

Digital DRIVE for Brushless motor SMD 230-A Series

INSTALLATION GUIDE

Read manual before installing and respect
all indications with this icon :



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I. INTRODUCTION



Read this manual first before installing the drive, non-observance may result in damage to property and in personal injuries.

Only suitable qualified personnel should undertake the mounting, installation, operation and maintenance of this equipment. The general set-up and safety regulations for work on power installations (e.g. DIN, VDE, EN, IEC or other national and international regulations) must be complied with.

It is important that all safety instructions are strictly followed. Personal injury can result from a poor understanding of the safety requirements.

The safety rules are:

VDE 0100	Specification for the installation of power systems up to 1000V
VDE0113	Electrical equipment of machines
VDE0160	Equipment for power systems containing electronic components

- *Never open the equipment.*
- *Dangerous high voltages exist within the equipment and on the connectors. Because of this, before removing any of the connectors, it is necessary to remove the power and wait at least 5 minutes to allow the capacitors to discharge.*
- *Never connect or disconnect the drive with power applied.*
- *Some of the drive's surfaces can be very hot.*

Some of the drive's components are susceptible to damage from electrostatic discharges. Always handle the equipment using appropriate anti-static precautions.

We have gone to great lengths to ensure this documentation is correct and complete. However, since it is not possible to produce an absolutely error-free text. No responsibility will be assumed by SERAD for any damage caused by using this documentation and software.

We reserve the right to make changes to all or part of the specification without prior notice.

I.1 SMD series drive description

I.1.1 General

The SMD Series brushless drives are specially adapted for high dynamic performance.

They contain an integrated power supply and optional mains filter.

They can be used to control motor torque, speed or position depending on their operating mode.

Various field bus configurations are available such as MODBUS, CANopen and EtherCAT that allow the use of the drives in networked systems.

Thanks to their easy-to-program Basic language, multi-tasking kernel, MOTION control features and integrated PLC functions, they are well suited to a wide range of applications.

I.1.2 Technical data

Supply :	90 to 250V AC single phase, neutral system TN or TT Earth leakage current (only for model with EMC filter) : 3,2 mA Neutral system IT is prohibited												
Auxiliary supply :	24 V DC $\pm 10\%$, 0.2A typical, 0.7A max												
Supply filter* :	EMC filter												
Switching frequency :	10 kHz sine-wave PWM												
DC bus voltage :	310V to 400V												
Thermal dissipation :	Power stage off SMD230/01: 15W max SMD230/02: 20W max SMD230/05: 20W max Power stage on, at rated current SMD230/01: 23W SMD230/02: 30W SMD230/05: 50W												
Absorption :	Energy absorbable by the drive without braking resistor: 15J												
Brake resistor :	Brake chopper integrated, Optional external brake resistor : Min value Typical value Max. continous. power Impulsional power 40 Ω 75 Ω 1,8kW 4,6kW												
Protection :	Short circuit between phases, phase to earth, over current, I2t Over voltage, under voltage Motor feedback fault												
Motor feedback* :	<table border="1"> <tr> <td>Tamagawa serial</td> <td>Multi turn : Max 16bits signed Bits per turn : Max 24bits</td> </tr> <tr> <td>EnDat 2.2</td> <td>EnDat 2.2 Bidirectional Multi turn : Max 32bits signed Total bits (Multi turn + 1 turn) : 64 bits</td> </tr> <tr> <td>Biss</td> <td>Biss C unidirectional Multi turn : Max 32bits signed Total bits (Multi turn + 1 turn) : 64 bits</td> </tr> <tr> <td>Ssi</td> <td>Frequency : 200KHz – 50MHz (Fmin > (NBits + 1.5) / 50μs) Multi turn : Max 32bits signed Total bits (Multi turn + 1 turn) : 64 bits</td> </tr> <tr> <td>Resolver</td> <td>Signal Sin/Cos differential Excitation : +/-10Vpp 10KHz – 30mA max Transformation ratio: 0.2 - 2</td> </tr> </table>			Tamagawa serial	Multi turn : Max 16bits signed Bits per turn : Max 24bits	EnDat 2.2	EnDat 2.2 Bidirectional Multi turn : Max 32bits signed Total bits (Multi turn + 1 turn) : 64 bits	Biss	Biss C unidirectional Multi turn : Max 32bits signed Total bits (Multi turn + 1 turn) : 64 bits	Ssi	Frequency : 200KHz – 50MHz (Fmin > (NBits + 1.5) / 50 μ s) Multi turn : Max 32bits signed Total bits (Multi turn + 1 turn) : 64 bits	Resolver	Signal Sin/Cos differential Excitation : +/-10Vpp 10KHz – 30mA max Transformation ratio: 0.2 - 2
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Resolver	Signal Sin/Cos differential Excitation : +/-10Vpp 10KHz – 30mA max Transformation ratio: 0.2 - 2												

	Incremental	A-quad-B, with or without index/Halls, Step/Dir, CW/CCW RS485 line receiver, differential A-quad-B max input frequency : 25MHz (before quadrature) Temps minimum impulsion index : 200ns Halls : Differential (Positive/Negative)
Master encoder :	Incremental	A-quad-B, with or without index, Step/Dir, CW/CCW RS485 line receiver, differential A-quad-B max input frequency : 25MHz (before quadrature) Temps minimum impulsion index : 200ns
	Virtual	DriveBasic
Communication* :	USB RS 485: MODBUS RTU slave CANopen: DS 402, SDO, PDO EtherCAT CoE, SoE	
Digital inputs :	6 inputs (2 fast inputs I5 and I6) Type: PNP, 24V DC, 10mA per input and 15mA per fast input Logic 0: Between 0 and 5 V Logic 1: Between 8 and 30 V Normal Input reaction time: 100µs Max Fast Input capture accuracy: 1.5µs Max	
Digital outputs :	2 outputs Q1 : Relay, 48V dc / 48V ac, 3A max Q2 : Static PNP 24Vdc, 1A max	
Analog input :	1 input : Input voltage : 0 ... 10 V Maximum voltage : 12 V Input impedance : 18 Kohm Resolution : 12 bit	
Diagnostic :	STATUS display 7 segments	
Safety* :	STO (Safe Torque Off), Category 4 / SIL3 / PL e 24 Vdc, 60 mA typical per channel	
Architecture :	Processor : 200 MHz DSP FLASH memory for operating system and programs FRAM memory for variables and parameters Real-time, multi-tasking kernel	
Control loops :	Current loop : 50 µs Speed loop : 100 µs Position loop : 100 µs	
Operating modes :	Torque, Speed and Position mode Motion functions (absolute, relative and infinite movements, S and Sin ² profile) Advanced motion functions (gearbox, CAM profiles, CAMBOX functions, triggered movement)	
Operating temperature :	Basic: 0 to 40°C SMD230 5A: In ventilated cabinet: 0 to +50°C. +50°C à +60°C with a power reduction of 1%/°C SMD230 2A & 1A : 0 to 50°C	
Storage temperature :	-10 to 70°C	
Degree of protection :	IP 20	
Weight	SMD 230/01 : 0.9 kg SMD 230/02 : 1.2 kg SMD 230/05 : 1.2 kg	

* according SMD 230 model

Drive	Rated current	Peak current (2s)	Rated power	Dimensions w x h x d (mm)
SMD 230 / 01	1,25 Arms	3,75 Arms	0,4 kVA	43 x 202 x 134
SMD 230 / 02	2,5 Arms	7,5 Arms	0,75 kVA	64 x 202 x 134
SMD 230 / 05	5 Arms	10 Arms	1,5 kVA	64 x 202 x 134

II. INSTALLATION

II.1 General



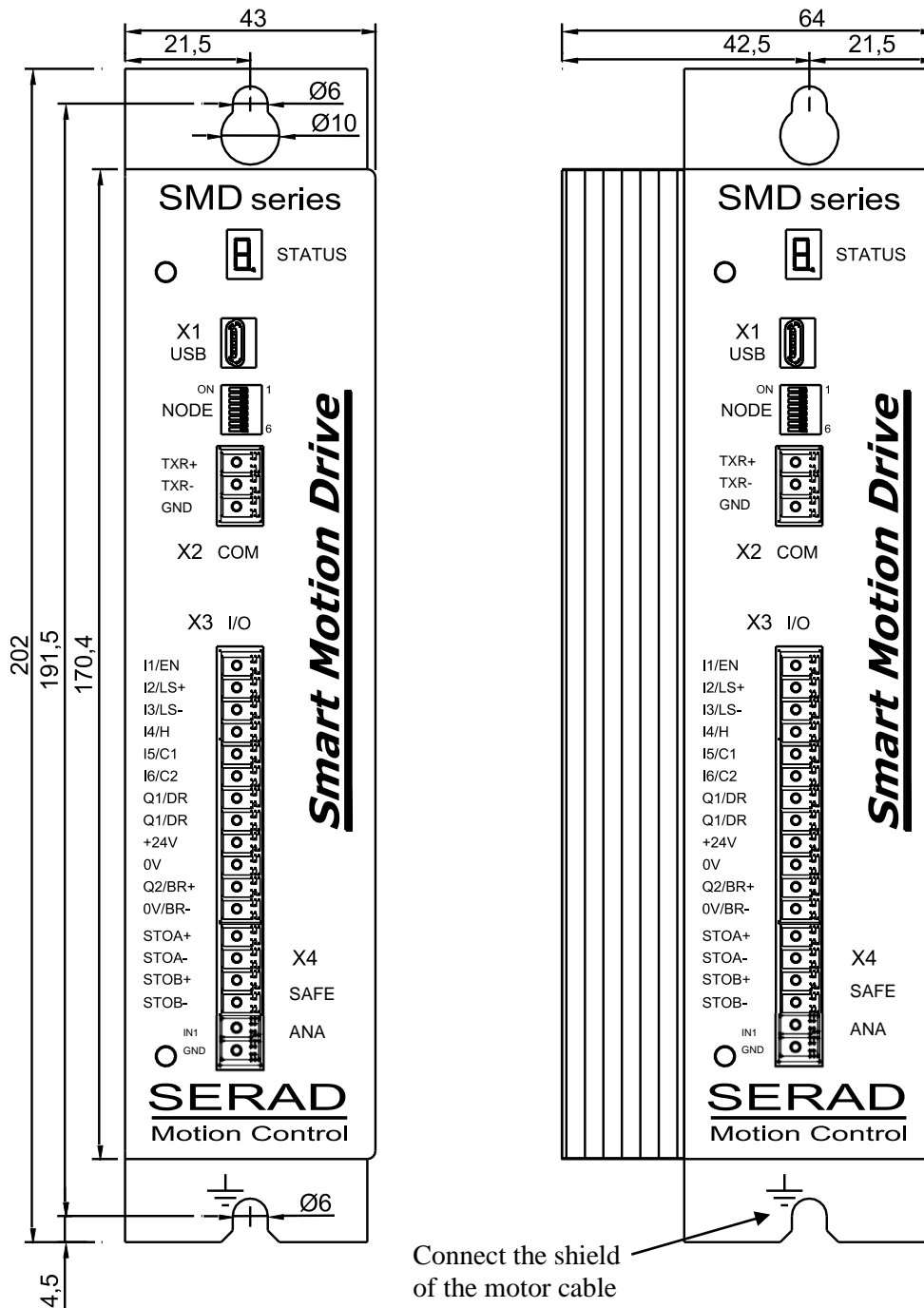
It is very important to adhere to the following:

- A badly earthed connection can damage electronic drive components.
- The drive must be installed vertically in free air to ensure cooling by natural convection.
- It must be protected from excess humidity, liquids, and dirt. The motor, resolver and encoder cables must be screened, the screen being earthed at both ends of the cable.
- All of the communication and I/O cables should be run separately from the power cables.
- The USB cable between the drive and the PC must be screened. It should be disconnected from the drive when no longer in use
- Diodes must be fitted across the loads on all static digital outputs. These diodes must be positioned as close to the load as possible. The supply and signal cables must be free from over-voltage transients.
- Safety standards specify a manual reset after a stop caused either by a supply interruption, or by an emergency stop or by a drive fault.
- For all serious faults, it is obligatory to remove the high voltage supply to the drive.
- The Drive Ready output should be connected in series in the emergency stop loop.
- In the case of axis over-travel, the over-travel limit switches must be connected to the limit inputs or in series with the emergency stop loop. It is also recommended to use the software limits.
- If the drive is configured in position loop, the parameter "Maximum following error" should be set appropriately.
- If the drive contains an application program developed using Drive Studio, connect a signal 'Power supplies OK' to one of the digital inputs and monitor it in a non-blocking safety task. On detection of an excess following error the drive will be put in open loop mode and the drive ready relay will be opened. If another action is required you should use the SECURITY instruction.

II.2 Front view

Model : SMD 230 / 01

SMD 230 / 02 - SMD 230 / 05



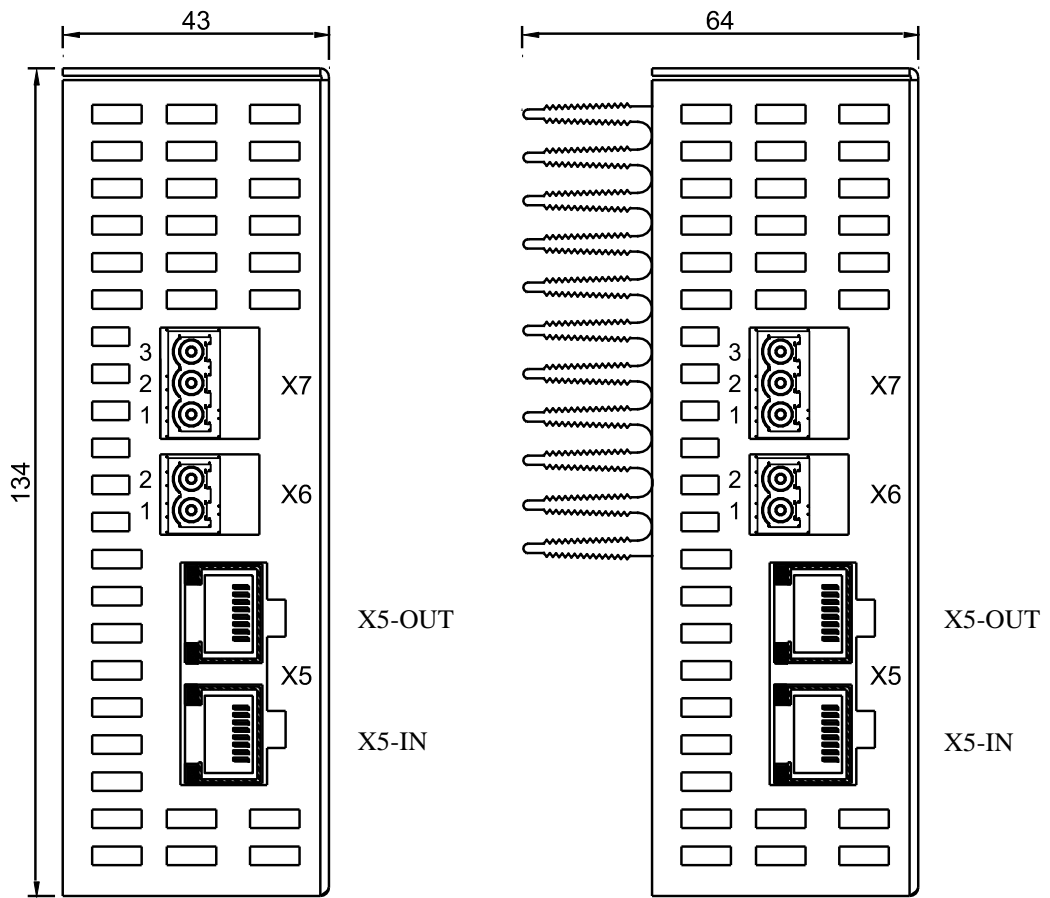
	STATUS	7-segment diagnostic display
	NODE	Node address
X1	USB	USB port for communication with a PC
X2	COM	RS485 serial port
X3	I/O	Digital Inputs / Outputs
X4	SAFE-ANA	SAFETY STO inputs, Analog input

II.3 Top view

Model :

SMD 230 / 01

SMD 230 / 02 - SMD 230 / 05



- | | | |
|----|-------|--|
| X5 | BUS | Fieldbus communication (CANopen, EtherCAT) |
| X6 | AUX | Auxiliary 24 Vdc supply |
| X7 | POWER | Single phase power 230 Vac supply |



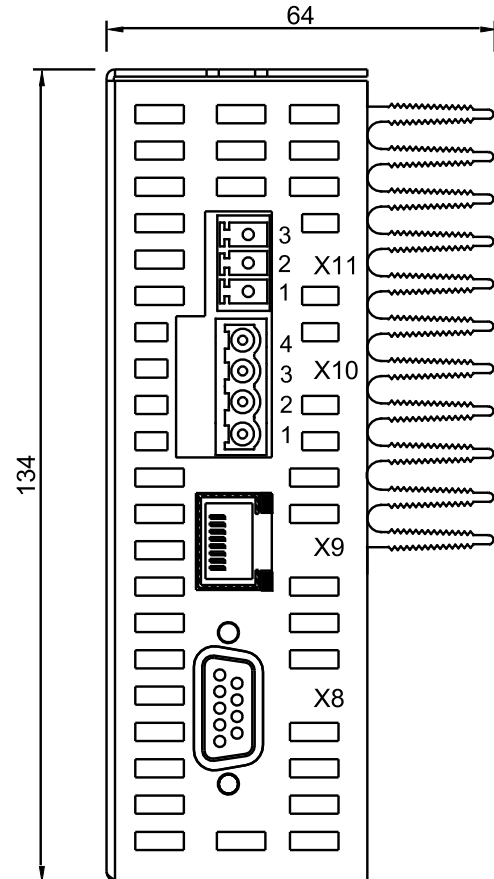
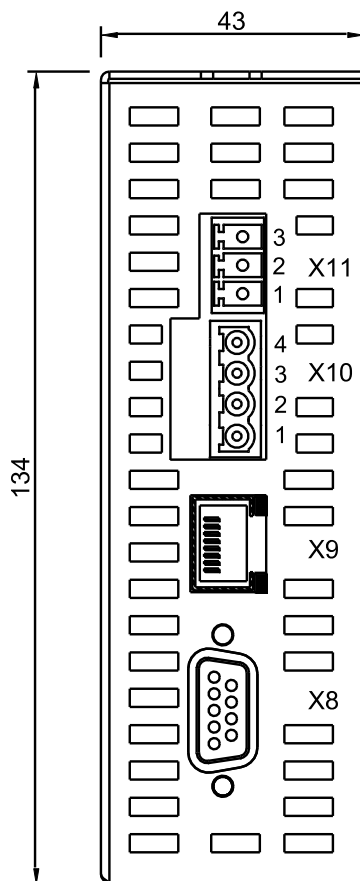
The voltage on connector X7 can reach 230Vac !

II.4 Bottom view

Model :

SMD 230 / 01

SMD 230 / 02 - SMD 230 / 05



X8	FEEDBACK	Main feedback (resolver / Tamagawa encoder / incremental)
X9	MASTER	Master feedback (incremental encoder / stepper)
X10	MOTOR	Motor power supply
X11	BALLAST	External braking resistor



Care must be taken when making connections to connector X10 and X11.

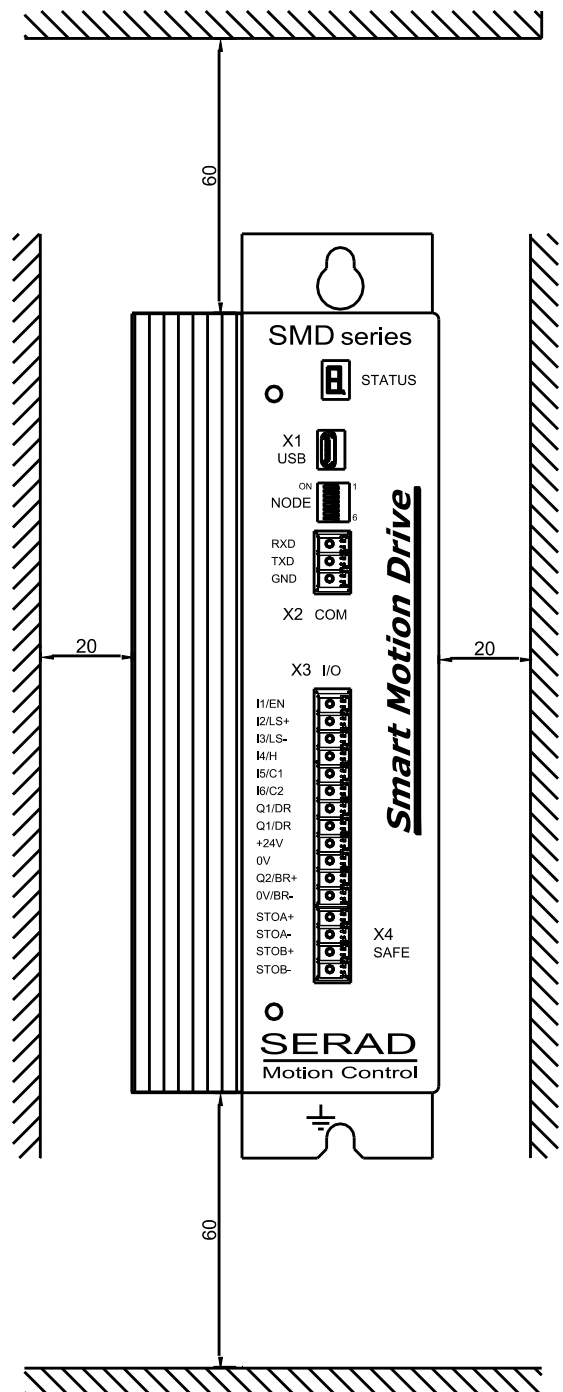
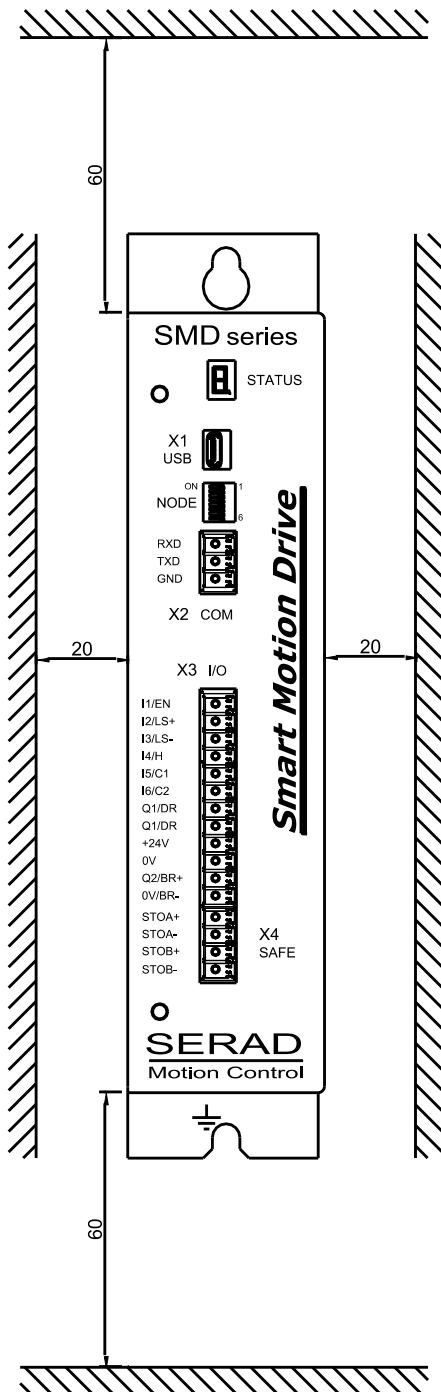
An incorrect connection can seriously damage the drive. Dangerous voltages are present (320V).

Wait at least 5 minutes to allow the capacitors to discharge before removing the connector.

II.5 Mounting

Model : SMD 230 / 01

SMD 230 / 02 - SMD 230 / 05

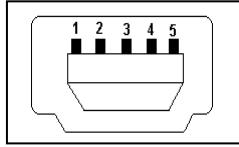


Several drives can be mounted side-by-side provided that enough space (at least 20mm) is left to ensure good natural convection. Leave a space greater than 60mm over and under the drives to allow for the various connectors and cables to be fitted.

II.6 Connector pin assignments

II.6.1 X1 - USB : USB port for communication with a PC

Connector type (device side) : Mini USB female

N°	Name	Type	Description
1	VCC	Inp	V Bus
2	USB D-	Inp/Out	USB Data - 
3	USB D+	Inp/Out	USB data +
4	NC		
5	GND		0V

II.6.2 X2 – COM : RS485 serial port

Connector type (Device side) : 3 ways, 3.81 pitch

N°	Name	Type	Description
1	TXR+	Inp/Out	Transmit & receive data + (A)
2	TXR-	Inp/Out	Transmit & receive data - (B)
3	GND		0V

- **RS485 Node Address :**

NodeID Adress = (binary to decimal conversion of Dipswitchs 1,2,3,4,5,6) + 1

Node ID N°	1	2	3	4	5	6	7	8	9	10	...	63	Reserved
Dip 1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON		OFF	ON
Dip 2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF		ON	ON
Dip 3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF		ON	ON
Dip 4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON		ON	ON
Dip 5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		ON	ON
Dip 6	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		ON	ON

Note: In case of also CANopen communication on the SMD drive, the Dip switch 6 is used to activate the terminal resistor of the CANopen bus and not available to select the nodeID.

Note: If needed, the RS485 terminal resistor (120 Ω) must be placed on the X2 connector between pins 1 and 2.

II.6.3 X3 – I/O : Digital Inputs/Outputs

Connector type (device side): 12 ways, 3.81 pitch

N°	Name	Type	Description
1	I1 / EN	Inp	Input 1 / Specific function: Enable
2	I2 / LS+	Inp	Input 2 / Specific function: Limit Switch +
3	I3 / LS-	Inp	Input 3 / Specific function: Limit Switch -
4	I4 / H	Inp	Input 4 / Specific function: Home switch
5	I5 / C1	Inp	Input 5 / Specific function: Capture 1 (fast input)
6	I6 / C2	Inp	Input 6 / Specific function: Capture 2 (fast input)
7	Q1 / DR	Out	Output 1 / Specific function: Drive Ready Relay contact NO between way 7 and 8
8	Q1 / DR	Out	Relay contact NO between way 7 and 8
9	+24V	Inp	24Vdc for Output 2 supply
10	0V		0V for I/O reference
11	Q2 / BR+	Out	Output 2 / Specific function: Motor Brake + PNP 24Vdc type, 1A max
12	0V / BR-		0V / Motor Brake -

II.6.4 X4 – SAFE - ANA : Safety STO inputs – Analog input

Connector type (device side): 6 ways, 3.81 pitch

N°	Name	Type	Description
1	STOA+	Inp	Safe Torque Off input A. Must be hold to 24V (60 mA typical)
2	STOA-	Inp	Safe Torque Off input A. Must be hold to 0V
3	STOB+	Inp	Safe Torque Off input B. Must be hold to 24V (60 mA typical)
4	STOB-	Inp	Safe Torque Off input B. Must be hold to 0V
5	IN1	Inp	Analog input
6	GND		Analog 0V

II.6.5 X5 – BUS : Fieldbus communication

Connector type (device side): RJ45

N°	CANOpen		EtherCAT	
	Name	Type	Name	Type
1	CAN_H	Inp/Out	TD+	Out
2	CAN_L	Inp/Out	TD-	Out
3	CAN_GND		RD+	Inp
4				
5				
6			RD-	Inp
7	CAN_GND			
8				
	Shield		Shield	

- **CANopen Node Address :**

NodeID Adress = (binary to decimal conversion of Dipswitchs 1,2,3,4,5) + 1

The terminal resistor is activated by the dipswitch n°6 (120 Ω).

Node ID N°	1	2	3	4	5	6	7	8	9	10	...	31	Reserved
Dip 1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON		OFF	ON
Dip 2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF		ON	ON
Dip 3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF		ON	ON
Dip 4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON		ON	ON
Dip 5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		ON	ON
Dip 6	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		OFF	OFF

- **EtherCAT Node Address :**

NodeID Adress = (binary to decimal conversion of Dipswitchs 1,2,3,4,5,6) + 1

Node ID N°	1	2	3	4	5	6	7	8	9	10	...	63	Reserved
Dip 1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON		OFF	ON
Dip 2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF		ON	ON
Dip 3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF		ON	ON
Dip 4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON		ON	ON
Dip 5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		ON	ON
Dip 6	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF		ON	ON



Node ID is taken into account by the drive only when auxiliary supply (X6 connector) is turned on.

II.6.6 X6 – AUX : Auxiliary 24Vdc supply

Connector type (device side): 2 ways, 5.08 pitch

N°	Name	Type	Description
1	XGND		0V
2	+24V	Inp	Control card supply, backup motor position

II.6.7 X7 – POWER : Power 230Vac supply

Connector type (device side) : 3 ways, 5.08 pitch

N°	Name	Type	Description
1	L1	Inp	Line L1
2	N	Inp	Neutral
3	PE		Supply earth



Neutral system : TN or TT only. Neutral system IT is prohibited

Care must be taken when making connections to connector X7.

An incorrect connection can seriously damage the drive. Dangerous voltages are present on X7.

II.6.8 X8 – FEEDBACK : Main feedback Encoder, Resolver

Connector type (device side) : Sub-D 9/25 female

N°	Tamagawa encoder		Resolver		Incremental		EnDat 2.2	
	Name	Type	Name	Type	Name	Type	Nom	Type
1	SD+	Inp/Out	S2 (sinus+)	Inp	A	Inp	Data	Inp/Out
2	SD-	Inp/Out	S1 (cosinus+)	Inp	A/	Inp	/Data	Inp/Out
3	GND		GND		B	Inp	GND	
4			R1 (reference+)	Out	B/	Inp		
5	°CM+ (thermal sensor)	Inp	°CM+ (thermal sensor)	Inp	Z	Inp	°CM+ (thermal sensor)	Inp
6			S4 (sinus-)	Inp	Z/	Inp	Clk	Out
7	+5Vdc (250mA max*)	Out	S3 (cosinus-)	Inp	HALL U	Inp	+5Vdc (250mA max*)	Out
8	°CM- (thermal sensor)	Inp	°CM- (thermal sensor)	Inp	HALL U/	Inp	°CM- (thermal sensor)	Inp
9			R2 (reference-) = GND	Out	HALL V	Inp	/Clk	Out
10					HALL V/	Inp		
11					HALL W	Inp		
12					HALL W/	Inp		
13					°CM+ (thermal sensor)	Inp		
14					+5Vdc (250mA max*)	Out		
15					GND			
	Shield		Shield		Shield		Shield	

*250mA maximum cumulated with the 5V output of the MASTER X9 encoder

II.6.9 X9 – MASTER : Master feedback

Connector type (device side) : RJ45

N°	Incremental encoder		Stepper	
	Name	Type	Name	Type
1	A	Inp	Pulse	Inp
2	A/	Inp	Pulse/	Inp
3	B	Inp	Direction	Inp
4	Z/	Inp		
5	Z	Inp		
6	B/	Inp	Direction/	Inp
7	+5Vdc (250mA max*)	Out	+5Vdc (250mA max*)	Out
8	GND		GND	
	shield		shield	

*250mA maximum cumulated with the 5V output of the FEEDBACK X8 encoder

II.6.10 X10 – MOTOR : motor power supply

Connector type (device side) : 4 ways, 5.08 pitch

N°	Name	Type	Description
1	PE		Motor earth
2	U	Out	Motor phase U
3	V	Out	Motor phase V
4	W	Out	Motor phase W

The shielded motor cable must be connected directly to the terminals of the drive.
Connect the shield, on drive side, to the lower fixing hole (see “Front view” picture).



Care must be taken when making connections to connector X10. An incorrect connection can seriously damage the drive. Dangerous voltages are present on X10.

II.6.11 X11 – BALLAST: External braking resistor

Connector type (device side) : 3 ways, 5.08 pitch

N°	Name	Type	Description
1	DC BUS -	Out	DC Bus (320 Vdc)
2	RB	Out	Braking resistor
3	DC BUS +	Out	DC Bus (320 Vdc)

The external braking resistor must be connected between the terminals 2 and 3 (RB and DC BUS+).

For SMD 230 / 02 and SMD 230 / 05 models, the external resistor can be mounted on the heatsink using the two screws provided .

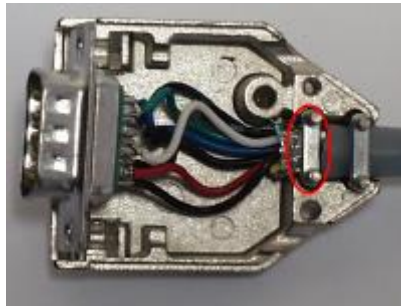


If you have lost the supplied screws for the external resistor, you must use only M4 x 6 screw or you will damage the drive.

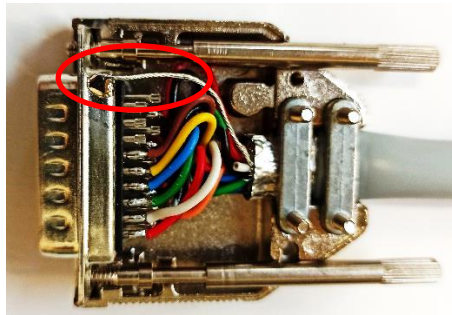
II.7 Cables

We can supply all cables with connectors (standard, robotics ...), contacts us.

- Motor feedback cable (encoder or resolver), X8:
Screened cable with 4 twisted pairs, 0.25 mm²
Ground the shield of the feedback SUBD as shown below.



It is highly recommended to use cable with additional shield wire and sold it on the Sub-D:



Maximum length, encoder feedback: 17 m

Maximum length, resolver feedback: 30 m

- Motor power cable, X10:
Screened cable, 4 core, 1.5 mm²
Connect the shield, on drive side, to the lower fixing hole (see “Front view” picture).

II.8 Protection / Connection diagram

Drive	Input voltage	Maximal input current	Safety device: cutout curve C	Wire
SMD 230 / 01	230V single phase	3 A	10 A maxi	1,5 ²
SMD 230 / 02	230V single phase	7 A	10 A maxi	1,5 ²
SMD 230 / 05	230V single phase	14 A	10 A maxi	1,5 ²

Caution: the in-rush current can reach 10A with a duration of 20ms.



All connections must be made by qualified personnel. The cables must be tested before being connected as any wiring fault can give rise to serious problems

Remove all voltages before inserting the connectors.

Connect the motor earth to the drive (pin 1 of the connector X10) before applying any voltages. For the shielded cables, connect the screen to the chassis at each extremity via the shell of the connectors (for the SUBD) .

Transient suppression measures should be taken on control panel components such as contactors (obligatory on brake) and relays using RC elements or diodes (e.g. 1N4007).

II.8.1 Motor Brake output

Using the Drive Studio parameter set-up window, select the function Brake for output 2.



The output Q2 is PNP 24V, 1A max. It is obligatory to use protection diode otherwise drive components can be damaged.

II.8.2 STO function caution

If the drive integrate Safety inputs (optional STO function), when there is no voltage on the Safety Input but several of the transistors in the IGBT bridge have failed short circuit, it is possible that a small uncontrolled movement of the motor can take place. The maximum movement depends on the number of motor poles:
Maximum movement = 360° / Motor poles, e.g. a 6 pole motor can move 60°.

If the motor is in motion before the Safety Input is removed it will coast to a stop. The time taken to stop will depend on the mechanics of the system.

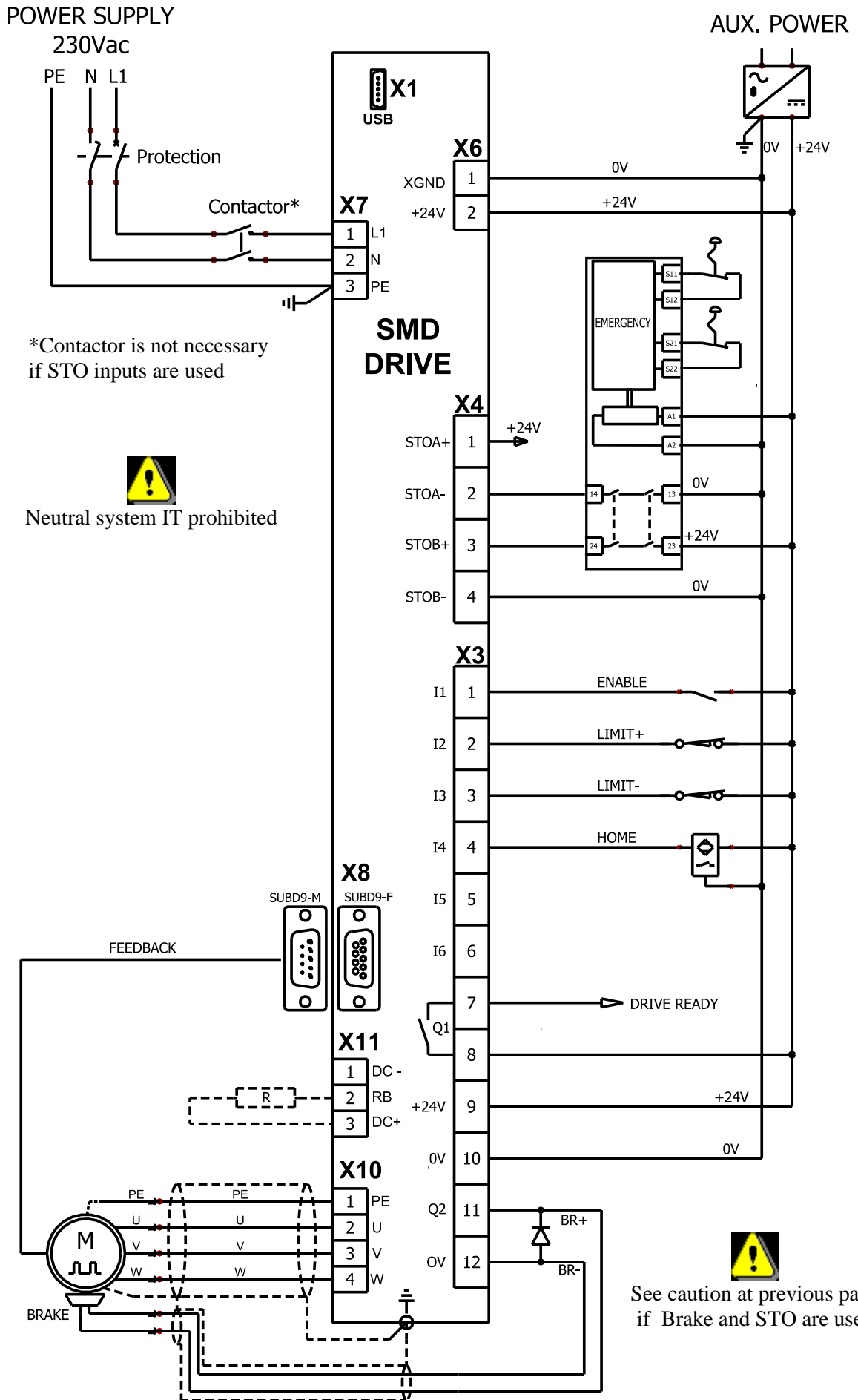
Similarly, as the drive is no longer controlling the motor it is no longer able to support a vertical load. A correctly sized braked must be provided to stop the axis in such cases.



The Q2 output for brake is not SIL3 / PL e level. You must add a serial NO contact, controlled by external emergency safety module, between Q2 and motor brake.

It is important to remember that even when the Safety Input is removed there is still approximately 320V dc present on the internal dc bus .

Therefore it is imperative that the main supply to the equipment is removed before any attempt is made to work on the motor or the drive.



II.9 System check before starting

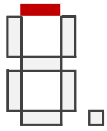
- With the Enable input off, switch on the auxiliary 24V dc supply.
- Ensure that on the **STATUS display**, the point blinking.
- Apply power.
- If the Status display shows an **error message** check the list of error codes.

III. 7 SEGMENTS STATUS DISPLAY

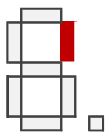
The drive can display some information through the 7 segments STATUS display.

III.1 Initialization sequence

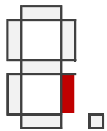
On power on, the drive display the initialization sequence:



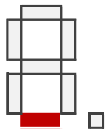
Start



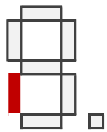
Driver initialized
Fram/Flash init (Can be display E or F)
Communication init



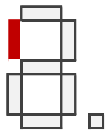
Communication Ok
Init feedback



Init Feedback Ok
Init application




Init application done
Init analog resources



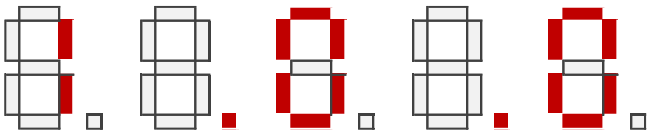
Initialization done

If OS problem occurs during this sequence, display will lead infinitely to the following sequence:
x-x-x... With x a specific character. Please contact support.

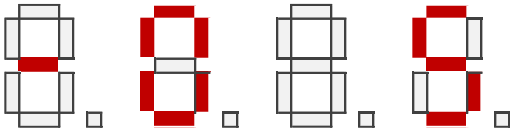


If a  flashing light appears continuously, it is necessary to load an Operating System into the drive.

Then, the software version is displayed. (Example v1.0.0):

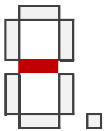


Then, on drive with fieldbus, the configured nodeID with Dipswitchs is displayed (Example node ID = 5):



III.2 SMD in running

In running, the middle segment indicate if the drive is enable (segment on) or not (segment off).

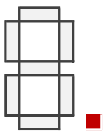


Then the peripheral segments move as the motor feedback in clockwise or counterclockwise direction.



If the instructions display is used in a tasks, the display is a priority.

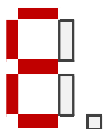
The dot information is according the number of flash:



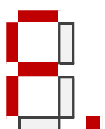
- 1 Flash : No communication
- 3 Flashes: USB communication
- 4 Flashes: USB communication in Supervision mode (CANopen / EtherCAT are disable)
- 6 Flashes: Communication is Ok (CANopen / EtherCAT are enable)

III.3 Specific phase

With some operation, the drive memories can be erase and program.



Flashing “E” indicate the erase of the flash memory (OS/PGM update)



“F” indicate the program of the flash memory (OS/PGM update)

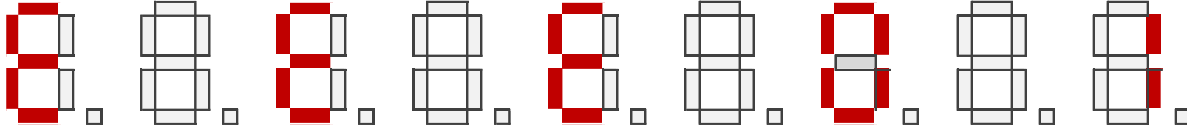
III.4 Error code

Then, after specific event, errors could be displayed.

III.4.1 Errors

The sequence is a 3 flashes with “E” letter, following by two numbers.

Example for Error E01:



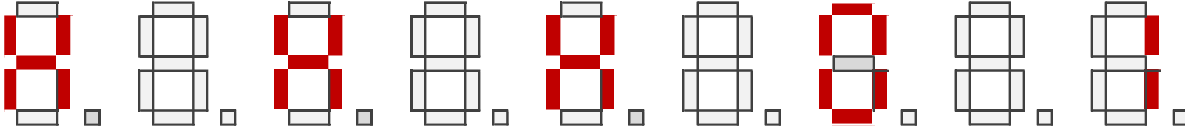
Code	Description
E01	DC bus overvoltage: An overvoltage has been detected on the internal DC bus. This fault may be due to overvoltage on the network or due to overloaded ballast resistor (E51).
E02	Undervoltage DC Bus: The internal DC bus has dropped below the configured minimum voltage. This fault is managed while the drive is enabled.
E03	I ² t motor: Overload on the motor, possible causes: Mechanical hard point, bad power wiring, motor feedback problem, poorly controlled brake.
E04	Overcurrent: A current greater than the maximum measurable current has been detected on at least one of the motor phases. The drive must be powered 24Vdc (connector X6) for 15 min before it can be unlocked. Immediate unlocking possible by computer with Drive Studio in advanced mode.
E05	Short circuit: A short-circuit between phases or the earthing of a motor phase has been detected. The drive must be powered 24Vdc (connector X6) for 15 min before it can be unlocked. Immediate unlocking possible by computer with Drive Studio in advanced mode.
E06	IGBT temperature: maximum temperature reached in the drive. It is impossible to acknowledge the fault until the temperature has gone back down.
E07	Motor temperature: maximum temperature reached in the motor. It is impossible to acknowledge the fault until the temperature has gone back down.
E08	Resolver fault: Defective resolver signals.
E09	Coil temperature: maximum temperature reached in the self. It is impossible to acknowledge the fault until the temperature has gone back down.
E10	Internal error on trajectory computation. Please, contact your vendor.
E11	Drive Studio program error: an error has been detected during the execution of the tasks (division by zero, not correct instruction, CAM or synchro. movement error ...).
E12	Following error: The drive has exceeded the allowed Following error.
E13	Parameter error: Feedback / Auxiliary configuration on Range / Ratio
E14	FRAM read or write error for DriveBasic variable Additional information from Drive Studio: Communication "Online", Tool "Show faults / history".
E15	Overspeed: Speed greater than max defined by object 0x6080 (Max Motor Speed).
E16	Resolver saturation: Sin / Cos resolver signals received too high.

E17	24V auxiliary supply error. This fault is triggered if the 24V auxiliary power supply is noisy or has a voltage dip (<15V). Check the 24V supply.
E20	Communication error CAN*: Transition to STOPPED, INIT or RESET EtherCAT MPC: SMD accept full etherCAT mapping only. PROFINET*: Module Profinet internal Error or exception <i>(*Note: error reported only if object 0x6007 -Abort Connection Option Code- is different from "NO ACTION")</i>
E21	With Serad MPC only: occurs when Axis on asked whereas Input 1 on Validation mode is not set
E23	Error on the communication bus. CAN: <ul style="list-style-type: none"> • Supervision error (LifeGuard / Heartbit event) • CAN BusOff error Profinet: <ul style="list-style-type: none"> • Lost communication with Profinet Master EtherCAT MPC: Cyclic frame not received under expected time <i>(Note: error reported only if object 0x6007 -Abort Connection Option Code- is different from "NO ACTION")</i> EtherCAT DS-402: Problem on the ECAT Chip. N = ALStatusCode
E24	Tamagawa encoder (communication or internal error)
E25	Watchdog: The drive has restarted because of the internal watchdog timeout reached
E26	EnDat / Biss feedback (Communication, CEC, init phase error)
E27	Incremental/Hall sensor default. Check wiring.
E28	Sensor position supply: Detection problem on the sensor position 5 Vdc supply (Tamagawa, Resolver, Endat ...) This may be due to a short-circuit, an over-current on the 5Vdc supply ...
E29	The configuration of the servo loops (0x2111.B, 0x2111.C, 0x2111.D) uses unactivated feedback. (0x2120.1, 0x2121.1, 0x2122.1, 0x2130.1).
E30	Error when executing a cam profile
E51	Brake resistor overload: This fault may be due to an overloaded ballast resistor (not enough) or wrong setting. If no braking resistor configured (Ton = 0), this means that you must either put a braking resistor or configure a lower motor deceleration.

III.4.2 Hardware problems

The sequence is a 3 flashes with “H” letter, following by two numbers.
If these errors occurs, contact the manufacturer.

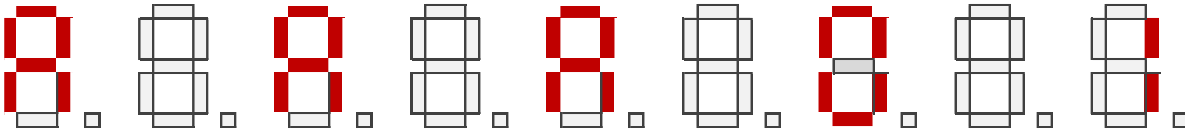
Example for Hardware H01:



Code	Description
H01	FRam memory module not detected.
H02	Flash memory module not detected.
H03	Failed write Flash memory module.
H04	Asic EtherCAT not detected.
H05	Eeprom memory Asic EtherCAT not detected.
H06	Flash memory module detected as empty. The copy of the OS to the Flash memory module has taken place, but the CRC check is bad.
H07	Empty hardware signature error. (No hardware signature in DSP Flash). Factory return for signature programming is needed (non-erasable error).
H08	Corrupted hardware signature error (Bad CRC). Factory return for signature programming is needed (Nnn-erasable error).
H09	Hardware signature error in memory module. Factory return for signature programming is needed (non-erasable error).
H10	Internal system error. Please contact manufacturer
H11	The drive's communication board does not match the value of the "Bus type" parameter. Using DriveStudio to change the value of the "Bus type" parameter to match the drive's hardware configuration.
H12	Internal system error. No interrupt signal on communication module. Please contact manufacturer
H13	Internal system error. DSP processor not compatible with feedback type (Biss, EnDat, SSI). Please contact manufacturer
H14	Internal system error. Simultaneous memory access. Please contact manufacturer.

III.4.3 Warnings

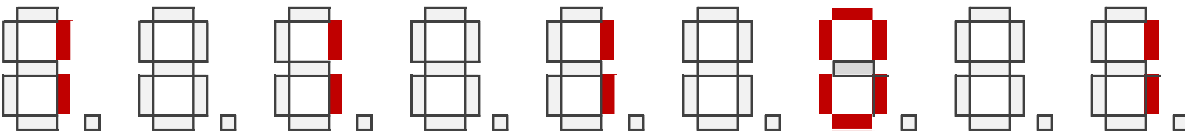
The sequence is a 3 flashes with “A” letter, following by two numbers.
 Example for Warning A01:



Code	Description
A01	Parameter memory problem: at least one parameter and/or DriveBasic variables has been restored to its factory value. Additional information from Drive Studio: Communication "Online", Tool "Show faults / history".
A02	Tamagawa encoder battery too low: the encoder has detected the battery level too low. The absolute position may not be consistent after power on. Change battery is needed.
A03	ENABLE request asked while the internal DC bus has not reached the level sufficient to trigger the soft start.
A04	Safety 1: the safety STO A channel has tripped.
A05	Safety 2: the safety STO B channel has tripped.

III.4.4 Information

The sequence is a 3 flashes with “I” letter, following by two numbers.
 Example for Info I01:

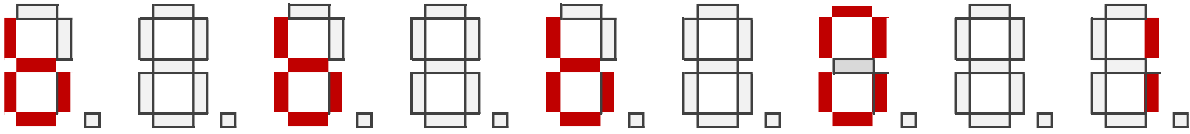


Code	Description
I01	DS-402 Mode: Wrong Transition Requested
I02	EtherCAT : EtherCAT error detected and set to AL Status register of EtherCAT chip.

III.4.5 Bootloader error

The sequence is a 3 flashes with “b” letter, following by two numbers.

Example for boot error b01:



Code	Description
b01	Bootloader error: The DSP Flash memory is empty, the Flash memory module has not been found. But it is mandatory. You cannot reload a program.
b02	Bootloader error: DSP Flash memory error, Unable to activate bank1
b03	Bootloader error: DSP Flash memory error, Blank check fail
b04	Bootloader error: DSP Flash memory error, Programming fail
b05	Bootloader error: DSP Flash memory error, Header fail programming

IV. REVISION

R1821	Initial version
R1837	Add Hardware error H10.
R1840	Add information about display on DriveBasic
R1844	On Display 7 seg init sequence, add OS problem possibility
R1851	Error code updated for Profinet Add earth leakage current
R1908	X5-IN et X5-OUT connectors information on top view SAFETY Error Code: E21/E22 -> A04/A05
R1915	Add E10 error description
R1925	Add EtherCAT MPC error description for E20 and E23
R1931	Add E13 error Correction Pulse & Direction pin assignment on X9 connector
R1939	Add E26 error description
R1941	Add H11 error
R1945	Hardware modifications on SMD230xxxxxA models : Connector X2 – COM : serial port RS485 instead of RS232 Connector X4 – SAFE – ANA : add analog input 0 ... 10 V Connector X9 – MASTER : pin assignment modification on signals Z/, B/, Direction/
R1950	E27 error added
R2002	Add E21 Error description
R2009	Additional information in error E04 and E05 description
R2021	Add incremental encoder
R2038	Add H14 Error description, A01 description, add E14 error
R2042	Update feedback information Add thermal dissipation
R2104	Add information on Input characteristics
R2143	Add information on feedback cable
R2221	Add thermal info carateristics
R2230	Correction R2 Resolver pin assignment on X8 connector Correction +5Vdc Incremental Type pin assignment on X8 connector
R2329	More information added to error messages.