SDMWA170v _ _ _ _

USER'S MANUAL
(for installation, operation and maintenance)

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EVER Elettronica
VIA DEL Commercio , 2/4 Loc. S. Grato Z.I.
26900 – LODI - ITALY
Tel. ++39 0371 412318 Fax ++39 0371 412367
E-mail: infoever@everelettronica.it
Web: www.everelettronica.com

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Notes :

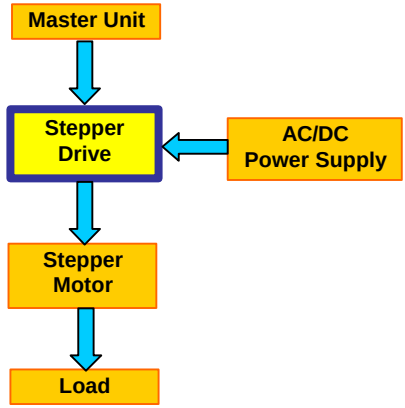
1 INTRODUCTION

This section introduces the main characteristics of the SDMWA170Vxxxx drive as a part of a step motor driving system.

1.1 Driving System Parts

Parts to be provided for a complete installation of a driver.

Block diagram



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Design steps for a motion system:

1. Define the application requirements (load torque, RPM, position precision, acceleration and speed ratings, etc.);
2. Select the motor according to the characters of step 1;
3. Define the characters of the driver:
    a. Electrical performance of the motor
    b. Motion control commands (Step / direction, serial communication links, etc.)
    c. Additional features (User I/O, encoder interface, etc.)
4. Define the power supply capacity according to the motion profile, motor's power and power supply of the driver;
5. Define the heat dissipation capability;

Sizing Refer to the service of support@everelettronica.it for the parts sizing of a motion control system (motor, driver and power supply).

Refer to section A.2 for power supply sizing information.

1.2 SDMWA170 Description

The SDMWA170 has been designed to drive a 2 phases step motor, with bipolar chopper technology, through step/direction inputs or serial interface link. The complete drive conform to the EN61800-3 and 60204-1 standards: In order to satisfy the requirements of the standards, the user should ensure the useful connection, as like connection to the ground for driver and motor protection, proper installation, power rate filter, etc., to satisfy the requirement of prevention and emission of EMC,

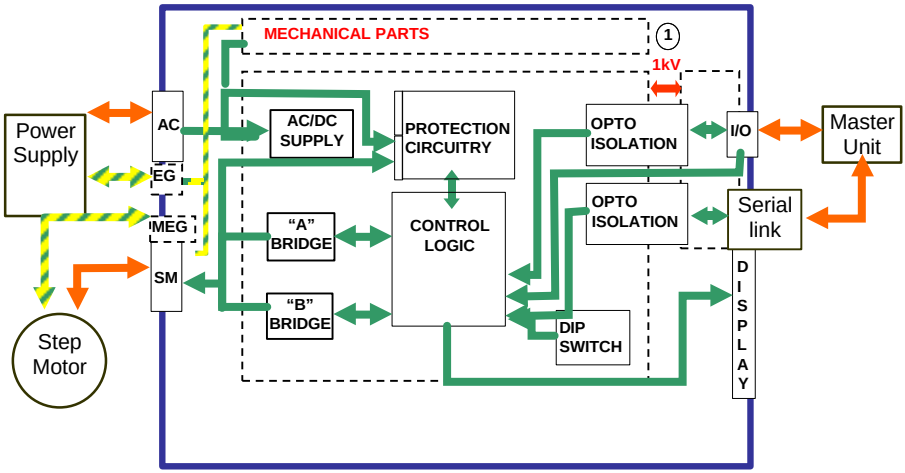
1.3 Complete Drive Block Diagram

The following figure shows the block diagram of a SDMWA170Vxxxx unit: a controlled unit can drive a two-phases motor in bipolar chopper mode. The motor can have 4, 6 or 8 leads.
Thanks to the characters of the voltage and current output of the power stage, a wide range of motors can be driven by this unit.

Motor** features must be **compatible with** the output ratings of the **drive.

The drive is provided with:

- Micro-stepping for high resolution and smooth movement;
- Sinusoidal waveforms of winding current for optimization of motor performances;
- A set of protection and monitoring. Over/Under voltage, Thermal and Over Current protections, prevent the electronics from possible damage;
- Motor step ramps generation capability.



(1) Max electric strength voltages between drive's parts

This manual contains main information and procedures for installation, set-up and troubleshoot of the driver. Many functions depend on the driver's version.

1.4 Use Limits, Risks and Warnings

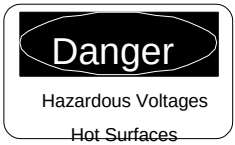
- The installation must be executed according to the prescriptions contained in this manual.

- EVER ELETTRONICA is in no way responsible for damages to persons or to things caused by an improper use of the device.

- The system is a component for internal installation in a control panel: the technician of the installation should take the responsibility and provide a suitable operation condition of SDMWA170, In order to guarantee the minimum requirement of applicable standards.

- This manual is only for the use of SDMWA170 installation technician. It shouldn't be used by end user as technical support document.

The controller SDMWA170 works at a voltage which can cause a dangerous electrical shock to the life. So it's permitted only to the qualified technician to do the installation of the unit and the accessories. A safe and effective installation could be possible only when the operation is executed according to the standards IEC1000, EN 60204-1, EN61800-3 and the safety regulations about industrial installation of user's area.



It's forbidden to take off the cover of the controller: some parts of the controller are with high voltage, high temperature and some capacities may maintain dangerous electrical charge. Each time after working, it's necessary to wait several minutes before operating on the device, in order to cool down the temperature of heat sink and the capacitor's voltage goes down to safe values. Please pay attention to the power supply and motor cable connections: when the motor connector is unplugged and the SDMWA170 is powered on, a dangerous voltage could be present on motor connector pins.

During the insulation test on a machine where the SDMWA170 drive is installed, it's necessary to be sure that the voltage doesn't exceed the maximum insulation ratings of the unit.

The unit will cause environment pollution if it's disposal regulations are not respected.

1.5 Warranty

Ever Electronica Co. warrants its motors and controllers to his own buyers (end users, machine manufacturers or distributors), that they are free from defects caused in material or transport and packing operation, and they are made according to the customer's specifications which have been accepted in writing by Ever.

Ever Elettronica's products are warranted for one year from the date of manufacture as indicated in the code on the drive label.

In no event, however, EVER should be responsible, during the period of guarantee, if the product has been improperly stored, installed, used without executing necessary maintenance, or if the product has been executed modifications, adjustments and/or repairs without authorization.

The responsibility of EVER is limited only to repairing (or replacing at its discretion), its products or parts of the product, which are defective because of defective materials or incorrect workmanship, according to EVER's guarantee conditions.

The contents of this manual are up-dated till the date of printing. With the continuous development and improvement of product, EVER co. reserves the right to modify the specifications of the product and the contents of this manual without notice.

EVER co. does not recommend the use of its products in life support applications where a failure or malfunction of the products may threaten directly the safety of life or things. If the user make use of EVER's products in life support applications, should assume all risks and indemnify EVER co. for all damages.

1.6 In This Manual

The symbols used in this manual have the following meanings:

Danger
Warning
Caution

Used when life or health of the user are exposed to **dangerous condition or** when **severe damage** to materials may occur.

Attention

Special instruction for a safe and effective operation.

Tip
Help
Information

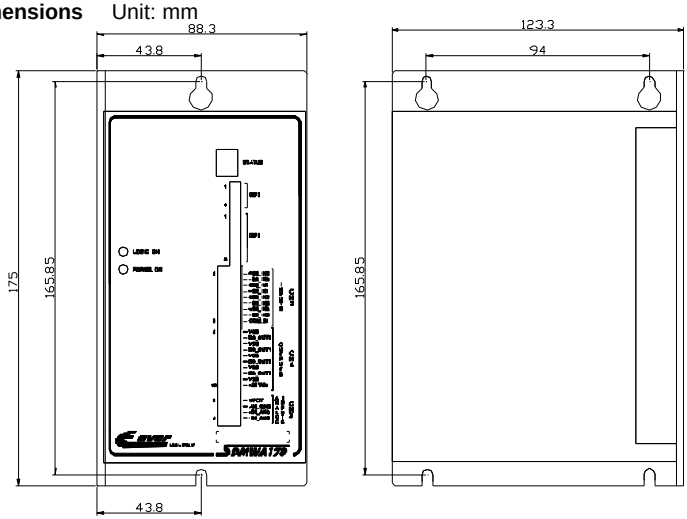
Used to mark **additional important information.**

An essential element to meet the **limit values specified in the EMC directives.** Apart from the use of filters, the installation of the device should conform to the EMC standards requirements.

2 Specification

2.1 Mechanical

Dimensions Unit: mm



Installation type “A” installation type “B”

For the drive installation, need:

- #2 or #4 4MA screws for installation type A or B;
- #1 5-pins 721-605/000-042 WAGO 5mm pitch female connector for the connection of motor and earth ground of motor;
- #1 6-pins 721-606 WAGO 5mm pitch male connector for the connection of power supply DC-out (PS-AUX);
- #1 4-pins 721-104/026-045 WAGO 5mm pitch female connector for the connection of power supply and earth ground;
- #1 2-pins 721-104/026-047 WAGO 5mm pitch female connector for the connection of logical power supply;
- #1 9-pins 1881396 PHOENIX MICRO-COMBICON 2.5mm pitch female connector for the connection of Digital Inputs;
- #1 10-pins 1881406 PHOENIX MICRO-COMBICON 2.5mm pitch female connector for the connection of Digital Outputs;
- #1 4-pins 1881341 PHOENIX MICRO-COMBICON 2.5mm pitch female connector for the connection of Analog Inputs;
- #1 9-pins SubD female with soldered terminal + metallic shell;
- Dimensions 175(H) x 88.3(W) x 124(D) mm
- Weight 1500 g
- Protection class IP 20
- Storage temperature from - 25° C to +55° C
- Operating ambient temperature from 5 to 50° C
- Humidity 5% to 85% not condensing
- Maximum working altitude 1000 m.

2.2 Electrical

*If it's not indicated differently, the **electrical specification** tolerance **is according** to EN 60204 standard requirements.*
Some ratings depend on the actual drive version.

2.2.1 Power Supply Rating

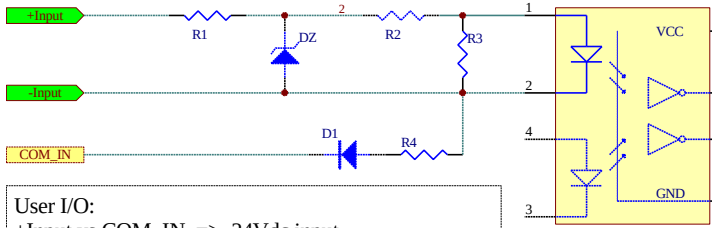
Refer to **section 5.0** *for the electrical specifications of **power supply** of the actual **drive version.***

2.2.2 I/O Electrical Specifications

Digital Inputs can be used as real time, opto-isolated, 200kHz, 5Vdc line driver and 24Vdc PNP/Push-Pull type.

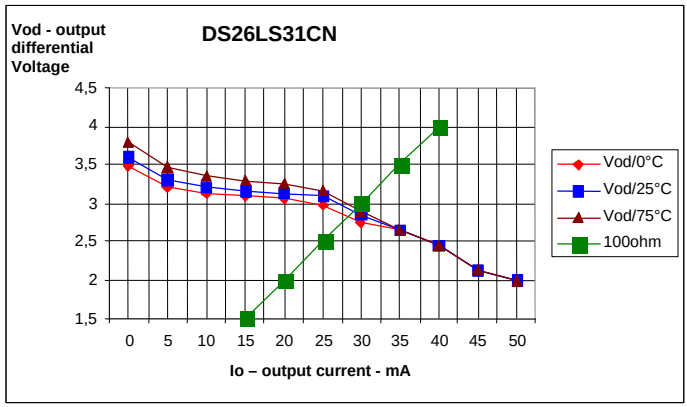
Digital inputs cannot work contemporarily at 5Vdc and 24Vdc

Digital Inputs
Schematic drawing



User I/O:
+Input vs COM_IN => 24Vdc input
+Input vs -Input => 5Vdc Line-Driver

Ratings The line driver inputs are designed to be driven through devices with following V-A output characteristic.



To avoid improper connection and damage of input circuit, don't exceed the maximum rating listed in the following table.

Digital Input					
Rated Voltage	**Limits**	**State 0**		**State 1**	
		UL V	**IL mA**	**UH V**	**IH mA**
5 Vdc ± 5%	**Max.**	1.5	ND	5	17
	Min.	0	ND	2	3
24 Vdc ± 20%	**Max.**	ND	ND	19.2	7
	Min.	ND	ND	28.8	12
f_{MAX}		200kHz			
Protection		Reverse polarity			

The devices connected to the drive inputs must be powered through a dedicated power supply.

Digital inputs
Electrical connection

Inputs control devices with an output voltage Vo (Volt) exceeding the Line Driver's ratings must be connected to the drive inputs through a series resistor **Rs** rated in the following way (Vo is assumed greater than 10 Vdc):

R_S = [Vo * 125 – 220] O with a power rating of

P_D = [(Vo / (R_S + 220))^2 * R_S] W

For example:

Assuming Vcc = 24Vdc ± 15%

R_S = (24 * 125) - 220 ˜ 2780 O

P_D = (24 / (2700 + 220))^2 * 2700 ˜ 0.18W (0.25W @ Vo+15%)

A 2.7kO - ½ W rated external series resistor can be a correct choice.

Assuming Vcc = 12Vdc ± 15%

R_S = (12 * 125) - 220 ˜ 1280 O

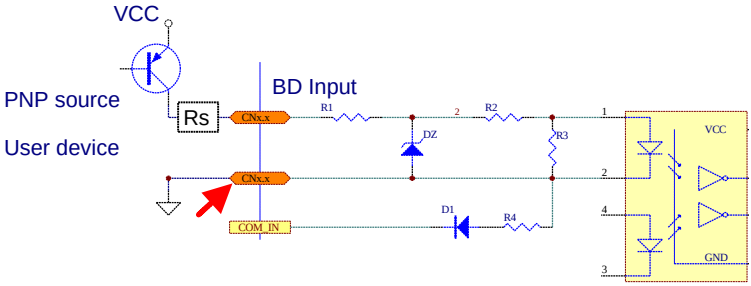
P_D = (12 / (1200 + 220))^2 * 1200 ˜ 0.086W (0.12W @ Vo+15%)

A 1.2kO - ½ W rated external series resistor can be a correct choice

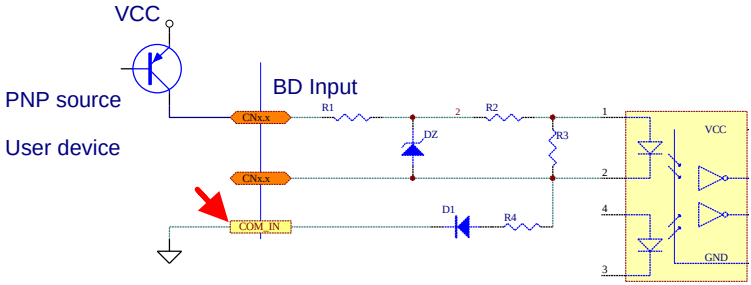
Connection guidance of digital input depend on driving device output style.

PNP source

VCC = 5 Vdc

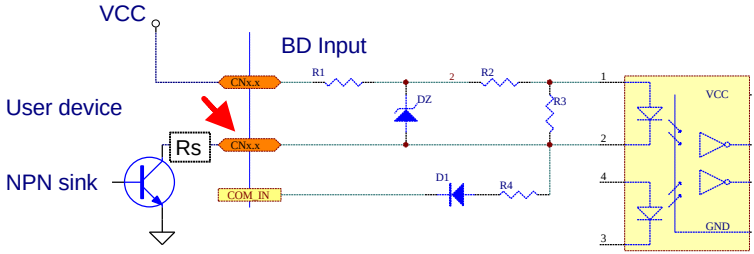


VCC = 24 Vdc



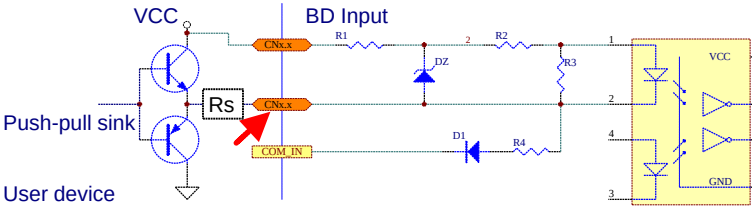
NPN sink

VCC = 5 Vdc



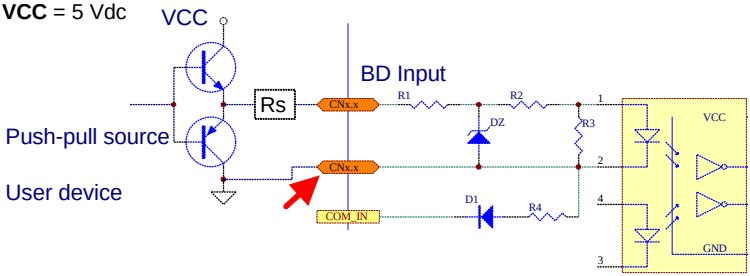
Push-Pull sink

VCC = 5 Vdc

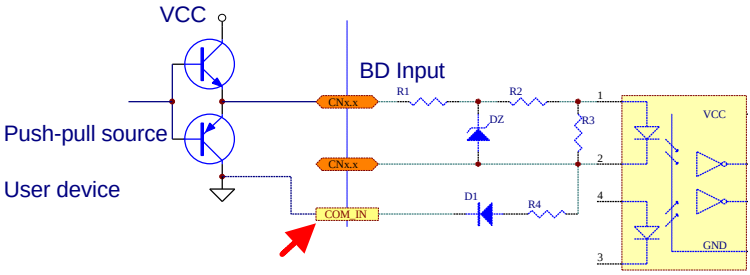


Push-Pull source

VCC = 5 Vdc

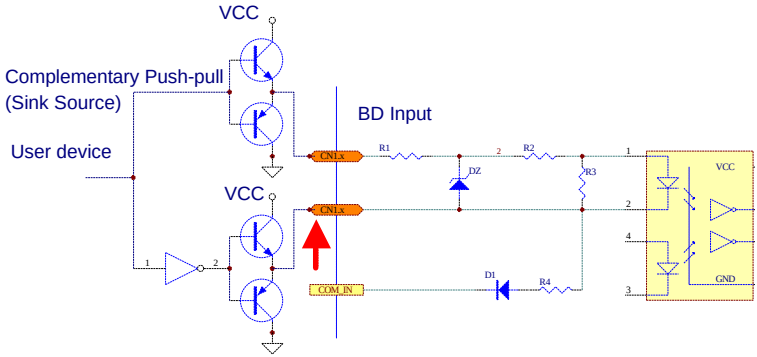


VCC = 24 Vdc

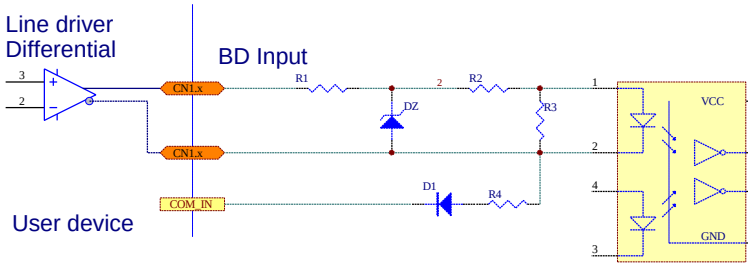


Push-pull sink-source

VCC = 5 Vdc

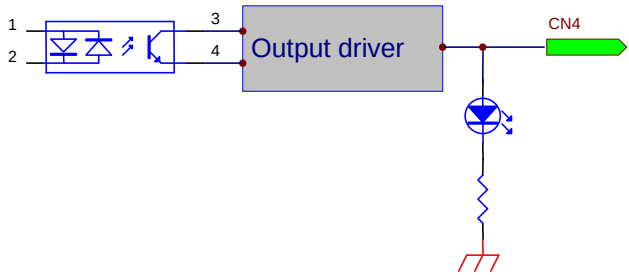


- Line-Driver differential 5 Vdc



Digital Outputs opto-isolated, short circuit protected, 24Vdc PNP type.

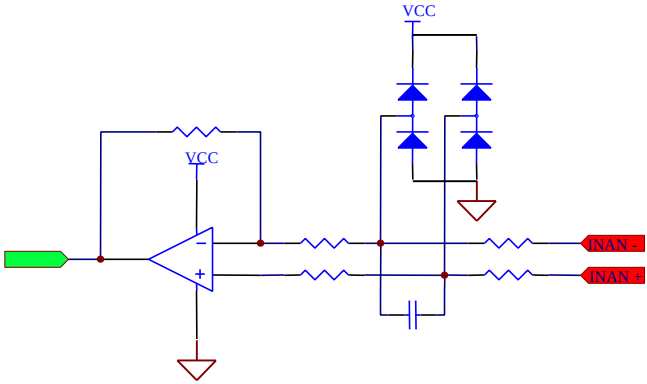
Electrical specification of Digital Output		
Rated current (state 1)	In (A)	0.5
Max current (state 1)	Max (A)	0.7
Max current for output with 4 output ON	Iout(A)	0.5@24Vdc
N° max output ON at max current	N°	4
Voltage drop (state 1)	Max (V)	3
Leakage current (state 0)	Max (A)	2
Rated voltage	Vnom	24Vdc
Min voltage output	Vmin	19Vdc
Max voltage output	Vmax	28.8Vdc
Max voltage ripple	Vrmax	1Vdc
Type	PNP	current source
Max frequency output	f	1kHz
Protection	Short circuit between OUT and GROUND, between OUT and +V, between OUT and OUT, Open Load Detection	
Overload & short circuit threshold protection	I (over-current)	> 0.7A min = 2.5A max
Protection intervention delay	$tshort_{MAX}$	100µs @Vout = 30Vdc @RL = 0



Analog Inputs +/-10Vdc CEI EN 61131-2 type, not opto-isolated.

CEI EN 61131-2 compliant analog inputs	
Input voltage range	±10Vdc
Input impedance limits	=10Kohm
Reading resolution	19.5mV (1024) 10 bit
Maximum error over full temperature range	± 3% of full range
Maximum overload	Vin = 57Vdc (without damage) Imax = 2mA (without damage)
Digital output under overload condition	1024
Type of input	Differential not isolated
Input sampling time	T_{SAMPLE} = 1ms including stabilization
Sampling repetition time	T=1ms
Input filtering characteristics	1° order Transition frequency: Hz –3dB@8.5KHz
Protection type	RC – ricirculating network
Conversion method	Sample & Hold
Operating mode	Self-scan

Analog Inputs diagram



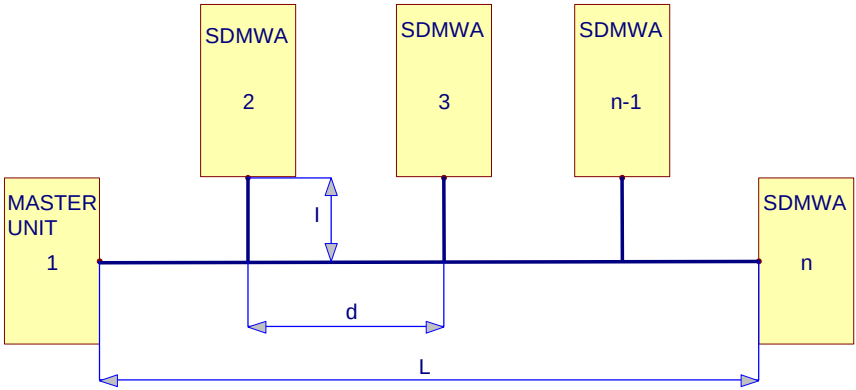
2.2.3 CAN Bus Interface

Introduction

The CAN Bus interface provides a multipoint connection according to the ISO 11898 standard.
The isolated interface is powered by an internal isolated DC/DC converter, no external power supply is required.

Refer to **section 5** for information about available driver version.
Refer to software manual for information about the Canbus interface operating modes.

Canbus Network connection



Network paths length						
Parameter	symbol	Unit	Value			Condition
			Min.	Nom.	Max.	
Length of Bus cable	L	m	0		40	
Length of Deviation Cable	l	m	0		0.3	Bit rate: 1Mbit/sec
Node distance	d	m	0.1		40	

Bus cable length	Baud rate [kbit/s]
< 25m	1000
< 50m	800
< 100m	500
< 250m	250
< 500m	125
< 1000m	50
< 2500m	20

2.2.4 RS232 and RS485 Interface

Introduction

The RS232 interface provides a point to point connection and the RS485 a multipoint connection link according to the EIA/TIA232E CCIT V.28 and RS-485 CCITT V.11 X.27 international standards.
The isolated interface is powered by an internal isolated DC/DC converter, no external power supply is required.

Refer to **section 5** for more information about available drive versions.

Refer to software manual for information about the serial interface operating modes.

Cable requirements

Use 0.5 mm² (#20 AWG) or 0.25mm^2 (#23AWG) shielded cables for the RS232 and RS485 connection.

3 DRIVE INSTALLATION

This section explains how to install the step motor drive. Main topics are:

- Unpacking and inspecting the materials supplied;
- Selecting motor and optional parts of drive;
- Setting user's parameters;
- Installing and using the unit safely;
- Mounting the drive;
- Connecting to the drive.

Refer to system diagram in **section 1.3**.

3.1 Unpacking, Inspecting and Storing

Check the item(s) against the packing-list. A label located on the drive's housing identifies the model version, serial number and manufacture date of the unit.

Inspect the unit: any transportation damages must be submitted by the buyer to the transporter.

Store the SDMWA170 unit in a place meeting the specified environmental conditions required.

3.2 Selecting Motors and Options

Motor selection

The SDMWA170 drive is designed for use with EVER's step motor product line and most two phases step motors of other brands. The motor's rating must be compatible with the output configuration of the drive. Refer to the Torque/Speed Curves in the "EVER ELETTRONICA Motors Catalogues" or call EVER sales dept. or your local distributor for motor sizing and drive-motor compatibility verification.

Options Selection

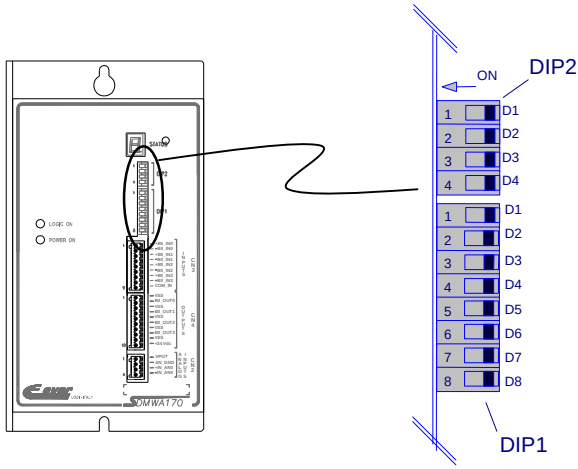
Refer to "EVER ELETTRONICA Drives Catalogue" for drive options selection or call EVER Co. sales dept. or refer to www.everelettronica.it

3.3 User Adjustment: Dip-switch Setting

Dip-switch Location

DIP1 and DIP2 are used for user adjustment as for example:

- Bus node identification
- Baud rate setting
- User function mode setting



*Some parts inside the SDMWA170 housing can be a potential source of **electric shock**.*
To avoid electric shock, before handling DIP-SWITCH, turn of the power and wait until all the leds of 7 segment display on drive front panel are off.

*Refer to **dip-switch function table** of **section 5** for your unit version.*

3.4 Installing and Using the Unit Safely

Guide

Only qualified personnel, after completely reading and understanding the information in this manual, can install the SDMWA170 unit,. The installation instructions should be followed and approved. Any questions or doubts should be clarified with the supplier of the drive before using the unit.

*In no case EVER co. will accept **liability** for indirect damage or consequences caused by negligence, incorrect installation, modification of the drive, or incorrect connection to the SDMWA170 drive.*

*The power supply cables, the motor output cables and some parts of the SDMWA170 unit are a potential source of severe **electric shock**. Follow the safety instructions in this manual to avoid danger.*

To avoid the possibility of personal injury whenever you are working with SDMWA170 unit:

- Do not operate the drive without the motor case and the system housing connected with earth ground;
- The impedance of earth protection(PE) must conform to the requirements of local regulations;
- Do not make any connections to internal circuitry of the system;
- Before making or removing connections from the unit, the power supply should always be turned off;
- When the power supply fails, the drive cannot hold the load: it's not permitted to use this system if in lack of motor toque, may cause a dangerous situation, unless that the user provides a suitable blocking device for the load.

Before maintenance or setting operation on SDMWA170 unit, it's necessary to be sure that the power supply has been turned off.

- Be careful of the motor connector terminals. When the motor is disconnected, and the power supply is applied to the unit, there will be a high voltage on these terminals.
- Do not use the stop of software as safe shutdown. Always remove the power supply from the drive for a safe shutdown.
- Pay attention to the heat dissipation of some parts of SDMWA170 unit: The temperature of some surfaces could be high when the device is used in a heavy application. Please wait a proper time to cool it down before unplugging the drive.

3.5 Mounting the Drive

Environment

The drive should be installed in an environment without dust, corrosive vapors, gases and liquids. Avoid location with possible condensation of vaporized liquids, including atmospheric moisture.

Installing the drive inside a cabinet, be sure that the air flow opening or the cabinet cooling system is suitable to ensure that the internal temperature doesn't exceed the maximum ambient temperature rating of the device.

Any local safety regulations concerning to the motor drive installation should be carefully considered as a requirement in the installation project.

Mounting Guide

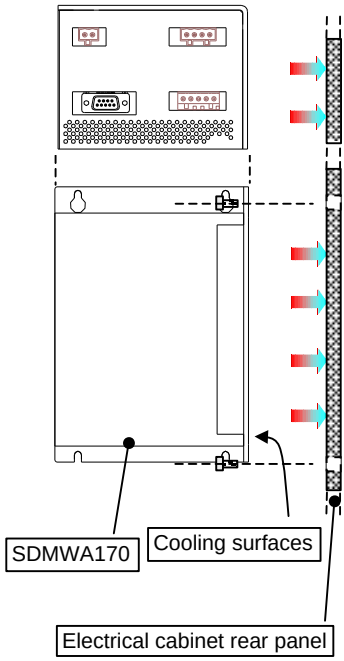
Your installation should satisfy the following requirements at least:

- Keep the drive in vertical orientation;
- Avoid excessive vibration or shock;
- Provide free space for air flow above and below the drive.

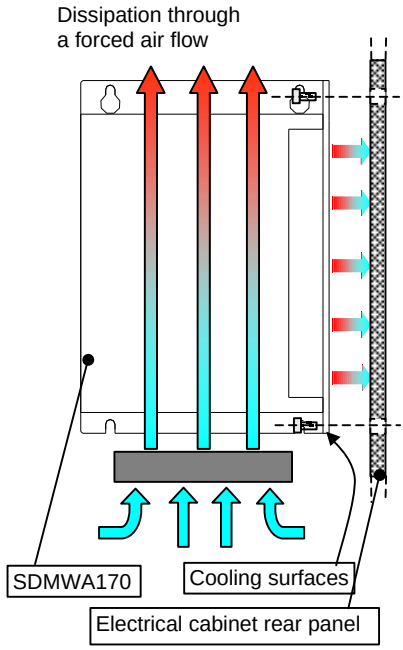
Cooling

The SDMWA170 unit is provided an internal circuitry cooling through the heat dissipation capability of the housing surfaces. Optimize the thermal flow between the unit cooling surfaces and the ambient according to the 'worst case' of dissipation condition of the application.

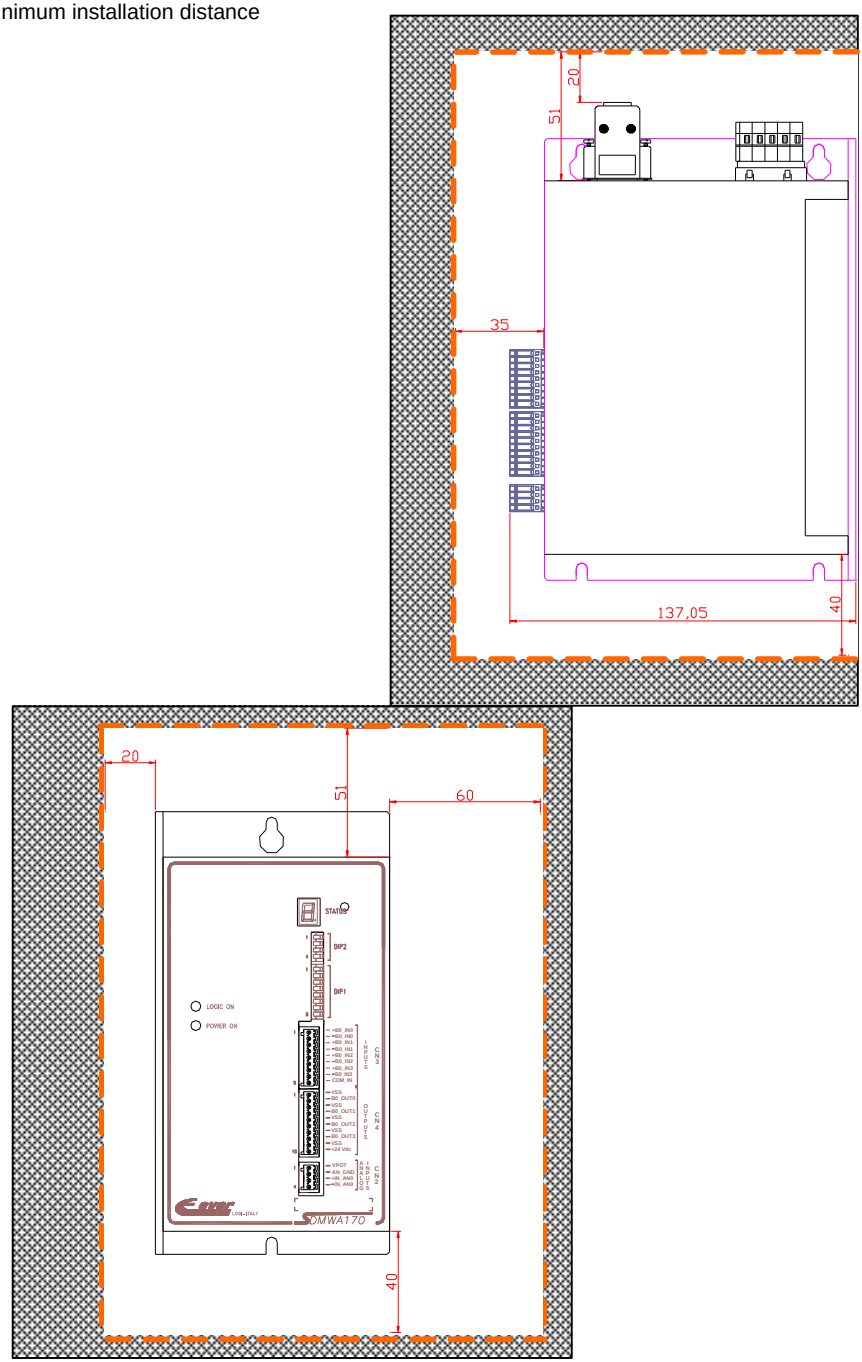
Dissipation through the fixing surface



Dissipation through a forced air flow



Minimum installation distance



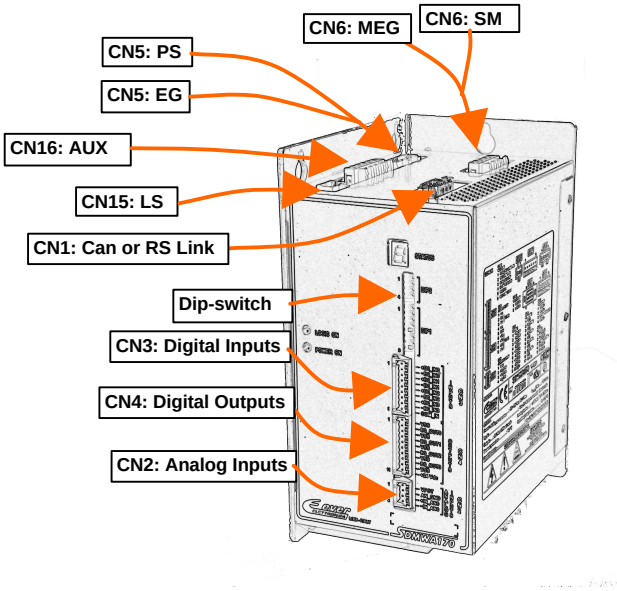
3.6 Drive connection

connection to the drive's inputs / outputs are:

EG	- Earth Ground
MEG	- Motor Earth Ground
PS	- AC Supply Input
LS	- AC Logic Supply
SM	- Step Motor Output
I/O	- Digital Inputs/Outputs
CAN*	- CAN bus
RS*	- RS232 and RS485 Interfaces

(*****) available on different drive versions

Location of Connectors



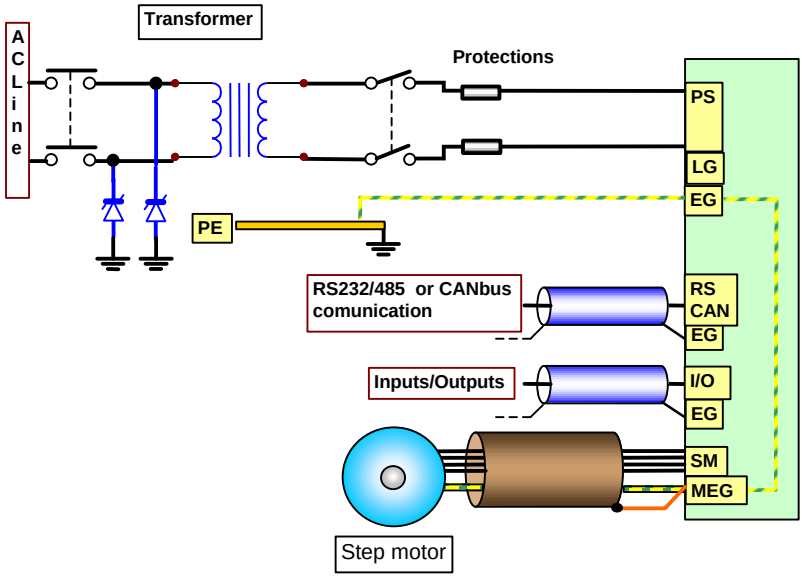
The cabling is specified for application

The instruction about the cabling and earth grounding / shielding techniques described in the following sections represents a common experience, could satisfy most cases of application.
It's possible to obtain a good protection using twisted and shielded cables and separating the signal lines from power lines.

Local electrical regulations, special operation conditions, and particular cabling standards have priority on the information contained in this manual.

The system cabling should be done in the way that the power supply could be as near as possible to the system, and the power supply cable, which is with impulsive current and possible high ripple on voltage, could be very short. The power supply voltage refers to the earth ground protection, through a internal connection in the drive between the cathode of DC power supply and the earth ground protection.

Connection Diagram



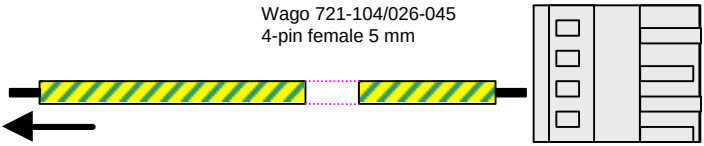
3.6.1 CN5: Connection to Earth Ground (EG)

Earth Ground connection to PE, the clamp EG on the drive, must be connected **before any other connection**.

Cable Requirements Use 1.5 mm² (#16 AWG) or bigger wire for EG connection. Moreover, EG wire section must be, at least, as large as the wire of power supply.

*The EG connection must conform to the **requirements of local industry installation regulations.***

Earth Ground **EG terminal** is a 721-464/001-040 4-pins male WAGO connector.



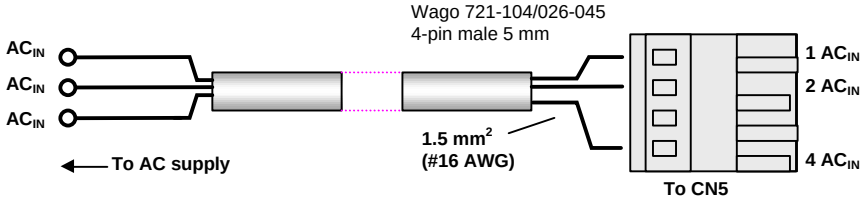
Input	*Pin*	*Description*
AC$_{IN}$	CN5.1	Power supply AC input
AC$_{IN}$	CN5.2	Power supply AC input
PE	CN5.3	Earth Ground
AC$_{IN}$	CN5.4	Power supply AC input

3.6.2 CN5: Connection to power supply AC (PS)

Introduction PS connector connects the SDMWA170 drive to power supply AC.

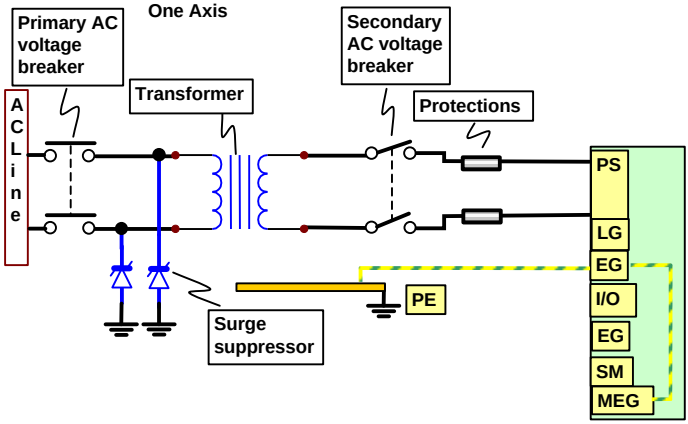
Power Supply PS connector is a 721-464/001-040 4-pins male WAGO connector.

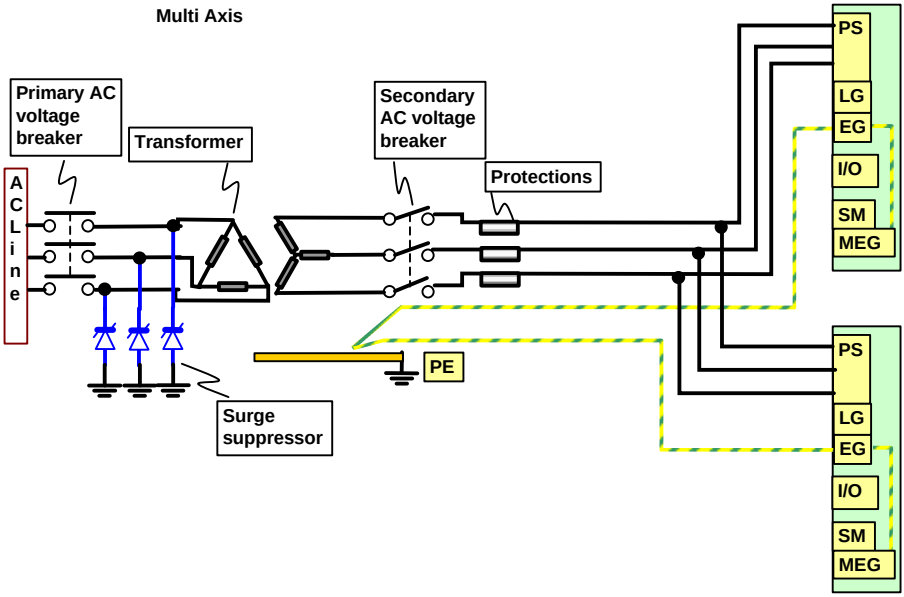
Input	*Pin*	*Description*
AC$_{IN}$	CN5.1	Power supply AC input
AC$_{IN}$	CN5.2	Power supply AC input
PE	CN5.3	Earth Ground
AC$_{IN}$	CN5.4	Power supply AC input



Do not solder *the tips of the cable before inserting them into the connector. The solder could be impaired and cause* ***loose of connection****.*

Connection Diagram





***Refer** to **section A.2** for more information about the power supply sizing.*

Protections by 16A delay fuses on AC bus or by an automatic protection switch.

breaker on primary side of the transformer for disconnecting the voltage of AC power supply.

The AC supply voltage must never exceed the Vac rating of your unit version.

***Refer** to **section 5.0** for more information about the power supply rating of your unit version.*

Cabling Requirements Use 1.5 mm² (#16 AWG) or bigger cable for the power supply of the system.

3.6.3 CN15: Connection to Logic Power Supply (LG)

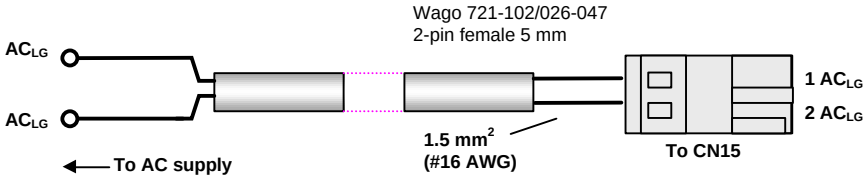
Introduction

LG connector connects the SDMWA170 drive to logic AC power supply.

Logic Power Supply LG connector is a 721-464/001-000 2-pins male WAGO connector.

Input	*Pin*	*Description*
AC_{LG}	CN15.1	Logic supply AC input
AC_{LG}	CN15.2	Logic supply AC input

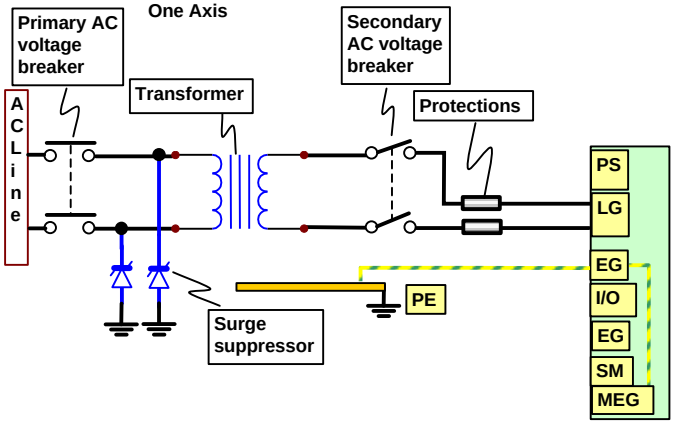
AC_{LG} provides power supply to the logic control system of the drive when the main power supply is turned off: if it doesn't need this safety system, AC_{IN} will provide the complete power supply, even if AC_{LG} is not available.

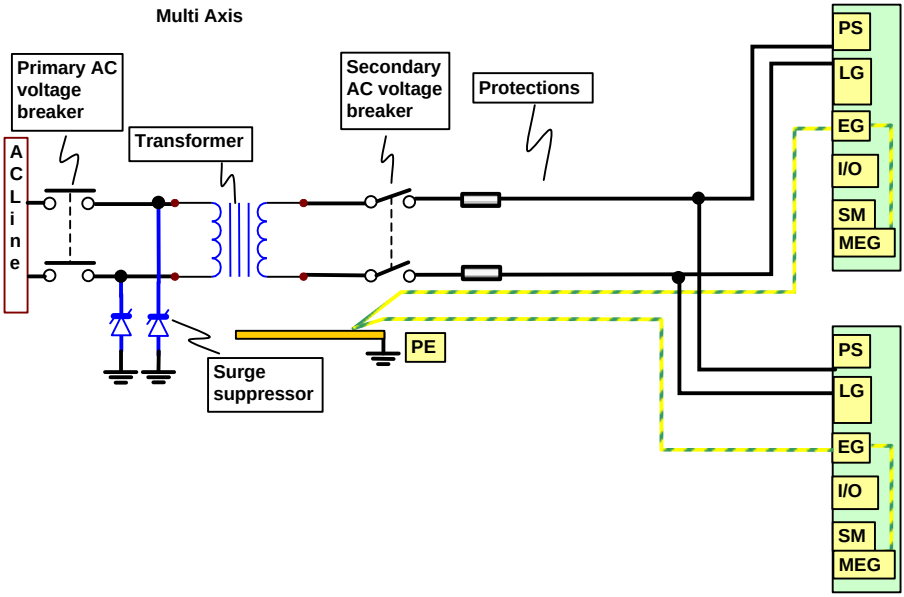


***Do not solder** the tips of the cable before inserting them into the connector. Solder could be impaired and cause **loose of connection**.*

Connection Diagram

One Axis





***Refer** to **section A.2** for more information about the power supply sizing.*

Protections by 5A delay fuses on AC bus or by an automatic protection switch.

breaker on primary side of the transformer for disconnecting the voltage of AC power supply.

The AC supply voltage must never exceed the Vac rating of your unit version.

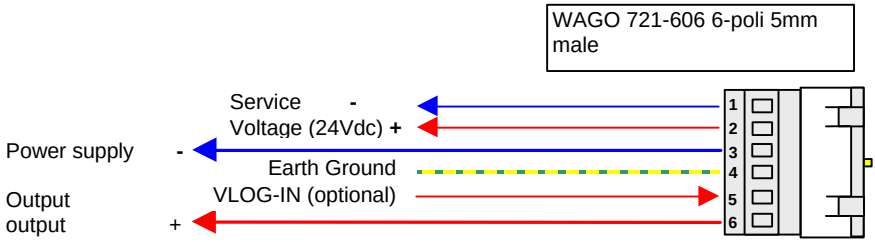
***Refer** to **section 5.0** for more information about the power supply rating of your unit version.*

Cabling Requirements Use 1.5 mm² (#16 AWG) or bigger cable for the power supply of the system.

3.6.4 CN16: Connection to Power Supply DC-out (PS-AUX)

introduction **the connector** connects SDMWA170 to DC power supply.

Input	*Pin*	*Description*
GND_VDC-OUT/AUX	*CN5.1*	*Service voltage output riference (-)*
VDC-OUT/AUX	*CN5.2*	*Service voltage output (+)*
GND_VDC-OUT	*CN5.3*	*Power output riference (-)*
EARTH GROUND	*CN5.4*	*Earth Ground*
VLOG-IN	*CN5.5*	*Logic input (+)*
VDC-OUT/CONV	*CN5.6*	*Power output (+)*



To earth ground terminal

Do not solder *the tips of the cable before inserting them into the connector. The solder could be impaired and cause* ***loose of connection****.*

3.6.5 CN6: Connection to Stepper Motor Output(SM)

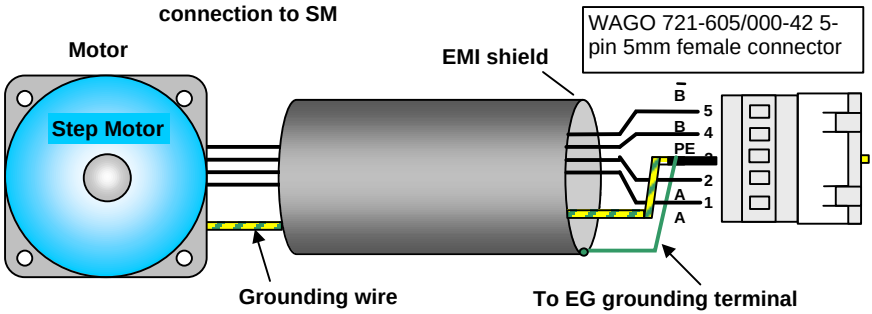
Connector SM connects the drive power stage to motor.

Cabling Diagram We suggest to follow the instruction while connecting a motor. Always connect the motor case to the earth ground trough the specified earth ground terminal before any connection. It doesn't guarantee a low impedance to earth to fix the motor case simply on the machine.

Refer to motor specifications in the motor catalogue to determine the motor connection as required.

Step Motor **SM connector** mates to a 722-235 5-pins male WAGO connector

Pin	Description
CN6.1	Motor phase (B*)
CN6.2	Motor phase (B)
CN6.3	Motor Earth Ground (MEG)
CN6.4	Motor phase (A*)
CN6.5	Motor phase (A)



EMC

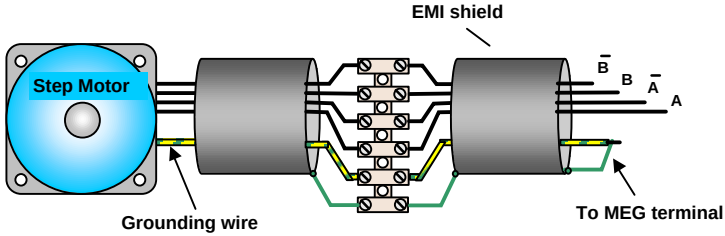
It's possible to obtain a better EMC condition *using paired-twisted and shielded cable, and cabling the signal line and the power line separately.*

***Do not solder** the tips of the cable before inserting them into the connector. The solder could be impaired and cause **loose of connection**.*

Cable Requirements Use #10 to #24 AWG cable.
The following table shows a practical solution for connecting the motor to the drive:

Motor current (A)	Section (mm^2)	AWG
I_{PHASE} = 5 Arms	1	18

Cable If it's necessary, interrupt the motor cable only through connectors or clamps, isolated from mechanical parts or earth grounded parts, in order to keep separate the motor phases, shield of cable and motor's protection ground cable. Avoid switches for motor phase connection.



3.6.6 CN3: Connection of Inputs

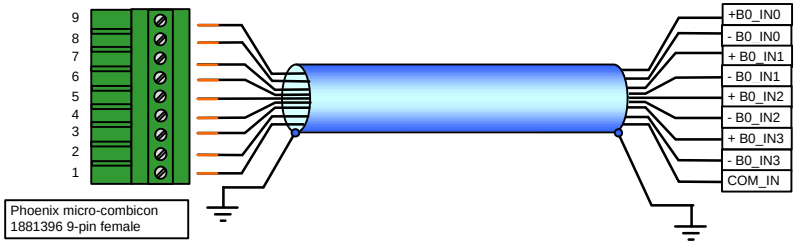
Inputs: opto-isolated 5 Vdc Line Driver, PNP, NPN, Push-Pull, Complementary Push-Pull and 24 Vdc PNP/Push-Pull input available on the connector CN3 at the frontal of the drive.

Inputs Connector is a 1881516 9-pins male PHOENIX MICRO-COMBICON connector.

Pin	Description	Functioning
CN3.1	+B0_IN0	Depend on user's program
CN3.2	-B0_IN0	
CN3.3	+B0_IN1	
CN3.4	-B0_IN1	
CN3.5	+B0_IN2	
CN3.6	-B0_IN2	
CN3.7	+B0_IN3	
CN3.8	-B0_IN3	
CN3.9	COM_IN	Inputs common (- side)

Refer to section 5.3.3 for input/output function of available drive version.

Connection to I/O
For this connection, use a shielded cable of section 1 mm² (#18 AWG) or 0.5 mm² (#20 AWG) .



*When **NPN** style **connection** is used, an unexpected short circuit to the earth ground could cause an unexpected start of the drive.*

3.6.7 CN4: Connection of Outputs

Outputs are optically isolated 24 Vdc PNP type.

Output Connector is a 1881529 10-pins male PHOENIX MICRO-COMBICON cable connector.

Pin	Description	Function
CN4.1	VSS	Depend on user's program
CN4.2	B0_OUT0	
CN4.3	VSS	Depend on user's program
CN4.4	B0_OUT1	
CN4.5	VSS	Depend on user's program
CN4.6	B0_OUT2	
CN4.7	VSS	Depend on user's program
CN4.8	B0_OUT3	
CN4.9	VSS	Common (-)
CN4.10	+24Vdc	Digital outputs power supply (+)

Refer to section 5.3.3 for inputs/outputs function of the drive version in use.

Connection to I/O
For this connection, use a shielded cable of section 1 mm² (#18 AWG) or 0.5 mm² (#20 AWG).

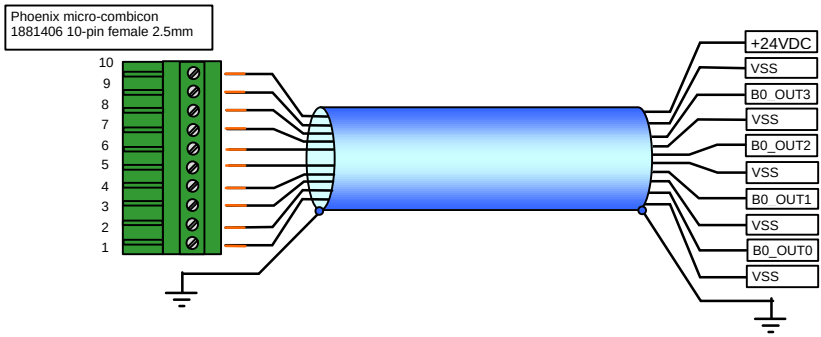
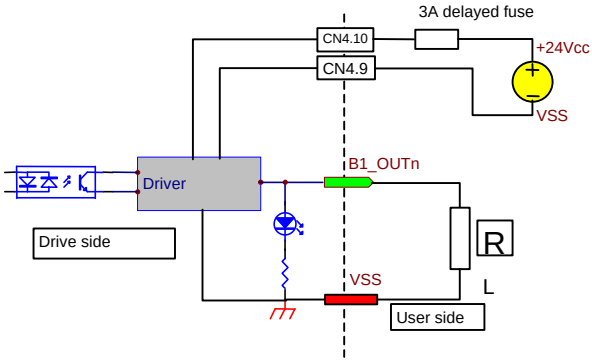
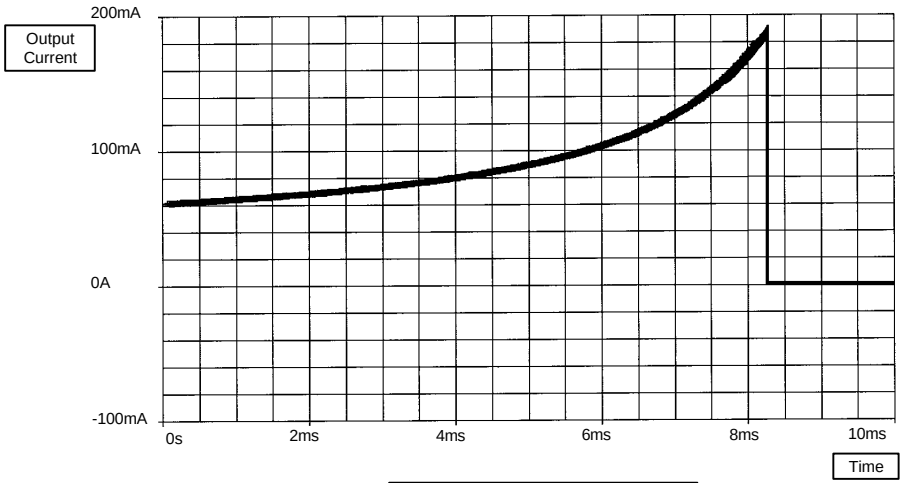


Diagram of Outputs and connections



Output protection status is not displayed on the 7 segment display.



Output protection diagram

3.6.8 CN2: Connection of Analog Inputs

Inputs: not isolated ±10Vdc available on CN2 at the frontal of the drive.

Inputs Connector is a 1881464 4-pins male PHOENIX MICRO-COMBICON cable connector.

Pin	Description	Function
CN2.1	VPOT=5Vdc	Voltage supply output for analog inputs (+)
CN2.2	AN_GND	Voltage supply common (-)
CN2.3	+IN_AN0	Depend on user's program
CN2.4	-IN_AN0	

- **VPOT=5Vdc**: voltage output to supply an external device connected to analog input;

Refer to section 5.3.3 for inputs/outputs function of the unit version in use.

Connection to I/O

For this connection, use a shielded cable of section1 mm² (#18 AWG) or 0.5 mm² (#20 AWG) .

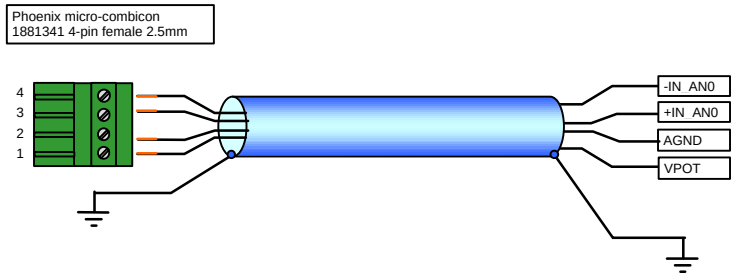
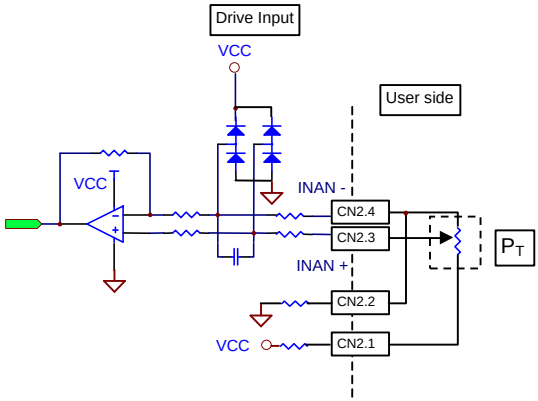


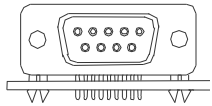
Diagram of Inputs and connection



External potentiometer : 5KO.

3.6.9 CN1: Connection to CANbus

Can Bus CN1 is a SUB-D 9-pin male connector.



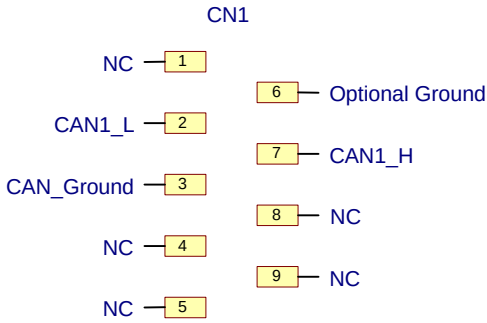
Refer to software manual for the drive's function when CAN bus is in operation.

Connection table

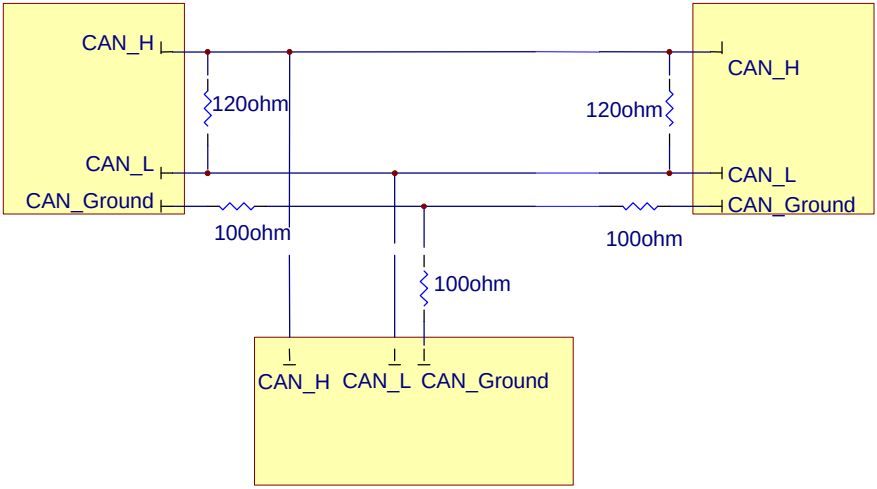
Signal	Pin	Function
N.C.	CN1.1	N.C.
CAN_L	CN1.2	CAN_L signal
0_CAN	CN1.3	Can_ Ground
Reserved	CN1.4	Not used
Reserved	CN1.5	Not used
0_CAN	CN1.6	Optional_Ground
CAN_H	CN1.7	CAN_H signal
Reserved	CN1.8	Not used
N.C.	CN1.9	N.C.

Cable requirements Use a 9-pins F Sub-D connector and shielded twisted cable of section 0.5 mm² (#20AWG) or 0,25mm^2 (#23 AWG)for CANbus connection.

Pin-Out of the CAN-bus connector



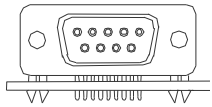
Canbus network diagram



Note:
The first and the last system should be connected to the network with a termination resistor of 120ohm. The CAN_Ground connection is optional.

3.6.10 CN1: Connection of RS232 and RS485 Interface

RS232 and RS485 connector is a 9 pins male SUB-D connector.



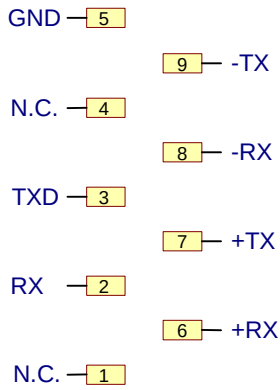
Refer to software manual for the function of serial link

Connection table

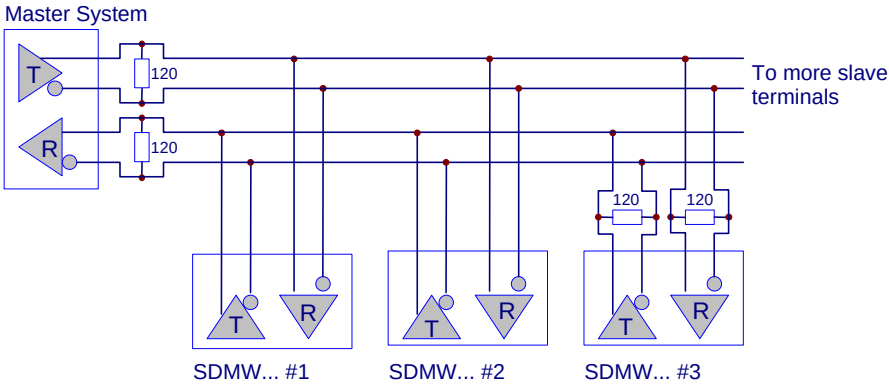
Signal	Pin	Function
N.C.	CN1.1	N.C.
Rx	CN1.2	RS232 receiver input
Tx	CN1.3	RS232 transmitter output
DTR	CN1.4	N.C.
GND	CN1.5	RS232 Interface Signal ground
+Rx	CN1.6	RS485 receiver +side (input)
+Tx	CN1.7	RS485 transmitter +side (output)
-Rx	CN1.8	RS485 receiver –side (input)
-Tx	CN1.9	RS485 transmitter –side (output)

Cable: requirements Use shielded twisted cable of section 0.5 mm² (#20 AWG) or 0.25mm² (#23 AWG) for RS232 and RS485 serial interface connection.

Connector pin-out



RS485 Connection



Note: The first and the last system should be connected to the network with termination resistors

The dot led of 7 segment display on the drive's front panel is lighted to show the DE (drive enable) state of the RS485 interface or when it's connected to the external bus.

4 STARTING THE DRIVE

This section explains how to power on the SDMWA170 unit after installation. Main Topics are:

- Check the installation
- Maintenance of the SDMWA170 unit

4.1 Check the Installation

Before Power on

- Check that if the device version is what you need (**Refer** to section 5.0). Improper AC input voltage or motor current setting could cause irreparable damages on the unit's or on the motor.
- Check that all settings are as you need in your application.
- Check the cabling and mounting to verify the proper installation and integrity of the unit.

First Power on Procedure

*Optimize this initial operation of power on with the **motor shaft disconnected from the load.** An improper cabling or unexpected failure could cause undesirable movement of the motor.*

4.2 Maintenance

Procedure The SDMWA170 unit is designed for a minimum maintenance. Remove superficial dust and dirt from the unit and the dissipation part using only clean, dry and low pressure air.

4.3 Drive Operation Status Monitoring

Drive Status Monitoring

The working condition of SDMWA170 is monitored on the 7 segment light emitting diodes (led) display.
The drive operation modes are displayed as:

"**b**" Boot program execution: Indicate that the boot program is properly executed as soon as the power of the unit is turned on;

"**I**" Initialization: the drive is running the start-up procedure (for about 6 seconds from beginning of the procedure);

"**S**" drive firmware running situation:

- "**S**" proper running;
- "**S**"+"  " characters flashing:
  Warning: Missing $I_{nominal}$;
  Limits: see the limits in current setting table;
  Action: set motor current;
  Resuming: automatically, at current setting;
- "**S**"+"**1**" characters flashing:
  Warning: Voltage of DC bus close to max limit;
  Limits: 24Vdc=Vbus=110Vdc;
  Action: correct the power supply voltage to ensure that 24Vdc= Vbus=110Vdc;
  Resuming: automatically, if 24Vdc=Vbus=110Vdc;
- **S**"+"**3**" characters flashing:
  Warning: drive temperature close to limit;
  Limits: 70°C=Tsink=76°C;
  Action: improve drive cooling;
  Resuming: automatically, if Tsink=70°C;
- **S**"+"**6**" characters alternate:
  Warning: regulation parameters overflow;
  Limits: no signification;
  Action: check the compatibility of the drive and the motor;
  Resuming: automatically;

"**L**" Missing Operation System: no working software stored inside the drive;

"**U**" Firmware upgrading: new software downloading in progress;

"**E**" General error: some errors has been detected by the real time internal supervisor of firmware;

"**P**" Protection status: a protection intervention condition has been detected;

- "**P**"+"**0**" characters alternate:
  Protection: motor phase open;
  Limits: no signification;
  Action: check motor connection;
  Resuming: Turn power off to resume the system from a memorized protection status;
- "**P**"+"**1**"characters alternate:
  Protection: over/under voltage;
  Limits: DC bus<21Vdc and DC bus>130Vdc;
  Action: correct the DC power supply;
  Resuming: automatically, if 24Vdc=Vbus=110Vdc;
- "**P**"+"**2**" characters alternate:
  Protection: over current;
  Limits: see current setting table;
  Action: check the cable and the motor for short circuit between wires or to motor case;
  Resuming: Turn power off to resume the system from a memorized protection status;
- "**P**"+"**3**" characters alternate:
  Protection: over temperature;
  Limits: Heatsink temperature > 75°C;
  Action: Improve drive cooling;
  Resuming: automatically, when drive temperature =75°C;

"**F**" fault: a Software Error inside the drive detected;

- "**F**"+"**0**" characters alternate:
  Fault: Watchdog protection intervention;
  Action: refer to Troubleshooting Table at 4.3.1 section;
- "**F**"+"**1**" characters alternate:
  Fault: Internal Software Error;
  Action: refer to Troubleshooting Table at 4.3.1 section;
- "**F**"+"**2**" characters alternate:
  Fault: Missing calibration value;
  Action: refer to Troubleshooting Table at 4.3.1 section;
- "**F**"+"**3**" characters alternate:
  Fault: Internal Hardware Error;
  Action: refer to Troubleshooting Table at 4.3.1 section;
- "**F**"+"**4**" characters alternate:
  Fault: EEPROM Failure;
  Action: refer to Troubleshooting Table at 4.3.1 section;
- "**F**"+"**6**"characters alternate:

Fault: Missing Setup;
Action: refer to Troubleshooting Table at 4.3.1section;

Power ON Sequence

It's possible to display the sequence of power on through the 7 segment led display:

"b" ⇒ "I" ⇒ "S" : correct powering on sequence.
⇒ "S"+"⌐" "1" "3" "6":warning condition.

"b" ⇒ "I" ⇒ "P"+ "0" "1" "2" "3": power on followed by a protection intervention.

"b" ⇒ "I" ⇒ "F"+"0" "1" "2" "3" "4" "6": power on followed by an internal software error.

"b" ⇒ "I" ⇒ "E" : power on followed by an user program error.

"b" ⇒ "L" : power on without operating system.

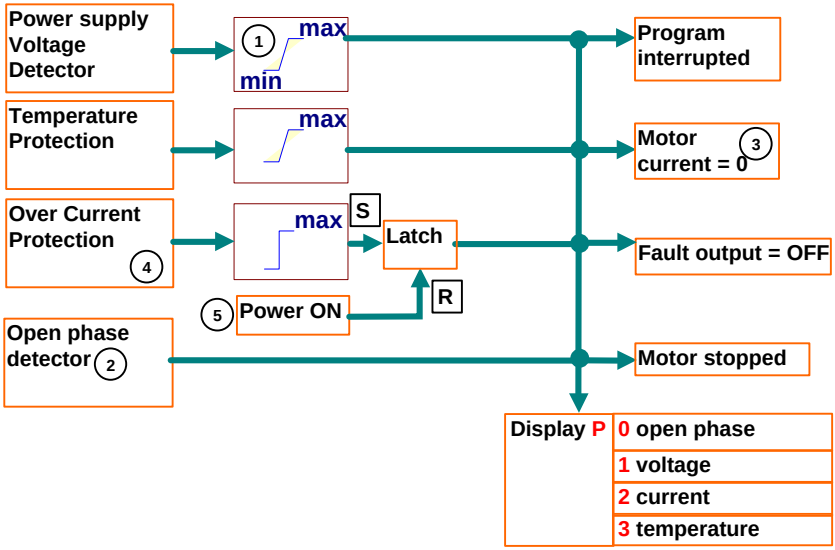
"b" ⇒ "I" ⇒ "H" : power on without user program.

For each protection intervention, a dedicated error message is transmitted through the present communication link:

- **OVER TEMPERATURE:** an overheating on the power stages was detected and the "thermal monitoring circuitry " disable the drive's power stages;
- **OVER/UNDER VOLTAGE:** the unit is actually powered with a voltage out of range and the "voltage monitoring circuitry" disable the drive's power stages;
- **OVER CURRENT:** a motor overloading was detected on output and the "current protection" disable the drive's power stages;
- **OPEN PHASE:** intervention block the operation of the drive;

The protections previously described are caused by hardware failures.

Protection Diagram



Note:

(1) The power supply voltage out of range condition is defined as:

- under voltage: DC bus <24Vac
- over voltage: DC bus > 110Vac
- DC internal bus voltage ripple > 10%
  ($V_{ripple\text{-}pp}$ > Rated Vdc / 10)

(2) Open phase: the winding current cannot meet the setting value;

(3) *When the SDMWA170 switches to the "fault" status, the power stage is disabled and the **motor will lose the holding torque**. The installation's planner must provide a safety device to prevent any damage to things or persons in case the load drags the motor.*

(4) *After an **over current** protection intervention, turn the power of the drive off and fix the problem before powering the device on again.*

(5) *Turn power off to resume the system **from a latched current protection** intervention.*

4.3.1 Troubleshooting Table

SYMPTOM	ACTION
No effect on the unit at power supply switching on.	Check the power supply cabling and fuses, if ok, check if the supply voltage, on power connector with a voltage-meter, meets the drive's ratings.
Over current protection "on"	Be sure that the motor connections have been made according to the wiring diagrams in the EVER's motors catalogue. Check the motor cable for short circuit between wilding cables or between phase and motor or between phase and earth ground.
No torque on the motor	Check if the motor cable is correctly wired and properly connected to the drive.
The motor produces torque but does not run.	Check if the I/O cable is correctly wired and properly plugged to the drive.
The motor rotates in wrong direction.	Reverse A and A motor leads.
The motor does not reach the target position.	Verify if the motor is blocked. If it is: 1. Verify motor sizing. Be sure that the power supply voltage and motor current setting is properly to obtain torque vs. speed curve. 2. Use a smaller step angle size to avoid low-speed resonance problems.

*Use protection diagram and the **troubleshooting table** in these pages to fix and resolve the problems. If is not possible to resume the correct condition of the drive, please call Support dept. of EVER Company.*

*Suspecting the **SDMWA170 system has been damaged**, before replacing it by a new unit, check that the installation and the power supply design meet all the drive's requirements: to resolve the problem by simply replacing a SDMWA170 unit isn't a good troubleshooting practice.*

*The power supply connectors, the motor output and some parts of the SDMWA170 unit are a potential source of **electric shock**. To avoid dangers, please follow the safety instruction in section 1.3 and 3.5 of this manual.*

To resume normal working conditions, after a intervention of a protection or an interruption unexpected of working section, use a working restart cycle to avoid dangerous situations.

If it' not possible to resolve the problem, but the system is not considered faulty, please call EVER co. for technical support or send a message including the following information:

Unit version code (SDMWA170Vyyyy) and serial number as printed in the label on the unit case.
An complete description of the problem and the working condition where it occurs.
A description of the unit settings in your application (Current, step type, waveform of wilding current, operation mode, etc.)
The serial number of the motor (code of Ever co.)
The value of power supply and characteristics (ripple....).
A description of power supply and control signals, cabling and other components in this installation .
A description of your application (motor movements, load, speed, etc.).

Return procedure

To return a defective drive to EVER co. for repair or replacement:

1) Possibly put back the unit in its original packing.
[EVER co. is not responsible for damage resulting from improper packaging or shipment].
If it's possible, including a complete a complete description of the problem in order that the defect could be verified as soon as possible.

2) Ship the goods to:

EVER Elettronica
Via del Commercio 2/4
Zona Industriale Loc. San Grato
26900 - LODI - ITALY
Attn: AS Dept.
Email: reparations@everelettronica.it

*EVER co. is used to sending to customers a **repair costs estimation offer before repairing** the unit.*
All shipment costs are in charge of customer.

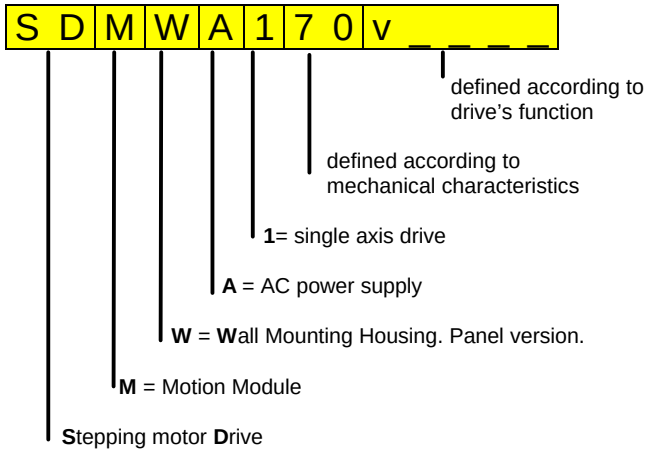
5 SDMWA170 VERSIONS AND SPECIFICATIONS

This section describes the specific features of the available versions of SDMWA170 drive.

*The **information** herein should be considered with priority on the general SDMWA170 specification in the previous sections.*

5.1 Drive Code and Order Information

To order the SDMWA170 drive version you want please use the following information:



Specifications on front panel housing:

CDM (**C**omplete **D**rive **M**odule) step motor with **AC** supply, working as motion control module. After receiving the relative working program at the installation, the unit will work as a stepping motor controlled drive.

5.2 Table of SDMWA170Vxxxx Available Versions

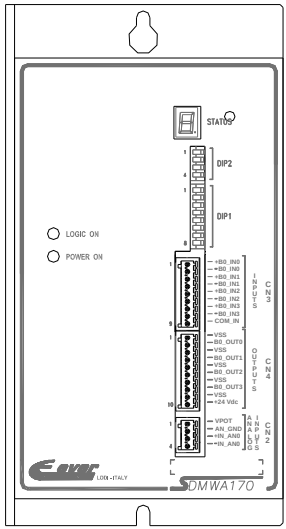
SDMWA170	Vac	Inputs (1)	Outputs (2)	Analog Inputs (3)	Firmware	Bus Link	Connector kit code
VB221	24-80	4	4	2	C0300	CANbus	SDMWA170V4221C
VB231		4	4	2	C0400	RS232 and RS485	SDMWA170V4231C

(1) 5 Vdc Line Driver and 24Vdc PNP and NPN;
(2) 24Vdc @ 500mA;
(3) ± 10 Vdc

5.3 SDMWA170v4221(v2221) Complete Drive (C0300)

Performances available in this version: the SDMWA170 is a step motor motion module and drive implemented through a new generation DIGITAL SIGNAL PROCESSOR CONTROLLER. In a wall mounting housing, the unit integrates a micro stepping drive, is able to move the motor according to motion profiling commands mastered by a PLC or by a PC. The connection to the master unit is realized through a interface link CANbus or by #4 optoisolated 200kHz digital inputs (5Vdc Line-driver and 24Vdc PNP/Push-Pull), #4 optoisolated outputs (24Vdc@500mA PNP) and #1 ±10Vdc analog input. Dip-switches are available to user settings and for the identification of the unit in a CANbus network. The unit drives the stepping motor according to a user program, while checking in real time the critical working parameters as temperature, voltage and current. The device is powered through only one AC supply and can drive the stepper motor in open or close loop of velocity & position.

5.3.1 Electrical specifications



- **AC voltage** range (24÷80) Vac;
- **Bipolar chopper:** 2 “H” power bridges;
- **Switching frequency:** 40 kHz;
- **Phase current ratings:** 1÷8Arms (11Apeak);
- **Step angle:** from full step to 1/128 step sinusoidal current waveforms;
- **Display:** 7 segment led display working status of drive;
- **Dip switches and Jumpers** for user functions setting;
- **Unit Protection circuitry** against:
  - Voltage out of operating range **(1)**
  - Over temperature : T_{sink} >= 75°C ±5°C
  - Over current due to:
    - short circuit between motor phases
    - short circuit between phase and ground
    - wrong motor phase connection
    - motor phase open

(1) the voltage out of operating range condition is defined as:

- under voltage: DC bus < 24Vdc
- over voltage: DC bus > 110Vdc
- ripple >10% ($V_{ripple-pp}$ > Rated Vdc / 10)

- User's adjustments:

Motor Current: 1 to 8 Arms sinusoidal winding currents. Selectable from software

Micro-stepping: selectable from software

Current reduction: selectable from software

Boost current: selectable from software

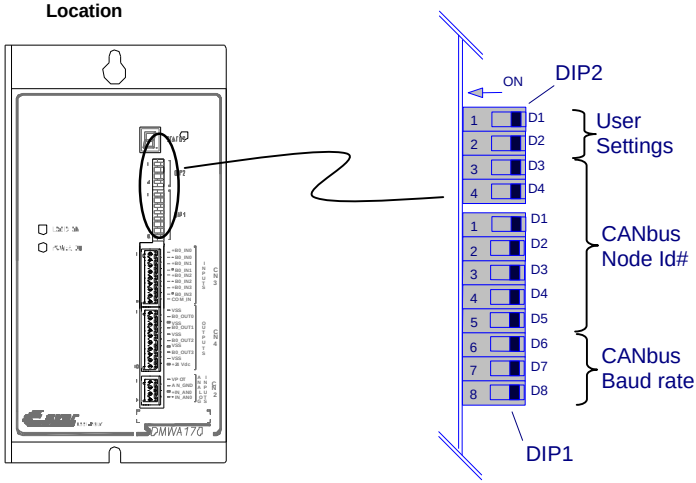
- User's responsibility

Boost current: The maximum boost current should not exceed the maximum rating current of the drive.

Anulling current the motor loses the holding torque. The user must provide a safety device to prevent any damage to things or persons in case the load drags the motor.

5.3.2 Dip-switch Setting

Location



DIP2				DIP1							
D1	D2	D3	D4	D1	D2	D3	D4	D5	D6	D7	D8
U1	U2	ID6	ID5	ID4	ID3	ID2	ID1	ID0	BD2	BD1	BD0
Free for User Settings.		CANbus Node Identifier							CANbus Baud rate		

*Some parts inside the SDMWA170 unit housing can be a potential source of **electric shock**. Before handling DIP-SWITCH, switch power off and wait until the 7 segment display leds on drive's front panel are off.*

CANbus Baud Rate Selection table

BD2	BD1	BD0	Baud Rate (Kbit/s)
OFF	OFF	OFF	1000
OFF	OFF	ON	500
OFF	ON	OFF	250
OFF	ON	ON	125
ON	OFF	OFF	100
ON	OFF	ON	50
ON	ON	OFF	20
ON	ON	ON	10

Refer to software manual of the drive for more detail information about operating modes.

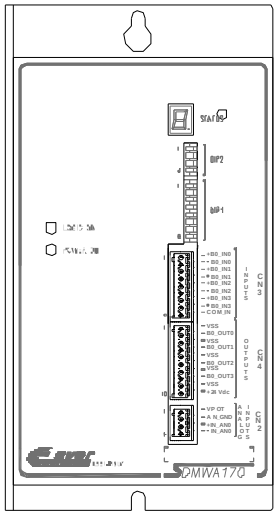
CANbus Node Identifiers table

Node	ID6	ID5	ID4	ID3	ID2	ID1	ID0	Node	ID6	ID5	ID4	ID3	ID2	ID1	ID0
//	OFF	OFF	OFF	OFF	OFF	OFF	OFF	64	ON	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	ON	65	ON	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	ON	OFF	66	ON	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	ON	ON	67	ON	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF	68	ON	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	ON	OFF	ON	69	ON	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	ON	ON	OFF	70	ON	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	ON	ON	ON	71	ON	OFF	OFF	OFF	ON	ON	ON
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	72	ON	OFF	OFF	ON	OFF	OFF	OFF
9	OFF	OFF	OFF	ON	OFF	OFF	ON	73	ON	OFF	OFF	ON	OFF	OFF	ON
10	OFF	OFF	OFF	ON	OFF	ON	OFF	74	ON	OFF	OFF	ON	OFF	ON	OFF
11	OFF	OFF	OFF	ON	OFF	ON	ON	75	ON	OFF	OFF	ON	OFF	ON	ON
12	OFF	OFF	OFF	ON	ON	OFF	OFF	76	ON	OFF	OFF	ON	ON	OFF	OFF
13	OFF	OFF	OFF	ON	ON	OFF	ON	77	ON	OFF	OFF	ON	ON	OFF	ON
14	OFF	OFF	OFF	ON	ON	ON	OFF	78	ON	OFF	OFF	ON	ON	ON	OFF
15	OFF	OFF	OFF	ON	ON	ON	ON	79	ON	OFF	OFF	ON	ON	ON	ON
16	OFF	OFF	ON	OFF	OFF	OFF	OFF	80	ON	OFF	ON	OFF	OFF	OFF	OFF
17	OFF	OFF	ON	OFF	OFF	OFF	ON	81	ON	OFF	ON	OFF	OFF	OFF	ON
18	OFF	OFF	ON	OFF	OFF	ON	OFF	82	ON	OFF	ON	OFF	OFF	ON	OFF
19	OFF	OFF	ON	OFF	OFF	ON	ON	83	ON	OFF	ON	OFF	OFF	ON	ON
20	OFF	OFF	ON	OFF	ON	OFF	OFF	84	ON	OFF	ON	OFF	ON	OFF	OFF
21	OFF	OFF	ON	OFF	ON	OFF	ON	85	ON	OFF	ON	OFF	ON	OFF	ON
22	OFF	OFF	ON	OFF	ON	ON	OFF	86	ON	OFF	ON	OFF	ON	ON	OFF
23	OFF	OFF	ON	OFF	ON	ON	ON	87	ON	OFF	ON	OFF	ON	ON	ON
24	OFF	OFF	ON	ON	OFF	OFF	OFF	88	ON	OFF	ON	ON	OFF	OFF	OFF
25	OFF	OFF	ON	ON	OFF	OFF	ON	89	ON	OFF	ON	ON	OFF	OFF	ON
26	OFF	OFF	ON	ON	OFF	ON	OFF	90	ON	OFF	ON	ON	OFF	ON	OFF
27	OFF	OFF	ON	ON	OFF	ON	ON	91	ON	OFF	ON	ON	OFF	ON	ON
28	OFF	OFF	ON	ON	ON	OFF	OFF	92	ON	OFF	ON	ON	ON	OFF	OFF
29	OFF	OFF	ON	ON	ON	OFF	ON	93	ON	OFF	ON	ON	ON	OFF	ON
30	OFF	OFF	ON	ON	ON	ON	OFF	94	ON	OFF	ON	ON	ON	ON	OFF
31	OFF	OFF	ON	ON	ON	ON	ON	95	ON	OFF	ON	ON	ON	ON	ON
32	OFF	ON	OFF	OFF	OFF	OFF	OFF	96	ON	ON	OFF	OFF	OFF	OFF	OFF
33	OFF	ON	OFF	OFF	OFF	OFF	ON	97	ON	ON	OFF	OFF	OFF	OFF	ON
34	OFF	ON	OFF	OFF	OFF	ON	OFF	98	ON	ON	OFF	OFF	OFF	ON	OFF
35	OFF	ON	OFF	OFF	OFF	ON	ON	99	ON	ON	OFF	OFF	OFF	ON	ON
36	OFF	ON	OFF	OFF	ON	OFF	OFF	100	ON	ON	OFF	OFF	ON	OFF	OFF
37	OFF	ON	OFF	OFF	ON	OFF	ON	101	ON	ON	OFF	OFF	ON	OFF	ON
38	OFF	ON	OFF	OFF	ON	ON	OFF	102	ON	ON	OFF	OFF	ON	ON	OFF
39	OFF	ON	OFF	OFF	ON	ON	ON	103	ON	ON	OFF	OFF	ON	ON	ON
40	OFF	ON	OFF	ON	OFF	OFF	OFF	104	ON	ON	OFF	ON	OFF	OFF	OFF
41	OFF	ON	OFF	ON	OFF	OFF	ON	105	ON	ON	OFF	ON	OFF	OFF	ON
42	OFF	ON	OFF	ON	OFF	ON	OFF	106	ON	ON	OFF	ON	OFF	ON	OFF
43	OFF	ON	OFF	ON	OFF	ON	ON	107	ON	ON	OFF	ON	OFF	ON	ON
44	OFF	ON	OFF	ON	ON	OFF	OFF	108	ON	ON	OFF	ON	ON	OFF	OFF
45	OFF	ON	OFF	ON	ON	OFF	ON	109	ON	ON	OFF	ON	ON	OFF	ON
46	OFF	ON	OFF	ON	ON	ON	OFF	110	ON	ON	OFF	ON	ON	ON	OFF
47	OFF	ON	OFF	ON	ON	ON	ON	111	ON	ON	OFF	ON	ON	ON	ON
48	OFF	ON	ON	OFF	OFF	OFF	OFF	112	ON	ON	ON	OFF	OFF	OFF	OFF
49	OFF	ON	ON	OFF	OFF	OFF	ON	113	ON	ON	ON	OFF	OFF	OFF	ON
50	OFF	ON	ON	OFF	OFF	ON	OFF	114	ON	ON	ON	OFF	OFF	ON	OFF
51	OFF	ON	ON	OFF	OFF	ON	ON	115	ON	ON	ON	OFF	OFF	ON	ON
52	OFF	ON	ON	OFF	ON	OFF	OFF	116	ON	ON	ON	OFF	ON	OFF	OFF
53	OFF	ON	ON	OFF	ON	OFF	ON	117	ON	ON	ON	OFF	ON	OFF	ON
54	OFF	ON	ON	OFF	ON	ON	OFF	118	ON	ON	ON	OFF	ON	ON	OFF
55	OFF	ON	ON	OFF	ON	ON	ON	119	ON	ON	ON	OFF	ON	ON	ON
56	OFF	ON	ON	ON	OFF	OFF	OFF	120	ON	ON	ON	ON	OFF	OFF	OFF
57	OFF	ON	ON	ON	OFF	OFF	ON	121	ON	ON	ON	ON	OFF	OFF	ON
58	OFF	ON	ON	ON	OFF	ON	OFF	122	ON	ON	ON	ON	OFF	ON	OFF
59	OFF	ON	ON	ON	OFF	ON	ON	123	ON	ON	ON	ON	OFF	ON	ON
60	OFF	ON	ON	ON	ON	OFF	OFF	124	ON	ON	ON	ON	ON	OFF	OFF
61	OFF	ON	ON	ON	ON	OFF	ON	125	ON	ON	ON	ON	ON	OFF	ON
62	OFF	ON	ON	ON	ON	ON	OFF	126	ON	ON	ON	ON	ON	ON	OFF
63	OFF	ON	ON	ON	ON	ON	ON	127	ON	ON	ON	ON	ON	ON	ON

5.4 SDMWA170v4231(v2231) Complete Drive (C0400)

Performances available in this version: the SDMWA170 is a step motor motion module and drive implemented through a new generation DIGITAL SIGNAL PROCESSOR CONTROLLER. In a wall mounting housing, the unit integrates a micro stepping drive, is able to move the motor according to motion profiling commands mastered by a PLC or by a PC. The connection to the master unit is realized through a interface link RS232 e RS485 or by #4 optoisolated 200kHz digital inputs (5Vdc Line-driver and 24Vdc PNP/Push-Pull), #4 optoisolated outputs (24Vdc@500mA PNP) and #1 ±10Vdc analog input. Dip-switches are available to user settings and for the identification of the unit in a RS485 network. The unit drives the stepping motor according to a user program, while checking in real time the critical working parameters as temperature, voltage and current. The device is powered through only one AC supply and can drive the stepper motor in open or close loop of velocity & position.

5.4.1 Electrical Specifications



- **AC voltage** range (24÷80) Vac;
- **Bipolar chopper:** 2 “H” power bridges;
- **Switching frequency:** 40 kHz;
- **Phase current ratings:** 1÷8Arms (11Apeak);
- **Step angle:** from full step to 1/128 step sinusoidal current waveforms;
- **Display:** 7 segment led display drive’s working status;
- **Dip switches** for user functions setting;
- **Unit Protection circuitry** against:
  - Voltage out of operating range **(1)**
  - Over temperature : T $_{sink}$ >= 75°C ±5°C
  - Over current due to:
    - short circuit between motor phases
    - short circuit between phase and ground
    - wrong motor phase connection
    - motor phase open

(1) the voltage out of operating range condition is defined as:

- under voltage: DC bus < 24Vdc
- over voltage: DC bus > 110Vdc
- ripple >10% ($V_{ripple-pp}$ > Rated Vdc / 10)

- User's adjustments:

Motor Current: 1 to 8 Arms sinusoidal winding currents. Selectable from software

Micro-stepping: selectable from software

Current reduction: selectable from software

Boost current: selectable from software

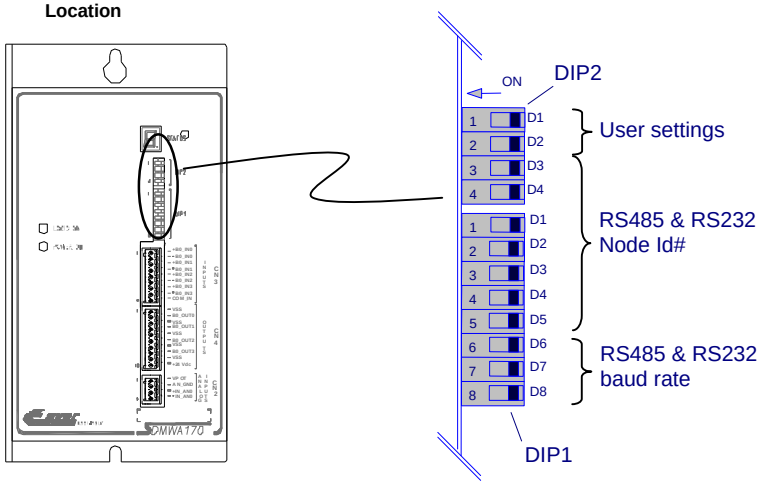
- User's responsibility

Boost current: The maximum boost current should not exceed the maximum rating current of the drive.

Anulling current the motor loses the holding torque. The user must provide a safety device to prevent any damage to things or persons in case the load drags the motor.

5.4.2 Dip-switch setting

Location



DIP2				DIP1							
D1	D2	D3	D4	D1	D2	D3	D4	D5	D6	D7	D8
U1	U2	ID6	ID5	ID4	ID3	ID2	ID1	ID0	BD2	BD1	BD0
Free for User settings.		RS485 & RS232 Node Identifier							RS485 & RS232 Baud rate		

*Some parts inside the SDMWA170 unit housing can be a potential source of **electric shock**. Before handling DIP-SWITCH, switch power off and wait until the 7 segment display leds on drive's front panel are off.*

Baud rate table

Rs232 and RS485 Baud Rate selection table

B2	B1	B0	Baud Rate (Kbit/s)
OFF	OFF	OFF	reserved
OFF	OFF	ON	57600
OFF	ON	OFF	38400
OFF	ON	ON	19200
ON	OFF	OFF	9600
ON	OFF	ON	4800
ON	ON	OFF	2400
ON	ON	ON	1200

Refer to software manual of the drive for more detail information about operating modes.

RS485 and RS232 Node Identifiers table

Node	I6	I5	I4	I3	I2	I1	I0	Node	I6	I5	I4	I3	I2	I1	I0
//	OFF	OFF	OFF	OFF	OFF	OFF	OFF	64	ON	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	ON	65	ON	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	ON	OFF	66	ON	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	ON	ON	67	ON	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF	68	ON	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	ON	OFF	ON	69	ON	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	ON	ON	OFF	70	ON	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	ON	ON	ON	71	ON	OFF	OFF	OFF	ON	ON	ON
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	72	ON	OFF	OFF	ON	OFF	OFF	OFF
9	OFF	OFF	OFF	ON	OFF	OFF	ON	73	ON	OFF	OFF	ON	OFF	OFF	ON
10	OFF	OFF	OFF	ON	OFF	ON	OFF	74	ON	OFF	OFF	ON	OFF	ON	OFF
11	OFF	OFF	OFF	ON	OFF	ON	ON	75	ON	OFF	OFF	ON	OFF	ON	ON
12	OFF	OFF	OFF	ON	ON	OFF	OFF	76	ON	OFF	OFF	ON	ON	OFF	OFF
13	OFF	OFF	OFF	ON	ON	OFF	ON	77	ON	OFF	OFF	ON	ON	OFF	ON
14	OFF	OFF	OFF	ON	ON	ON	OFF	78	ON	OFF	OFF	ON	ON	ON	OFF
15	OFF	OFF	OFF	ON	ON	ON	ON	79	ON	OFF	OFF	ON	ON	ON	ON
16	OFF	OFF	ON	OFF	OFF	OFF	OFF	80	ON	OFF	ON	OFF	OFF	OFF	OFF
17	OFF	OFF	ON	OFF	OFF	OFF	ON	81	ON	OFF	ON	OFF	OFF	OFF	ON
18	OFF	OFF	ON	OFF	OFF	ON	OFF	82	ON	OFF	ON	OFF	OFF	ON	OFF
19	OFF	OFF	ON	OFF	OFF	ON	ON	83	ON	OFF	ON	OFF	OFF	ON	ON
20	OFF	OFF	ON	OFF	ON	OFF	OFF	84	ON	OFF	ON	OFF	ON	OFF	OFF
21	OFF	OFF	ON	OFF	ON	OFF	ON	85	ON	OFF	ON	OFF	ON	OFF	ON
22	OFF	OFF	ON	OFF	ON	ON	OFF	86	ON	OFF	ON	OFF	ON	ON	OFF
23	OFF	OFF	ON	OFF	ON	ON	ON	87	ON	OFF	ON	OFF	ON	ON	ON
24	OFF	OFF	ON	ON	OFF	OFF	OFF	88	ON	OFF	ON	ON	OFF	OFF	OFF
25	OFF	OFF	ON	ON	OFF	OFF	ON	89	ON	OFF	ON	ON	OFF	OFF	ON
26	OFF	OFF	ON	ON	OFF	ON	OFF	90	ON	OFF	ON	ON	OFF	ON	OFF
27	OFF	OFF	ON	ON	OFF	ON	ON	91	ON	OFF	ON	ON	OFF	ON	ON
28	OFF	OFF	ON	ON	ON	OFF	OFF	92	ON	OFF	ON	ON	ON	OFF	OFF
29	OFF	OFF	ON	ON	ON	OFF	ON	93	ON	OFF	ON	ON	ON	OFF	ON
30	OFF	OFF	ON	ON	ON	ON	OFF	94	ON	OFF	ON	ON	ON	ON	OFF
31	OFF	OFF	ON	ON	ON	ON	ON	95	ON	OFF	ON	ON	ON	ON	ON
32	OFF	ON	OFF	OFF	OFF	OFF	OFF	96	ON	ON	OFF	OFF	OFF	OFF	OFF
33	OFF	ON	OFF	OFF	OFF	OFF	ON	97	ON	ON	OFF	OFF	OFF	OFF	ON
34	OFF	ON	OFF	OFF	OFF	ON	OFF	98	ON	ON	OFF	OFF	OFF	ON	OFF
35	OFF	ON	OFF	OFF	OFF	ON	ON	99	ON	ON	OFF	OFF	OFF	ON	ON
36	OFF	ON	OFF	OFF	ON	OFF	OFF	100	ON	ON	OFF	OFF	ON	OFF	OFF
37	OFF	ON	OFF	OFF	ON	OFF	ON	101	ON	ON	OFF	OFF	ON	OFF	ON
38	OFF	ON	OFF	OFF	ON	ON	OFF	102	ON	ON	OFF	OFF	ON	ON	OFF
39	OFF	ON	OFF	OFF	ON	ON	ON	103	ON	ON	OFF	OFF	ON	ON	ON
40	OFF	ON	OFF	ON	OFF	OFF	OFF	104	ON	ON	OFF	ON	OFF	OFF	OFF
41	OFF	ON	OFF	ON	OFF	OFF	ON	105	ON	ON	OFF	ON	OFF	OFF	ON
42	OFF	ON	OFF	ON	OFF	ON	OFF	106	ON	ON	OFF	ON	OFF	ON	OFF
43	OFF	ON	OFF	ON	OFF	ON	ON	107	ON	ON	OFF	ON	OFF	ON	ON
44	OFF	ON	OFF	ON	ON	OFF	OFF	108	ON	ON	OFF	ON	ON	OFF	OFF
45	OFF	ON	OFF	ON	ON	OFF	ON	109	ON	ON	OFF	ON	ON	OFF	ON
46	OFF	ON	OFF	ON	ON	ON	OFF	110	ON	ON	OFF	ON	ON	ON	OFF
47	OFF	ON	OFF	ON	ON	ON	ON	111	ON	ON	OFF	ON	ON	ON	ON
48	OFF	ON	ON	OFF	OFF	OFF	OFF	112	ON	ON	ON	OFF	OFF	OFF	OFF
49	OFF	ON	ON	OFF	OFF	OFF	ON	113	ON	ON	ON	OFF	OFF	OFF	ON
50	OFF	ON	ON	OFF	OFF	ON	OFF	114	ON	ON	ON	OFF	OFF	ON	OFF
51	OFF	ON	ON	OFF	OFF	ON	ON	115	ON	ON	ON	OFF	OFF	ON	ON
52	OFF	ON	ON	OFF	ON	OFF	OFF	116	ON	ON	ON	OFF	ON	OFF	OFF
53	OFF	ON	ON	OFF	ON	OFF	ON	117	ON	ON	ON	OFF	ON	OFF	ON
54	OFF	ON	ON	OFF	ON	ON	OFF	118	ON	ON	ON	OFF	ON	ON	OFF
55	OFF	ON	ON	OFF	ON	ON	ON	119	ON	ON	ON	OFF	ON	ON	ON
56	OFF	ON	ON	ON	OFF	OFF	OFF	120	ON	ON	ON	ON	OFF	OFF	OFF
57	OFF	ON	ON	ON	OFF	OFF	ON	121	ON	ON	ON	ON	OFF	OFF	ON
58	OFF	ON	ON	ON	OFF	ON	OFF	122	ON	ON	ON	ON	OFF	ON	OFF
59	OFF	ON	ON	ON	OFF	ON	ON	123	ON	ON	ON	ON	OFF	ON	ON
60	OFF	ON	ON	ON	ON	OFF	OFF	124	ON	ON	ON	ON	ON	OFF	OFF
61	OFF	ON	ON	ON	ON	OFF	ON	125	ON	ON	ON	ON	ON	OFF	ON
62	OFF	ON	ON	ON	ON	ON	OFF	126	ON	ON	ON	ON	ON	ON	OFF
63	OFF	ON	ON	ON	ON	ON	ON	127	ON	ON	ON	ON	ON	ON	ON

A.1 Factory and User Dip-switch Setting

Use the following table to bring back the state of dip-switch setting and some connections of the application.

*See **section 3.5.2** for **dip-switch setting information.***

FACTORY SETTING											
DIP1								DIP2			
D1	D2	D3	D4	D5	D6	D7	D8	D1	D2	D3	D4
off	off	off	off	off	off	off	off	off	off	off	off

USER SETTINGS												
	DIP1								DIP2			
	D1	D2	D3	D4	D5	D6	D7	D8	D1	D2	D3	D4

USER CONNECTIONS

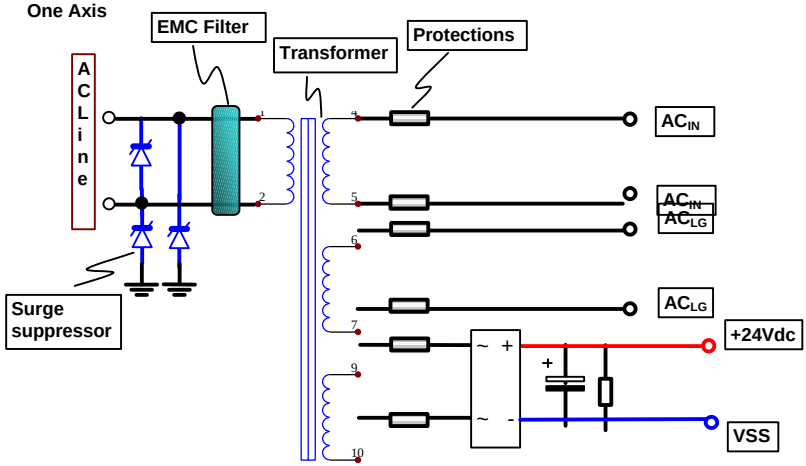
SDMWA170		Working mode						
Connector		C0300	C0400					
CN1	1	Not available	Not available					
	2	CAN_L signal	RS232 Rx					
	3	CAN Ground	RS232 Tx					
	4	Not available	Not available					
	5	Not available	RS232 Ground					
	6	Not available	RS485 +RX					
	7	CAN_H signal	RS485 +TX					
	8	Not available	RS485 -RX					
	9	Not available	RS485 -TX					
CN2	1	+5Vdc						
	2	AGND						
	3	+IN_AN0						
	4	-IN_AN0						
CN3	1	+B0_IN0						
	2	-B0_IN0						
	3	+B0_IN1						
	4	-B0_IN1						
	5	+B0_IN2						
	6	-B0_IN2						
	7	+B0_IN3						
	8	-B0_IN3						
	9	COM_IN						
CN4	1	VSS						
	2	B0_OUT0						
	3	VSS						
	4	B0_OUT1						
	5	VSS						
	6	B0_OUT2						
	7	VSS						
	8	B0_OUT3						
	9	VSS						
	10	+24Vdc						
CN5	1	AC_{IN}						
	2	AC_{IN}						
	3	EG						
	4	AC_{IN}						
CN15		AC_{LG}						
		AC_{LG}						
CN6	1	B*						
	2	B						
	3	MEG						
	4	A*						
	5	A						

CN16	**1**	**GND_VDC-OUT/AUX**					
	2	**VDC-OUT/AUX**					
	3	**GND_VDC-OUT**					
	4	**EARTH GROUND**					
	5	**VLOG-IN**					
	6	**VDC-OUT/CONV**					

A.2 Power Supply

Connection Diagram

One Axis



Drive Power Supply: converter

Surge Suppressors on primary circuit to protects the drive against line surge spikes.

Transformer Be sure that the transformer primary voltage can withstand the power line peak voltage. The secondary bus peak voltage is approximately equal to 1.41 * Actual secondary rms voltage.

The AC supply voltage must never exceed the Vac rating of your unit version.

Transformer VA ratings depend on motor power ratings: defining the trasformer the user can make reference to support@everelettronica.it service for the motion control system parts definition (motor and power supply sizing). The following procedure can also be used to make an approximated extimation of the power supply features:

1. Power at each axis shaft (watts)=p*N*T/30 where N=[RPM], T=[Nm];
2. Total_power (watts) = summ of simultaneously moving axes power;

3. Transformer_power (watts) = 2 * total_power (efficiency = 0.5)
4. Transformer_power (VA)= Transformer_power [watts] divided by 0,7 (single phase ac) or 0,8 (three phases ac);
5. To define the transformer losses assume an 8% Load Regulation (the secondary voltage can exceed the rated value of 8% when the load current is reduced from maximum to zero);

An easy and fast solution allows to calculate Transformer VA ratings: as Power(VA) = v2* Vdc_{BUS}* $Imax_{PHASE}$

An EMC Filter is generally necessary to meet the requirements of the EMC emissions regulating standards. A filter is recommended when a sensitive circuit is powered by the drive ac line.

Looking for a commerc line filter consider the total continuous RMS lcurrent of the motion control system..

The supply line filter should be inserted between the ac mains and the transformer if this is near the drive or in the same cabinet, between the transformer and the rectifier bridge in the other cases, keeping the rectifier bridge as close to the drive as possible and the connection between the filter and the transformer as short as possible.

Refer to the filter manufacturer installing instructions for an efffective reduction most of conducted emissions.

Protections use 16A rated fuses on AC bus or a safety switch.

Drive Power Supply: logic

Surge Suppressors on primary circuit to protects the drive against line surge spikes.

Transformer Be sure that the transformer primary voltage can withstand the power line peak voltage. The secondary bus peak voltage is approximately equal to 1.41 * Actual secondary rms voltage.

The AC supply voltage must never exceed the Vac rating of your unit version.

Logic Transformer VA ratings is 25VA.

Protections use 1A rated fuses on AC bus or a safety switch.

Dirver Power Supply: input/output

Surge Suppressors on primary circuit to protects the drive against line surge spikes.

Transformer Be sure that the transformer primary voltage can withstand the power line peak voltage. The secondary bus peak voltage is approximately equal to 1.41 * Actual secondary rms voltage.

The AC supply voltage must never exceed the Vac rating of your unit version.

Logic Transformer VA ratings is 85VA.

Power rectifier:

Bridge assume a 6 Arms as worst case rectifier current rating.

Capacitor 3000uF capacitor (85°C) is needed. The capacitor's working voltage rating must widsthand the maximum dc bus voltage with a safety margin.

Protections use 5A rated fuses on AC bus or a safety switch.