

# SMD2204

## Multi-Axis Stepper Motor Drive



### Models

Model	Control (*)	Fieldbus	Peak current (A)	Nominal current
SMD2204xIM	D / SA / M	Modbus RTU	8,5A	8A per motor
SMD2204xIC	D / SA / M	CANopen		
SMD2204xIE	D / SA / M	Modbus TCP/IP		
SMD2204xIT	D / SA / M	EtherCAT		
SMD2204xIN	D / SA / M	Profinet		

\* D = Direct; SA = Stand-Alone; M = Mixed



Electrical characteristics		U.M.	SMD2204Lxx	SMD2204Hxx
Power Supply (HVdc)	Voltage range	Vdc	+24 .. 85	+24 .. 135
	Nominal voltage	Vdc	+65	+120
	Peak current	A	(Motor current +10%) per motor	
Logic Supply (LVdc)	Voltage range	Vdc	+24Vdc +/- 10%	
	Peak current	A <sub>RMS</sub>	1,5	
Output current (per motor)	Nominal current (sinusoidal)	A <sub>RMS</sub>	6	
	Peak current	A	max 8,5A	
	BOOST current	A	max 8,5A	
Current control	Type		Bipolar PWM	
	Frequency	KHz	20 (50 μs)	
	PWM Outputs		Dual MOSFET H-bridges, 20 KHz center-weighted PWM field oriented space-vector modulation	
General purpose digital inputs	Number		8 <sup>a</sup> (vedi nota a)	
	Type		PNP TTL compatible up to + 30 Vdc	
	"High" / "Low" threshold	Vdc	+12V default 2,2V threshold configurable through StepControl	
General purpose digital outputs	Number		8 <sup>a</sup> (see note a)	
	Type		PNP + 24 VDC	
	Current	mA	100 per channel	
	Protection		Temperature, short-circuit	
Service digital inputs	Number		8 per motor	
	Type		PNP TTL compatible up to + 30 Vdc	
	Absorbed current	mA	8	
	"High" / "Low" level threshold	Vdc	+12V default 2,5V threshold if connected in differential	
	Characteristics		High speed inputs (max 70Khz, D.C. 50%)	
Analog input	Number		3	
	Resolution	bit	12	
	Range	Vdc	0 .. +10	
Analog output	Number		1	
	Resolution	bit	10	
	Range	Vdc	0 .. +10	

<sup>a</sup> The general purpose inputs share the same pin-out with the general purpose outputs.

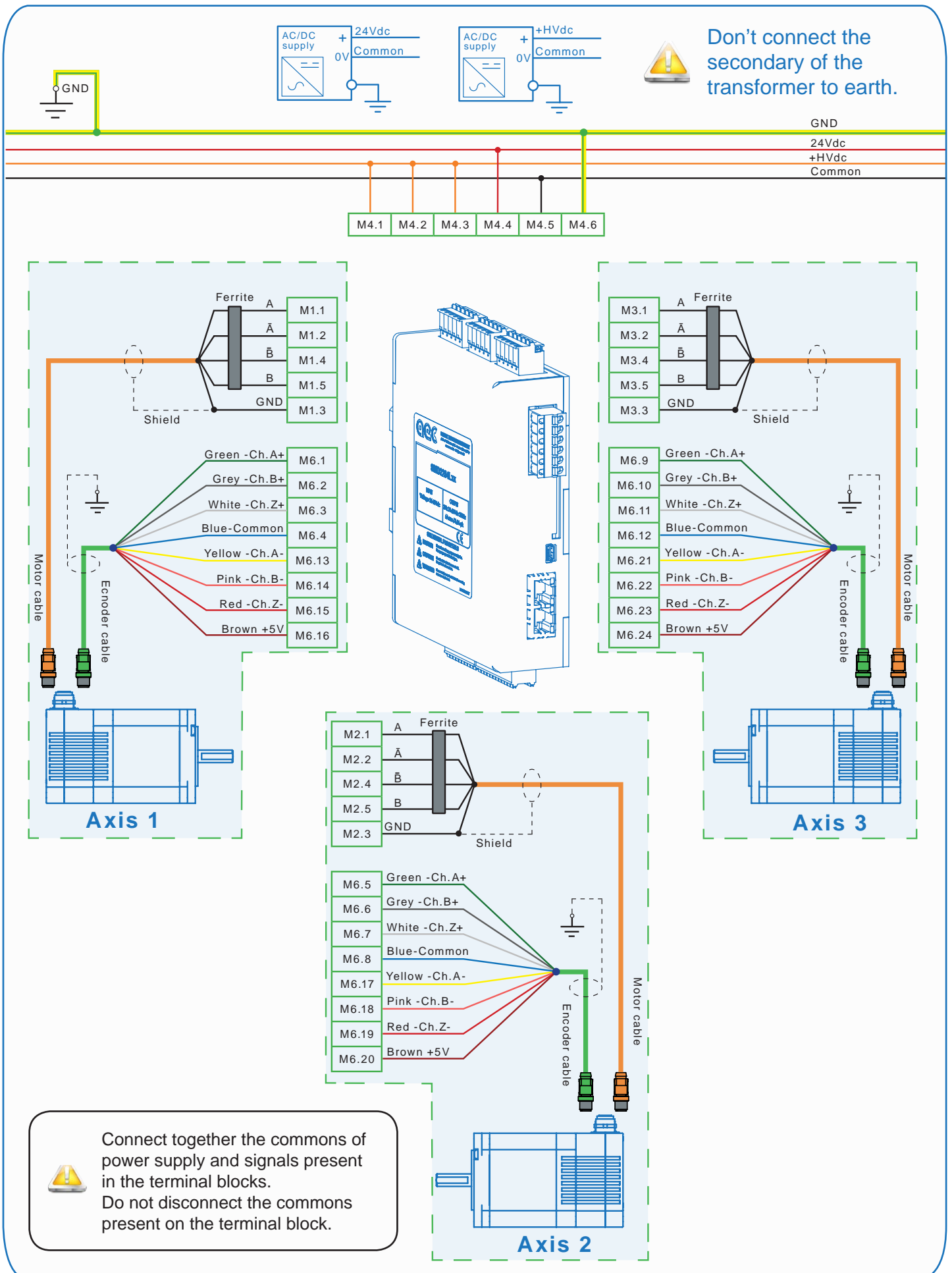


- The drive SMD2204 must be supplied only with DC current.
- It is recommended to use a transformer and a converter mod. AL1120 or AL2620.
- Provide an appropriate forced ventilation in the electrical cabinet

# SMD2204

## Multi-Axis Stepper Motor Drive

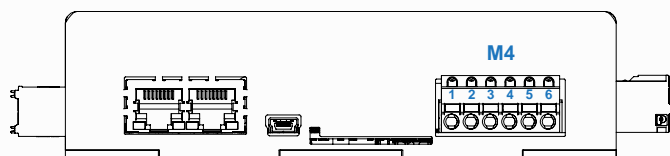
### Wiring scheme



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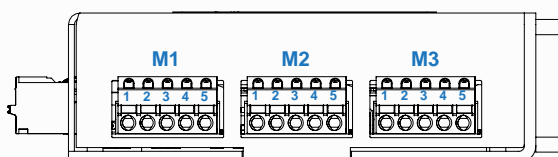
## Terminal blocks

### Power supply



M4 - Power supply stage		
Pin	Signal name	Description
1	Power supply 1	Axis 1 HVdc power supply
2	Power supply 2	Axis 2 HVdc power supply
3	Power supply 3	Axis 3 HVdc power supply
4	Logic supply	Outputs and logic stage +24Vdc power supply
5	Common	Power supplies common reference
6	Ground	Ground

### Motors

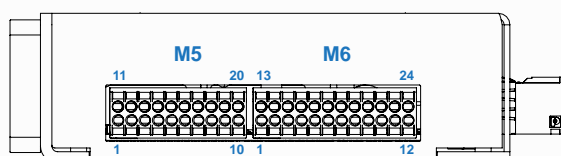


M1 - Axis 1		
Pin	Signal name	Description
1	Phase A+	Phase A+ output
2	Phase A-	Phase A- output
3	GND	Ground
4	Phase B-	Phase B- output
5	Phase B+	Phase B+ output

M2 - Axis 2		
Pin	Signal name	Description
1	Phase A+	Phase A+ output
2	Phase A-	Phase A- output
3	GND	Ground
4	Phase B-	Phase B- output
5	Phase B+	Phase B+ output

M3 - Axis 3		
Pin	Signal name	Description
1	Phase A+	Phase A+ output
2	Phase A-	Phase A- output
3	GND	Ground
4	Phase B-	Phase B- output
5	Phase B+	Phase B+ output

### Inputs/Outputs



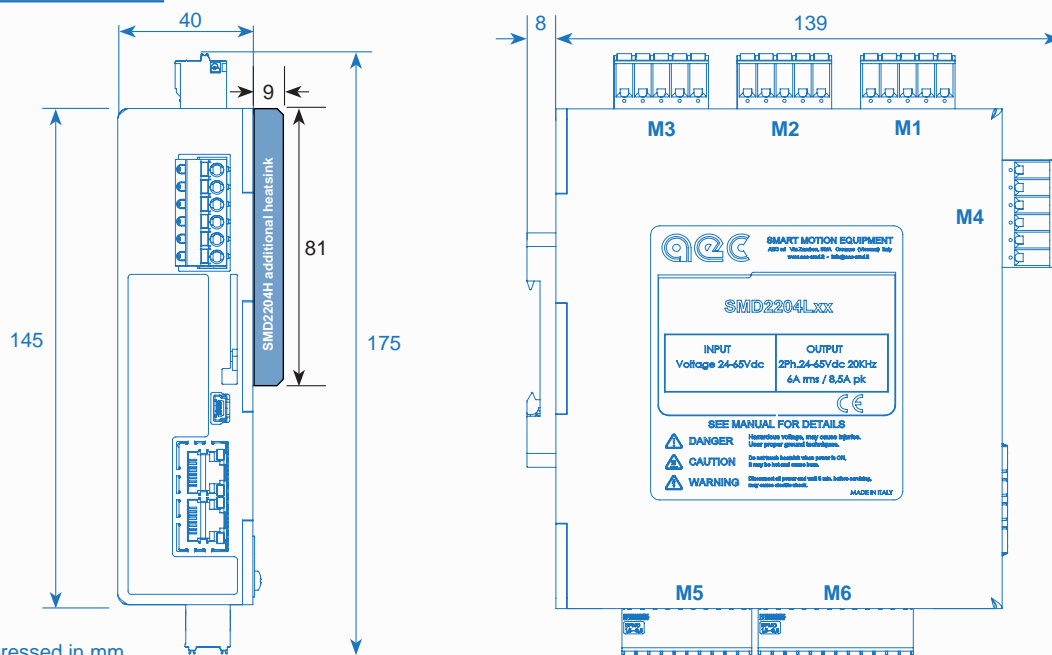
M5		
Pin	Signal name	Description
1	BLS_1	Axis 1 backward limit switch
2	FLS_1	Axis 1 forward limit switch
3	BLS_2	Axis 2 backward limit switch
4	FLS_2	Axis 2 forward limit switch
5	BLS_3	Axis 3 backward limit switch
6	FLS_3	Axis 3 forward limit switch
7	Input / Output 0	Input / Output 0
8	Input / Output 1	Input / Output 1
9	Input / Output 2	Input / Output 2
10	Common	Inputs common
11	Input / Output 3	Input / Output 3
12	Input / Output 4	Input / Output 4
13	Input / Output 5	Input / Output 5
14	Input / Output 6	Input / Output 6
15	Input / Output 7	Input / Output 7
16	Analog input	Analog input
17	Analog input 1	Analog input 1
18	Analog input 2	Analog input 2
19	Analog common	Analog i/o common
20	Analog output	Analog output

M6		
Pin	Signal name	Description
1	Motor 1 encoder A+	Axis 1 encoder channel A+
2	Motor 1 encoder B+	Axis 1 encoder channel B+
3	Motor 1 encoder Z+	Axis 1 encoder channel Z+
4	Common	Inputs common
5	Motor 2 encoder A+	Canale A+ encoder Axis 2
6	Motor 2 encoder B+	Canale B+ encoder Axis 2
7	Motor 2 encoder Z+	Canale Z+ encoder Axis 2
8	Common	Inputs common
9	Motor 3 encoder A+	Axis 3 encoder channel A+
10	Motor 3 encoder B+	Axis 3 encoder channel B+
11	Motor 3 encoder Z+	Axis 3 encoder channel Z+
12	Common	Inputs common
13	Motor 1 encoder A-	Axis 1 encoder channel A-
14	Motor 1 encoder B-	Axis 1 encoder channel B-
15	Motor 1 encoder Z-	Axis 1 encoder channel Z-
16	+5Vdc out (max 100mA)	+5Vdc output (max 100mA)
17	Motor 2 encoder A-	Axis 2 encoder channel A-
18	Motor 2 encoder B-	Axis 2 encoder channel B-
19	Motor 2 encoder Z-	Axis 2 encoder channel Z-
20	+5Vdc out (max 100mA)	+5Vdc output (max 100mA)
21	Motor 3 encoder A-	Axis 3 encoder channel A-
22	Motor 3 encoder B-	Axis 3 encoder channel B-
23	Motor 3 encoder Z-	Axis 3 encoder channel Z-
24	+5Vdc out (max 100mA)	+5Vdc output (max 100mA)

# SMD2204

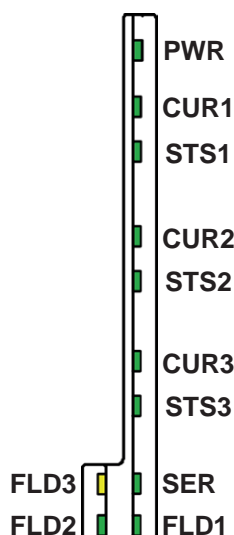
## Multi-Axis Stepper Motor Drive

### Mechanical dimensions



Dimensions are expressed in mm

### Status LED indicators



LED name	Color	Description
<b>PWR</b> (Power supply)	Off	The drive is not supplied.
	Green	The logic stage of the drive is supplied.
<b>CUR</b> (Current to the motor)	Off	No current to the motor.
	Green	Nominal current to the motor.
	Orange	Reduced current to the motor.
<b>STS</b> (Drive status)	Red	BOOST current during the ramps.
	Off	Logic stage error.
	Green	Drive is OK.
	Orange	Overtemperature alarm.
<b>SER</b> (Communication)	Red (fixed)	Active alarm (check the alarm type with StepControl).
	Red (blinking)	Power stage overvoltage or undervoltage alarm.
	Orange (blinking)	Communication in progress through USB port.
<b>FLD</b> (Fieldbus status)		See the manual of the protocol

### Protocol connector

#### Modbus<sup>RTU</sup>

RJ45 Female	Pin	Description
	1	Shield
	2	Not connected
	3	Not connected
	4	Not connected
	5	Common
	6	Not connected
	7	DAta + (RS485)
	8	Data - (RS485)

#### CANopen

RJ45 Female	Pin	Description
	1	CAN H Line
	2	CAN L Line
	3	CAN_GND
	4	Reserved
	5	Reserved
	6	CAN Shield
	7	CAN_GND
	8	Reserved

**CAUTION:** If the mode 8 of the drive is in use (it is possible to verify it with StepControl, register "Rcanmodeofoperation"), it is necessary to set the maximum step resolution, in order to have a smooth and noiseless movement.

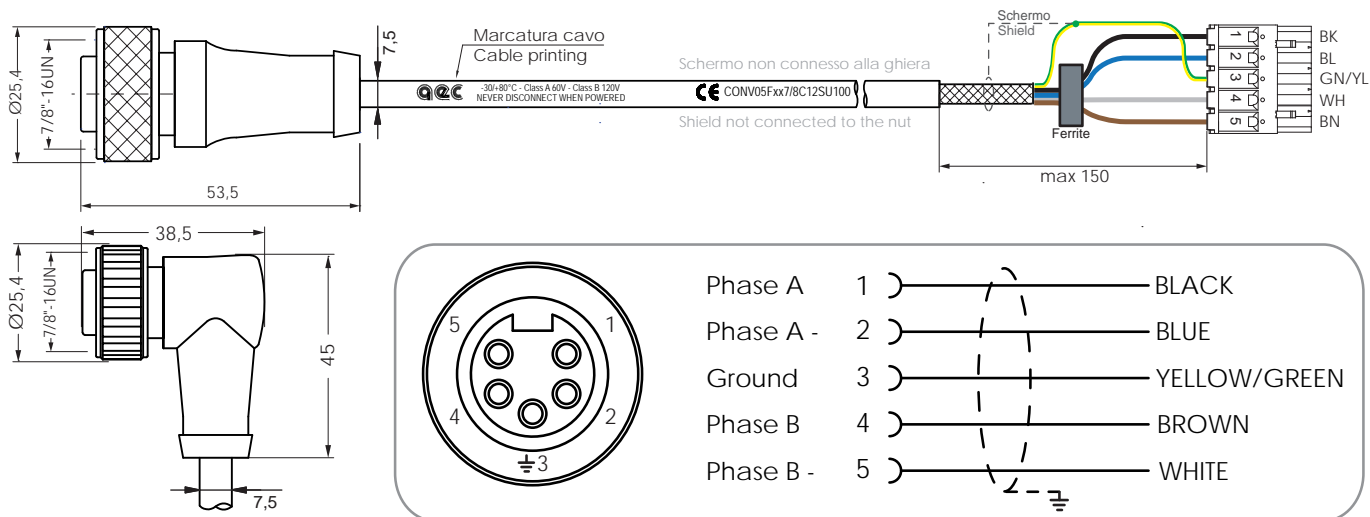
For information on slot arrangement, refer to the protocol manual.

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## Motor cables

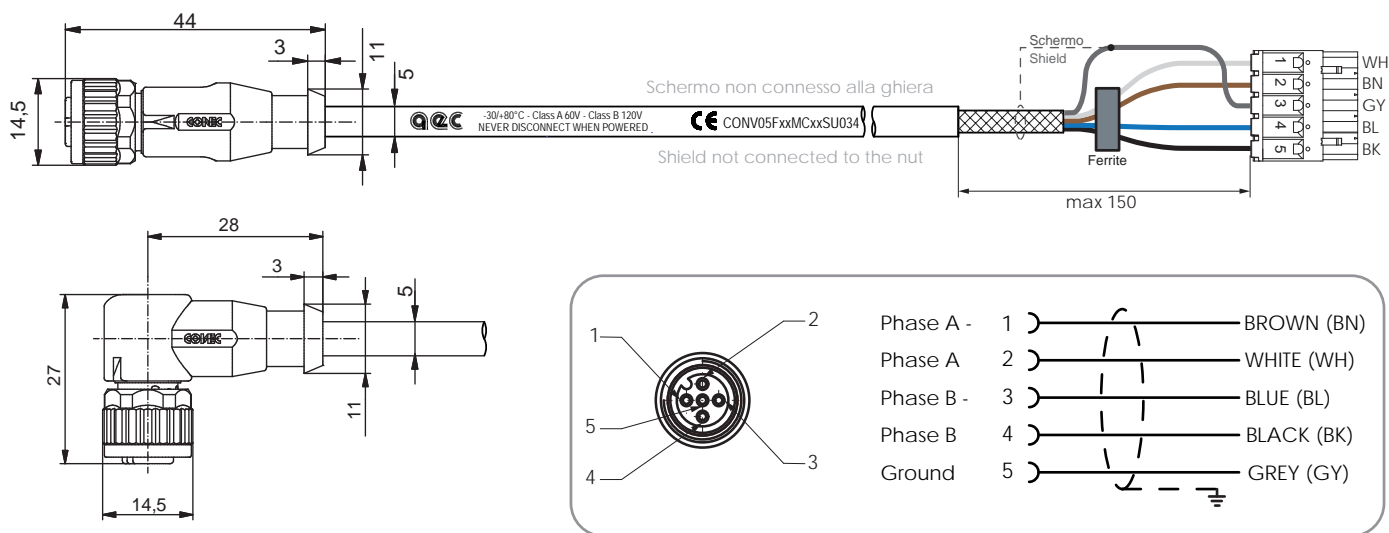
### 7/8" MOTOR CONNECTION CABLE: CONV05Fxx7/8Cxxx

Shielded dynamic laying cables with 7/8" female connector, for stepper motors series M86SHxx and M110SHxx.



### M12 MOTOR CONNECTION CABLE: CONV05FxxM12Cxxx

Shielded dynamic laying cables with M12 female connector, for stepper motors series M42SHxx, M57SHxx and M60SHxx.



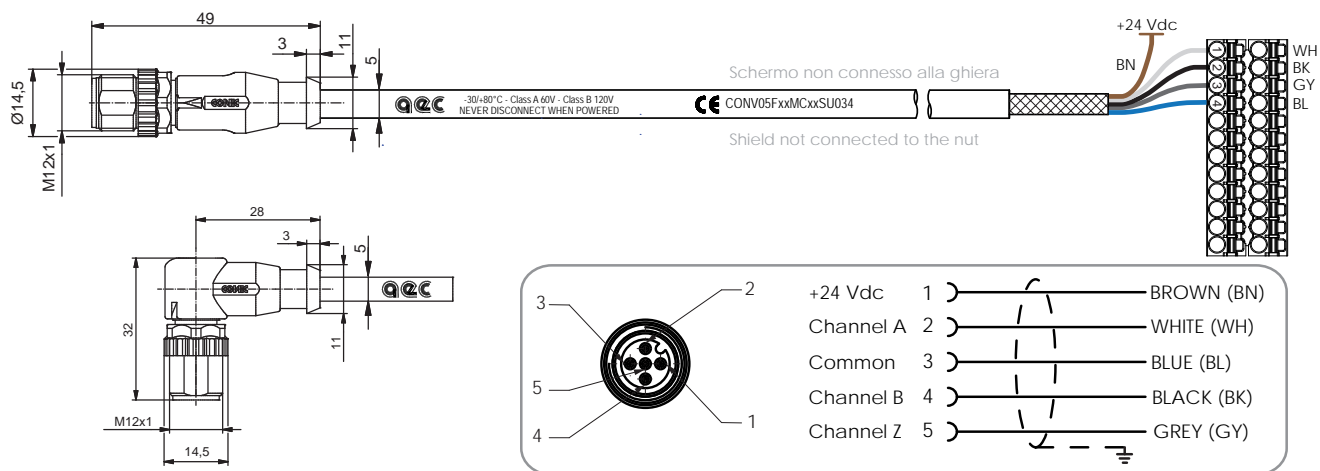
# SMD2204

## Multi-Axis Stepper Motor Drive

### M12 PUSH PULL ENCODER CONNECTION CABLE: CONV05MxxM12Cxxx

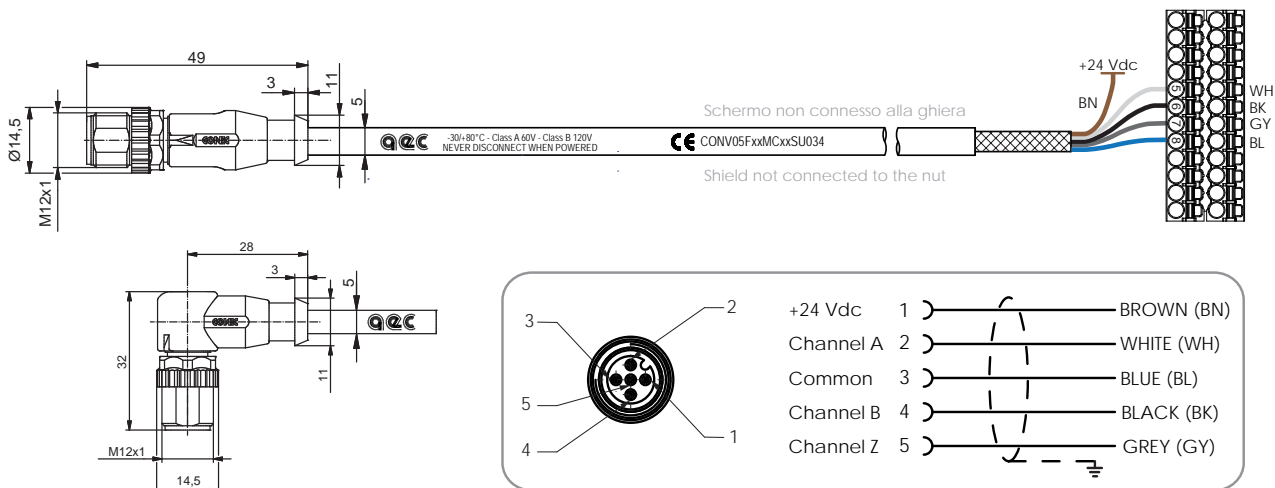
Shielded dynamic laying cables with M12 male connector, for AEC integrated Push Pull encoders.

#### Axis 1



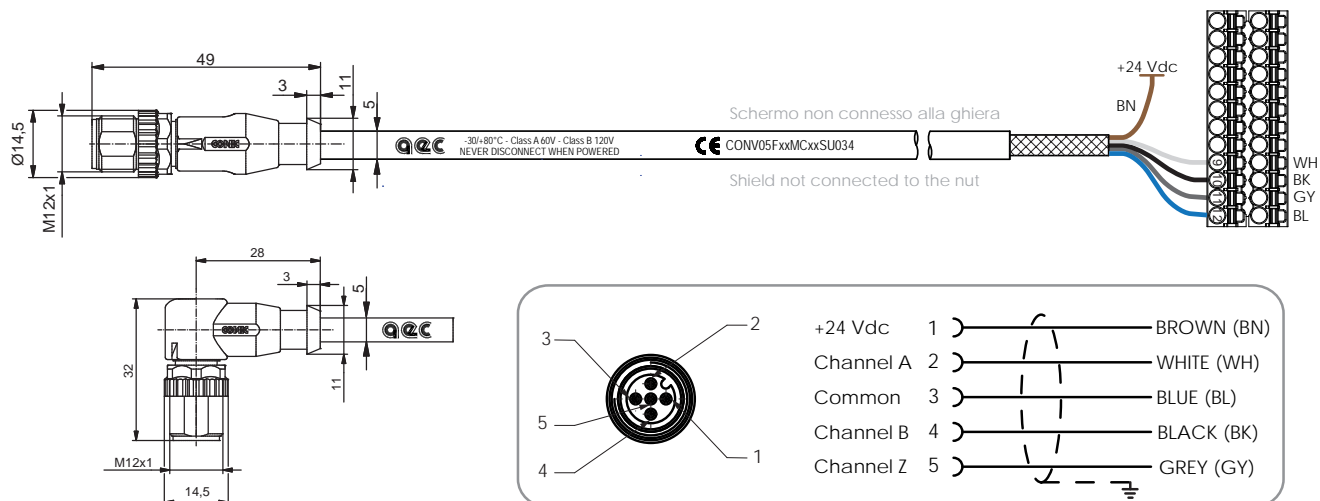
Dimensions are expressed in mm

#### Axis 2



Dimensions are expressed in mm

#### Axis 3



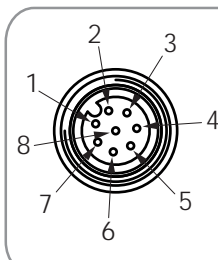
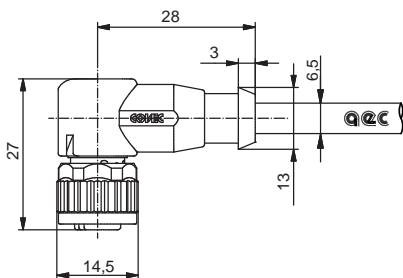
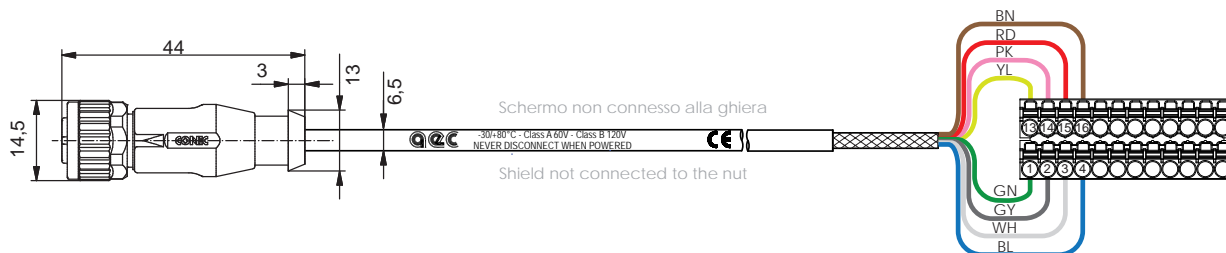
Dimensions are expressed in mm

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# M12 LINE DRIVER ENCODER CONNECTION CABLE: CONV08FxxM12Cxxx

Shielded dynamic laying cables with M12 male connector, for AEC integrated Line Driver encoders.

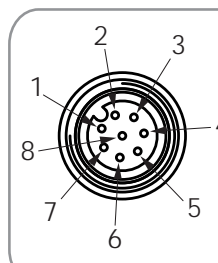
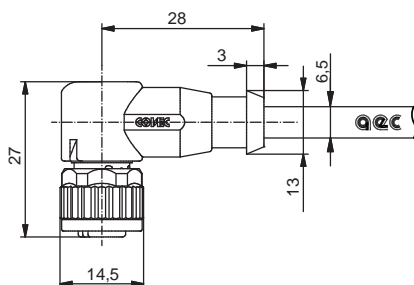
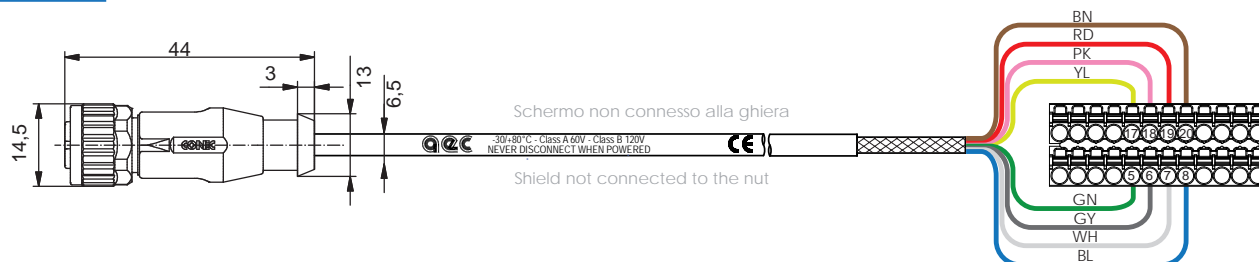
## Axis 1



Ch. Z+	1	WHITE (WH)
+Vin	2	BROWN (BN)
Ch. A +	3	GREEN (GN)
Ch. A -	4	YELLOW (YL)
Ch. B +	5	GREY (GY)
Ch. B -	6	PINK (PK)
Common	7	BLUE (BL)
Ch. Z -	8	RED (RD)

Dimensions are expressed in mm

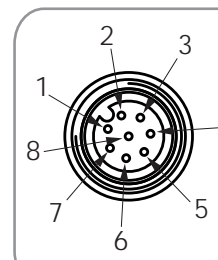
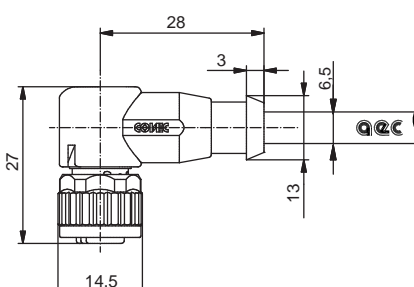
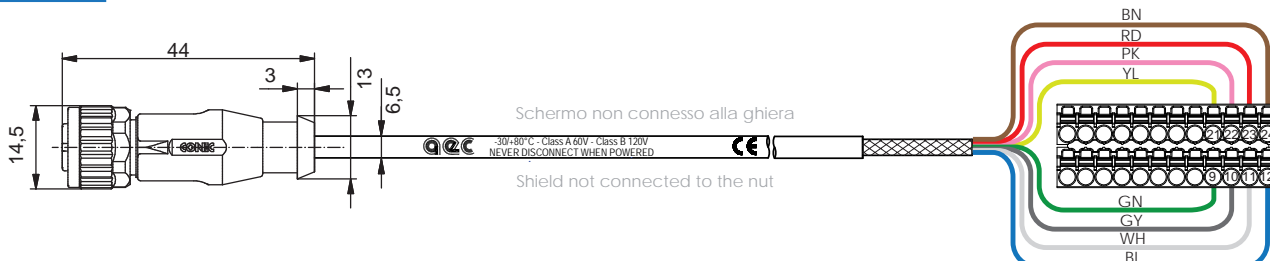
## Axis 2



Ch. Z+	1	WHITE (WH)
+Vin	2	BROWN (BN)
Ch. A +	3	GREEN (GN)
Ch. A -	4	YELLOW (YL)
Ch. B +	5	GREY (GY)
Ch. B -	6	PINK (PK)
Common	7	BLUE (BL)
Ch. Z -	8	RED (RD)

Dimensions are expressed in mm

## Axis 3



Ch. Z+	1	WHITE (WH)
+Vin	2	BROWN (BN)
Ch. A +	3	GREEN (GN)
Ch. A -	4	YELLOW (YL)
Ch. B +	5	GREY (GY)
Ch. B -	6	PINK (PK)
Common	7	BLUE (BL)
Ch. Z -	8	RED (RD)

Dimensions are expressed in mm

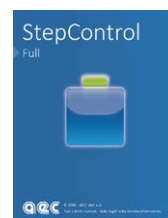


# SMD2204

## Multi-Axis Stepper Motor Drive

### Programming and parameterization

The parameterization of the multi-axis drive SMD2204 is made with the software StepControl, via the USB communication port. The three axes will be managed independently, each one with their own parameters and variables. Also the possible user program is independent per each axis.



### Modbus RTU protocol

Inside a Modbus RTU network, the multi-axis drive SMD2204LIM is seen as three single independent drives. With StepControl, it is necessary to set the drive of the axis 1. The axes 2 and 3 will automatically take the next two addresses.

Example:

Axis 1 = Node ID 4 (set with StepControl)

Axis 2 = Node ID 5

Axis 3 = Node ID 6



### Modbus TCP/IP protocol

The multi-axis drive SMD2204LIE have a unique IP address inside a Modbus TCP/IP network. In order to send a data to the single axis, set the "Unit ID" in the Master controller (1 for axis 1, 2 for axis 2, 3 for axis 3). In order to send the same data to all the three axes, send the data to the "Unit ID" 0.



### CANopen and EtherCAT protocols

For multiaxis drives CANopen/EtherCAT communication is similar to the typical single axis drive, and it is compliant with the CiA301 and CiA402 specifications.

To command the second and third axes, it is sufficient to shift the registers, so that the location H6000 of the axes 1 becomes H6800 for the axis 2, and H7000 for the axis 3.

As an example, the register H6060 (Mode of operation) for the axis 1 simply becomes H6860 for the axis 2 and H7060 for the axis 3.

For further information, please refer to the protocol manual, section "SMD2204 Multi-axis drive communication".



### Profinet protocol

Configuration Slots

**SMD2204xIN 3 axis board, ProfiNet Slots Structure**

SMD2204xIN 3 axis board, ProfiNet Slots Structure										
Slot 0 (API=0)		Slot 1 (API = 0x3A00 PROFIDrive)			Slot 2 (API = 0x3A00 PROFIDrive)			Slot 3 (API = 0x3A00 PROFIDrive)		
Subslot 0		Subslot 0	Subslot 1	Subslot 2	Subslot 0	Subslot 1	Subslot 2	Subslot 0	Subslot 1	Subslot 2
			Module Access Point (MAP)	Standard Telegram x (submodule ID = PROFIDrive telegram number)		Module Access Point (MAP)	Standard Telegram x (submodule ID = PROFIDrive telegram number)		Module Access Point (MAP)	Standard Telegram x (submodule ID = PROFIDrive telegram number)
			Contains parameters Access Point and alarm			Contains parameters Access Point and alarm			Contains parameters Access Point and alarm	
P-Device		Drive Object 1			Drive Object 2			Drive Object 3		
SMD1204xIN		1AxLE board, ProfiNet slots structure			SMD5206xIN					

For more information, see the protocol manual