TSA	Motor thermal threshold reached	ttd
LO/R2	PEE	PID error	PEr
LO/R2	PFA	PID feedback alarm	PAL - PAH
LO/R2	TAD	Drive thermal threshold reached	dtd

Some reassignments result in new adjustment parameters being added which the user must configure in the control, drive or fault menu:

I/O		Assignments	Parameters to set
LI	-SP	- speed	Str (control menu)
LI	FST	Fast stop	dCF (drive menu)
LI	RST	Fault reset	rSt (fault menu)
AI	SFB	Tachogenerator	Sdd (fault menu)
A+, A-, B+, B-	SAI	Summing reference	PGt, PLS (drive menu)
R2	BLC	Brake logic	Stt (drive menu)

Configurable I/O Application Functions

Function compatibility table

The choice of application functions may be limited by incompatibility between certain functions. Functions which are not listed in this table are fully compatible.

	DC injection braking	Summing inputs	PID regulator	+/- speed	Reference switching	Freewheel stop	Fast stop	Jog operation	Preset speeds	Speed regulation with tachogenerator	Reference saved	Closed loop FVC	Open / closed loop switching
DC injection braking						↑						●	
Summing inputs					●								
PID regulator				●	●			●	●	●	●		●
+/- speed			●		●			↑	●		●		
Reference switching		●	●	●					●				
Freewheel stop	←						←					←	
Fast stop						↑							
Jog operation			●	←					←		●		
Preset speeds			●	●	●			↑			●		
Speed regulation with tachogenerator			●									●	
Reference saved			●	●				●	●				●
Closed loop FVC	●					↑				●			
Open / closed loop switching			●								●		

● Incompatible functions Compatible functions Not applicable

Priority functions (functions which cannot be active simultaneously):

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

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

ENGLISH

Logic Input Application Functions

Operating direction: forward / reverse

Reverse operation can be disabled for applications requiring only a single direction of motor rotation.

2-wire control:

Run (forward or reverse) and stop are controlled by the same logic input, for which state 1 (run) or 0 (stop), or a change in state is taken into account (see the 2-wire control menu).

3-wire control:

Run (forward or reverse) and stop are controlled by 2 different logic inputs.
LI1 is always assigned to the stop function. A stop is obtained on opening (state 0).

The pulse on the run input is stored until the stop input opens.

During power-up or manual or automatic fault resetting, the motor can only be supplied with power after a reset prior to the “forward”, “reverse”, and “injection stop” commands.

Ramp switching: 1st ramp: ACC, DEC ; 2nd ramp: AC2, DE2

Two types of activation are possible:
- activation of a logic input LIx
- detection of an adjustable frequency threshold.

If a logic input is assigned to the function, ramp switching can only be performed by this input.

Step by step operation (“JOG”): Low speed operation pulse

If the JOG contact is closed and then the operating direction contact is actuated, the ramp is 0.1 s irrespective of the ACC, dEC, AC2, dE2 settings. If the direction contact is closed and the JOG contact is then actuated, the configured ramps are used.

Parameters which can be accessed in the adjust menu:
- JOG speed
- anti-repeat delay (minimum time between 2 “JOG” commands).

+/- speed: Two types of operation are available.

1 - Use of double action buttons:

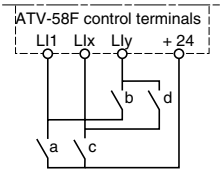
Only one logic input assigned to + speed is required.

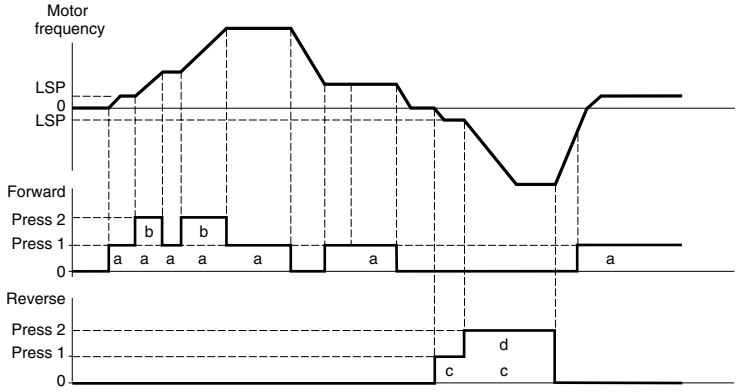
Description: 1 button pressed twice for each direction of rotation. Each action closes a contact.

	Released (- speed)	Press 1 (speed maintained)	Press 2 (+ speed)
forward button	–	contact a	contacts a and b
reverse button	–	contact c	contacts c and d

Wiring example:

LI1: forward
LIx: reverse
LIy: + speed





This type of +/- speed is incompatible with 3-wire control. In this case, the - speed function is automatically assigned to the logic input with the highest index (for example: LI3 (+ speed), LI4 (- speed)).

In this case, the maximum speed is given by the references applied to the analog inputs. For example, connect AI1 to +10V.

2 - Use of single action buttons:

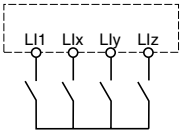
Two logic inputs are required in addition to the operating direction(s).
The input assigned to the “+ speed” command increases the speed, the input assigned to the “- speed” command decreases the speed.

This function accesses the STr save reference parameter in the CONTROL menu.

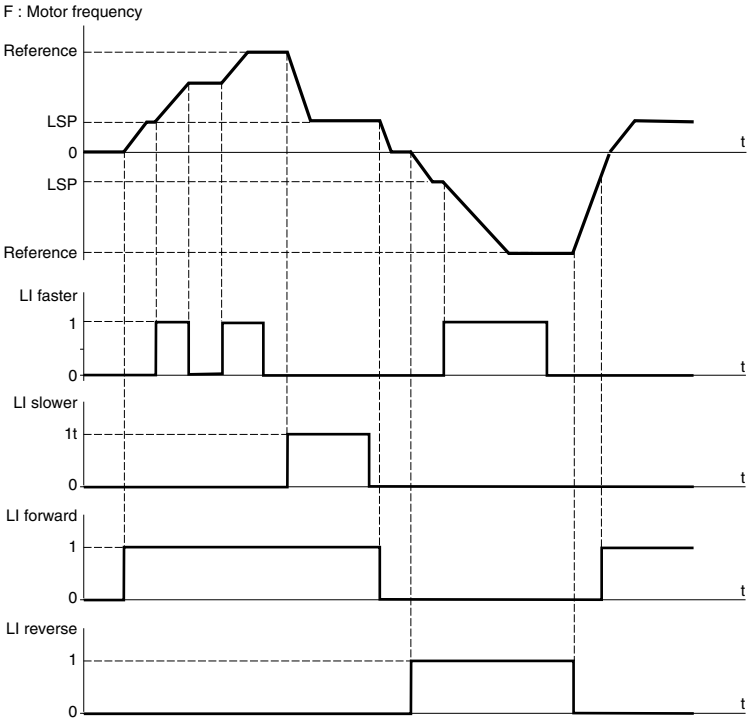
- The minimum rotation speed is limited to LSP.
- If Str = No, RAM or EEP, the maximum rotation speed is fixed by the analog references (for example, connect AI1 to +10V). If the reference decreases and drops below the rotation speed, the rotation speed follows the reference. The rate of increase is given by the valid acceleration parameter (ACC, DEC or AC2, DC2).
- If Str = SRE, the maximum rotation speed is fixed by HSP. When the run command is issued, the speed controller changes to the setpoint reference following the ACC / DEC ramps. Pressing + speed / - speed varies the speed around this setpoint following the AC2 / DE2 ramps.
- - speed has priority over + speed.
- + or - speed adjustment around the setpoint is limited by parameter SRP (ADJUST menu). This parameter is a percentage of the setpoint.
- If the reference changes, the ratio between the reference and the setpoint resulting from the + speed / - speed correction is fixed.

Wiring examples:

LI1: forward
LIx: reverse
LIy: + speed
LIz: - speed



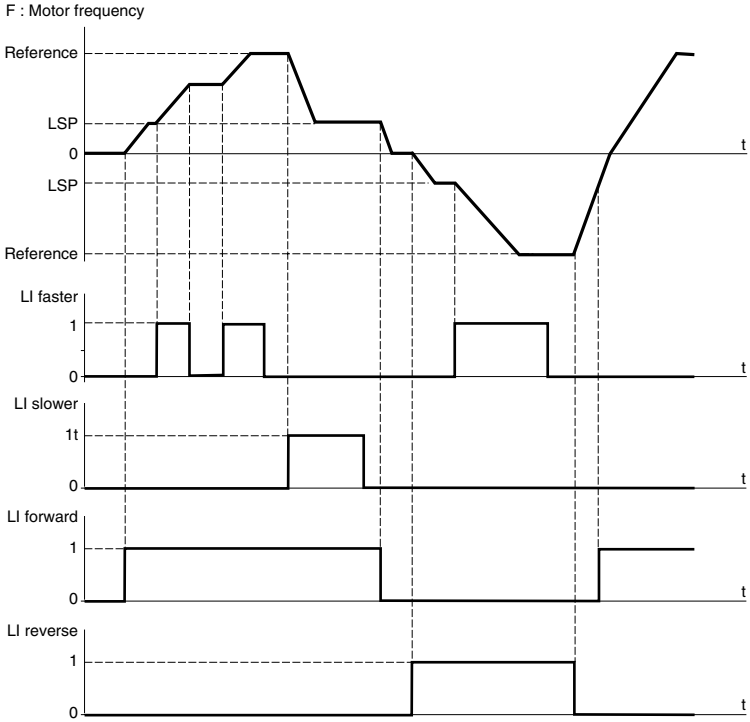
+ speed / - speed with single action pushbuttons with no reference saving:
Str = No



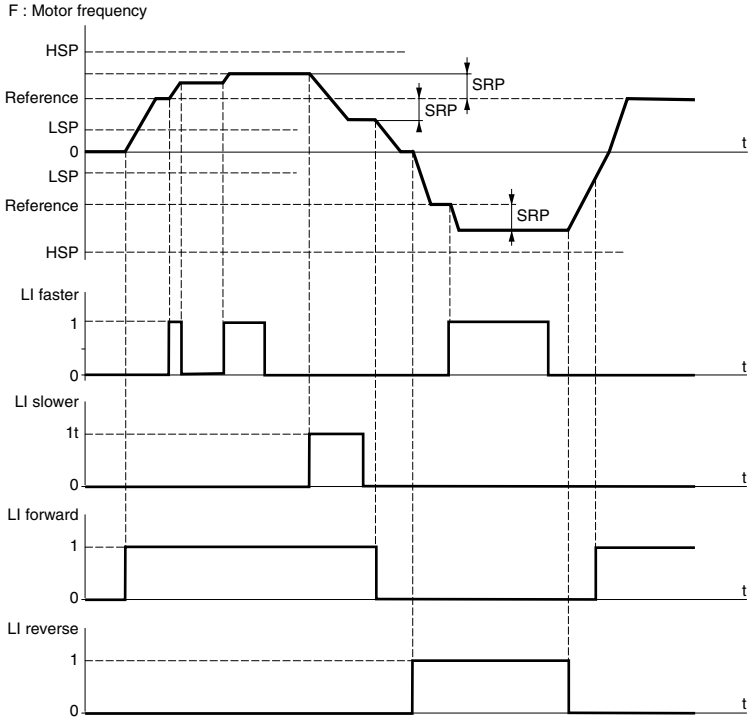
+ speed / - speed with single action pushbuttons with reference saving:

Str = RAM (saved in RAM): the reference is saved on each + speed / - speed falling edge. Thus, after a stop **without** the speed controller being powered down, when a run command appears the frequency increases to the saved value if the + speed / - speed commands are not active. + speed / - speed still have priority.

Str = EEP (saved in EEPROM): the reference is saved on each + speed / - speed falling edge. Thus, after a stop **with or without** the speed controller being powered down, when a run command appears the frequency increases to the saved value if the + speed / - speed commands are not active. + speed / - speed still have priority.



+ speed / - speed with single action pushbuttons with no reference saving:
Str = SRE



Adjustments around the setpoint using + speed and - speed are made following the AC2 and dE2 ramps.

Logic Input Application Functions

Preset speeds:

2, 4 or 8 speeds can be preset, requiring 1, 2 or 3 logic inputs respectively.
The following order of assignments must be observed: PS2 (LIx), then PS4 (LIy), then PS8 (LIz).

2 preset speeds		4 preset speeds			8 preset speeds			
Assign: LIx to PS2		Assign: LIx to PS2 then LIy to PS4			Assign: LIx to PS2, LIy to PS4, then LIz to PS8			
LIx	speed reference	LIy	LIx	speed reference	LIz	LIy	LIx	speed reference
0	LSP or reference (1)	0	0	LSP or reference (1)	0	0	0	LSP or reference (1)
1	HSP	0	1	SP2	0	0	1	SP2
		1	0	SP3	0	1	0	SP3
		1	1	HSP	0	1	1	SP4
					1	0	0	SP5
					1	0	1	SP6
					1	1	0	SP7
					1	1	1	HSP

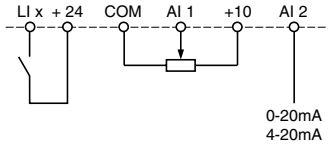
(1) If the reference is higher than LSP.

To unassign the logic inputs, the following order must be observed: PS8 (LIz), then PS4 (LIy), then PS2 (LIx).

Reference switching: (for manual / automatic operation, for example)

Switching of two references (AI1 reference and AI2 reference) by logic input command.
This function automatically assigns AI2 to speed reference 2.

Connection diagram



Open contact, reference = AI2
Closed contact, reference = AI1

Freewheel stop:

Causes the motor to stop using the resistive torque only. The motor power supply is cut.
A freewheel stop is obtained when the logic input opens (state 0).

DC injection stop:

An injection stop is obtained when the logic input closes (state 1). The injection current is adjusted by the parameter IdC which is located in the Adjust menu.
This function cannot be accessed in closed loop mode.

Fast stop:

Braked stop with the deceleration ramp time reduced by a reduction factor dCF which appears in the drive menu.
A fast stop is obtained when the logic input opens (state 0).

Logic Input Application Functions

Open loop / closed loop switching:

This function is used to switch between open loop and closed loop mode. It is only available if the speed controller is configured in closed loop mode (parameter Ctr = FVC, DRIVE menu). First of all performance optimization must be performed in closed loop mode (FVC) (see page 85).

After a change in the state of the logic input assigned to this function, switching does not actually take effect until the next time the drive is stopped and locked.

Second torque limit:

Reduction of the maximum motor torque when the logic input is active.
Parameter tL2 in the adjust menu.

Fault reset:

Two types of reset are available: partial or general (parameter rSt in the “fault” menu).

Partial reset (rSt = RSP):

Used to clear the stored fault and reset the speed controller if the cause of the fault has disappeared.
Faults affected by partial clearing:

- line overvoltage	- communication fault	- motor overheating
- DC bus overvoltage	- motor overload	- serial link fault
- motor phase loss	- loss of 4-20 mA	- speed controller overheating
- overhauling	- external fault	- overspeed

General reset (rSt = RSG):

This inhibits all faults (forced operation) except SCF (motor short circuit) while the assigned logic input is closed.

Forced local mode:

Used to switch between line control mode (serial link) and local mode (controlled via the terminals or via the display module).

Auto-tuning:

When the assigned logic input changes to 1 an auto-tuning operation is triggered, in the same way as parameter tUn in the “drive” menu.

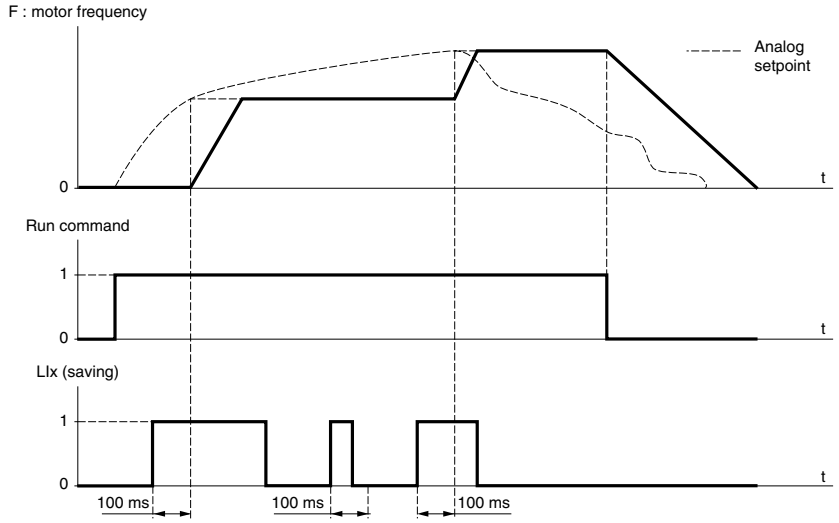
Caution:

- Auto-tuning is only performed if no command has been activated. If a “freewheel stop” or “fast stop” function is assigned to a logic input, this input must be set to 1 (active at 0).
- Auto-tuning may last for 1 minute. It should not be interrupted.
- The motor parameters (UnS, FrS, nCr, nSP, COS) must be configured before auto-tuning is performed.
- During auto-tuning the motor absorbs its nominal current.

Reference saving:

Saving the speed reference value of the analog input using a logic input when the command lasts longer than 0.1 s.

- This function is used to control the speed of several speed controllers alternately via a single analog setpoint and a logic input for each controller.
- It is also used to confirm a line reference (serial link) on several speed controllers via a logic input. This allows movements to be synchronized by getting rid of variations when the reference is sent.
- The setpoint is acquired 100 ms after the rising edge of the request. A new reference is not then acquired until a new request is made.



Motor fluxing:

In order to obtain rapid high torque on start-up, magnetic flux needs to be already established in the motor.

- This function can be selected in open or closed loop operation.
- In continuous mode (FCt), the speed controller automatically builds up flux when it is powered up.
- In non-continuous mode:
  - If an LI is assigned to the motor fluxing command, flux is built up when the command is confirmed.
  - If no LI has been assigned or if it is not active when a run command is given, the motor is fluxed when it starts up.
- The flux current is equal to 1.5 x nCr (configured nominal motor current) when the flux is established and is then adjusted to the motor no-load current.

Auto/man PID, PID integral shunting, preset PID setpoints:

PID operation (see page 128).

Torque limitation by LI and AI :

This function can only be accessed if an analog input has been assigned to the torque limit
If the logic input is at 0, the torque is limited by setting tLI or tL2. If the logic input is at 1, the torque is limited by the analog input assigned to this function (see page 128).

External fault

When the assigned logic input changes to 1, the drive locks in EPF external fault fault mode.

Analog Input Application Functions

Input AI1 is always the speed reference. Analog inputs AI2 and AI3 can be assigned.

Summing and subtracting speed references:

The frequency setpoints given by AI2 and/or AI3 can be summed and/or subtracted with AI1:
(AI1 ± AI2 ± AI3).

Speed regulation with tachogenerator:

Assignment on AI3 only with an I/O extension card with analog input: used for speed correction via tachogenerator feedback.
An external divider bridge is required to adapt the voltage of the tachogenerator. The maximum voltage must be between 5 and 9 V. A precise setting is then obtained by setting parameter dtS available in the adjust menu.

PTC probe protection:

Assignment on AI3 only with an I/O extension card with analog input: used for the direct thermal protection of the motor by connecting the PTC probes in the motor windings to analog input AI3.
PTC probe characteristics:
Total resistance of the probe circuit at 20 °C = 750 Ω.

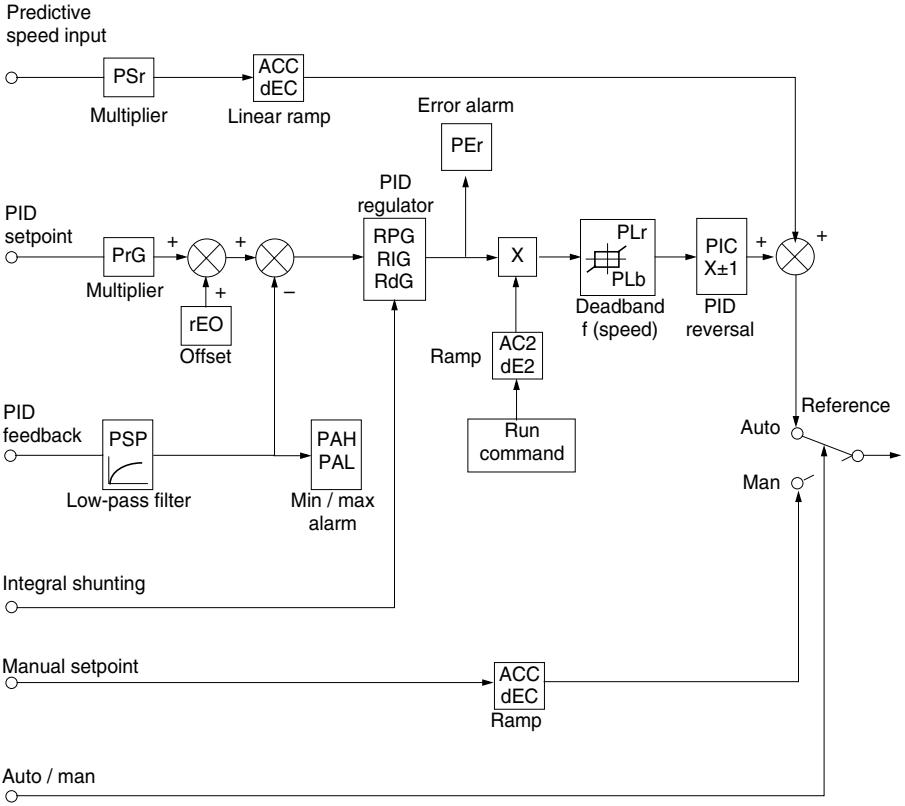
PID regulator:

Used to regulate a process with a reference and a feedback given by a sensor. A speed input gives an initial (or predictive) setpoint for start-up. In PID mode the ramps are all linear, even if they are configured differently.

Example: remote regulation of traction.

Note:
PID regulator mode is active if an AI input is assigned to PID feedback.

Diagram of PID principle



Speed input:
- Line setpoint (serial link)
- or analog input AI3.

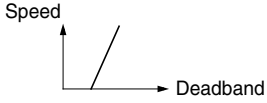
PID setpoint:
- Line setpoint (serial link)
- or 2 or 4 setpoints preset via logic input
- or analog input AI1 (± AI2 ± AI3).

PID feedback:
- Analog input AI2
- or analog input AI3.

Manual setpoint:
(speed regulation mode)
- Analog input AI3.

Integral shunting:
- Logic input LI: integral shunted if LIx =1.

Auto/man:
- Logic input LI for switching operation to speed regulation (man) if LIx = 1, or PID regulation (auto) if LIx = 0.
- In automatic mode the following actions are possible:
  - Adapt the setpoint input to the process feedback: GAIN (PrG) and OFFSET (rEO).
  - Correct PID inversion.
  - Adjust the proportional, integral and derivative gain (RPG, RIG and RdG).
  - Use the “alarm” on logic output if a threshold is exceeded (Max. feedback, Min. feedback and PID error).
  - Assign an analog output for the PID setpoint, PID feedback and PID error.
  - Limit the action of the PID according to the speed, with an adjustable base and ratio:



  - Apply a ramp to establish the action of the PID (AC2) on start-up and a ramp (dE2) on stopping.
- The motor speed is limited to between LSP and HSP.
- It is displayed as a percentage.

Preset setpoints:
2 or 4 preset setpoints require the use of 1 or 2 logic inputs respectively:

2 preset setpoints		4 preset setpoints		
Assign: LIx to Pr2		Assign: LIx to Pr2, then LIy to Pr4		
LIx	Reference	LIy	LIx	Reference
0	Analog reference	0	0	Analog reference
1	Process max	0	1	PI2 (adjustable)
		1	0	PI3 (adjustable)
		1	1	Process max

Torque limit:

AI2 or AI3 analog input. The signal applied at AI operates in a linear fashion on the internal torque limit (parameter TLI in the “drive” menu):
- If AI = 0V: limit = TLI x 0 = 0
- If AI = 10 V: limit = TLI.

This function can also be activated by a logic input (see page 125)

Applications: Load compensation, torque or traction correction, etc.

Encoder input application function with an I/O extension card with encoder input

Summing speed reference:

The setpoint from the encoder input is summed with AI1 (see documentation supplied with the card).

Applications:

- Synchronization of the speed of a number of speed controllers. Parameter PLS on the DRIVE menu is used to adjust the speed ratio of one motor in relation to that of another.
- Setpoint via encoder.

Encoder input application function with control card

Closed loop FVC:

Flux vector control mode with sensor (inputs A, A-, B, B-).

This relates to the encoder for the control card. It is used for fine speed adjustments, irrespective of the state of the load, and for control optimization (flux vector control mode in closed loop: Ctr = FVC, DRIVE menu).

- Consistency between the motor frequency and the speed feedback is monitored in the speed controller fault management system.
- If there is no PG signal (FVC mode) or in the event of inconsistency, the speed controller locks in fault mode SPF.
- During operation, if the difference between the motor frequency and the speed feedback is greater than 5 Hz, the speed controller locks in fault mode SPF.
- If the speed feedback is greater than 1.2 x tFr, the speed controller changes to default mode SOF.

CAUTION: The encoder input terminals on the I/O extension card are identified in the same way as the encoder input terminals on the control card (A, A-, B, B-). Suitable precautions should be taken to avoid any possible confusion, and the terminals should be checked before setup.

Logic Output Application Functions

Relay R2, LO solid state output (with I/O extension card).

Downstream contactor control (OCC): can be assigned to R2 or LO

Enables the speed controller to control a contactor located between the speed controller and the motor. The request to close the contactor is made when a run command appears. The request to open the contactor is made when there is no more current in the motor.

If a DC injection braking function is configured, it should not be left operating too long in stop mode, as the contactor only opens at the end of braking.
If continuous flux is configured (in closed loop mode), the contactor does not open.

Speed controller running (RUN): can be assigned to R2 or LO

The logic output is at state 1 if the motor power supply is provided by the speed controller (current present) or if a run command is present with a zero reference.

Frequency threshold reached (FTA): can be assigned to R2 or LO

The logic output is at state 1 if the motor frequency is greater than or equal to the frequency threshold set by Ftd in the adjust menu.

Second frequency threshold reached (F2A): can be assigned to R2 or LO

The logic output is at state 1 if the motor frequency is greater than or equal to the frequency threshold set by F2d in the adjust menu.

Setpoint reached (SRA): can be assigned to R2 or LO

The logic output is at state 1 if the motor frequency is equal to the setpoint value.

High speed reached (FLA): can be assigned to R2 or LO

The logic output is at state 1 if the motor frequency is equal to HSP.

Current threshold reached (CTA): can be assigned to R2 or LO

The logic output is at state 1 if the motor current is greater than or equal to the current threshold set by Ctd in the adjust menu.

Motor thermal state reached (TSA): can be assigned to R2 or LO

The logic output is at state 1 if the motor thermal state is greater than or equal to the thermal state threshold set by ttd in the adjust menu.

Drive thermal state reached (TAD) : can be assigned to R2 or LO

The logic output is at state 1 if the drive thermal state is greater than or equal to the thermal state threshold set by dtd in the adjust menu.

PID error (PEE): can be assigned to R2 or LO

The logic output is at 1 if the PID regulator output error is greater than the threshold set by parameter PEr.

PID feedback alarm (PFA): can be assigned to R2 or LO

The logic output is at 1 if the PID feedback moves outside the range set by parameters PAH and PAL.

Loss of 4-20 mA signal (APL): can be assigned to R2 or LO.

The logic output is set to 1 if the signal on the 4-20 mA input is less than 2 mA.

Brake sequence (BLC): can only be assigned to relay R2

Used to control an electromagnetic brake by the speed controller, for horizontal and vertical lifting applications, and for unbalanced machines (parking brake).

Principle:

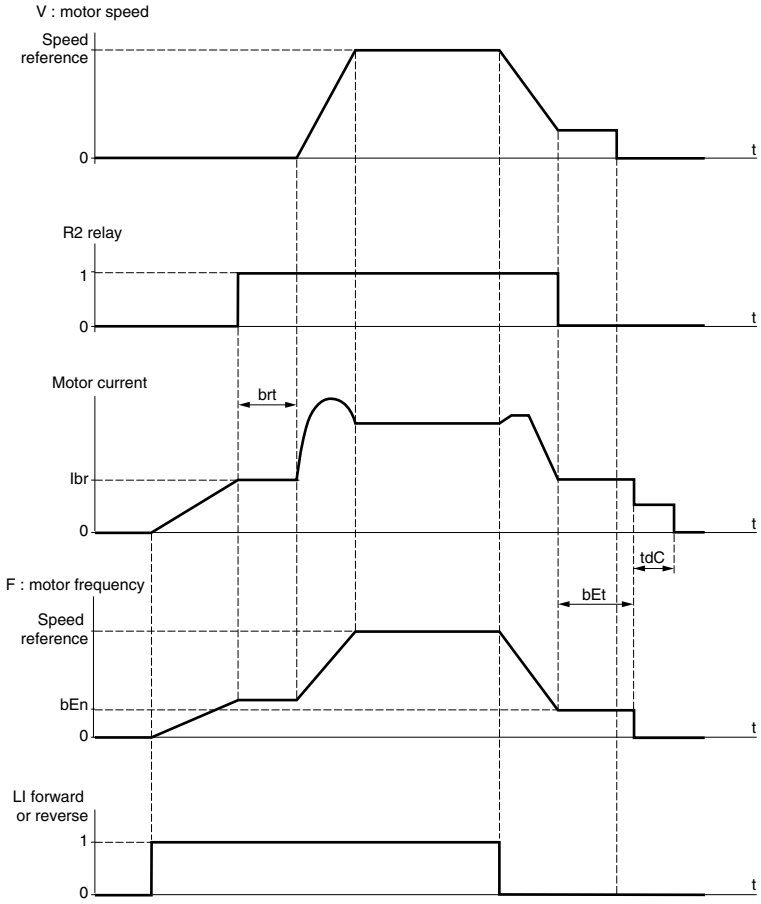
Vertical movement:

Maintain motor torque in an upward direction when the brake is being opened and closed, in order to hold the load, and start smoothly as soon as the brake is released.

Horizontal movement:

Synchronize the opening of the brake with the build-up of torque during start-up and the closing of the brake at zero speed on stopping, to prevent jolting.

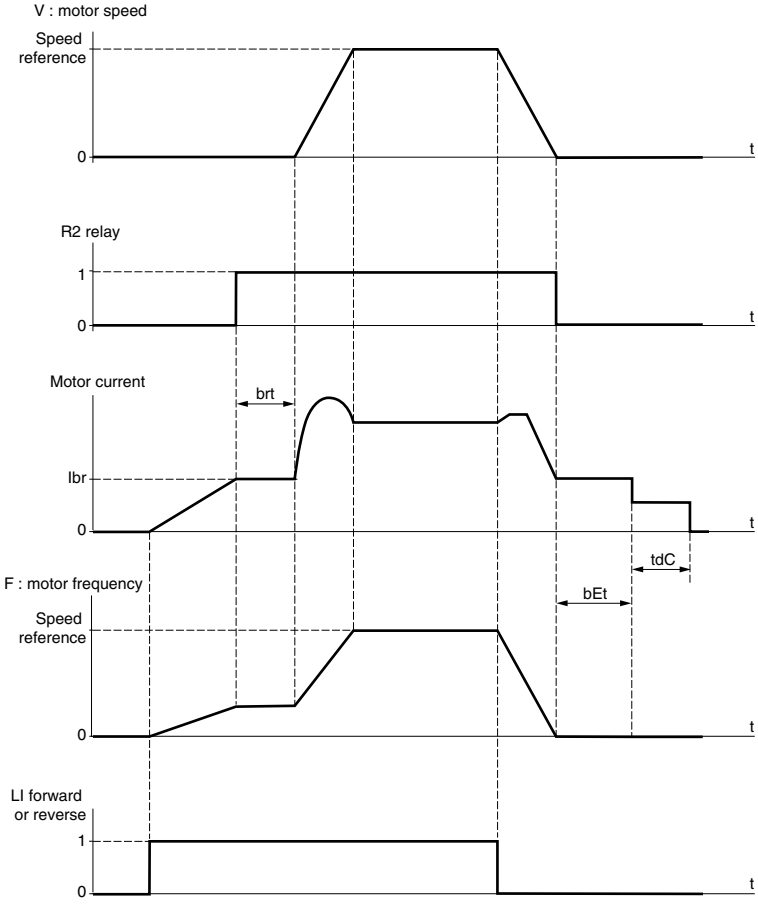
Brake sequence in open loop mode



State of brake	engaged	released	engaged

Settings which can be accessed in the adjust menu:
- brake release delay (brt)
- brake release current (Ibr)
- brake engage frequency (bEn)
- brake engage delay (bEt)
- DC injection braking time on stopping (tdC)
- brake pulse (bIP). When set to “YES”, it always gives a motor torque in the FW (forward) direction before the brake is released, which should correspond to the “up” direction for vertical lifting. When set to “no” the torque direction corresponds to the requested operating direction, for horizontal movement.

Brake sequence in closed loop mode



State of brake	engaged	released	engaged

Settings which can be accessed in the adjust menu:

- brake release delay (brt)
- brake release current (Ibr)
- brake engage delay (bEt)
- brake pulse (bIP). When set to “YES”, it always gives a motor torque in the FW (forward) direction before the brake is released, which should correspond to the “up” direction for vertical lifting. When set to “no” the torque direction corresponds to the requested operating direction, for horizontal movement.
- zero speed maintenance time in stop mode (tdC).

Logic Output Application Functions

Recommended settings for brake control, for a vertical lifting application (for a horizontal application set Ibr to zero and BIP to “no”):

1 Brake pulse (bIP): YES. Ensure that the direction of rotation FW corresponds to lifting the load.

2 Brake release current (Ibr):
Adjust the brake release current to the nominal current indicated on the motor.
If during testing the torque is insufficient, increase the brake release current (the maximum value is imposed by the speed controller).

3 Acceleration time:
For lifting applications it is advisable to set the acceleration ramps to more than 0.5 seconds. Ensure that the speed controller does not exceed the current limit.
The same recommendation applies for deceleration.
Note: for a lifting movement, a braking resistor should be used. Ensure that the settings and configurations selected cannot cause a drop or a loss of control of the lifted load.

4 Brake release delay (brt):
Adjust according to the type of brake. It is the time required for the mechanical brake to open.

5 Brake engage frequency (bEn): in open loop mode (Ctr = SVC, DRIVE menu)
Set to twice the nominal slip. Then adjust according to the result.

6 Brake engage delay (bEt):
Adjust according to the type of brake. It is the time required for the mechanical brake to close.

Analog Output Application Functions

Analog outputs AO1 and AO are current outputs, from AOL (mA) to AOH (mA), AOL and AOH being configurable from 0 to 20 mA. The configuration of AOL and AOH is common to both outputs.

Examples AOL – AOH:
0 - 20 mA
4 - 20 mA
20 - 4 mA

Motor current (Code OCR): the image of the motor rms current.

AOH corresponds to twice the nominal speed controller current. AOL corresponds to zero current.

Motor frequency (Code OFR): the motor frequency estimated by the speed controller.

AOH corresponds to the maximum frequency (parameter tFr). AOL corresponds to zero frequency.

Ramp output (Code ORP): the image of the ramp output frequency.

AOH corresponds to the maximum frequency (parameter tFr). AOL corresponds to zero frequency.

Motor torque (Code TRQ): the image of the motor torque as an absolute value.

AOH corresponds to twice the nominal motor torque. AOL corresponds to zero torque.

Signed motor torque (Code STQ): the image of the motor torque and direction:

- AOL corresponds to a braking torque = twice the nominal torque
- AOH corresponds to a motor torque = twice the nominal torque
- $\frac{AOH + AOL}{2}$ corresponds to zero torque.

Signed ramp (Code ORS): the image of the ramp output frequency and direction.

- AOL corresponds to the maximum frequency (parameter tFr) in the reverse direction.
- AOH corresponds to the maximum frequency (parameter tFr) in the forward direction.
- $\frac{AOH + AOL}{2}$ corresponds to zero frequency.

PID setpoint (Code OPS): the image of the PID regulator setpoint

- AOL corresponds to the minimum setpoint.
- AOH corresponds to the maximum setpoint.

PID feedback (Code OPF): the image of the PID regulator feedback

- AOL corresponds to the minimum feedback.
- AOH corresponds to the maximum feedback.

Analog Output Application Functions

PID error (Code OPE): the image of the PID regulator error as a % of the sensor range (maximum feedback - minimum feedback).

- AOL corresponds to -5%.
- AOH corresponds to +5 %.
- $\frac{AOH + AOL}{2}$ corresponds to 0.

PID integral (Code OPI): the image of the PID regulator error integral.

- AOL corresponds to LSP.
- AOH corresponds to HSP.

Motor power (Code OPR) : the image of the power drawn by the motor.

- AOL corresponds to 0% of the motor nominal power.
- AOH corresponds to 200% of the motor nominal power.

Etat thermique Moteur (code THR) : fournit l'image de l'état thermique du moteur, calculé.

- AOL correspond à 0 %.
- AOH correspond à 200 %.

Etat thermique Variateur (code THD) : fournit l'image de l'état thermique du variateur.

- AOL correspond à 0 %.
- AOH correspond à 200 %.

Fault Menu

This menu can be accessed when the switch is in position ⊓ .
Modifications can only be made in stop mode with the speed controller locked.

Name	Code	Description	Factory setting
Auto Restart	Atr	This function is used to restart the speed controller automatically if the fault has disappeared (YES/no option). Automatic restarting is possible after the following faults: - line overvoltage - DC bus overvoltage - external fault - motor phase loss - serial link fault - communication fault - loss of 4-20 mA reference - motor overload (condition: thermal state less than 100 %) - speed controller overheating (condition: speed controller thermal state less than 100 %) - motor overheating (condition: resistance of probes less than 1500 Ohms) When the function is activated and after stopping, the fault relay remains closed on one or more of these faults, and when the conditions for restarting are correct (disappearance of the fault) the speed controller attempts a start after a 30 s delay. A maximum of 6 attempts are made when the speed controller cannot start. If all 6 fail, the speed controller remains locked definitively with the fault relay open, until it is reset by being switched off. ⚠ This function requires the associated sequence to be maintained. **Ensure that accidental restarting will not pose any danger to either equipment or personnel.**	no
Reset Type	rSt	This function can be accessed if the fault reset is assigned to a logic input. 2 possible options: partial reset (RSP), general reset (RSG). Faults affected by a partial reset (rSt = RSP) - line overvoltage - DC bus overvoltage - motor overheating - loss of 4-20 mA - motor overload - overhauling - motor phase loss - speed controller overheating - serial link fault - external fault - communication fault - overspeed Faults affected by a general reset (rSt = RSG): all faults. The general reset actually inhibits all the faults (forced operation). To configure rSt = RSG: 1 - Display RSG 2 - Press the “ENT” key 3 - The speed controller displays “See manual ” 4 - Press ▲ then ▼ then “ENT”	RSP

ENGLISH

Fault Menu

Name	Code	Description	Factory setting
OutPhaseLoss	OPL	Used to enable the motor phase loss fault. (Fault is disabled if an isolator is used between the speed controller and the motor). YES/no options	YES
InPhaseLoss	IPL	Used to enable the line phase loss fault. (Fault is disabled if there is a direct power supply via a DC bus). YES/no options	YES
ThermProType	tHt	Defines the type of indirect thermal protection provided by the speed controller. If PTC probes are connected to the speed controller, this function is not available. No thermal protection: N0: No protection Self-cooled motor (ACL): the speed controller takes account of a derating depending on the rotation frequency. Force-cooled motor (FCL): the speed controller does not take account of a derating depending on the rotation frequency.	ACL
LossFollower	LFL	Used to enable the loss of 4-20 mA reference fault. This fault can only be configured if the min/max AI2 reference parameters (CrL and CrH, CONTROL menu) are greater than 3 mA, or if CrL>CrH. No: No faults Yes: Immediate fault STT: Stop (1) without fault, restart on return of signal LSF: Stop (1) followed by fault LFF: Forcing to fallback speed set by the LFF parameter RLS : maintain the speed reached when the 4-20mA disappeared without a fault, restart on the return of the signal. (1) Type of stopping method depends on the Stt parameter in the DRIVE menu.	no
Flt.Speed 4-20	LFF	Fallback speed in the event of the loss of the 4-20mA signal. Can be adjusted from 0 to HSP	0
Catch On Fly	FLr	Used to enable a smooth restart after one of the following events: - loss of line supply or simple power off - fault reset or automatic restart - freewheel stop or injection stop with logic input. - uncontrolled loss downstream of the speed controller. YES/no options If relay R2 is assigned to the brake sequence function, the parameter FLr remains locked on no. If closed loop mode has been selected (Ctr = FVC, DRIVE menu), parameter FLr is inactive and the system naturally starts smoothly in all cases, even if FLr = no.	no
Cont. Stop	StP	Controlled stop on a line phase loss. This function is only operational if parameter IPL is set to no. If IPL is set to YES, leave StP in position no. Possible options: **no**: locking on loss of line supply **MMS**: maintain DC bus: voltage for the speed controller control is maintained by the kinetic energy restored by the inertia, until the USF fault (undervoltage) occurs **FRP**: follow ramp: deceleration following the programmed dEC or dE2 ramp until a stop or until the USF fault (undervoltage) occurs.	no

Name	Code	Description	Factory setting
RampNotFoll	5dd	This function can be accessed in closed loop mode (Ctr = FVC, DRIVE menu) or with the I/O option card if feedback via tachogenerator is configured. When enabled, it is used to lock the speed controller if a speed error is detected (difference between the stator frequency and the measured speed). YES/no options.	yes

Files Menu

This menu can be accessed when the switch is in position .
The operations are only possible in stop mode with the speed controller locked.

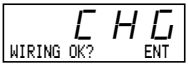
The display module is used to store 4 files containing the speed controller configurations.

Name	Code	Description	Factory setting
File 1 State File 2 State File 3 State File 4 State	F 1S F 2S F 3S F 4S	Used to display the state of the corresponding file. Possible states: **FRE**: file free (state when display module is delivered) **EnG**: a configuration has already been saved in this file.	FRE FRE FRE FRE
Operat.Type	F Ot	Used to select the operation to be performed on the files. Possible operations: **NO**: no operation requested (default value on each new connection of the display module to the speed controller) **STR**: operation to save the speed controller configuration in a file on the display module **REC**: transfer of the content of a file to the speed controller **Ini**: return of the speed controller to factory settings. ⚠ **A return to factory settings cancels all your settings and your configuration.**	NO

Operating mode

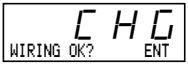
- Select STR, REC or Ini and press “ENT”.
  1 - If Operat.Type = STR:
  The file numbers are displayed. Select a file using ▲ or ▼ and confirm with "ENT".
  2 - If Operat.Type = REC:
  The file numbers are displayed. Select a file using ▲ or ▼ and confirm with "ENT".

  - The display indicates:



  Check that the wiring is compatible with the file configuration.
  Cancel with “ESC” or confirm with “ENT”
  - The display then requests a second confirmation using “ENT” or cancellation using “ESC”.
  3 - If Operat.Type = Ini:
  Confirm with “ENT”

  - The display indicates:



  Check that the wiring is compatible with the factory configuration.
  Cancel with “ESC” or confirm with “ENT”
  - The display then requests a second confirmation using “ENT” or cancellation using “ESC”.

At the end of each operation the display returns to the “Operat.Type” parameter set to “NO”

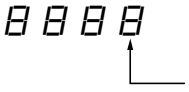
Files Menu

Name	Code	Description
Password	COd	Confidential code

The speed controller configuration can be protected by a password (COd).

CAUTION: THIS PARAMETER SHOULD BE USED WITH CAUTION. IT MAY PREVENT ACCESS TO ALL PARAMETERS. ANY MODIFICATION TO THE VALUE OF THIS PARAMETER MUST BE CAREFULLY NOTED AND SAVED.

The code value is given by four figures, the last of which is used to define the level of accessibility required by the user.



This figure gives the access level permitted, without having the correct code.

Access to the menus according to the position of the access locking switch on the rear of the display module is always operational, within the limits authorised by the code.
The value Code 0000 (factory setting) does not restrict access.

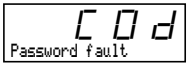
The table below defines access to the menus according to the last figure in the code.

	Last figure in the code		
Menus	Access locked	Display	Modification
Settings	0 exc. 0000 and 9	1	2
Level 2: Adjust, Macro-config, Drive, Control, I/O, Fault, Files (excluding code), Communication (if card present)	0 exc. 0000 and 9	3	4
Application (if card present)	0 exc. 0000 and 9	5	6
Level 2 and Application (if card present)	0 exc. 0000 and 9	7	8

For access to the APPLICATION menu, refer to the application card documentation.

The code is modified using the ▲ and ▼ keys.

If an incorrect code is entered, it is refused and the following message is displayed:



After pressing the ENT or ESC key on the keypad, the value displayed for the Code parameter changes to 0000: the level of accessibility does not change. The operation should be repeated.

To access menus protected by the access code, the user must first enter this code which can always be accessed in the Files menu.

Communication and Application Menus - Assistance During Operation - Maintenance

Communication menu

This menu is only displayed if a communication card is installed. It can be accessed when the switch is in position . Configuration is only possible in stop mode with the speed controller locked.

For use with a communication option card, refer to the document provided with this card.

For communication via the RS485 link on the base product, refer to the document provided with the RS485 connection kit.

Application menu

This menu is only displayed if a “customer application” card is installed. It can be accessed when the switch is in position . Configuration is only possible in stop mode with the speed controller locked.

Refer to the document provided with the card.

Assistance during operation

See the LEDs explained in the “Introduction”.

Maintenance

Before working on the speed controller, switch off the power supply and wait for the capacitors to discharge (approximately 3 minutes): the green LED on the front panel of the speed controller is no longer illuminated.

CAUTION: the DC voltage at the + and - terminals or PA and PB terminals may reach 900 V depending on the line voltage.

If a problem arises during setup or operation, ensure that the recommendations relating to the environment, mounting and connections have been observed. **Refer to the Altivar User’s Manual.**

Servicing

The Altivar does not require any preventive maintenance. It is nevertheless advisable to perform the following regularly:

- check 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: 3 to 5 years depending on the operating conditions)
- remove any dust from the speed controller.

Assistance with maintenance

The first fault detected is stored and displayed on the display: the speed controller locks, the red LED illuminates, and fault relay R1 trips.

Clearing the fault

Cut the power supply to the speed controller in the event of a non-resettable fault.
Locate the cause of the fault in order to eliminate it.
Reconnect the power supply: this clears the fault if it has disappeared.

In some cases there may be an automatic restart once the fault has disappeared, if this function has been programmed.

Fault Display - Causes / Remedies

Fault displayed	Probable cause	Procedure, remedy
PHF Mains Phase Loss	• speed corrector incorrectly supplied or fuses blown • transient fault on one phase	• check the power connection and the fuses • reset
USF Undervoltage	• line supply too low • transient voltage dip • damaged load resistor	• check the line voltage • change the load resistor
OSF Overvoltage	• line supply too high	• check the line voltage
OHF Drive Overheated	• heatsink temperature too high	• monitor the motor load, the speed controller ventilation and wait for the drive to cool down before resetting
OLF Mot Overload	• thermal trip due to prolonged overload	• check the thermal protection setting, monitor the motor load • a reset will be possible after approximately 7 minutes
ObF Overbraking	• braking too sudden or driving load	• increase the deceleration time, add a braking resistor if necessary.
OPF Motor Phase Loss	• one phase open-circuit at the speed controller output	• check the motor connections
LFF LossFollower	• loss of the 4-20 mA setpoint on input AI2	• check the connection of the setpoint circuits
OCF Overcurrent	• ramp too short • inertia or load too high • mechanical locking	• check the settings • check the size of the motor/speed controller/load • check the state of the mechanism
SCF Short Circuit	• short-circuit or grounding at the speed controller output	• check the connection cables with the speed controller disconnected, and the motor insulation. Check the speed controller transistor bridge
CrF Precharge Fault	• load relay control fault • damaged load resistor	• check the connectors in the speed controller and the load resistor
SLF Serial Link Flt	• incorrect connection on the speed controller connector port	• check the connection on the speed controller connector port
ObF Motor Overheated	• motor temperature too high (PTC probes)	• check the motor ventilation and the ambient temperature, monitor the motor load • check the type of probes used
tSF PTC Therm Sensor	• incorrect connection of probes to the speed controller	• check the connection of the probes to the speed controller • check the probes
EEF EEProm Fault	• error saving in EEPROM	• cut the power supply to the speed controller and reset
InF Internal Fault	• internal fault • connector fault	• check the connectors in the speed controller

Fault Display - Causes / Remedies

Fault displayed	Probable cause	Procedure, remedy
EPF External Fault	• fault triggered by an external device	• check the device which has caused the fault and reset
SPF SP. Feedbk. Loss	• no speed feedback	• check the connection and the mechanical coupling of the speed sensor
AnF Load Veer. Flt	• non-following of ramp • speed inverse to the setpoint	• check the speed feedback settings and the wiring • check the suitability of the settings for the load • check the size of the motor-speed controller and the possible need for a braking resistor
SOF OverSpeed	• instability • driving load too high	• check the settings and the parameters • add a braking resistor • check the size of the motor/speed controller/load
CnF Network Fault	• communication fault on the fieldbus	• check the network connection to the speed controller • check the time-out
ILF Int. Comm. Flt	• communication fault between the option card and the control card	• check the connection of the option card to the control card
CFF Rating Fault-ENT Option Fault-ENT Opt. Missing-ENT CKS Fault - ENT	Error probably caused when changing the card: • change of rating of the power card • change of the type of option card or installation of an option card if there was not one already and if the macro-config is CUS • option card removed • inconsistent configuration saved	• check the hardware configuration of the speed controller (power card, others) • cut the power supply to the speed controller then reset • save the configuration in a file on the display module • press ENT twice to return to the factory settings (when ENT is pressed the first time the following message appears: Fact.Set? ENT/ESC).
CFI Config. Fault	• inconsistent configuration sent to speed controller via serial link	• check the configuration sent previously • send a consistent configuration

Fault Display - Causes / Remedies

Malfunction with no fault display

Display	Probable cause	Procedure, remedy
No code, LEDs not illuminated	No power supply	Check power supply to speed controller
No code, green LED illuminated, red LED illuminated or not illuminated	Display module defective	Change the display module
rdy green LED illuminated	• Speed controller in line mode with communication card or RS485 kit • An LI input is assigned to “Freewheel stop” or “Fast stop”, and this input is not switched on. These stops are controlled by loss of the input.	• Set parameter LI4 to forced local mode then use LI4 to confirm this forced mode. • Connect the input to 24 V to disable the stop.

Record of Configuration and Settings

Speed controller reference ATV58F ..... Display rEF: .....
Customer identification number (if applicable): .....
Option card: no ☐ yes ☐ : reference .....

Access code: no ☐ yes ☐ : .....
Configuration in file no. ..... on the display module
Macro-configuration: .....

For | CUS: customized | configuration, assign the I/O as follows:

	ALTIVAR	Option card
Logic inputs	LI 1: LI 2: LI 3: LI 4:	LI 5: LI 6:
Analog inputs	AI 1: AI 2:	AI 3:
Encoder input		AI3:
Relay	R2:	
Logic output		LO:
Analog output	AO1:	AO:

Adjustment parameters:

Code	Factory setting	Customer setting (1)	Code	Factory setting	Customer setting (1)
Inr	0.1 s	s	ItH	Acc. to controller rating	A
ACC	3 s	s	IdC	Acc. to controller rating	A
dEC	3 s	s	tdC	0.5 s	s
AC2	5 s	s	SdC	Acc. to controller rating	A
dE2	5 s	s	UFr	100 %	%
tA1	10	%	SLP	100 %	%
tA2	10	%	SP2	10 Hz	Hz
tA3	10	%	SP3	15 Hz	Hz
tA4	10	%	SP4	20 Hz	Hz
LSP	0 Hz	Hz	SP5	25 Hz	Hz
HSP	50/60 Hz	Hz	SP6	30 Hz	Hz
FLG	20	%	SP7	35 Hz	Hz
StA	20	%	JOG	10 Hz	Hz
SPG	40	%	JGt	0.5 s	s
SIG	40	%	Ibr	0 A	A

(1) leave blank when the parameter is missing

Record of Configuration and Settings

Adjustment parameters (continued):

Code	Factory setting	Customer setting (1)	Code	Factory setting	Customer setting (1)
brt	0 s	s	JF3	0 Hz	Hz
bEn	0 Hz	Hz	USC	1	
bEt	0 s	s	tLS	0 (no time limit)	s
FFt	50/60 Hz	Hz	SrP	10 %	%
b IP	no		rEO	0	
dtS	1		PrG	999	
rPG	1		PSr	0	
r IG	1 / s	/ s	PSP	0 s	s
rdG	0.00		PAL	0 %	%
P IC	no		PAH	0 %	%
Ftd	50/60 Hz	Hz	PEr	100 %	%
F2d	50/60 Hz	Hz	P I2	30 %	%
Ctd	1.36 In	A	P I3	60 %	%
ttd	100 %	%	PLr	20 %	%
tL2	200 %	%	PLb	HSP	Hz
JPF	0 Hz	Hz	FLU	FNC	
JF2	0 Hz	Hz	dtd	105 %	%

Drive menu parameters:

Code	Factory setting	Customer setting (1)	Code	Factory setting	Customer setting (1)
UnS	acc. to model	V	rPt	LIN	
FrS	50/60 Hz	Hz	dCF	4	
nCr	acc. to model	A	tL I	200 %	%
nSP	acc. to model	rpm	CL I	1.36 In	A
CoS	acc. to model		AdC	YES	
Ctr	SVC		SFt	LF	
PG I	1024		SFr	acc. to model	kHz
tUn	no		nrd	YES	
EnC	no		SPC	no	
tFr	60/72 Hz	Hz	PGt	DET	
BrA	no		PLS	1024	
Frt	0 Hz	Hz	SSL	IP	
Stt	STN				

(1) leave blank when the parameter is missing

Record of Configuration and Settings

Control menu parameters:

Code	Factory setting	Customer setting (1)	Code	Factory setting	Customer setting (1)
tCC	2W		AOH	20 mA	mA
tCt	LEL		Str	NO	
r In	no		LCC	no	
bSP	no		PSt	YES	
CrL	4 mA	mA	Add	0	
CrH	20 mA	mA	tbr	19200	
AOL	0 mA	mA	rPr	No	

Fault menu parameters:

Code	Factory setting	Customer setting (1)	Code	Factory setting	Customer setting (1)
Atr	no		LFL	no	
rSt	RSP		LFF	0 Hz	Hz
OPL	YES		FLr	no	
IPL	YES		StP	no	
tHt	ACL		Sdd	yes	

(1) leave blank when the parameter is missing

Summary of menus

LANGUAGE menu

Name	Code
English	LnG
Français	LnG
Deutsch	LnG
Español	LnG
Italiano	LnG

MACRO-CONFIG menu

Name	Code
Hdg: Handling	CFG
GEn: General Use	CFG

1 - DISPLAY menu

Name	Code
Drive State	---
Freq. Ref.	LFr
Freq. Ref.	FrH
OutPut Freq.	rFr
Motor SPeed	SPd
MotorCurrent	LCr
Machine SPd	USP
OutPut Power	OPr
MainsVoltage	ULn
MotorThermal	tHr
DriveThermal	tHd
Last Fault	LFt
Motor volt.	UOP
Consumption	APH
Run time	rtH

2 - ADJUST menu

Name	Code
Freq. Ref. - Hz	LFr
Ramp Incr. - s	Inr
Acceleration - s	ACC
Deceleration - s	dEC
Accelerate2 - s	AC2
Decelerate2 - s	dE2
Beg ACC Rnd. - %	tA1
End ACC Rnd. - %	tA2
Beg DEC Rnd. - %	tA3
End DEC Rnd. - %	tA4
Low SPeed - Hz	LSP
HiGh SPeed - Hz	HSP
Gain - %	FLG
Stability - %	StA

2 - ADJUST menu (continued)

Name	Code
SPeed ProP.g - %	SPG
SPeed int.g. - %	SIG
ThermCurrent - A	ItH
DC Inj. Curr.- A	IdC
DC Inj. Time - s	tdC
dc I at rest - A	SdC
IR ComPens. - %	UFr
SliP ComP. - %	SLP
Preset SP.2 - Hz	SP2
Preset SP.3 - Hz	SP3
Preset SP.4 - Hz	SP4
Preset SP.5 - Hz	SP5
Preset SP.6 - Hz	SP6
Preset SP.7 - Hz	SP7
Jog Freq. - Hz	JOG
Jog Delay - s	JGt
BrRelease I - A	Ibr
BrReleasTime - s	brt
BrEngage Lev- Hz	bEn
BrEngageTime- Hz	bEt
Trip Thresh.	FFt
Brake imPul.	b IP
Tacho Coeff.	dtS
PI ProP.Gain	rPG
PI Int.Gain	r IG
PID der.g.	rdG
PI Inversion	P IC
Freq.Lev.Att- Hz	Ftd
Freq.Lev.2 - Hz	F2d
Curr.Lev.Att - A	Ctd
ThermLev.Att - %	ttd
Trq. Limit 2 - %	tL2
Jump Freq. - Hz	JPF
Jump Freq.2 - Hz	JF2
Jump Freq.3 - Hz	JF3
Machine Coef	USC
LSP Time - s	tLS
+/-SPeedLim. - %	SrP
PID ref.off.	rEO
Ref. Gain PI	PrG
PID SPeed r.	PSr
PID Filter - s	PSP
Min.feed.PID - %	PAL
Max.feed.PID - %	PAH
PID error - %	PEr
PID Preset 2 - %	P I2
PID Preset 3 - %	P I3
PID Limit r. - %	PLr
PID base lim.- Hz	PLb
Motor fluxing	FLU
ATV Th. fault	dtd

Summary of menus

3 - DRIVE menu

Name	Code
Nom.Mot.Volt - V	UnS
Nom.Mot.Freq - Hz	FrS
Nom.Mot.Curr - A	nCr
Nom.MotSPeed - RPM	nSP
Mot. Cos Phi	CoS
Control mode	Ctr
Enc Pulse No	PG I
Auto Tuning	tUn
Encoder chk	EnC
Max. Freq. - Hz	tFr
DecRampAdapt	brA
SwitchRamP2 - Hz	Frt
TyPe of stoP	Stt
RamP TyPe	rPt
DECRAmPCoeff	dCF
Trq.Limit. 1 _ %	tL I
Int. I Lim - A	CL I
Auto DC Inj.	AdC
Sw Freq. TyPe	SFt
Sw Freq - kHz	SFr
Noise Reduct	nrd
SP'l Motor	SPC
PG TyPe	PGt
Num. Pulses	PLS
SPeed Reg.	SSL

4 - CONTROL menu

Name	Code
TermStriPCon	tCC
TyPe 2 Wire	tCt
RV inhibit	r In
deadb./PedSt	bSP
AI2 min Ref. - mA	CrL
AI2 Max Ref. - mA	CrH
Min Val AO - mA	AOL
Max Val AO - mA	AOH
Save Ref.	Str
KeyPad Comm.	LCC
StoP Priorit	PSt
DriveAddress	Add
BdRate RS485	tbr
Reset counters	rPr

5 - I/O menu

Name	Code
LI2 Assign. LI3 Assign. LI4 Assign. LI5 Assign. LI6 Assign.	L I2 L I3 L I4 L I5 L I6
NO :Not assigned RV :Reverse RP2:Switch RamP2 JOG:JOG ImPuls +SP:+ SPeed -SP:- SPeed PS2:2 Preset SP PS4:4 Preset SP PS8:8 Preset SP NST:Freewhl StoP DCI:DC inject. FST:Fast stoP CHP:Multi. Motor TL2:Trq.Limit 2 FLO:Forced Local RST:Fault Reset RFC:Auto/Man ATN:Auto-tune SPM:Ref.memory FLI:Motor fluxing PAU:PID Auto/Man PIS:PIDint.reset PR2:PID 2 Preset PR4:PID 4 Preset TLA:Torque limit EDD:Ext flt.	
R2 Assign. L0 Assign.	r2 LO
NO :Not assigned RUN:DriveRunning OCC:OutPutCont. FTA:Freq Attain. FLA:HSP Attained CTA:I Attained SRA:FRH Attained TSA:MtrThermLvl BLC:Brk Logic PEE:PID error PFA:PID Feed alm APL:4-20 mA loss F2A:F2 Attained TAD:Alarm.th.var.	

Summary of menus

5 - I/O menu (continued)

Name	Code
AI2 Assign. AI3 Assign.	AI2 AI3
NO :Not assigned FR2:Speed Ref2 SAI:Summed Ref. PIF:PID Regulator SFB:Tacho feedbk PTC:Therm.Sensor ATL:Torque Limit DAI:Subtract ref PIM:PID Man.ref. FPI:PID Spd inp.	
AO Assign. AO1 Assign.	AO AO1
OCR:Motor Curr. OFR:Motor Freq ORP:Output ramp TRQ:Motor torque STQ:Signed Torq. ORS:Signed ramp OPS:PID ref. OPF:PID Feedback OPE:PID Error OPI:PID Integral OPR:Motor Power THR:Motor Thermal THD:Drive Thermal	

6 - FAULT menu

Name	Code
Auto Restart	Atr
Reset Type	rSt
OutPhaseLoss	OPL
InPhaseLoss	IPL
ThermProType	tHt
LossFollower	LFL
Flt. Speed 4-20mA	LFF
Catch On Fly	FLr
Cont. Stop	StP
RampNotFoll	Sdd

7 - FILES menu

Name	Code
File 1 State	F1S
File 2 State	F2S
File 3 State	F3S
File 4 State	F4S
OPerat.TyPe	FOt
Password	COd

8 - COMMUNICATION menu

Refer to the documentation provided with the communication card.

8 - APPLICATION menu

Refer to the documentation provided with the application card.

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