COMPACT-LINE

Short manual ER23K

Variable speed drives for asynchronous motors

EN 61800-3

Line voltage:	1 ~ 200 - 240 V –	Output voltage: 3~ 0 ... 240 V -	Power: 0,18- 2,2 kW
Line voltage:	1(3)~ 200 - 240 V –	Output voltage: 3~ 0 ... 240 V -	Power: 0,18- 15,0 kW
Line voltage:	3 ~ 380 - 500 V –	Output voltage: 3~ 0 ... 500 V -	Power: 0,37- 15,0 kW
Line voltage:	3 ~ 525 - 600 V –	Output voltage: 3~ 0 ... 600 V -	Power: 0,75- 15,0 kW

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Contents

Important Information

NOTICE

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

CAUTION

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

PLEASE NOTE

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

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

Before you begin

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

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this manual before installing or operating the ER23K drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical code requirements with respect to grounding of all equipment.
- Many parts of this drive, including the printed circuit boards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/– or across the DC bus capacitors.
- Before servicing the drive:
  - Disconnect all power, including external control power that may be present.
  - Place a “DO NOT TURN ON” label on all power disconnects.
  - Lock all power disconnects in the open position.
  - WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the “Bus Voltage Measurement Procedure” in the installation manual to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

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

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Read and understand this manual before installing or operating the ER23K drive.
- Any changes made to the parameter settings must be performed by qualified personnel.

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

⚠ WARNING

DAMAGED DRIVE EQUIPMENT

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

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

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.[a]

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

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

Steps for setting up (also refer to Quick Start)

1. Receive and inspect the drive

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

2. Check the line voltage

- Check that the voltage range of the drive is compatible with the line voltage (see installation manual).

3. Mount the drive

- Mount the drive in accordance with the instructions in this document, page 8.
- Install any options required (see option documentation).

4. Wire the drive page 10

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

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

5. Configure the drive (see programming manual)

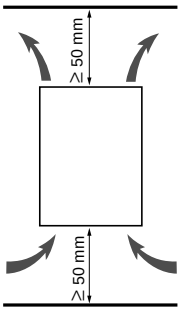
- Apply input power to the drive, but do not give a run command.
- Set the motor parameters in [MOTOR CONTROL] (drC-) menu if the factory configuration of the drive is not suitable and especialy if the motor power doesn't correspond to the drive power. See page 32.
- Set the parameters ACC, dEC, LSP, HSP and ItH in the [SETTINGS] (SEt-) menu page 29
- Perform an auto-tuning.

6. Start

- Before start, check that there is no risk for person and material.
- If possible, start without load and with low speed.

Mounting

Mounting and temperature conditions

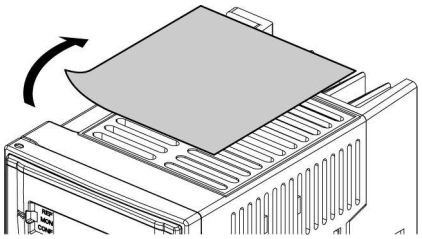


Install the unit vertically, at ± 10°.
Do not place it close to heating elements.
Leave sufficient free space so that the air required for cooling purposes can circulate from the bottom to the top of the unit.

Free space in front of unit: 10 mm (0.39 in.) minimum.

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

Removing the vent cover

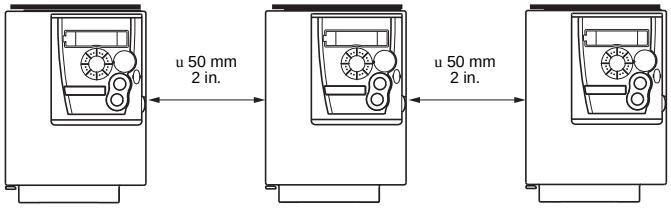


Example ER23-1.1/3K

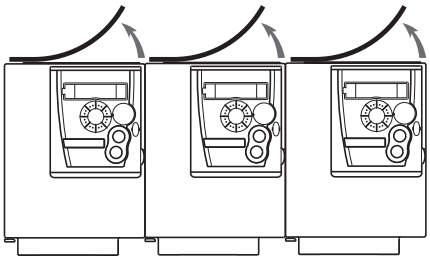
Mounting types

3 types of mounting are possible:

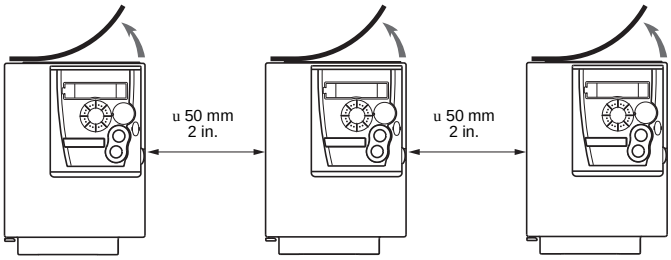
Type A mounting: Free space < 50 mm (2 in.) on each side, with vent cover fitted. Mounting type A is suitable for drive operation at surrounding air temperature less or equal to 50°C (122°F).



Type B mounting: Drives mounted side-by-side, vent cover should be removed (the degree of protection becomes IP20).



Type C mounting: Free space < 50 mm (2 in.) on each side. Vent cover should be removed for operation at surrounding air temperature above 50°C (122°F). The degree of protection becomes IP20.



Note: For switching frequencies above 4 kHz and derating conditions, refer to the Installation manual for guidelines.

Wiring

Power and circuit protection

The drive must be grounded to conform with the regulations concerning high leakage currents (over 3.5 mA).

Where local and national codes require upstream protection by means of a residual current device, use a type A device for single-phase drives and a type B device for three-phase drives as defined in the IEC Standard 60755. Choose a suitable model integrating:

- High frequency current filtering,
- A time delay that helps to prevent tripping caused by the load from stray capacitance on power-up. The time delay is not possible for 30 mA devices; in this case, choose devices with immunity against nuisance tripping.

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

Keep the power cables separate from circuits in the installation with low-level signals (detectors, PLCs, measuring apparatus, video, telephone).

If you are using cables longer than 50 m (164 ft) between the drive and the motor, add output filters.

Control

Keep the control circuits away from the power cables. For control and speed reference circuits, we recommend using shielded twisted cables with a pitch of between 25 and 50 mm (1 and 2 in.), connecting the shielding to ground at each end.

Equipment Grounding

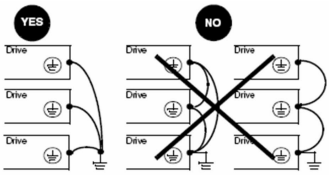
Ground the drive according to local and national code requirements. A minimum wire size of 10 mm² (6 AWG) may be required to meet standards limiting leakage current.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

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

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



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

⚠ WARNING

RISK OF DRIVE DESTRUCTION

- The drive will be damaged if input line voltage is applied to the output terminals (U/T1,V/T2, W/T3).
- Check the power connections before energizing the drive.
- If replacing another drive, verify that all wiring connections to the ER23K drive comply with wiring instructions in this manual.

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

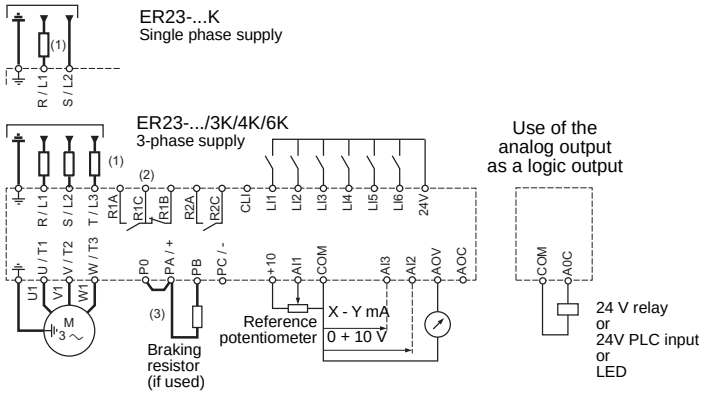
⚠ WARNING

INADEQUATE OVERCURRENT PROTECTION

- Overcurrent protective devices must be properly coordinated.
- The Canadian Electrical Code and the National Electrical Code require branch circuit protection. Use the fuses recommended in the installation manual.
- Do not connect the drive to a power feeder whose short-circuit capacity exceeds the drive short-circuit current rating listed in the installation manual.

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

General wiring diagram



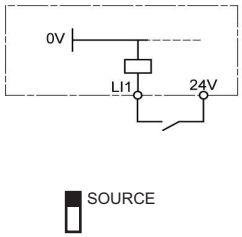
(1) Line choke, if used (single phase or 3-phase)
(2) Relay contacts for remote signalling of drive status
(3) If a braking resistor is connected, set [Dec ramp adapt.] (brA) parameter to yes (refer to the progamming manual).

Note: Use interference suppressors on all inductive circuits near the drive or coupled to the same circuit (relays, contactors, solenoid valves, etc).

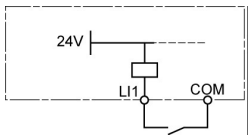
Logic input switch

This switch assigns the logic input common link to 0V, 24 V or "floating" (1).

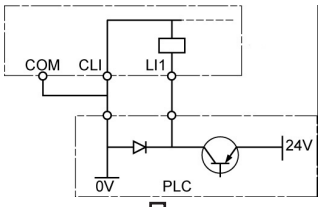
Using volt-free contacts
Switch in «Source» position (factory setting)



Switch in «Sink» position



Using PLC transistor output
Switch in CLI position



⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

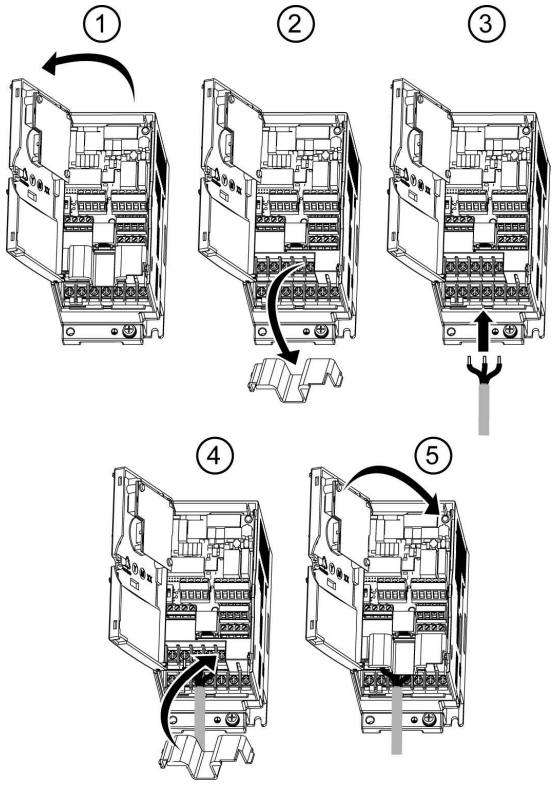
- Prevent accidental grounding of logic inputs configured for sink logic. Accidental grounding can result in unintended activation of drive functions.
- Protect the signal conductors against damage that could result in unintentional conductor grounding.
- Follow NFPA 79 and EN 60204 guidelines for proper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

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

(1) To locate the switch on the terminal board, see «Access to the control terminals» page 16.

Power terminals

Access to the power terminals



⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH.

Replace the cover plate on the terminals and close the door before applying power.

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

Functions of the power terminals

Terminal	Function	For ER23K
⏚	Ground terminal	All ratings
R/L1 - S/L2	Power supply	ER23-...K
R/L1 - S/L2 - T/L3		ER23-.../3K ER23-.../4K ER23-.../6K
PO	DC bus + polarity	All ratings
PA/+	Output to braking resistor (+ polarity)	All ratings
PB	Output to braking resistor	All ratings
PC/-	DC bus - polarity	All ratings
U/T1 - V/T2 - W/T3	Outputs to the motor	All ratings

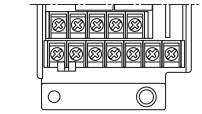
Characteristics of the power terminals

ER23-	Applicable wire size (1) mm^2 (AWG)	Recommended wire size (2) mm^2 (AWG)	Tightening torque (3) N·m (lb.in)
0..../3K, 0....K	**2.5** (14)	2,5 (14)	0.8 (7.1)
1.1/3K, 1.5/3K, 0.../4K, 1.1/4K, 1.5/4K, 0.75/6K, 1.5/6K	**2.5** to 6 (14 to 10)	2,5 (14)	0.8 (7.1)
1.1K, 1.5K, 2.2/3K	**2.5** to 6 (12 to 10)	3.5 (12)	1.2 (10.7)
3.0/3K, 4.0/3K	**2.5** to 6 (14 to 10)	6 (10)	1.2 (10.7)
2.2/4K, 3.0/4K, 2.2/6K, 4.0/6K	**2.5** to 6 (14 to 10)	2,5 (14)	1.2 (10.7)
4.0/4K, 2.2K	**4** to 6 (12 to 10)	4 (12)	1.2 (10.7)
5.5/3K	**10** to 16 (8 to 6)	10 (8)	2.5 (22.3)
7.5/3K	**10** to 16 (8 to 6)	16 (6)	2.5 (22.3)
7.5/4K	**10** to 16 (8 to 6)	16 (8)	2.5 (22.3)
5.5/4K, 5.5/6K, 7.5/6K	**6** to 10 (10 to 6)	6 (10)	2.5 (22.3)
11.0/3K, 15.0/3K	**20** to 25 (4 to 3)	20 (4)	4.5 (40.1)
15.0/4K	**16** to 25 (6 to 3)	16 (6)	4.5 (40.1)
11.0/4K, 11.0/6K, 15.0/6K	**10** to 25 (8 to 3)	10 (8)	4.5 (40.1)

(1) The value in bold corresponds to the minimum wire gauge to permit secureness.
(2) 75℃ (167 ℉) copper cable (minimum wire size f or rated use).
(3) Recommended value.

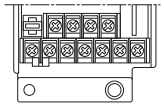
Arrangement of the power terminals

ER23-0.../3K



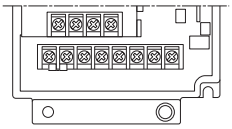
⏚	⏚	R/L1	S/L2	T/L3		
P0	PA/+	PB	PC/-	U/T1	V/T2	W/T3

ER23-0...K



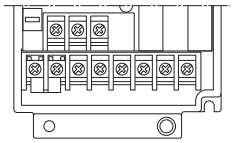
⏚	⏚	R/L1	S/L2			
P0	PA/+	PB	PC/-	U/T1	V/T2	W/T3

ER23-1.1/3K to 4.0/3K, 0.../4K, 1.1/4K to 4.0/4K, 1.5/6K to 4.0/6K, 0.75/6K



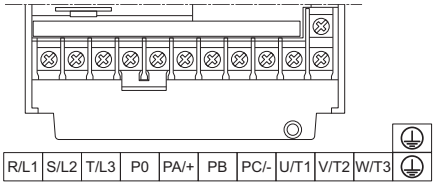
⏚	R/L1	S/L2	T/L3				
P0	PA/+	PB	PC/-	U/T1	V/T2	W/T3	⏚

ER23-1.1K, 1.5K, 2.2K



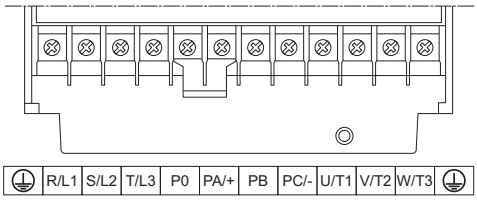
⏚	R/L1	S/L2					
P0	PA/+	PB	PC/-	U/T1	V/T2	W/T3	⏚

ER23-5.5/3K, 7.5/3K, 5.5/4K, 7.5/4K, 5.5/6K, 7.5/6K



											⏚
R/L1	S/L2	T/L3	P0	PA/+	PB	PC/-	U/T1	V/T2	W/T3	⏚	

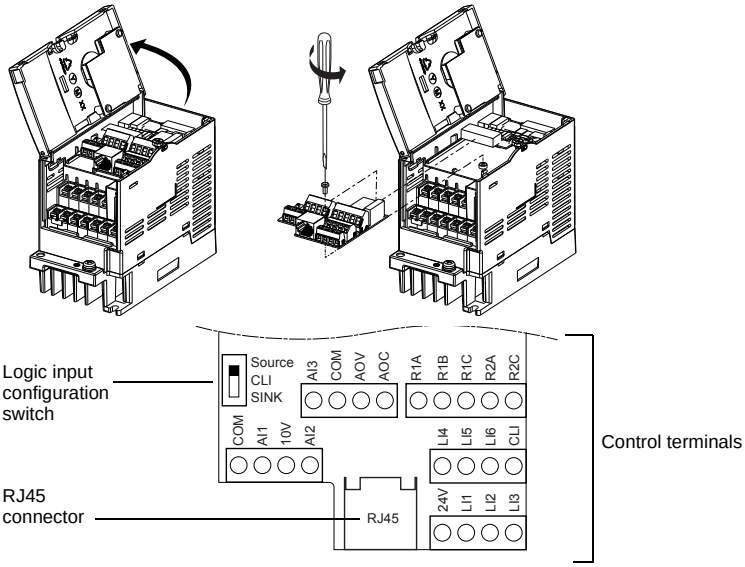
ER23-11.0/3K, 15.0/3K, 11.0/4K, 15.0/4K, 11.0/6K, 15.0/6K



⏚	R/L1	S/L2	T/L3	P0	PA/+	PB	PC/-	U/T1	V/T2	W/T3	⏚

Control terminals

Access to the control terminals



⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Do not plug or unplug the terminal board while drive is powered.
- Check the tightening of the fixing screw after any manipulation on the terminal board.

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

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not touch the terminal board before :
- removing power on the drive,
- removing any voltage on input and output terminals.

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

Arrangement of the control terminals

ER23K Control terminals	Applicable wire size (1) mm² (AWG)	Tightening torque (2) N·m (lb.in)
R1A, R1B, R1C, R2A, R2C	**0.75** to 2.5 (**18** to 14)	0.5 to 0.6 (4.4 to 5.3)
Other terminals	**0.14** to 2.5 (**26** to 16)	

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

Characteristics and functions of the control terminals

Terminal	Function	Electrical characteristics
R1A R1B R1C	Common point C/O contact (R1C) of programmable relay R1	• Minimum switching capacity: 10 mA for 5 VDC • Maximum switching capacity on resistive load (cos φ = 1 and L/R= 0 ms): 5 A for 250 VAC and 30 VDC • Maximum switching capacity on inductive load (cos φ = 0.4 and L/R = 7 ms): 1.5 A for 250 VAC and 30 VDC • Sampling time 8 ms • Service life: 100,000 operations at maximum switching power 1,000,000 operations at minimum switching power
R2A R2C	N/O contact of programmable relay R2	
COM	Analog I/O common	0 V
AI1	Analog input voltage	Analog input 0 + 10 V (maximum safe voltage 30 V) • Impedance 30 kΩ • Resolution 0.01 V, 10-bit converter • Precision ± 4.3%, linearity ± 0.2%, of maximum value • Sampling time 8 ms • Operation with shielded cable 100 m maximum
10 V	Power supply for reference potentiometer	+10 V (+ 8% - 0%), 10 mA max, protected against short-circuits and overloads
AI2	Analog input voltage	Bipolar analog input 0 ± 10 V (maximum safe voltage ± 30 V) **The + or - polarity of the voltage on AI2 affects the direction of the setpoint and therefore the direction of operation.** • Impedance 30 kΩ • Resolution 0.01 V, 10-bit + sign converter • Precision ± 4.3%, linearity ± 0.2%, of maximum value • Sampling time 8 ms • Operation with shielded cable 100 m maximum.
AI3	Analog input current	Analog input X - Y mA. X and Y can be programmed from 0 to 20 mA • Impedance 250 Ω • Resolution 0.02 mA, 10-bit converter • Precision ± 4.3%, linearity ± 0.2%, of maximum value • Sampling time 8 ms
COM	Analog I/O common	0 V

AOV AOC	Analog output voltage AOV or Analog output current AOC or Logic output voltage AOC AOV or AOC can be assigned (either, but not both)	Analog output 0 to 10 V, minimum load impedance 470 Ω or Analog output X - Y mA. X and Y can be programmed from 0 to 20 mA, Maximum load impedance 800 Ω • Resolution 8 bits (1) • Precision ± 1% (1) • Linearity ± 0.2% (1) • Sampling time 8 ms This analog output can be configured as a 24 V logic output on AOC, minimum load impedance 1.2 kΩ (1) Characteristics of digital/analog converter.
24 V	Logic input power supply	+ 24 V protected against short-circuits and overloads, minimum 19 V, maximum 30 V Maximum customer current available 100 mA
LI1 LI2 LI3 LI4 LI5 LI6	Logic inputs	Programmable logic inputs • + 24 V power supply (maximum 30 V) • Impedance 3.5 kΩ • State 0 if < 5 V, state 1 if > 11 V (voltage difference between LI- and CLI) • Sampling time 4 ms
CLI	Logic input common	See page 12.
RJ45	Communication port	Connection for SoMove software, Modbus and CANopen network, remote display, loader tools

Electromagnetic compatibility (EMC)

Principle

- Grounds between the drive, motor and cable shielding must have "high frequency" equipotentiality.
- Use shielded cables with shielding connected to ground at both ends of the motor cable **6** page 20, braking resistor (if used) **8** page 20, and control-signalling cables **7** page 20. Metal ducting or conduit can be used for part of the shielding length provided that there is no break in continuity.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable.

Installation diagram (examples)

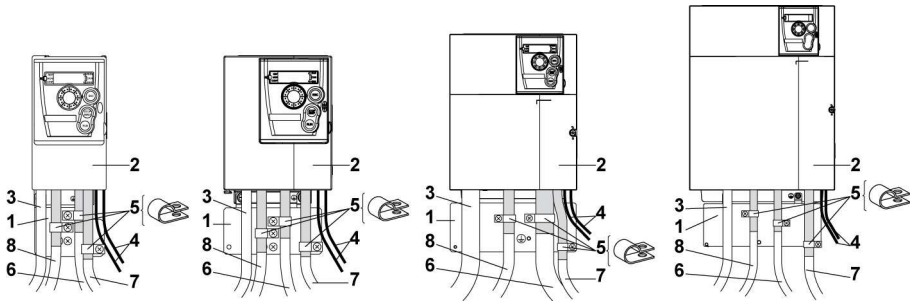
Installation depends on the drive size. The table below gives the size according to the reference.

Size 1	Size 2	Size 3	Size 4	Size 5	Size 6	Size 7
0.18/3K, 0.37/3K	0.55/3K, 0.75/3K	0.18K, 0.37K	0.55K, 0.75K	1.1/3K, 1.5/3K	1.1K, 1.5K, 2.2/3K, 0.37/4K, 0.55/4K, 0.75/4K, 1.1/4K, 1.5/4K, 0.75/6K, 1.5/6K	2.2K, 3.0/3K, 4.0/3K, 2.2/4K, 3.0/4K, 4.0/4K, 2.2/6K, 4.0/6K

Size 8	Size 9
5.5/3K, 7.5/3K, 5.5/4K, 7.5/4K, 5.5/6K, 7.5/6K	11.0/3K, 15.0/3K, 11.0/4K, 15.0/4K, 11.0/6K, 15.0/6K

The corresponding installation diagrams are given on the following page.

Sizes 1 to 4 Size 5 to 7 Size 8 Size 9



1 EMC plate supplied with the drive, to be installed as indicated on the diagram

2 ER23K

3 Non-shielded power supply wires or cable

4 Non-shielded wires for relay contacts

5 Attach 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 to the metal plate to improve electrical contact.

6 Shielded cable for motor connection with shielding connected to ground at both ends.
The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.
For 0.18 to 1.5 kW drives, if the switching frequency is higher than 12 kHz, use cables with low linear capacitance: maximum 130 pF (picoFarads) per meter.

7 Shielded cable for connecting the control/signalling wiring.
For applications requiring several conductors, use cables with a small cross-section (0.5 mm^2, 20 AWG).
The shielding must be connected to ground at both ends. The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

8 Shielded cable for connecting braking resistor (if used).
The shielding must be continuous and intermediate terminals must be in EMC shielded metal boxes.

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 ground conductors (green-yellow) to the appropriate terminals on each unit.

Internal EMC filter on ER23-... and ER23-.../4K

ER23-...K and ER23K-...4K drives have a built-in EMC filter. As a result they exhibit leakage current to ground. If the leakage current creates compatibility problems with your installation (residual current device or other), then you can reduce the leakage current by opening the IT jumper, see ER23K Installation manual. In this configuration EMC compliance is not guaranteed.

Check list

Read carefully the safety information in programming, installation, simplified manuals and the catalogue. Before starting up the drive, please check the following points regarding mechanical and electrical installations, then use and run the drive.
For complete documentation, refer to www.blemo.com.

1. Mechanical installation

- For drive mounting types and recommendations on the ambient temperature, please see the Mounting instructions on page 8 and in the installation manual.
- Mount the drive vertically as specified, see the Mounting instructions on page 8 or in the installation manual.
- The use of the drive must be in agreement with the environments defined by the standard 60721-3-3.
- Mount the options required for your application.

2. Electrical installation

- Connect the drive to the ground, see Equipment Grounding on page 10 and in the installation manual.
- Ensure that the input power voltage corresponds to the drive nominal voltage and connect the line supply as shown on the drawing on page 11 and in the installation manual.
- Ensure to use appropriate input power fuses and circuit breaker. See Installation manual.
- Wire the control terminals as required, see Control terminals on page 16 and in the installation manual. Separate the power cable and the control cable according to EMC compatibility rules.
- The range ER23-...K and ER23-.../4K integrates EMC filter. The leakage current can be reduced using the IT jumper as explained in the paragraph Internal EMC filter on ER23-...K and ER23-.../4K on page 20 and in the installation manual.
- Ensure that motor connections correspond to the voltage (star, delta).

3. Use and run the drive

- Start the drive and you will see [Standard mot. freq] (bFr) page 26 at the first power on. Check that the frequency defined by the frequency bFr (the factory setting is 50 Hz) is in accordance with the frequency of the motor.
- On first power-up parameters [Ref.1 channel] (Fr1) page 26 and [2/3 wire control] (tCC) page 27 appear after bFr. These parameters should be set if you want to control the drive locally, see page «How to control the drive locally» page 39.
- On subsequent power-up, **rdY** will be displayed on the HMI.
- The [Restore config.] (FCS) function, page 36 permits you to reset the drive with factory settings.

Factory Configuration

Drive factory setting

The ER23K is factory-set for the most common operating conditions:
- Display: Drive ready (**rdY**) with motor stopped, and motor frequency with motor running,
- Logic inputs LI5 and LI6, analog input AI3, analog output AOC and relay R2 are not assigned,
- Stop mode in the event of detected fault: freewheel.

Code	Description	Value	Page
bFr	[Standard mot. freq]	50 Hz	26
tCC	[2/3 wire control]	2-wire transition detection control	27
UFt	[U/F mot 1 selected]	SVC (Sensorless flux vector control for constant torque applications)	34
ACC< DEC	[Acceleration] [Deceleration]	3.00 seconds	29
LSP	[Low speed]	0 Hz	29
HSP	[High speed]	50 Hz	29
ItH	[Mot. therm. current]	nominal motor current (value depending on drive rating)	29
SdC1	[Auto DC inj. level 1]	0.7 x nominal drive current, for 0.5 seconds	30
SFr	[Switching freq.]	4 kHz	31
rrS	[Reverse assign.]	Logic input 2 (LI2)	37
PS2	[2 preset speeds]	Logic input 3 (LI3)	30
PS4	[4 preset speeds]	Logic input 4 (LI4)	30
Fr1	[Ref.1 channel]	Analog input 1 (AI1)	26
SA2	[Summing ref. 2]	Analog input 2 (AI2)	(1)
r1	[R1 Assignment]	Detected fault(FLt): the contact opens in the event of a detected fault (or drive off)	(1)
brA	[Dec ramp adapt.]	Automatic adaptation of the deceleration ramp in the event of overvoltage on braking	(1)
Atr	[Automatic restart]	No automatic restarting after a detected fault	(1)
Stt	[Type of stop]	Normal stop mode on deceleration ramp (rMP)	(1)

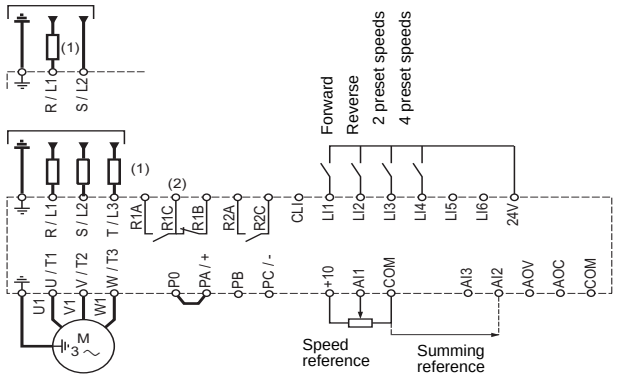
(1) See programming manual for more details.

Check that the above values are compatible with the application. In this case, the drive can be used without changing the settings.

Factory Configuration (continued)

ER23-...K
Single phase supply

ER23-/3K/4K/6K
3-phase supply



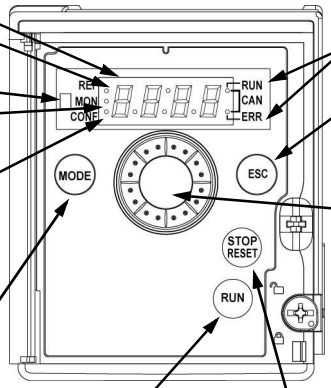
(1) Line choke, if used (single phase or 3-phase)
(2) Relay contacts for remote signalling of drive status

Programming

HMI description

Functions of the display and keys

- Four 7-segment displays
- REF LED, illuminated when **rEF-** menu is active
- Charge LED
- MON LED, illuminated when **SUP-** menu is active
- CONF LED, illuminated when **SEt**, **drC**, **I-O**, **CtL**, **FUn**, **FLt** or **COM** menu is active
- MODE button: When **rEF-** displayed, switches to **SEt-** menu. Otherwise, switches to **rEF-** menu. See page 28
- RUN button: Controls motor switch-on in forward mode if parameter **tCC** in the **I-O-** menu is set to **LOC** page 27



- 2 CANopen status LEDs
- Exits a menu or parameter, or clears the displayed value to return to the previous stored value
- Jog dial - Acts as a potentiometer in local mode. For navigation when turned clockwise + or counterclockwise - and selection / validation when pushed. = *ENT*

  It acts as reference potentiometer, if parameter **Fr1** in the **CtL-** menu is set to **AIU1**

STOP/RESET button

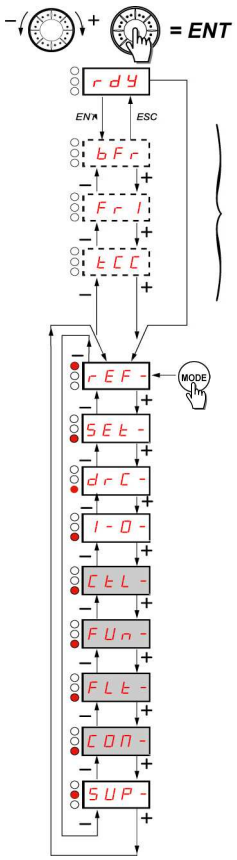
- Used to reset faults to zero
- It can be used to control motor stopping
  - If **tCC** (**I-O-** menu) is not set to **LOC**, it is a freewheel stop.
  - If **tCC** (**I-O-** menu) is set to **LOC**, stopping is on a ramp, but if injection braking is in progress, a freewheel stop takes place.

Normal display, with no detected faults, and the motor not running:

- *4 3.0*: Display of the parameter selected in the [MONITORING] (SUP-) menu (default selection: motor frequency).
- In current limiting mode or saturation of speed or current loop, 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

Menus structure

Refer to the programming manual for comprehensive menu description.

<table>
<tr><th>Power-up</th><th></th><th>Parameter selection</th></tr>
<tr>
<td> 
</td>
<td>These 3 parameters are only visible at first power up of the drive.

Settings can be changed subsequently in menu:
drC- for bFr
CtL- for Fr1
I-O- for tCC.

[SPEED REFERENCE] (rEF-)

[SETTINGS] (SEt-)

[MOTOR CONTROL] (drC-)

[INPUTS / OUTPUTS CFG] (I-O-)

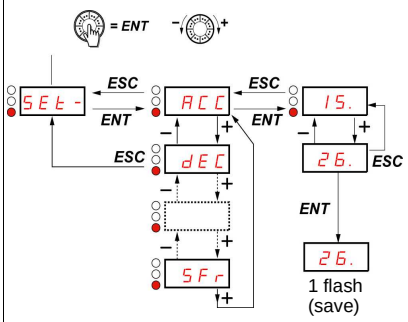
[COMMAND] (CtL-)

[APPLICATION FUNCT.] (FUn-)

[FAULT MANAGEMENT] (FLt-)

[COMMUNICATION] (COM-)

[MONITORING] (SUP-)

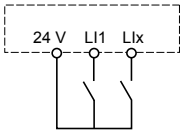
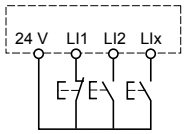
See programming manual</td>
<td> 
</td>
</tr>
</table>

A dash appears after menu codes to differentiate them from parameter codes. Example: [SETTINGS] (SEt-) menu, **ACC** parameter.

Configuration of the bFr, Fr1 and tCC parameters

bFr, **Fr1** and **tCC** parameters can only be modified in stop mode with the drive locked.

Code	Name/Description	Factory settings
bFr	**[Standard mot. freq]** This parameter is only visible the first time the drive is switched on. It can be modified subsequently in the [MOTOR CONTROL] (drC-) menu if required.	[50Hz IEC] (50)
50	• [50Hz IEC] (50) 50 Hz: IEC	
60	• [60Hz NEMA] (60) 60 Hz: NEMA	
	This parameter modifies the presets of the following parameters: **HSP** page 29, **Ftd** page 30, **FrS** page 32 and **tFr** page 34.	
Fr1	**[Ref.1 channel]** This parameter is only visible the first time the drive is switched on. It can be modified subsequently in the [COMMAND] (CtL-) menu if required.	[AI1] (AI1)
AI1	• [AI1] (AI1) Analog input AI1	
AI2	• [AI2] (AI2) Analog input AI2	
AI3	• [AI3] (AI3) Analog input AI3	
AIU1	• [Network AI] (AIV1) Jog dial. In keypad control mode the jog dial acts as a potentiometer.	
	If LAC = L2 or L3, the following additional assignments are possible:	
UPdt	• [+/-Speed] (UPdt) + speed/- speed via LI1	
UPdH	• [+/-spd HMI] (UPdH) + speed/- speed via the drive jog dial or the remote keypad. For operation, display the frequency rFr.	
	If LAC = L3, the following additional assignments are possible:	
LCC	• [HMI] (LCC) Reference via the remote keypad display, [HMI Frequency ref.] (LFr) parameter in the [SETTINGS] (SEt-) menu, see programming manual.	
Ndb	• [Modbus] (Mdb) Reference via Modbus.	
nEt	• [Network] (nEt) Reference via communication protocol other than Modbus.	

Code	Name/Description	Factory settings
tCC	**[2/3 wire control]** This parameter is only visible the first time the drive is switched on. It can be modified subsequently in the [INPUTS / OUTPUTS CFG] (I-O-) menu if required.	[2 wire] (2C)
2C 2 s	• [2 wire] (2C) 2-wire control: The open or closed state of the input controls running or stopping. Wiring example: LI1: forward LIx: reverse 	
3C	• [3 wire] (3C) 3-wire control (pulse control): A "forward" or "reverse" pulse is sufficient to control starting, a "stop" pulse is sufficient to control stopping. Refer to the programming manual. Wiring example: LI1: stop LI2: forward LIx: reverse 	
LOC	• [Local] (LOC) Local control (drive or remote keypad RUN/STOP/RESET). **⚠ DANGER** **UNINTENDED EQUIPMENT OPERATION** When [2/3 wire control] (tCC) assignment is modified, the following parameters [Reverse assign.] (rrS), [2 wire type] (tCt) and all functions affecting logic inputs will return to their factory setting value. Check that this change is compatible with the wiring diagram used. **Failure to follow these instructions will result in death or serious injury.**	

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

[SPEED REFERENCE] (rEF-)

[SPEED REFERENCE] (rEF-) menu displays **LFr**, **AIU1** or **FrH** depending on reference channel active. Refer to the programming manual for further details.

When local control is enabled, the jog dial of the HMI acts as a potentiometer to change the reference value up and down within the limits preset by other parameters [Low speed] (LSP) and [High speed] (HSP).

If local command mode is disabled, using [Cmd channel 1] (Cd1), only reference values and units are displayed. The value will be "read only" and cannot be modified by the jog dial (the reference is no longer given by the jog dial but from an AI or other source).

Actual reference displayed depends on choice made by [Ref. 1 channel] (Fr1).

Code	Name/Description	Adjustment range
LFr	**[HMI Frequency ref.]** This parameter only appears if the function has been enabled. Enables modification of the speed reference with remote keypad. It is not necessary to press ENT key to validate modification of the reference.	0 to 500 Hz
AIU1	**[Image input AIV1]** Enables modification of the speed reference with jog dial.	0 to 100%
FrH	**[Frequency ref.]** Frequency reference before ramp (absolute value).	LSP to HSP Hz

[SETTINGS] (SEt-)

The adjustment parameters can be modified with the drive running or stopped.
Important: It is recommended to make changes with the drive stopped. Test the changes made for proper operation before placing back into service.

Code	Name/Description	Adjustment range	Factory settings
ACC dEC	**[Acceleration]** **[Deceleration]**	according to the value of parameter Inr	3 s 3 s
	Defined for accelerating and decelerating between 0 and the nominal frequency [Rated motor freq.] (FrS) parameter in the [MOTOR CONTROL] (drC-) menu). Check that the value of **dEC** is not too low according to the load to be stopped.		
LSP	**[Low speed]**	0 to HSP	0 Hz
	Motor frequency at minimum reference.		
HSP	**[High speed]**	LSP to tFr	bFR
	Motor frequency at maximum reference: Check that this setting is suitable for the motor and the application.		
ItH	**[Mot. therm. current]**	0 to 1.5 In (1)	According to drive rating
	Set **ItH** to the nominal current on the motor rating plate. Refer to the programming manual if you wish to suppress thermal protection.		
UFr	**[IR compensation]**	0 to 100%	20%
	Used to optimize torque at very low speed (increase **UFr** if the torque is insufficient). Check that the value of **UFr** is not too high when the motor is warm (risk of instability). **Note:** Modifying **UFt** (page 34) will cause **UFr** to return to the factory setting (20%).		
FLG	**[FreqLoopGain]**	1 to 100%	20%
	Parameter can only be accessed if **UFt** (page 34) = **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	**[Fr.Loop.Stab]**	1 to 100%	20%
	Parameter can only be accessed if **UFt** (page 34) = **n** or **nLd**. Value too low: Overspeed, instability Value too high: Longer response time Used to adapt the return to steady state after a speed transient (acceleration or deceleration), according to the dynamics of the machine. Gradually increase the stability to avoid any overspeed.		

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

Code	Name/Description	Adjustment range	Factory settings
SLP	**[Slip compensation]**	0 to 150%	100%
	Parameter can only be accessed if **UFt** (page 34) = **n** or **nLd**. Used to adjust the slip compensation value used by the motor at nominal speed. The speeds given on motor rating plates are not necessarily optimal. • 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	**[Auto DC inj. time 1]**	0.1 to 30 s	0.5 s
SdC1	**[Auto DC inj. level 1]**	0 to 1.2 In (1)	0.7 In (1)
	Important: Check that the motor will withstand this current without overheating.		
tdC2	**[Auto DC inj. time 2]**	0 to 30 s	0 s
SdC2	**[Auto DC inj. level 2]**	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 parameter to 0 disables the function.		
JF2	**[Skip frequency 2]**	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 parameter to 0 disables the function.		
SP2	**[2 preset speeds]**	0.0 to 500.0 Hz	10 Hz
SP3	**[4 preset speeds]**	0.0 to 500.0 Hz	15 Hz
SP4	**[8 preset speeds]**	0.0 to 500.0 Hz	20 Hz
CLI	**[Current Limitation]**	0.25 to 1.5 In (1)	1.5 In (1)
	Used to limit the torque and temperature rise of the motor.		
tLS	**[Low speed time out]**	0.0 to 999.9 s	0.0 s
	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. **Attention:** Value 0 corresponds to an unlimited period.		
Ftd	**[Freq. threshold]**	0 to 500 Hz	bFr
	(Refer to the programming manual).		

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

Code	Name/Description	Adjustment range	Factory settings
ttd	**[Motor therm. level]** (Refer to the programming manual).	0 to 118%	100%
Ctd	**[Current threshold]** (Refer to the programming manual).	0 to 1,5 In (1)	In
SdS	**[Scale factor display]** (Refer to the programming manual).	0,1 to 200	30
SFr	**[Switching freq.]** 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. This parameter can also be accessed in the [MOTOR CONTROL] (drC-) menu page 34.	2.0 to 16 kHz	4 kHz

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

[MOTOR CONTROL] (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	Name/Description	Adjustment range	Factory settings
bFr	**[Standard mot. freq]**	-	50 Hz
	See page 26.		
UnS	**[Rated motor volt.]**	According to drive rating	According to drive rating
	Rated motor voltage given on the nameplate. If the line voltage is less than the rated motor voltage, UnS should be set to the value of the line voltage applied to the drive terminals.		
FrS	**[Rated motor freq.]**	10 to 500 Hz	50 Hz
	Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or 60 Hz if bFr is set to 60 Hz.		
nCr	**[Rated mot. current]**	0.25 to 1.5 In (1)	According to drive rating
	Rated motor current given on the nameplate.		
nSP	**[Rated motor speed]**	0 to 32760 RPM	According to drive rating
	Rating plate value. 0 to 9999 RPM then 10.00 to 32.76 KRPM. If the nominal speed is not given on the rating plate, refer to the programming manual.		
COS	**[Motor 1 Cosinus Phi]**	0.5 to 1	According to drive rating
	Motor cos phi given on the motor nameplate.		
rSC	**[Cold stator resist.]**	-	[No] (nO)
	Leave at [No] (nO)or see programming manual.		

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

Code	Name/Description	Factory settings
tUn	**[Auto Tuning]**	[No] (nO)

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK OR ARC FLASH

- During auto-tuning, the motor operates at rated current.
- Do not service the motor during auto-tuning.

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

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

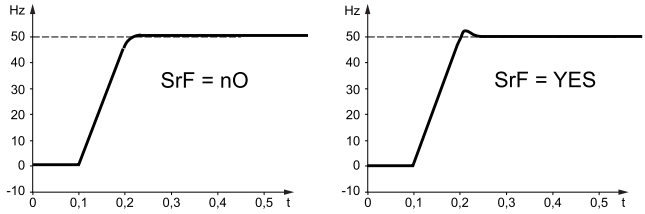
- The following parameters, must be correctly configured before starting auto-tuning: **UnS**, **FrS**, **nCr**, **nSP** and **nPr** or **COS**.
- If one or more of these parameters is modified after auto-tuning has been performed, **tUn** will return to **nO** and the procedure must be repeated.

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

nO	• [No] (nO) Auto-tuning not performed.
YES	• [Yes] (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	• [Done] (dOnE) Use of the values given the last time auto-tuning was performed.
rUn	• [Drv running] (rUn) Auto-tuning is performed every time a run command is sent.
POn	• [Power on] (POn) Auto-tuning is performed on every power-up.
LI1 to **LI6**	• [LI1] (LI1) Auto-tuning is performed on the transition from 0 V 1 of a logic input assigned to this function. • [LI6] (LI6)

Attention:
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 to 2 seconds. Do not interrupt; wait for the display to change to **dOnE** or **nO**.

Important:
During auto-tuning the motor operates at nominal current.

Code	Name/Description	Adjustment range	Factory settings
tUS	**[Auto tuning state]** (information only, cannot be modified)	-	[Not done] (tAb)
tAb **PEnd** **PrOG** **FAIL** **dOnE**	• [Not done] (tAb) The default stator resistance value is used to control the motor. • [Pending] (PEnd) Auto-tuning has been requested but not yet performed. • [In Progress] (PrOG) Auto-tuning in progress. • [Failed] (FAIL) Auto-tuning was not successful. • [Done] (DonE) The stator resistance measured by the auto-tuning function is used to control the motor.		
UFt	**[U/F mot 1 selected]**	-	[SVC] (n)
L **P** **n** **nLd**	• [Cst. torque] (L) Constant torque for motors connected in parallel or special motors. • [Var. torque] (P) Variable torque: Pump and fan applications. • [SVC] (n) Sensorless flux vector control for constant torque applications. • [Energy sav.] (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).		
nrd	**[Noise reduction]**	-	[Yes] (YES)
YES **nO**	• [Yes] (YES) Frequency with random modulation. • [No] (nO) Fixed frequency. Random frequency modulation reduces any resonance which may occur at a fixed frequency.		
SFr	**[Switching freq.]**(1) See page 31.	2.0 to 16 kHz	4 kHz
SrF	**[Speed loop filter]**	10 to 500 Hz	60 Hz
YES **nO**	• [Yes] (YES) The speed loop filter is suppressed (in position control applications, this reduces the response time and the reference may be exceeded). • [No] (nO) The speed loop filter is active (prevents the reference being exceeded). 		
tFr	**[Max frequency] (tFr)** The factory setting is 60 Hz, or 72 Hz if [Standard mot. freq] (bFr) is set to 60 Hz.	10 to 500 Hz	60 Hz

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

Code	Name/Description	Factory settings
SCS	**[Saving config.]** (1)	[No] (nO)
nO **StrI**  2 s	• [No] (nO) Function inactive. • [Config 1] (Str1) 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. The drive is factory set with the current configuration and the backup configuration both initialized to the factory configuration. If the remote keypad display is connected to the drive, up to four additional settings are available: **FIL1**, **FIL2**, **FIL3**, and **FIL4**. Use these selections to save up to four configurations in the remote keypad display's EEPROM memory. SCS automatically switches to **nO** as soon as the save is performed.	
CFG	**[Macro configuration]**	[Factory set.] (Std)
 2 s	**⚠ DANGER** **UNINTENDED EQUIPMENT OPERATION** Check that the selected macro configuration is compatible with the wiring diagram used. **Failure to follow these instructions will result in death or serious injury.**	
StS	Choice of source configuration. • [Start/Stop] (StS) Start/stop configuration. Identical to the factory configuration apart from the I/O assignments: Logic inputs: - LI1, LI2 (2 directions of operation): 2-wire transition detection control, - LI1 = forward, LI2 = reverse - LI3 to LI6: Inactive (not assigned) Analog inputs: - AI1: Speed reference 0-10 V - AI2, AI3: Inactive (not assigned) - Relay R1: The contact opens in the event of a detected fault (or drive off) - Relay R2: Inactive (not assigned) Analog output AOC: 0-20 mA inactive (not assigned)	
Std	• [Factory set.] (Std) Factory configuration (see page 22).	

(1) **SCS**, **CFG** and **FCS** can be accessed from several configuration menus, but they apply to all menus and parameters.

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

Code	Name/Description	Factory settings
FCS  2 s	**[Restore config.]** (1)	[No] (nO)

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

Check that the modification of the current configuration is compatible with the wiring diagram used.

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

nO • [No] (nO) Function inactive.

rECI • [Internal] (rEC1) 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 • [Config. CFG] (InI) The current configuration is replaced by the configuration selected by parameter **CFG** (2).
FCS automatically changes to **nO** as soon as this action has been performed.

If the remote keypad display is connected to the drive, up to four additional selections are available corresponding to backup files loaded in the remote keypad display's EEPROM memory: **FIL1**, **FIL2**, **FIL3**, and **FIL4**. These selections replace the current configuration with the corresponding backup configuration in the remote keypad display. **FCS** automatically changes to **nO** as soon as this action is performed.

Note: If **nAd** briefly appears on the display once the parameter has switched to **nO**, the configuration transfer is not possible and has not been performed (because the drive ratings are different, for example). If **ntr** briefly appears on the display once the parameter has switched to **nO**, a configuration transfer error has occurred and the factory settings must be restored using **InI**. In both cases, check the configuration to be transferred before trying again.

(1) **SCS**, **CFG** and **FCS** can be accessed from several configuration menus, but they apply to all menus and parameters.

(2) The following parameters are not modified by this function; they retain their configuration:
- **bFr** (Standard motor frequency) page 26.
- **LCC** (Control via remote display terminal) in the [COMMAND] (CtL-) menu. Refer to the programming manual.
- **COd** (Terminal locking code) page 39.
- The [COMMUNICATION] (COM-) menu parameters. Refer to the programming manual.
- The [MONITORING] (SUP-) menu. Refer to the programming manual.

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

[INPUTS / OUTPUTS CFG] (I-O-)

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

Code	Name/Description	Factory settings
tCC	**[2/3 wire control]** See page 27.	[2 wire] (2C)
tCt	**[2 wire type]** (parameter only accessible if tCC = 2C)	[Transition] (trn)
	⚠ DANGER **UNINTENDED EQUIPMENT OPERATION** Check that the modification of the 2 wire type control is compatible with the wiring diagram used. **Failure to follow these instructions will result in death or serious injury.**	
LEL	• [Level] (LEL) State 0 or 1 is taken into account for run or stop.	
trn	• [Transition] (trn) A change of state (transition or edge) is necessary to initiate operation, in order to reduce accidental restarts after an interruption of the power supply.	
PFO	• [Fwd priority] (PFO) State 0 or 1 is taken into account for run or stop, but the "forward" input takes priority over the "reverse" input.	
rrS	**[Reverse assign.]**	[LI2] (LI2)
	If **rrS** = **nO**, reverse operation is active, by means of negative voltage on AI2 for example.	
nO	• [No] (nO) Not assigned	
LI1	• [LI1] (LI1) Logic input LI1	
LI2	• [LI2] (LI2) Logic input LI2, can be accessed if **tCC** = **2C**	
LI3	• [LI3] (LI3) Logic input LI3	
LI4	• [LI4] (LI4) Logic input LI4	
LI5	• [LI5] (LI5) Logic input LI5	
LI6	• [LI6] (LI6) Logic input LI6	
CrL3 **CrH3** **AO1t** **dO** **r1** **r2**	See the programming manual.	
SCS **CFG** **FCS**	Identical to [MOTOR CONTROL] (drC-) menu, page 35.	

[MONITORING] (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). Displayed values are given as an indication. These values are not as accurate as those measured using a meter.

 2 s

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.
Note: Following a power off or loss of line supply, the drive status parameter is displayed (rdY for example). The selected parameter is displayed following a run command.

Code	Name/Description	Variation range
LFr	**[HMI Frequency ref.]**	0 to 500 Hz
	This parameter only appears if the function has been enabled. Displays the speed reference coming from the remote keypad.	
rPI	**[Internal PID ref.]**	0 to 100%
	This parameter only appears if PIF is not equal to n0.	
FrH	**[Frequency ref.]** (absolute value)	0 to 500 Hz
rFr	**[Output frequency]**	- 500 to + 500 Hz
	This parameter is also used for the +/- speed function using the display terminal or keypad. It displays and validates operation. In the event of a loss of line supply, rFr is not stored and the +/- speed function must be re-validated in the [MONITORING] (SUP-) menu.	
SPd	**[Motor speed]**	
LCr	**[Motor current]**	
OPr	**[Motor power]**	
	100% = Nominal motor power	
ULn	**[Mains 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)	

Code	Name/Description	Variation range
tHd	**[Drv. thermal state]** 100% = Nominal thermal state 118% = "OHF" threshold (motor overload)	
LFt	**[Last fault occurred]** See Diagnostic and troubleshooting, page 41.	
Otr	**[Motor torque]** 100% = nominal motor torque	
rtH	**[Run time]** 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 [FAULT MANAGEMENT] (FLt-) menu (Refer to the programming manual).	0 to 65530 hours
COd	**[PIN code 1]**	
tUS	**[Auto tuning state]** See page 34.	
UdP	**[Drv.Soft.Ver]** Indicates the ER23K software version. E.g.: 1102 = V1.1 IE02.	
LIA-	**[LOGIC INPUT CONF.]**	
AIA-	**[ANALOG INPUTS IMAGE]**	

Important: Refer to the programming manual for comprehensive parameter and value description.

How to control the drive locally

In factory setting "RUN" and jog dial are inactive. To control the drive locally, adjust the following parameters:

- set [Ref.1 channel] **Fr1** page 26 to **AIU1** (Integrated display with jog dial),
- set [2/3 wire control] **tCC** page 27 to **LOC** (local control).

Migration ER22K - ER23K

The ER23K is compatible with the ER22K latest version.
Nevertheless some difference can exist between both drives. You just have to copy the old paramater in the next drive for the compatibility.

Configuration transfer (using remote display or loader tool)

A new parameter has been added [Select ER22 conf.] (ArE) at the end of [APPLICATION FUNCT.] (FUn-) menu. It enables, during a transfer between ER22K and ER23K, to specify the ER22 type (ER22 or ER22P).
Values of [Select ER22 conf.] (ArE) parameter:

- **nO**, factory setting, transfer between two ER23K,
- **31A**, transfer from ER22P to ER23K,
- **31E**, transfer from ER22K to ER23K.

After transfer is completed, switch of and on the drive in order to initialize the configuration (parameter **ArE** returns to factory setting).

Dimensions

The only difference concerns depth. All ER23K products are 2 mm deeper.

Replacing ER22P

Switchover from HMI version « Europe » ER23K to ER22P
To substitute easily ER22P by ER23K, a fast and simple operation will be performed by the customer to switch ER23K from “Europe” version to “Asia” version.

At first power-up the 2 parameters below appear after bFr. These parameters should be set as follows:
[Ref.1 channel] **Fr1** page 26 set to **AIU1**
[2/3 wire control] **tCC** page 27 set to **LOC**

On subsequent power-up switchover to HMI version is still possible using the following parameters:
[Ref.1 channel] **Fr1** in [COMMAND] (CtL-) menu
[2/3 wire control] **tCC** in [INPUTS / OUTPUTS CFG] (I-O-) menu

Factory settings
Apart control using a potentiometer factory settings between ER22P and ER23K only differ as described in the table below.

Parameter	ATV31ppppppA	ER23K
[2/3 wire control] **tCC**	Local control **LOC**	**2C**
[Ref.1 channel] **Fr1**	Analog input AI1 **AIPV**	**AI1**
[Cmd channel] 1 **Cd1**	Local control **LOC**	**tEr**
[Reverse assign.] **rrS**	**nO** (if **tCC** = **LOC**))	**LI2**
[Forced local Ref.] **FLOC**	Jog Dial **AIP**	**AIU1**

Important: For ER22P logic input switch was set to «Sink» position, ER23K factory setting is «Source». See page 12.

Diagnostic and troubleshooting

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 programmable relay (R1A -R1C or R2A - R2C) contact opens.

Drive does not start, no fault displayed

- If there is no display, check the power supply to the drive, the wiring of inputs AI1 and AI2 and the RJ45 connection.
- Other cases: refer to the programming manual.

Fault detection codes which cannot be reset automatically

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

Code	Name	Possible causes	Remedy
bLF	[NETWORK FAULT]	• Brake release current not reached • Brake engage frequency bEn = nO (not adjusted) when brake logic bLC is assigned.	• Check the drive/motor connection. • Check the motor windings. • Check the Ibr setting in the FUn- menu • Carry out the recommended adjustment of bEn
CrF	[PRECHARGE FAULT]	• 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.
IF1	[INTERNAL FAULT]	• Unknown range	• Replace the drive. • Restart drive. • Contact local BLEMO representative.
IF2	[INTERNAL FAULT]	• MMI card not recognized • MMI card incompatible • Display missing	
IF3	[INTERNAL FAULT]	• EEPROM problem	
IF4	[INTERNAL FAULT]	• Industrial EEPROM fault	
OCF	[OVERCURRENT]	• Incorrect parameters in the [SETTINGS] (SEt-) and [MOTOR CONTROL] (drC-) menus • Inertia or load too high • Mechanical locking	• Check parameters in [SETTINGS] (SEt-) and [MOTOR CONTROL] (drC-) menus • Check the size of the motor/drive/load. • Check the state of the mechanism.

Fault detection codes which cannot be reset automatically (continued)

Code	Name	Possible causes	Remedy
SCF	[MOTOR SHORT CIRCUIT]	• Short-circuit or grounding at the drive output • Significant ground 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.
SOF	[OVERSPEED]	• Speed instability • Spinning load too important	• 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 34). • 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 with the automatic restart function, after the cause has disappeared

These faults can also be reset by switching the drive off and on again or via a logic input.

Code	Name	Possible causes	Remedy
CnF	[NETWORK FAULT]	• Communication fault on communication card	• Check the environment (electromagnetic compatibility). • Check the wiring. • Check the time-out. • Replace the option card.
COF	[CANopen FAULT]	• CANopen bus communication interrupted	• Check the communication bus. • Refer to the product-specific documentation.
EPF	[EXTERNAL FAULT]	• According to user	• According to user
ILF	[INTERNAL LINK FAULT]	• Communication fault between communication card and drive	• Check the environment (electromagnetic compatibility). • Check the connections. • Replace the option card.
LFF	[LOSS OF 4-20 mA]	• Loss of the 4-20 mA reference on input AI3	• Check the connection on input AI3.
ObF	[OVERBRAKING]	• Braking too sudden • Driving load	• Increase the deceleration time. • Install a braking resistor if necessary. • See the brA function (refer to the programming manual).

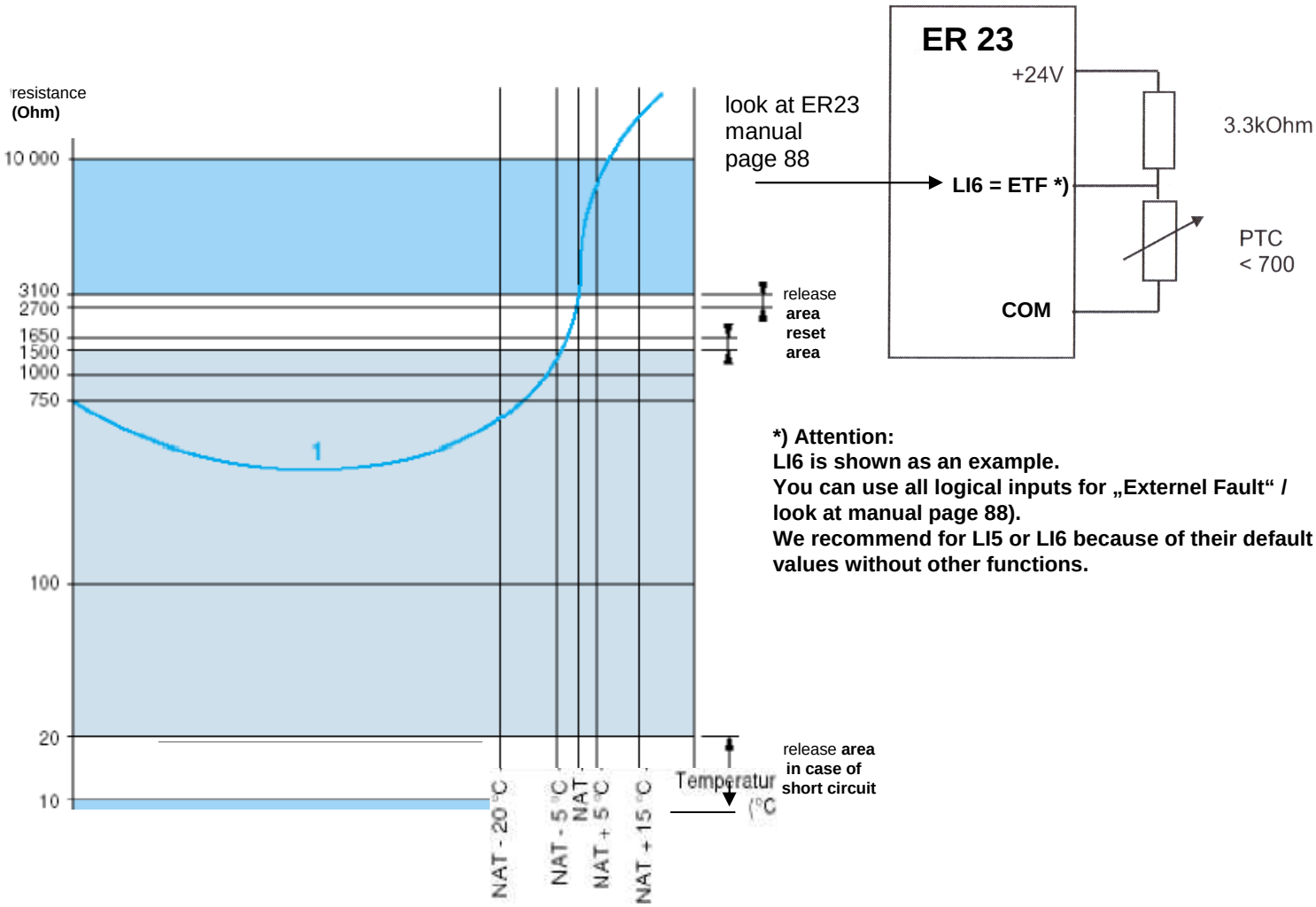
Faults which can be reset with the automatic restart function, after the cause has disappeared (continued)

Code	Name	Possible causes	Remedy
OHF	[DRIVE OVERHEAT]	• 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 • Incorrect value for parameter **rSC**	• Check the **ItH** setting (motor thermal protection) (page 29), check the motor load. Wait for the drive to cool down before restarting. • Re-measure **rSC** (page 32).
OPF	[MOTOR PHASE LOSS]	• 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** (refer to the programming manual, [FAULT MANAGEMENT] (FLt-) menu). • Test on a low power motor or without a motor: set **OPL** to **nO** (refer to the programming manual, [FAULT MANAGEMENT] (FLt-) menu). • Check and optimise the **UFr** (page 29), **UnS** and **nCr** (page 32) parameters and perform auto-tuning with **tUn** (page 33).
OSF	[MAINS OVERVOLTAGE]	• Line voltage too high • Disturbed line supply	• Check the line voltage.
PHF	[INPUT PHASE LOSS]	• Failure of one phase • 3-phase ER23K used on a single phase line supply • Unbalanced load This 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** (refer to the programming manual).
SLF	[MODBUS FAULT]	• Modbus bus communication interrupted • Confirmation of remote terminal **LCC** = **YES** and terminal disconnected	• Check the communication bus. • Refer to the product-specific documentation. • Check the display terminal connection.

Fault detection codes which can be reset as soon as their cause disappears

Code	Name	Possible causes	Remedy
CFF	[INCORRECT CONFIG.] (CFF)	• The current configuration is incompatible.	• Return to factory settings or call up the backup configuration, if it is valid. See parameter **FCS** in the [MOTOR CONTROL] (drC-) menu, page 36.
CFI	[INVALID CONFIG] (CFI)	• 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] (USF)	• Line supply too low • Transient voltage dip • Damaged load resistor	• Check the input voltage and the voltage parameter **UnS**. • Replace the drive.

Wiring/Evaluation of PTC



***) Attention:**
LI6 is shown as an example.
You can use all logical inputs for „Externel Fault“ / look at manual page 88).
We recommend for LI5 or LI6 because of their default values without other functions.

Attention:

- Releasing at about 3 kΩ, possibility of reset by logical input (LI1...LI6 to rSt) at lower values (2,9 kΩ) Please check the motor after releasing „external fault“!
- No realize PTC short circuit
- No use ex-protected motors!
- PTC has to stand 24 V and about 8 mA.

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