

BLEMO® • Siemensstraße 4 • 63110 Rodgau-Dudenhofen

Manual

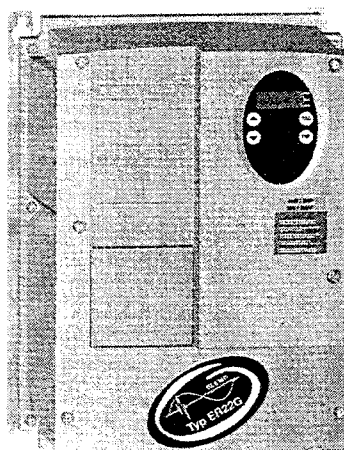
COMPACT-LINE

Frequency inverter

Type ER 22

Line: 1~ 200 - 240 V
Line: (1)/3~ 200 - 240 V
Line: 3~ 380 - 500 V
Line: 3~ 525 - 600 V

Main Power: 0.18 – 2.2 kW
Main Power: 0.18 – 15.0 kW
Main Power: 0.18 – 15.0 kW
Main Power: 0.75 – 15.0 kW



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The motor can be stopped during operation by inhibiting start commands or the speed reference while the drive remains powered up. If personnel safety requires prevention of sudden restarts, this electronic locking system is not sufficient: *fit a cut-off on the power circuit.*

The drive is fitted with safety devices which, in the event of a fault, can shut down the drive and consequently the motor. The motor itself may be stopped by a mechanical blockage. Finally, voltage variations, especially line supply failures, can also cause shutdowns.

If the cause of the shutdown disappears, there is a risk of restarting which may endanger certain machines or installations, especially those which must conform to safety regulations.

In this case the user must take precautions against the possibility of restarts, in particular by using a low speed detector to cut off power to the drive if the motor performs an unprogrammed shutdown.

The drive must be installed and set up in accordance with both international and national standards. Bringing the device into conformity is the responsibility of the systems integrator who must observe the EMC directive among others within the European Union.

The specifications contained in this document must be applied in order to comply with the essential requirements of the EMC directive.

The ER22 must be considered as a component: it is neither a machine nor a device ready for use in accordance with European directives (machinery directive and electromagnetic compatibility directive). It is the responsibility of the end user to ensure that the machine meets these standards.

The drive must not be used as a safety device for machines posing a potential risk of material damage or personal injury (lifting equipment, for example). In such applications, overspeed checks and checks to ensure that the trajectory remains under constant control must be made by separate devices which are independent of the drive.

The products and equipment described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

Preliminary recommendations

This simplified guide describes the minimum setup for the factory configuration of the drive.

All operations, parameters and faults described in this document relate to the factory configuration. Differences may become apparent if this configuration has been modified by the CtL-, FUn- or FLt- menus. The CD-ROM supplied with the drive contains the complete description along with all the configuration menus.

Prior to switching on and configuring the drive



- Check that the line voltage is compatible with the supply voltage range of the drive. The drive may be damaged if the line voltage is not compatible.
- Ensure the logic inputs are switched off (state 0) to prevent accidental starting. Otherwise, an input assigned to the run command may cause the motor to start immediately on exiting the configuration menus.

User adjustment and extension of functions

If necessary, the display and buttons can be used to modify the settings and to extend the functions. It is very easy to **return to the factory settings** using the FCS parameter in the drC- menu.

There are three types of parameter:

- Display: Values displayed by the drive
- Adjustment: Can be changed during operation or when stopped
- Configuration: Can only be modified when stopped and no braking is taking place. Can be displayed during operation.



- Check that changes to the current operating settings do not present any danger. Changes should preferably be made with the drive stopped.

Start up

Important: In factory settings mode, when the drive is switched on, or in a manual fault reset, or after a stop command, the motor can only be supplied with power once the "forward" and "reverse" commands have been reset. If they have not been reset, the drive will display "nst" but will not start.

Test on a low power motor or without a motor

In factory settings mode, motor phase loss detection is active. To check the drive in a test or maintenance environment without having to switch to a motor with the same rating as the drive (particularly useful in the case of high power drives), deactivate motor phase loss detection and configure the voltage/frequency ratio $UF_t = L$.

Operation on an IT system

IT system: Isolated or impedance earthed neutral.

Use a permanent insulation monitor compatible with non-linear loads: a Merlin Gerin type XM200, for example. ER22K and 4K drives feature built-in RFI filters. These filters can be disconnected from ground for operation on an IT system.

Steps for setting up the drive

1 - Delivery of the drive

- Check that the drive reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
- Remove the ER22 from its packaging and check that it has not been damaged in transit.

2 - Check that the line voltage is compatible with the supply voltage range of the drive (see the drive rating plate).



- The drive may be damaged if the line voltage is not compatible.

3 - Fit the drive

4 - Connect the following to the drive:

- The line supply, ensuring that it is:
 - **compatible with the voltage range of the drive**
 - **switched off**
- The motor, ensuring that its coupling corresponds to the line voltage
- The control via the logic inputs
- The speed reference via the logic or analog inputs

5 - Switch on the drive, but do not give a run command

6 - Configure the following:

The nominal frequency (bFr) of the motor, if it is different from 50 Hz.

7 - Configure the following in the drC- menu:

The motor parameters, only if the factory configuration of the drive is not suitable.

8 - Configure the following in the I-O- menu:

The control mode (only if the factory configuration is not suitable): 3-wire, or 2-wire transition detection, or 2-wire level detection, or 2-wire level detection with forward direction priority, or local control for ER22P.



The user must ensure that the programmed functions are compatible with the wiring diagram used.

9 - Set the following in the SEt- menu:

- The ACC (Acceleration) and dEC (Deceleration) parameters
- The LSP (Low speed when the reference is zero) and HSP (High speed when the reference is maximum) parameters
- The ItH parameter (Motor thermal protection)

10 - Start the drive

Practical recommendations

- It is always possible to **return to the factory settings** using the FCS parameter (set FCS = InII) in the drC- (page 28) or I-O- (page 29) menus.
- Auto-tuning, which is performed using the tUn parameter in the drC- menu (page 27), can be applied to optimise performance in terms of accuracy and response time.

Factory configuration

The ER22 is factory-set for the most common operating conditions:

- Display: Drive ready (rdY) with motor stopped, and motor frequency with motor running
- Motor frequency (bFr): 50 Hz
- Constant torque application with sensorless flux vector control (UFt = n)
- Normal stop mode on deceleration ramp
- Stop mode in the event of a fault: Freewheel
- Linear ramps (ACC, dEC): 3 seconds
- Low speed (LSP): 0 Hz
- High speed (HSP): 50 Hz
- Motor thermal current (ItH) = nominal motor current (value depending on drive rating)
- Standstill injection braking current (SdC1) = 0.7 x nominal drive current, for 0.5 seconds
- Automatic adaptation of the deceleration ramp in the event of overvoltage on braking
- No automatic restarting after a fault
- Switching frequency 4 kHz
- Logic inputs:
 - LI1, LI2 (2 directions of operation): 2-wire transition detection control
LI1 = forward, LI2 = reverse, inactive on ER22P drives (not assigned)
 - LI3, LI4: 4 preset speeds
(speed 1 = speed reference or LSP, speed 2 = 10 Hz, speed 3 = 15 Hz, speed 4 = 20 Hz)
 - LI5 - LI6: Inactive (not assigned)
- Analog inputs:
 - AI1: Speed reference 0-10 V, inactive on ER22P (not assigned)
 - AI2: Summed speed reference 0±10 V
 - AI3: 4-20 mA inactive (not assigned)
- Relay R1: The contact opens in the event of a fault (or drive off)
- Relay R2: Inactive (not assigned)
- Analog output AOC: 0-20 mA inactive (not assigned)

ER22P

When they leave the factory, ER22P drives are supplied with local control activated: the RUN, STOP buttons and the drive potentiometer are active. Logic inputs LI1 and LI2 and analog input AI1 are inactive (not assigned).

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

Replacing an ER21 with an ER22

The table below shows the similarities and differences in terms of the control terminals on each of the two drives.

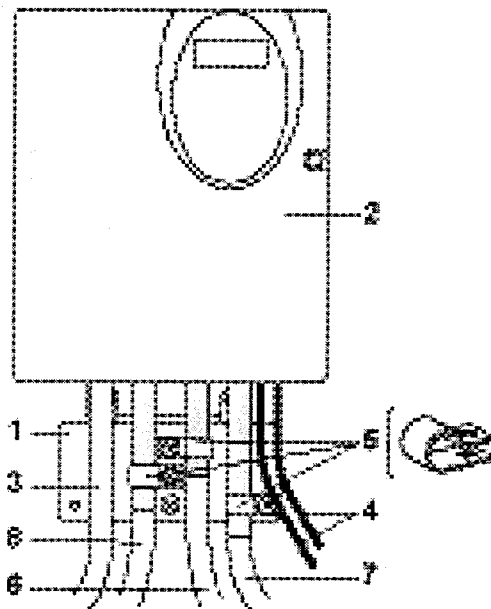
ER21 control terminals	Function in factory settings mode	ER22 control terminals	Function in factory settings mode
R1A - R1B - R1C	Fault relay	R1A - R1B - R1C	Fault relay
R2A - R2C	Speed reference reached	R2A - R2C	Not assigned
COM	0 V	COM	0 V
AI1 (0 - 10 V)	Speed reference	AI1 (0 - 10 V)	Speed reference
+10 V	+10 V	10 V	+10 V
AI2 (0 - ± 10 V)	Summed speed reference	AI2 (0 - ± 10 V)	Summed speed reference
AIC (X - Y mA)	Not assigned	AI3 (X - Y mA)	Not assigned
AO	Motor frequency	AOC/AOV	Not assigned
LI1 - LI2	Forward/reverse	LI1 - LI2	Forward/reverse
LI3 - LI4	Preset speeds	LI3 - LI4	Preset speeds
+24 V	+24 V	24 V	+24 V

Electromagnetic compatibility

Principle

- Grounds between the drive, motor and cable shielding must have "high frequency" equipotentiality.
- Use shielded cables with shielding connected to ground throughout 360° at both ends for the motor cable 6, braking resistor (if used) 8, and control-signalling cables 7. Metal ducting or conduit can be used for part of the shielding length provided that there is no break in continuity. If intermediate terminals are used, they must be housed in EMC shielded metal cases.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.

Installation diagram (example)



- 1 Sheet steel grounded plate supplied with the drive, to be fitted as indicated on the diagram.
- 2 ER22
- 3 Non-shielded power supply wires or cable
- 4 Non-shielded wires for relay contacts
- 5 Fix and ground the shielding of cables 6, 7 and 8 as close as possible to the drive:
 - Strip the shielding.
 - Use stainless steel cable clamps of an appropriate size on the parts from which the shielding has been stripped, to attach them to the plate 1.
 The shielding must be clamped tightly enough to the metal plate to ensure correct contact.
- 6 Shielded cable for connecting the motor. For 0.18 to 1.5 kW drives, if the switching frequency is higher than 12 kHz, use cables with low lineic capacitance: max. 130 pF (picoFarads) per metre.
- 7 Shielded cable for connecting the control/signalling wiring. For applications requiring several conductors, use cables with a small cross-section (0.5 mm²).
- 8 Shielded cable for connecting the braking resistor (if fitted).

Note:

- If using an additional input filter, it should be mounted under the drive and connected directly to the line supply via an unshielded cable. Link 3 on the drive is then via the filter output cable.
- The HF equipotential ground connection between the drive, motor and cable shielding does not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit.

Functions of the display and the keys

- Four 7-segment displays
- Red LED "DC bus ON"
- Returns to the previous menu or parameter, or increases the displayed value
- Goes to the next menu or parameter, or decreases the displayed value
- Reference potentiometer, active if parameter Fr1 in the CtL- menu is configured as AIP
- RUN button: Controls motor switch-on in forward mode if parameter tCC in the I-O- menu is configured as LOC
- STOP/RESET button
 - Used to reset faults to zero
 - It can be used to control motor stopping
 - If tCC (I-O- menu) is not configured as LOC, it is a freewheel stop.
 - If tCC (I-O- menu) is configured as LOC, stopping is on a ramp, but if injection braking is in progress, a freewheel stop takes place.
- 2 CANopen status LEDs
- Exits a menu or parameter, or clears the displayed value to return to the previous stored value
- Enters a menu or a parameter, or saves the displayed parameter or value

For ER22P only

- Reference potentiometer, active if parameter Fr1 in the CtL- menu is configured as AIP
- RUN button: Controls motor switch-on in forward mode if parameter tCC in the I-O- menu is configured as LOC
- STOP/RESET button
 - Used to reset faults to zero
 - It can be used to control motor stopping
 - If tCC (I-O- menu) is not configured as LOC, it is a freewheel stop.
 - If tCC (I-O- menu) is configured as LOC, stopping is on a ramp, but if injection braking is in progress, a freewheel stop takes place.



- Pressing ▲ or ▼ does not store the selection.
- Press and hold down (>2 s) ▲ or ▼ to scroll through the data quickly.
- To save and store the selection: ENT

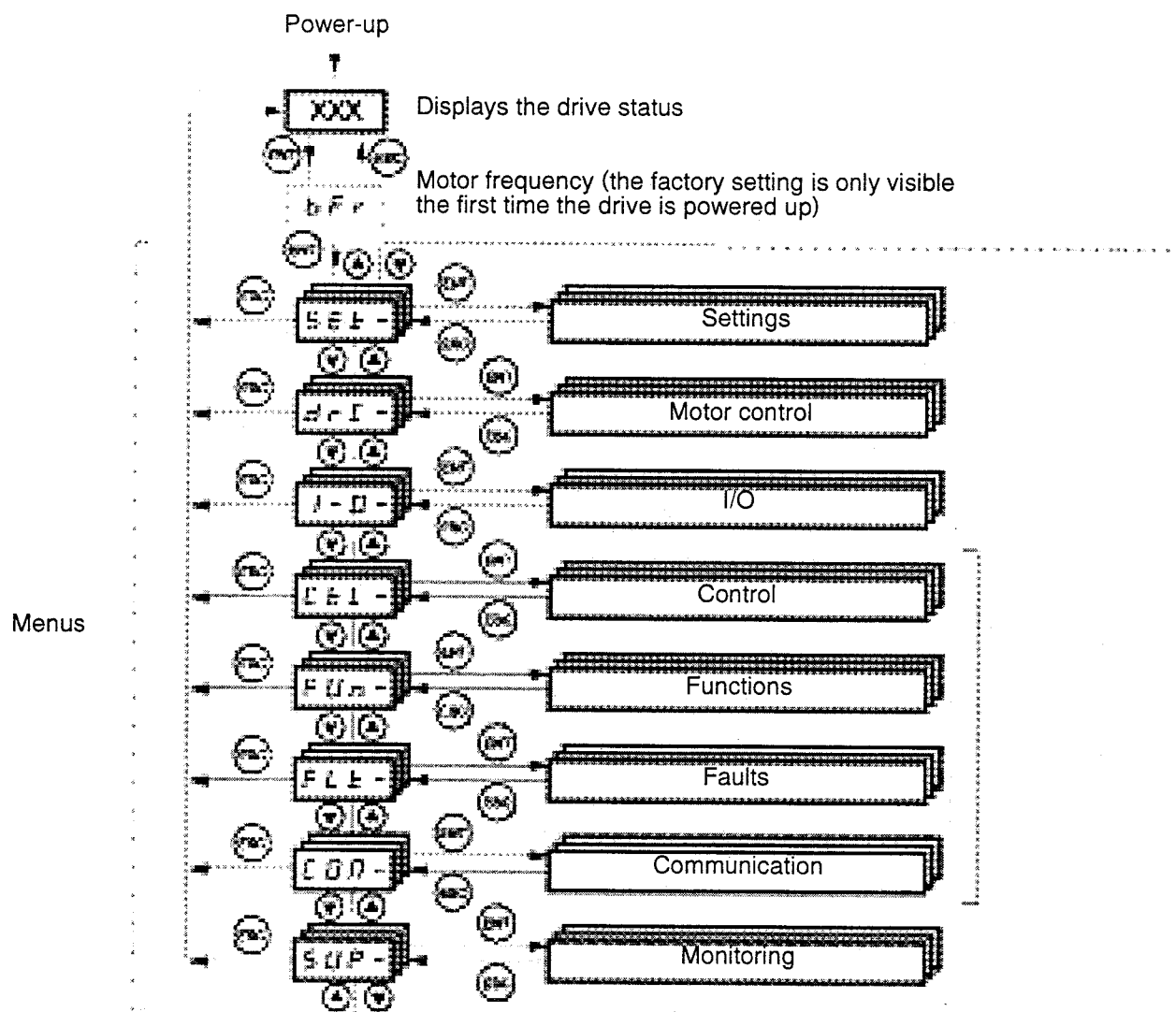
The display flashes when a value is stored.

Normal display, with no fault present and no starting:

- 43.0: Display of the parameter selected in the SUP- menu (default selection: motor frequency). In current limiting mode, the display flashes.
- init: Initialization sequence
- rdY: Drive ready
- dcb: DC injection braking in progress
- nSt: Freewheel stop
- FSt: Fast stop
- tUn: Auto-tuning in progress

The display flashes to indicate the presence of a fault.

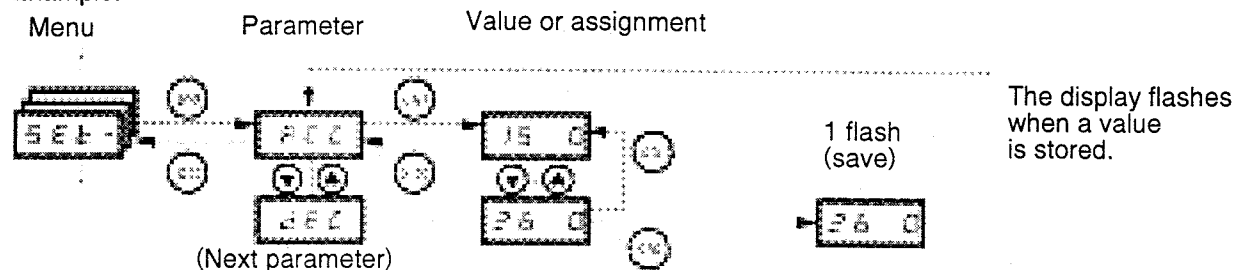
Access to menus



A dash appears after menu codes to differentiate them from parameter codes. Example: SEt- menu, ACC parameter.

To save and store the selection: (ENT)

Example:



Configuration of the bFr parameter

This parameter can only be modified in stop mode with the drive locked.

Code	Description	Adjustment range	Factory setting
bFr	Standard motor frequency This parameter is only visible the first time the drive is switched on. It can be modified at any time in the drC- menu. 50 Hz: IEC 60 Hz: NEMA This parameter modifies the presets of the following parameters: HSP page 24, Ftd page 26, FrS page 26 and tFr page 27.		50

Settings menu SEt-

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



Check that it is safe to make changes during operation.
Changes should preferably be made with the drive stopped.

Code	Description	Adjustment range	Factory setting
ACC dEC	Acceleration and deceleration ramp times Defined for accelerating and decelerating between 0 and the nominal frequency FrS (parameter in the drC- menu). Check that the value of dEC is not too low in relation to the load to be stopped.	0.1 to 999.9 s 0.1 to 999.9 s	3 s 3 s
LSP	Low speed (motor frequency to min. reference)	0 to HSP	0 Hz
HSP	High speed (motor frequency to max. reference): Check that this setting is suitable for the motor and the application.	LSP to tFr	bFr
ItH	Motor thermal protection - max. thermal current Set ItH to the nominal current on the motor rating plate. Please refer to the CD-ROM if you wish to suppress thermal protection.	0 to 1.5 In (1)	According to drive rating
UFR	IR compensation/Voltage boost Used to optimise torque at very low speed (increase UFR if the torque is insufficient). Check that the value of UFR is not too high for when the motor is warm (risk of instability). Modifying UFR (page 27) will cause UFR to return to the factory setting (20%).	0 to 100%	20%

(1) In corresponds to the nominal drive current indicated in the catalogue and on the drive rating plate.

Code	Description	Adjustment range	Factory setting
FLG	Frequency loop gain	1 to 100%	20
	Parameter can only be accessed if UFt (page 27) = n or nLd. The FLG parameter adjusts the following of the speed ramp on the basis of the inertia of the machine being driven. Value too low: Longer response time Value too high: Overspeed, instability		
StA	Frequency loop stability	1 to 100%	20
	Parameter can only be accessed if UFt (page 27) = n or nLd. Value too low: Overspeed, instability Value too high: Longer response time		
SLP	Slip compensation	0 to 150%	100
	Parameter can only be accessed if UFt (page 27) = n or nLd. Used to adjust the slip compensation value fixed by motor nominal speed. The speeds given on motor rating plates are not necessarily exact. • If slip setting < actual slip: The motor is not rotating at the correct speed in steady state. • If slip setting > actual slip: The motor is overcompensated and the speed is unstable.		
tdC1	Automatic standstill DC injection time	0.1 to 30 s	0.5 s
SdC1	Level of automatic standstill DC injection current	0 to 1.2 In (1)	0.7 In (1)
	 Check that the motor will withstand this current without overheating.		
tdC2	Second automatic standstill DC injection time	0 to 30 s	0 s
SdC2	Second level of standstill DC injection current	0 to 1.2 In (1)	0.5 In (1)
JPF	Skip frequency	0 to 500	0 Hz
	Prevents prolonged operation at a frequency range of ± 1 Hz around JPF. This function prevents a critical speed which leads to resonance. Setting the function to 0 renders it inactive.		
JF2	Second skip frequency	0 to 500	0 Hz
	Prevents prolonged operation at a frequency range of ± 1 Hz around JF2. This function prevents a critical speed which leads to resonance. Setting the function to 0 renders it inactive.		
SP2	Second preset speed	0.0 to 500.0 Hz	10 Hz
SP3	Third preset speed	0.0 to 500.0 Hz	15 Hz
SP4	Fourth preset speed	0.0 to 500.0 Hz	20 Hz
CLI	Current limiting	0.25 to 1.5 In (1)	1.5 In (1)
	Used to the torque and the temperature rise of the motor.		

(1) In corresponds to the nominal drive current indicated in the catalogue and on the drive rating plate.

Code	Description	Adjustment range	Factory setting
tLS	Low speed operating time Following operation at LSP for a defined period, a motor stop is requested 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 period.	0 to 999.9 s	0 (no time limit)
Ftd	Not used		
ttd	Not used		
Ctd	Not used		
SdS	Not used		
SFr	Switching frequency This parameter can also be accessed in the drC- menu.	2.0 to 16 kHz	4 kHz

Motor control menu drC-

With the exception of tUn, which can power up the motor, parameters can only be modified when the drive is stopped and there is no run command present.

Drive performance can be optimized by:

- Entering the values given on the motor rating plate in the drive menu
- Performing an auto-tune operation (on a standard asynchronous motor)

Code	Description	Adjustment range	Factory setting
bFr	Standard motor frequency 50 Hz: IEC 60 Hz: NEMA This parameter modifies the presets of the following parameters: HSP page 24, Ftd page 26, FrS page 26 and tFr page 27.		50
UnS	Nominal motor voltage given on the rating plate	According to drive rating	According to drive rating
FrS	Nominal motor frequency given on the rating plate The factory setting is 50 Hz, or 60 Hz if bFr is set to 60 Hz.	10 to 500 Hz	50 Hz
nCr	Nominal motor current given on the rating plate	0.25 to 1.5 In (1)	According to drive rating
nSP	Nominal motor speed given on the rating plate 0 to 9999 RPM then 10.00 to 32.76 KRPM If the nominal speed is not given on the rating plate.	0 to 32760 RPM	According to drive rating
COS	Motor Cos Phi given on the rating plate	0.5 to 1	According to drive rating
rSC	Leave at nO.		nO

(1) In corresponds to the nominal drive current indicated in the catalogue and on the drive rating plate.

Code	Description	Adjustment range	Factory setting
tUn	Motor control auto-tuning It is essential that all the motor parameters (UnS, FrS, nCr, nSP, COS) are configured correctly before performing auto-tuning. nO : Auto-tuning not performed. YES : Auto-tuning is performed as soon as possible, then the parameter automatically switches to dOnE or nO in the event of a fault (the tnF fault is displayed). dOnE : Use of the values given the last time auto-tuning was performed. rUn : Auto-tuning is performed every time a run command is sent. POn : Auto-tuning is performed on every power-up. LI1 to LI6 : Auto-tuning is performed on the transition from 0 V 1 of a logic input assigned to this function. Caution: Auto-tuning is only performed if no command has been activated. Auto-tuning may last for 1 to 2 seconds. Do not interrupt; wait for the display to change to "dOnE" or "nO".  During auto-tuning the motor operates at nominal current.		nO
tUS	Auto-tuning status (information only, cannot be modified) tAb : The default stator resistance value is used to control the motor. PEnd : Auto-tuning has been requested but not yet performed. PrOG : Auto-tuning in progress. FAIL : Auto-tuning has failed. dOnE : The stator resistance measured by the auto-tuning function is used to control the motor.		tAb
UFt	Selection of the type of voltage/frequency ratio L : Constant torque for motors connected in parallel or special motors P : Variable torque: Pump and fan applications n : Sensorless flux vector control for constant torque applications nLd : Energy saving, for variable torque applications not requiring high dynamics (behaves in a similar way to the P ratio at no-load and the n ratio on load).		n
nrd	Random switching frequency YES : Frequency with random modulation nO : Fixed frequency Random frequency modulation prevents any resonance which may occur at a fixed frequency.		YES
SFr	Switching frequency (1) The frequency can be adjusted to reduce the noise generated by the motor. If the frequency has been set to a value higher than 4 kHz, in the event of excessive temperature rise, the drive will automatically reduce the switching frequency and increase it again once the temperature has returned to normal.	2.0 to 16 kHz	4 kHz
tFr	Maximum output frequency The factory setting is 60 Hz, or 72 Hz if bFr is set to 60 Hz.	10 to 500 Hz	60 Hz
SSL	Suppression of the speed loop filter nO : The speed loop filter is active (prevents the reference being exceeded). YES : The speed loop filter is suppressed (in position control applications, this reduces the response time and the reference may be exceeded).		nO

(1) Parameter can also be accessed in the SEt- menu.

Code	Description	Adjustment range	Factory setting
SCS	Saving the configuration (1) nO: Function inactive StrI: Saves the current configuration (but not the result of auto-tuning) to EEPROM. SCS automatically switches to nO as soon as the save has been performed. This function is used to keep another configuration in reserve, in addition to the current configuration. When drives leave the factory the current configuration and the backup configuration are both initialized with the factory configuration.		nO
FCS	Return to factory setting/Restore configuration (1) nO: Function inactive rECI: The current configuration becomes identical to the backup configuration previously saved by SCS = StrI. rECI is only visible if the backup has been carried out. FCS automatically switches to nO as soon as this action has been performed. InI: The current configuration becomes identical to the factory setting. FCS automatically switches to nO as soon as this action has been performed.  For rECI and InI to be taken into account the ENT key must be held down for 2 s.		nO

(1) SCS and FCS can be accessed via several configuration menus but they concern all menus and parameters as a whole.

I/O menu I-O-

Parameters can only be modified when the drive is stopped and no run command is present.

Code	Description	Factory setting
tCC	2-wire/3-wire control (type of control)	2C ER22P: LOC
	Control configuration: 2C = 2-wire control 3C = 3-wire control LOC = local control (drive RUN/STOP/RESET) for ER22P only. 2-wire control: The open or closed state of the input controls running or stopping. 3-wire control (pulse control): A "forward" or "reverse" pulse is sufficient to control starting, a "stop" pulse is sufficient to control stopping. On ATV31pppA, reconfiguring tCC = 2C reassigns the LI1 (forward) and LI2 (reverse) inputs. Although this renders the RUN button on the drive inactive, the speed reference is still provided by the potentiometer. The potentiometer can be deactivated and the speed reference assigned to analog input AI1 by configuring parameter Fr1 = AI1 in the CtL- menu.  To change the assignment of tCC press the "ENT" key for 2 s. This causes the following functions to return to their factory setting: rrS, tCt and all functions affecting logic inputs.	

Code	Description	Factory setting
tCt	Type of 2-wire control (parameter only accessible if tCC = 2C) LEL: State 0 or 1 is taken into account for run or stop. trn: A change of state (transition or edge) is necessary to initiate operation, in order to prevent accidental restarts after a break in the power supply. PFO: State 0 or 1 is taken into account for run or stop, but the "forward" input always takes priority over the "reverse" input.	trn
rrS	Reverse operation via logic input If rrS = nO, reverse operation is active, by means of negative voltage on AI2 for example. nO: Not assigned LI2: Logic input LI2, can be accessed if tCC = 2C LI3: Logic input LI3 LI4: Logic input LI4 LI5: Logic input LI5 LI6: Logic input LI6	if tCC = 2C: LI2 if tCC = 3C: LI3 if tCC = LOC: nO
CrL3 CrH3 AOIt dO r1 r2		
SCS FCS	Identical to drC- menu, page 28	

Display menu SUP-

Parameters can be accessed with the drive running or stopped.

Some functions have numerous parameters. In order to clarify programming and avoid having to scroll through lists of parameters, these functions have been grouped in sub-menus.
Like menus, sub-menus are identified by a dash after their code: LIF-, for example.

When the drive is running, the value displayed is that of one of the monitoring parameters. By default, the value displayed is the output frequency applied to the motor (rFr parameter).

While the value of the required new monitoring parameter is being displayed, the "ENT" key must be pressed and held down a second time (for 2 seconds) to confirm the change of monitoring parameter and to store it. From then on the value of this parameter will be displayed during operation (even after the drive has been switched off).

If the new choice is not confirmed by pressing the "ENT" key a second time, the drive will return to the previous parameter after it has been switched off.

Code	Description	Variation range
LFr	Frequency reference for control via integrated terminal or remote terminal.	0 to 500 Hz
rPI	Internal PI reference	0 to 100%

These parameters only appear if the function has been enabled.

Code	Description	Variation range
FrH	Frequency reference before ramp (absolute value)	0 to 500 Hz
rFr	Output frequency applied to the motor	- 500 Hz to + 500 Hz
SPd	Output value in customer units	
LCr	Current in the motor	
OPr	Motor power	
	100% = Nominal motor power	
ULn	Line voltage (gives the line voltage via the DC bus, motor running or stopped)	
tHr	Motor thermal state	
	100% = Nominal thermal state	
	118% = "OLF" threshold (motor overload)	
tHd	Drive thermal state	
	100% = Nominal thermal state	
	118% = "OHF" threshold (motor overload)	
LFt	Last fault	
	See Faults - Causes - Remedies, page 31	
Otr	Motor torque	
	100% = nominal motor torque	
rtH	Operating time	0 to 65530 hours
	Total time the motor has been powered up: 0 to 9999 (hours), then 10.00 to 65.53 (kilo-hours). Can be reset to zero by the rPr parameter in the FLt- menu	
COd	Terminal locking code	
tUS	Auto-tuning status	
	tAb: The default stator resistance value is used to control the motor. PEnd: Auto-tuning has been requested but not yet performed. PrOG: Auto-tuning in progress FAIL: Auto-tuning has failed. dOnE: The stator resistance measured by the auto-tuning function is used to manage driving.	
UdP	Indicates the ER22 software version	
	E.g.: 1102 = V1.1 IE02.	
LIA-	Logic input functions	
AIA-	Analog input functions	

Faults - Causes - Remedies

Assistance with maintenance, fault display

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

The first fault detected is stored and displayed, flashing, on the screen: the drive locks and the fault relay (R1A - R1C or R2A - R) contact opens.

Drive does not start, no fault displayed

- If the display does not light up, check the power supply to the drive.

Faults to be reset

The cause of the fault should be rectified before resetting by powering down until the display goes out, then switching on again.

Fault	Probable cause	Remedy
COF CANopen fault	• CANopen bus communication interrupted	• Check the communication bus. • Please refer to the product-specific documentation.
CrF capacitor load circuit	• Load relay control fault or charging resistor damaged	• Replace the drive.
EEF EEPROM fault	• internal memory fault	• Check the environment (electromagnetic compatibility). • Replace the drive.
InF internal fault	• Internal fault	• Check the environment (electromagnetic compatibility). • Replace the drive.
LFF Loss of 4-20mA	• Loss of the 4-20 mA reference on input AI3	• Check the connection on input AI3.
ObF overvoltage during deceleration	• Braking too sudden • Driving load	• Increase the deceleration time. • Install a braking resistor if necessary. • See the brA function.
OCF overcurrent	• Incorrect parameters in the SEt- and drC- menus • Inertia or load too high • Mechanical locking	• Check the SEt- and drC- parameters. • Check the size of the motor/drive/load. • Check the state of the mechanism.
OHF drive overload	• Drive temperature too high	• Check the motor load, the drive ventilation and the environment. Wait for the drive to cool down before restarting.
OLF motor overload	• Triggered by excessive motor current	• Check the lth setting (motor thermal protection) (page 24), check the motor load. Wait for the drive to cool down before restarting.

Fault	Probable cause	Remedy
OPF motor phase break	- Loss of phase at drive output - Downstream contactor open - Motor not connected or motor power too low - Instantaneous instability in the motor current	- Check the connections from the drive to the motor. - If a downstream contactor is being used, set OPL to OAC (FLt- menu). - Test on a low power motor or without a motor: set OPL to nO (FLt- menu). - Check and optimise the UFr (page 24), UnS and nCr (page 26) parameters and perform auto-tuning with tUn (page 27).
OSF overvoltage	- Line voltage too high - Disturbed line supply	Check the line voltage.
PHF input phase failure	- Failure of one phase 3-phase ER22 used on a single phase line supply - Unbalanced load This protection only operates with the drive on load.	- Check the connection and the fuses. - Use a 3-phase line supply. - Disable the fault by setting IPL = nO
SCF motor short-circuit	- Short-circuit or earthing at the drive output - Significant earth leakage current at the drive output if several motors are connected in parallel	- Check the cables connecting the drive to the motor, and the motor insulation. - Reduce the switching frequency. - Connect chokes in series with the motor.
SLF Modbus fault	Modbus bus communication interrupted	- Check the communication bus. - Please refer to the product-specific documentation.
SOF overspeed	- Instability - Driving load too high	- Check the motor, gain and stability parameters. - Add a braking resistor. - Check the size of the motor/drive/load.
tnF auto-tuning fault	- Special motor or motor whose power is not suitable for the drive - Motor not connected to the drive	- Use the L or the P ratio (Uft page 27). - Check the presence of the motor during auto-tuning. - If a downstream contactor is being used, close it during auto-tuning.

Faults which can be reset as soon as their cause disappears

Fault	Probable cause	Remedy
CFF configuration fault	The current configuration is incompatible.	Return to factory settings or call up the backup configuration, if it is valid. See parameter FCS in the drC- menu, page 28.
CFI configuration fault via serial link	Invalid configuration (the configuration loaded in the drive via the serial link is incompatible).	- Check the configuration loaded previously. - Load a compatible configuration.
USF undervoltage	- Line supply too low - Transient voltage dip - Damaged load resistor	- Check the voltage and the voltage parameter. - Replace the drive.

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