

Digital DRIVE for Brushless motor

SMD 400 Series

Models
SMD 400-04
SMD 400-08

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:	400V AC $\pm 10\%$ three phase Earth leakage current: 2 mA		
Auxiliary supply:	24 V DC $\pm 10\%$, 0.3A typical, 1A max		
Supply filter:	Integrated EMC filter		
Switching frequency:	10 kHz sine-wave PWM		
DC bus voltage:	560V		
Thermal dissipation:	Power stage off SMD 400-04: 20 W max SMD 400-08: 20 W max Power stage on SMD 400-04: 110 W at $I_n = 4A$ SMD 400-08: 140 W at $I_n = 8A$		
Absorption	Energy absorbable by the drive without braking resistor SMD 400-04: 20J SMD 400-08: 41J		
Brake resistor	SMD 400-04:		
	Optional external brake resistor:		
	Min value	Typical value	Max. continuous power
	100 Ω	150 Ω	3.1kW
Brake resistor	SMD 400-08:		
	Internal brake resistor: 75 Ω , 57W, pulsed power 1100W		
	Optional external brake resistor:		
	Min value	Typical value	Max. continuous power
48 Ω	75 Ω	6,2kW	
Protection:	Short circuit between phases, phase to earth, over current, I ² t Over voltage, under voltage Motor feedback fault		

Motor feedback:	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
	Resolver	Signal Sin/Cos differential Excitation: +/-10Vpp 10KHz – 30mA max Transformation ratio: 0.2 - 2
	Incremental	A-quad-B, with or without index/Halls RS485 line receiver, differential A-quad-B max input frequency: 25MHz (before quadrature) Temps minimum impulsion index : 200ns Halls: Differential (Positive/Negative)
Master encoder:	Ssi	Frequency: 200KHz – 50MHz ($F_{min} > (N_{Bits} + 1.5) / 50\mu s$) 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
	Incremental	A-quad-B, with or without index, Step/Direction, CW, CCW RS485 line receiver, differential A-quad-B max input frequency: 25MHz (before quadrature) Temps minimum impulsion index: 200ns
	Virtual	Drive Basic
Communication:	USB RS 485: MODBUS RTU slave CANopen*: DS 402, SDO, PDO EtherCAT CoE* Modbus TCP*	
Digital inputs:	6 inputs (2 fast inputs I5 and I6) + extension board 10 inputs 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 + Extension board 8 outputs 500 mA max per output	
Analog input:	1 input: Input voltage: 0 ... 10 V Maximum voltage: 12 V Input impedance: 18Kohm Resolution: 12 bits	
Analog output:	1 output: Output voltage: 0 ... 10 V Maximum current: 50mA 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 μ s Speed loop: 100 μ s Position loop: 100 μ s
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:	0 to 40°C +40°C to 50°C with a power reduction of 3%/°C
Storage temperature:	-10 to 70°C
Degree of protection:	IP 20
Weight	SMD 400-04: 1.5 kg SMD 400-08: 2.4 kg

* Options

Drive	Rated current	Peak current (2s)	Rated power	Dimensions w x h x d (mm)
SMD 400-04	4 Arms	8 Arms	2.3kVA	85 x 202 x 134
SMD 400-08	8 Arms	16 Arms	4,5kVA	100 x 202 x 185

II. INSTALLATION

II.1 General



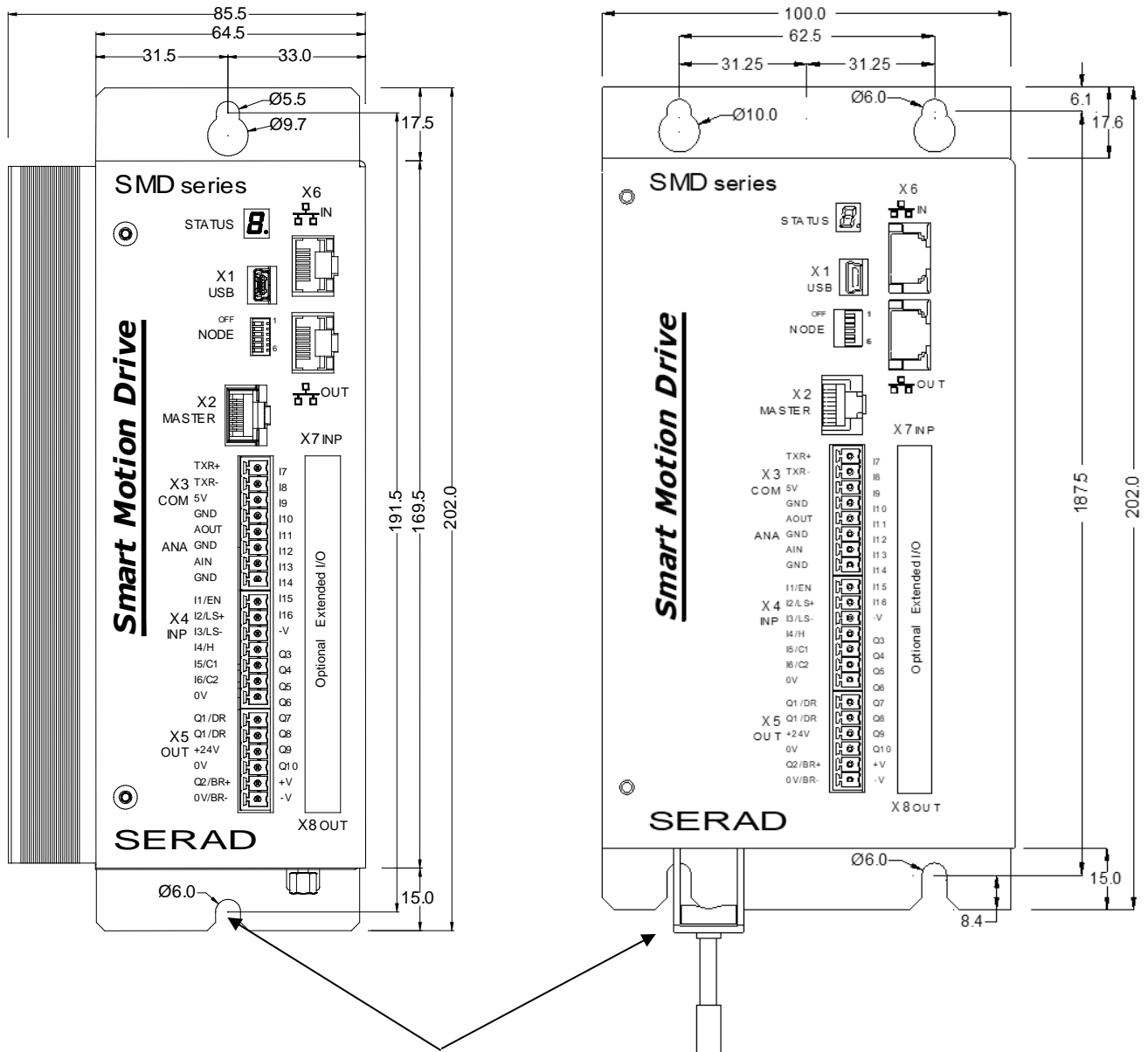
It is very important to adhere to the following:

- 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 400-04**

SMD 400-08



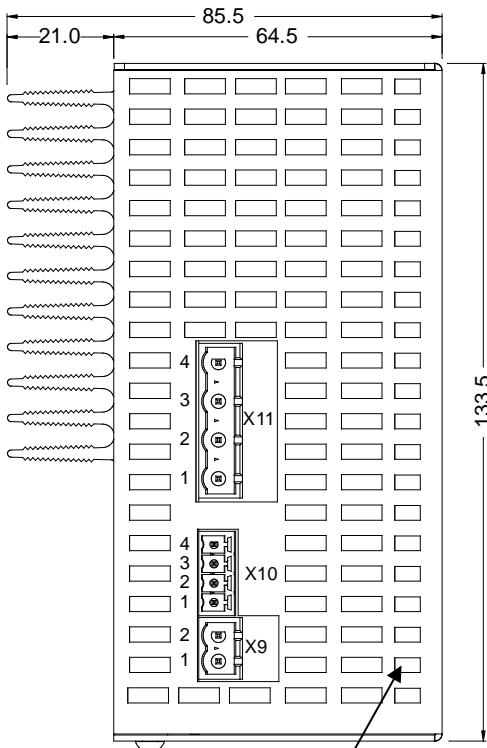
Connect the shield
of the motor cable

	STATUS	7-segment diagnostic display
	NODE	Node address
X1	USB	USB port for communication with a PC
X2	MASTER	Master feedback (incremental encoder / stepper / CW-CCW)
X3	COM-ANA	RS485 serial port / Analog input / Analog output
X4	INP	Digital Inputs
X5	OUT	Digital Outputs
X6	BUS	Fieldbus communication (CANopen, EtherCAT)
X7	INP	Digital inputs Extension board
X8	OUT	Digital outputs Extension board

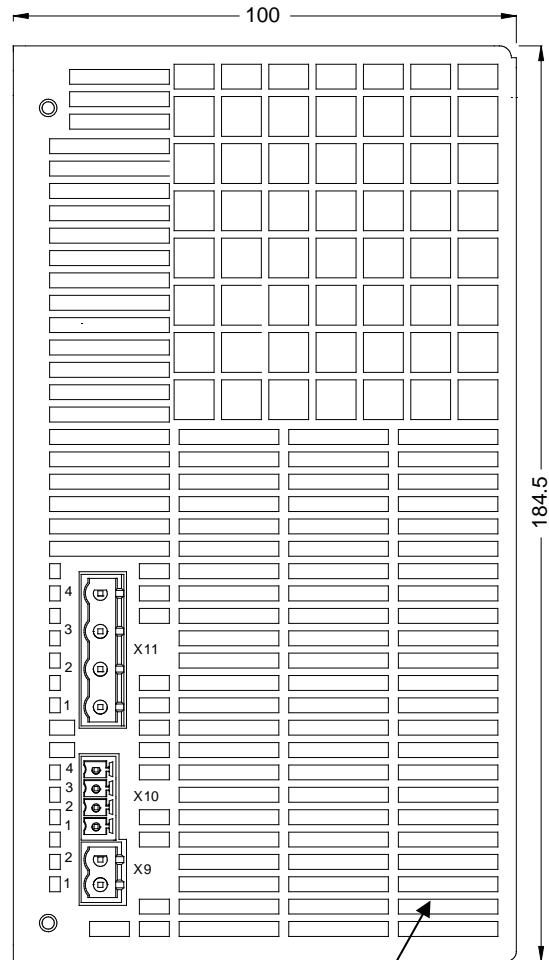
II.3 Top view

Model: **SMD 400-04**

SMD 400-08



ON OFF
Dipswitch termination
resistor if CANopen



ON OFF
Dipswitch termination
resistor if CANopen

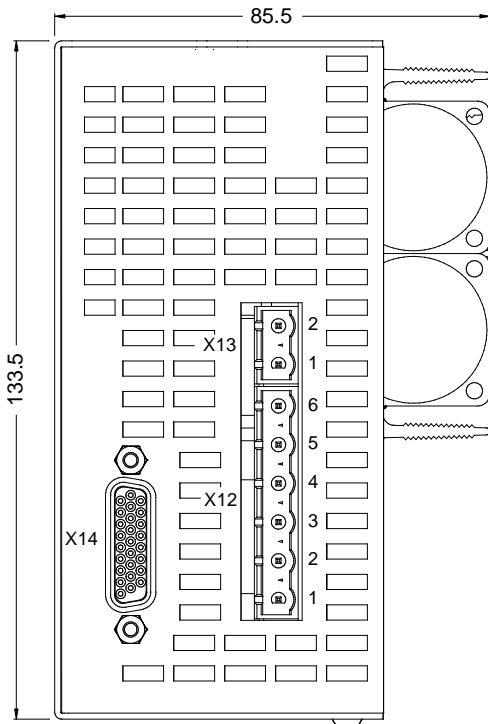
- | | | |
|-----|-------|----------------------------------|
| X9 | AUX | Auxiliary 24 Vdc supply |
| X10 | SAFE | SAFETY STO inputs |
| X11 | POWER | Three phase power 400 Vac supply |



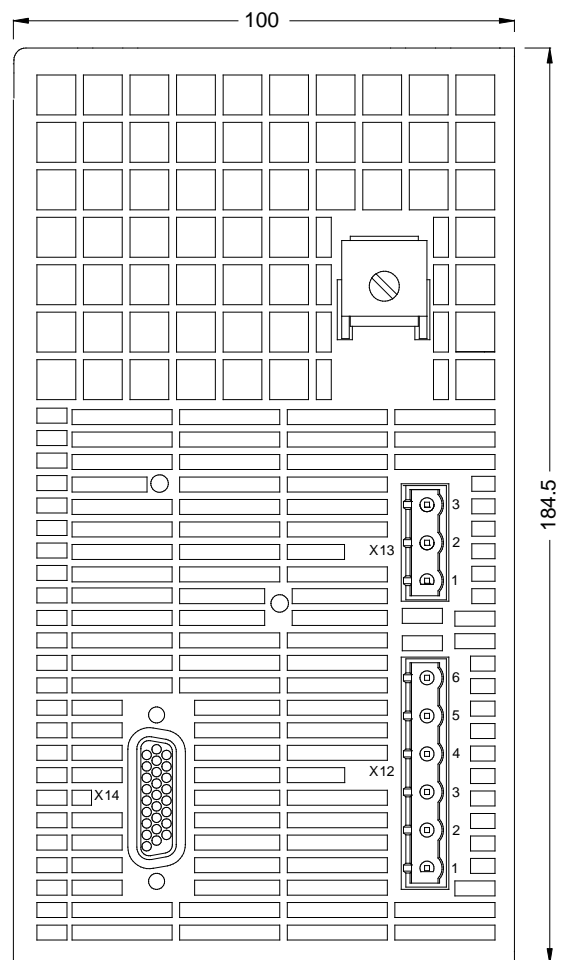
The voltage on connector X11 can reach 400Vac !

II.4 Bottom view

Model: SMD 400-04



SMD 400-08



X12 MOTOR
 X13 BALLAST
 X14 FEEDBACK

Motor power supply
 Braking resistor
 Main feedback
 (Resolver/ Tamagawa / incremental, Biss, EnDat, SSI)

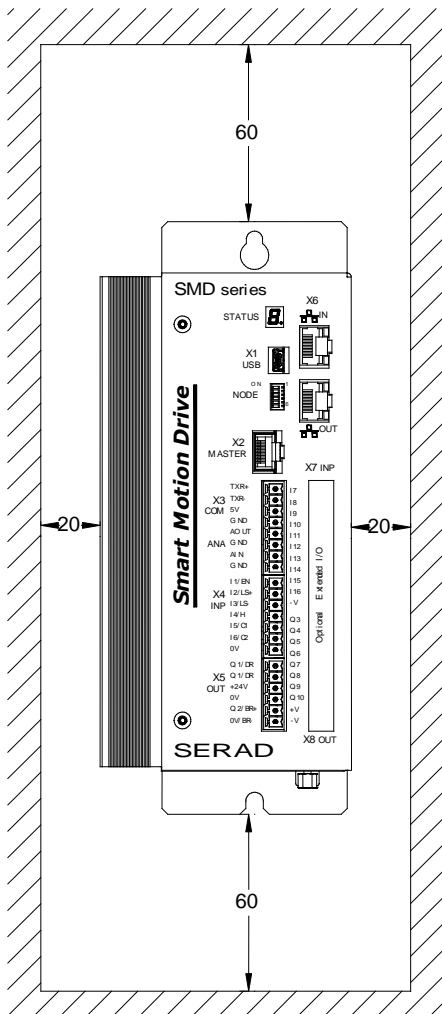


Care must be taken when making connections to connector X12 and X13. An incorrect connection can seriously damage the drive. Dangerous voltages are present (560V).

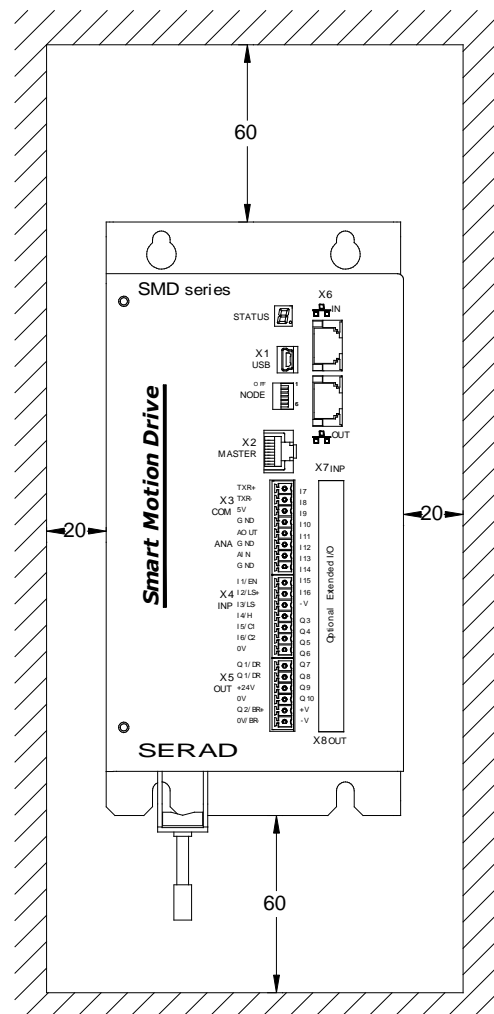
Wait at least 5 minutes to allow the capacitors to discharge before removing the connector.

II.5 Mounting

Model: **SMD 400-04**



Model: **SMD 400-08**

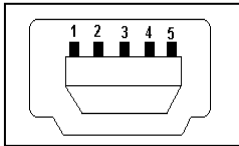


Several drives can be mounted side-by-side provided that enough space (at least 20mm) is left to ensure good natural convection. Leave a space greater than 60mm over and under the drives to allow for the various connectors and cables to be fitted.

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 – MASTER: Master feedback

Connector type (device side): RJ45

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

*250mA maximum cumulated with the 5V output of the FEEDBACK X14 encoder

II.6.3 X3 – COM-ANA: RS485 serial port / Analog inputs/outputs

Connector type (Device side): 8 ways, 3.81 pitch

N°	Nom	Type	Description
1	TXR+	Inp/Out	Transmit & receive data + (A)
2	TXR-	Inp/Out	Transmit & receive data - (B)
3	5V	Out	5Vdc (0.5A max)
4	GND		0V
5	AOUT	Out	Analog output 0 ... 10V – 50mA
6	GND		0V
7	AIN	Inp	Analog input 0 ... 10V
8	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 CAN bus communication, the Dip switch 6 is used to activate the terminal resistor of the CAN bus and not available to select the nodeID.

Note: If needed, the RS485 terminal resistor (120 Ω) must be placed on the X3 connector between pins 1 and 2.



The text silkscreened on the metal front of the case indicates the numbers of the dups and the OFF position

II.6.4 X4 – I/O: Digital Inputs

Connector type (device side): 7 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	0V		0V I/O

II.6.5 X5 – I/O: Digital Outputs

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

N°	Name	Type	Description
1	Q1 / DR	Out	Output 1 / Specific function: Drive Ready Relay contact NO between way 1 and 2
2	Q1 / DR	Out	Relay contact NO between way 1 and 2
3	+24V	Inp	24Vdc for Output 2 supply
4	0V		0V I/O
5	Q2 / BR+	Out	Output 2 / Specific function: Motor Brake + PNP 24Vdc type, 1A max
6	0V / BR-		0V I/O / Motor Brake -

II.6.6 X6 – 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 Address = (binary to decimal conversion of Dip switches 1,2,3,4,5) + 1

The Dip switches 6 must be set to Off

The terminal resistor is activated by the dipswitch on the bottom of the drive (120 Ω). See chapter II-2.

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 Address = (binary to decimal conversion of Dipswitches 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 (X9 connector) is turned on.



The text silkscreened on the metal front of the case indicates the numbers of the dipo and the OFF position

II.6.7 X7 – I/O: Extended digital inputs

Connector type (device side): 11 ways, 3.81 pitch

N°	Nom	Type	Description
1	I7	Inp	Input 7
2	I8	Inp	Input 8
3	I9	Inp	Input 9
4	I10	Inp	Input 10
5	I11	Inp	Input 11
6	I12	Inp	Input 12
7	I13	Inp	Input 13
8	I14	Inp	Input 14
9	I15	Inp	Input 15
10	I16	Inp	Input 16
11	-V		0V extended I/O

II.6.8 X8 – I/O: Extended digital output

Connector type (device side): 10 ways, 3.81 pitch

N°	Nom	Type	Description
1	Q3	Out	Output 3, PNP 24Vdc Type, 1A max
2	Q4	Out	Output 4, PNP 24Vdc Type, 1A max
3	Q5	Out	Output 5, PNP 24Vdc Type, 1A max
4	Q6	Out	Output 6, PNP 24Vdc Type, 1A max
5	Q7	Out	Output 7, PNP 24Vdc Type, 1A max
6	Q8	Out	Output 8, PNP 24Vdc Type, 1A max
7	Q9	Out	Output 9, PNP 24Vdc Type, 1A max
8	Q10	Out	Output 10, PNP 24Vdc Type, 1A max
9	+V	Inp	24Vdc for extended output supply
10	-V		0V extended I/O

II.6.9 X9 – 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.6.10 X10 – SAFE

Connector type (device side): 4 ways, 3.81 pitch

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

II.6.11 X11 – POWER: Power 400Vac supply

Connector type (device side): 4 ways, 7.62 pitch

N°	Name	Type	Description
1	PE		Supply earth
2	L1	Inp	Line L1
3	L2	Inp	Line L2
4	L3	Inp	Line L3



Care must be taken when making connections to connector X11.

An incorrect connection can seriously damage the drive. Dangerous voltages are present on X11.

II.6.12 X12 – MOTOR: motor power supply

Connector type (device side): 6 ways, 7.62 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
5	DC BUS -	Out	DC Bus (reference)
6	DC BUS +	Out	DC Bus (560Vdc)

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 chapter II-2 “Front view” picture).



Care must be taken when making connections to connector X12. An incorrect connection can seriously damage the drive. Dangerous voltages are present on X12.

II.6.13 X13 – BALLAST: Braking resistor

Model SMD 400-04**Connector type (device side): 2 ways, 7.62 pitch**

N°	Name	Type	Description
1	RB	Out	Braking resistor
2	DC BUS +	Out	DC Bus (560 Vdc)

The external braking resistor must be connected between the terminals 1 and 2 (RB and DC BUS+).

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.



The drive parameters must be adapted to the brake resistor used. Incorrect settings may seriously damage the installation.
(Drive Studio: Security group settings, DC Bus tab: Choose the right resistor into the library).

Model SMD 400-08**Connector type (device side): 3 ways, 7.62 pitch**

N°	Name	Type	Description
1	DC BUS +	Out	DC Bus (560Vdc)
2	RB	Out	Braking resistor *
3	RI	In	Internal braking resistor *

*Braking resistor selection:

- Internal resistor: Place a shunt between terminals 2 and 3 (RB and RI)
- External resistor: Remove the shunt between terminals 2 and 3
Connect the external resistor between terminals 1 and 2 (DC BUS+ and RB)



The drive parameters must be adapted to the brake resistor used. Incorrect settings may seriously damage the installation.
(Drive Studio: Security group settings, DC Bus tab: Choose the right resistor into the library).
For the internal resistor, choose « SMD 400-08 internal »

II.6.14 X14 - FEEDBACK: Main feedback Encoder, Resolver

Connector type (device side): Sub-D 26 female

N°	Tamagawa encoder		Resolver		Incremental		EnDat 2.2 / BiSS-C / SSI	
	Nom	Type	Nom	Type	Nom	Type	Nom	Type
1	SD-	Inp/Out					/Data	Inp/Out
2	GND		GND		GND		GND	
3							/Clk	Out
4					HALL W/	Inp		
5					HALL V/	Inp		
6					HALL U/	Inp		
7					Z/	Inp		
8					B/	Inp		
9					A/	Inp		
10	SD+	Inp/Out					Data	Inp/Out
11	+5Vdc (250mA max*)	Out	+5Vdc (250mA max*)	Out	+5Vdc (250mA max*)	Out	+5Vdc (250mA max*)	Out
12							Clk	Out
13					HALL W	Inp		
14					HALL V	Inp		
15					HALL U	Inp		
16					Z	Inp		
17					B	Inp		
18					A	Inp		
19	°CM- (thermal sensor)	Inp	°CM- (thermal sensor)	Inp			°CM- (thermal sensor)	Inp
20	°CM+ (thermal sensor)	Inp	°CM+ (thermal sensor)	Inp			°CM+ (thermal sensor)	Inp
21	GND		R2 (reference-) = GND		GND		GND	
22			R1 (reference +)	Out				
23			S3 (cosinus-)	Inp				
24			S1 (cosinus+)	Inp				
25			S4 (sinus-)	Inp				
26			S2 (sinus+)	Inp				
	Shield		Shield		Shield		Shield	

*250mA maximum cumulated with the 5V output of the MASTER X2 encoder

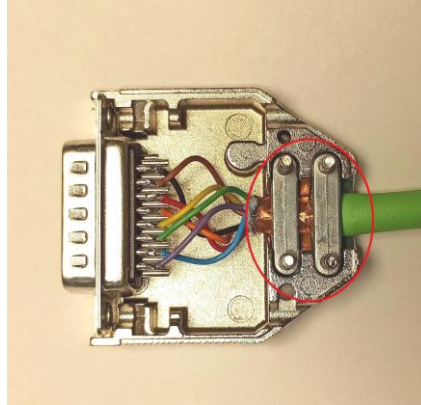
II.7 Cables

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

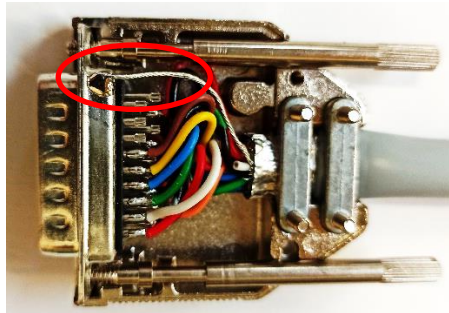
- Motor feedback cable (encoder or resolver), X14:

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, X12:

Screened cable, 4 core

Connect the shield, on drive side, to the lower fixing hole (see II-2 “Front view” picture).

II.8 Protection / Connection diagram

Drive	Input voltage	Maximal input current	Safety device: cut-out curve C	Wire
SMD 400-04	400V three phase	6.6 A	10 A maxi	1,5 ²
SMD 400-08	400V three phase	15 A	16 A maxi	2,5 ²

Caution: the in-rush current can reach 25A 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 X12) 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.

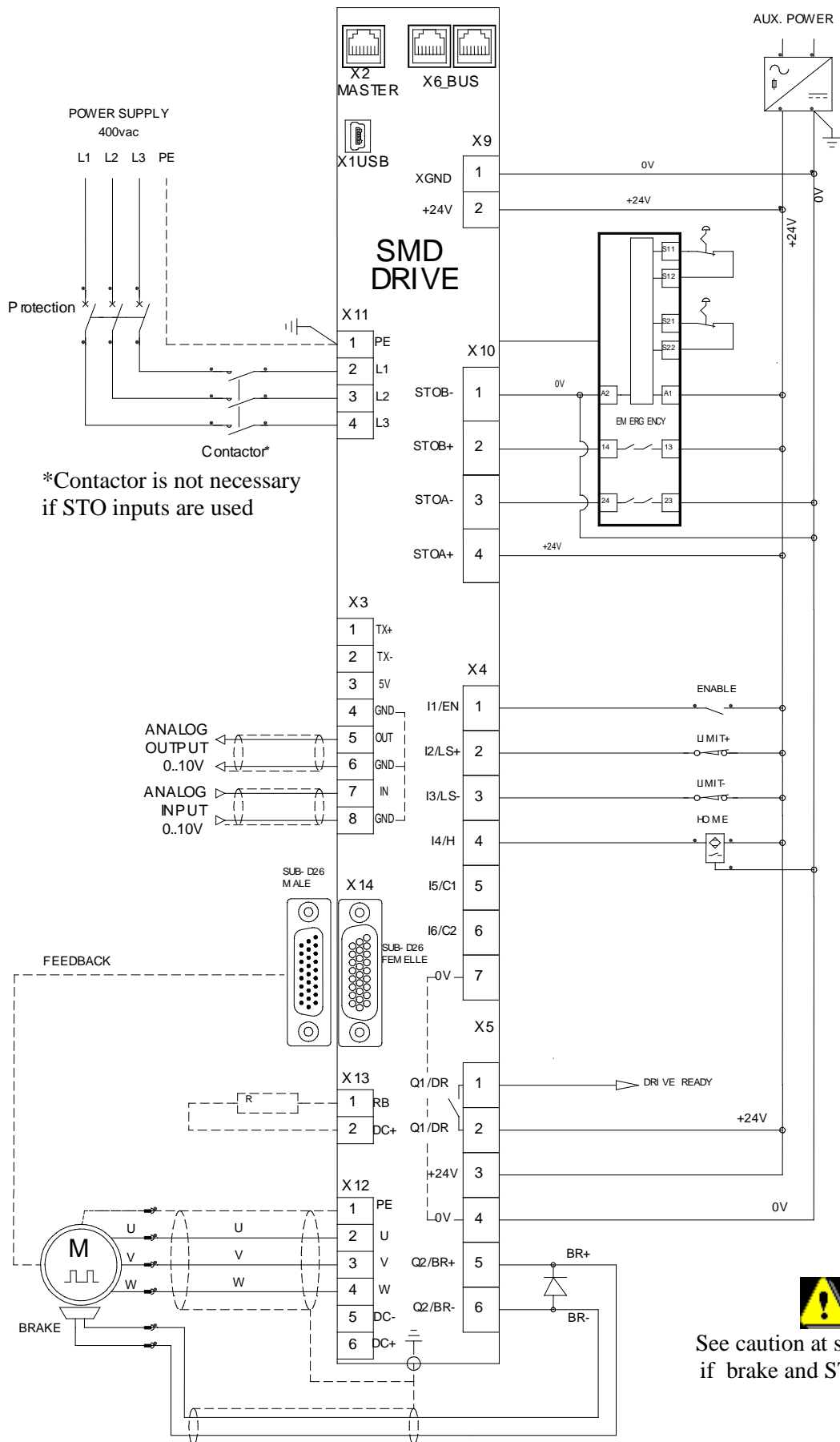


The Q2 output for brake is not SIL3 / PL e level. You must add a serial NO contact, controlled by external emergency safety module, between Q2 and motor brake.

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.

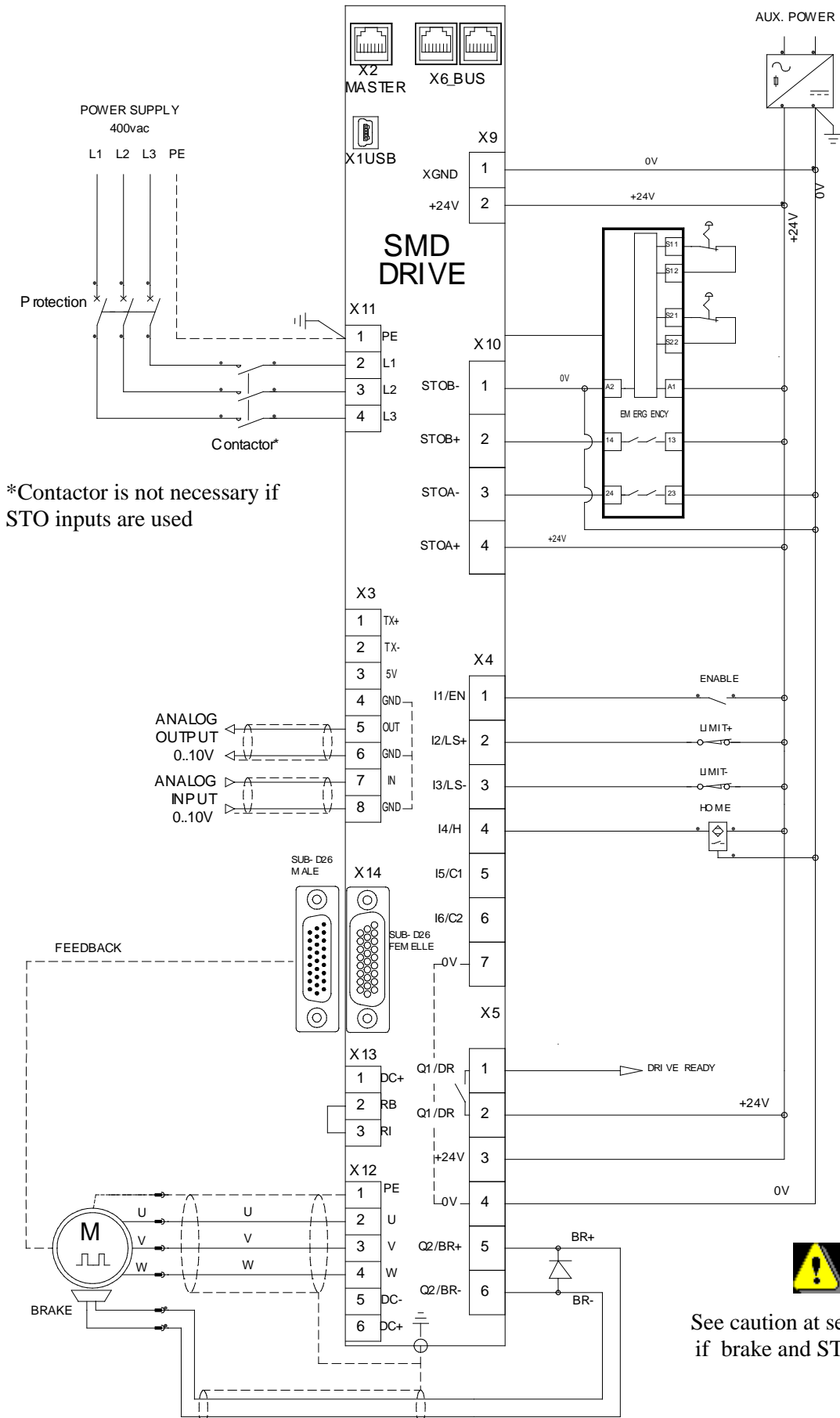
Therefore it is imperative that the main supply to the equipment is removed before any attempt is made to work on the motor or the drive.

Model SMD 400-04



See caution at section II.8.2 if brake and STO are used

Modèle SMD 400-08

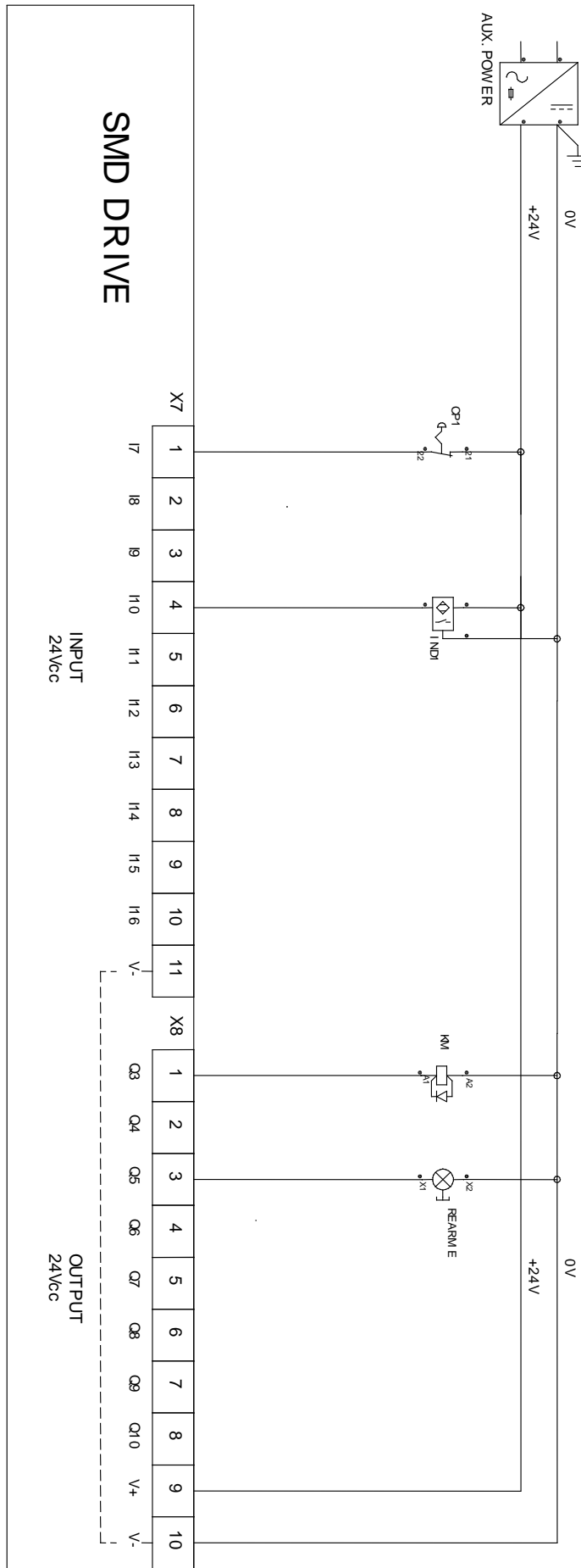


*Contactor is not necessary if STO inputs are used



See caution at section II.8.2 if brake and STO are used

Example of connection of extended inputs / outputs



II.9 System check before starting

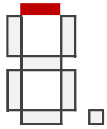
- With the Enable input off, switch on the auxiliary 24V dc supply.
- Ensure that on the **STATUS display**, the point blinking.
- Apply power.
- If the Status display shows an **error message** check the list of error codes.

III. 7 SEGMENTS STATUS DISPLAY

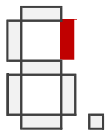
The drive can display some information through the 7 segments STATUS display.

III.1 Initialization sequence

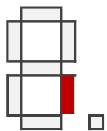
On power on, the drive display the initialization sequence:



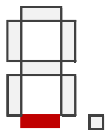
Start



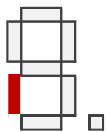
Driver initialized
Fram/Flash init (Can be display E or F)
Communication init



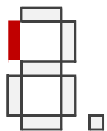
Communication Ok
Init feedback



Init Feedback Ok
Init application




Init application done
Init analog resources



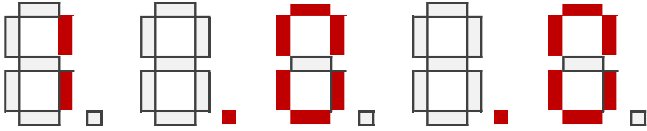
Initialization done

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.

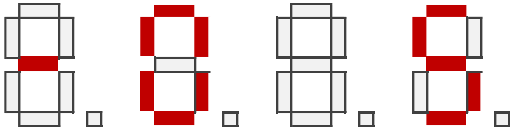


If a  flashing light appears continuously, it is necessary to load an Operating System into the drive.

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

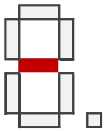


Then, on drive with fieldbus, the configured nodeID with Dipswitchs is displayed (Example node ID = 5):



III.2 SMD in running

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

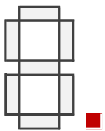


Then the peripheral segments move as the motor feedback in clockwise or counter clockwise direction.



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

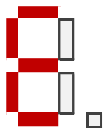
The dot information is according the number of flash:



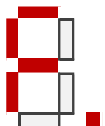
- 1 Flash: No communication
- 3 Flashes: USB communication
- 4 Flashes: USB communication in Supervision mode (CANopen / EtherCAT are disable)
- 6 Flashes: Communication is Ok (CANopen / EtherCAT are enable)

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)

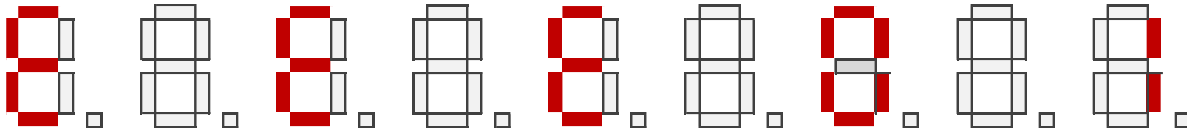
III.4 Error code

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:



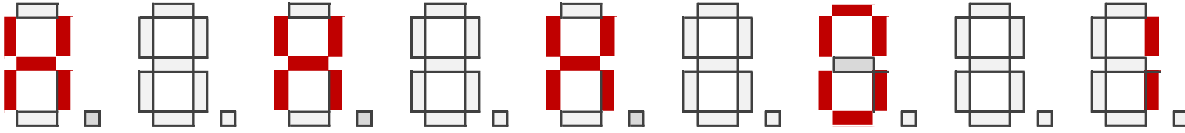
Code	Description
E01	DC bus overvoltage: An overvoltage has been detected on the internal DC bus. This fault may be due to overvoltage on the network or due to overloaded ballast resistor (E51).
E02	Undervoltage DC Bus: The internal DC bus has dropped below the configured minimum voltage. This fault is managed while the drive is enabled.
E03	I _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*: Transition from OPERATIONEL to other 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: 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>
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.

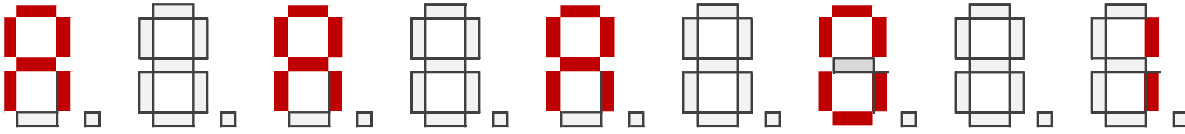
Example for Hardware H01:



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

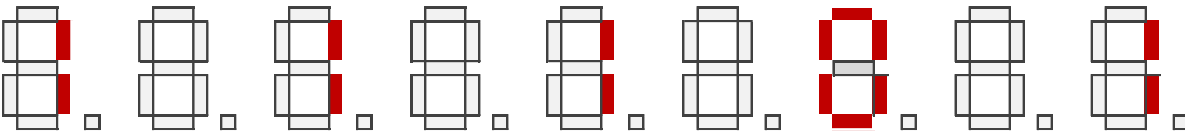
The sequence is a 3 flashes with “A” letter, following by two numbers.
Example for Warning A01:



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

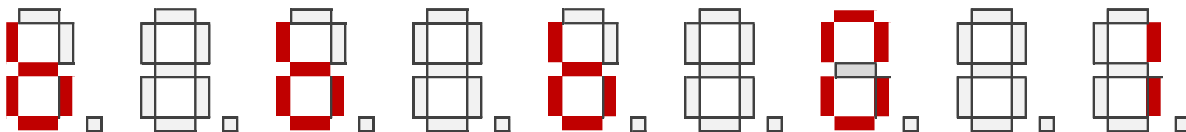
The sequence is a 3 flashes with “I” letter, following by two numbers.
Example for Info I01:



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 bank 1
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

R2028	Initial version
R2042	Update feedback information
R2049	Add H14 Error description, A01 description, add E14 error Add SMD 400-08 Add thermal dissipation
R2104	Add information on Input characteristics
R2128	Update front view (“ON” on Dips)
R2211	Update of the silkscreened of the dips switch on the front panel Add information on feedback cable
R2329	More information added to error messages.