LAM Technologies
electronic equipment

DSS1

Vector Controlled

Stepper Motor Drives

User’s Manual

(Hardware rev. 1.00   Firmware rev. 0.12)

Contents

1 Introduction

The DDS1 drives series is realized in digital technology and drives the stepper motors with vector technique. This allows to overcome the concept of step fractioning in favor of the STEPLESS driving of the motor, which allows to freely define the relationship between the pulses applied and the motor position, overcoming the strict fractioning imposed by dated drives.

The DDS12 models have the encoder input with allows the closed-loop motor control thus eliminating stall problem and improving efficiency.

The drive configuration is through the free software **Omni Automation IDE**, running under Windows Platform (Windows 7, Windows 8.1 and Windows 10 32bit or 64bit), which also allows an accurate diagnostic of the devices. For the connection to the PC the UDP30 interface is needed.

The DDS1 drives series can be configured to control the motor in position, speed or torque (the torque control is only possible in DDS12 models).

1.1 Position Control

In this mode, the motor position is controlled through the pulse train generated by the control device (PLC, CNC, etc.). The number of pulses required to execute a motor revolution can be freely set.

The motor position is always expressed in 1/10000 of step independently from the chosen resolution.

1.2 Speed Control

By selecting the speed control it is possible to use the analog input to set the reference of the motor rotation speed. Through the configuration it is possible to freely define the relationship between the voltage applied and the motor rotation speed. Alternatively, the speed reference can be selected from a table (among 4 possible values) through the combination of 2 Digital Inputs. Other inputs can be configured to manage the Start/Stop of the motor. The movement always occurs in accordance with the acceleration and deceleration ramps.

1.3 Torque Control

The torque control is available in DDS12 models when the drive is paired with a motor provided with encoder and allows to adjust the torque supplied by the motor through the analog input or a value selected from a table (among 4 possible values) through the combination of 2 Digital Inputs. Other inputs can be configured to manage the Start/Stop of motor. The maximum speed is settable and the movement always occurs in accordance with the acceleration and deceleration ramps. Through the configuration it is possible to freely define the relationship between the voltage applied and the torque supplied by the motor.

Finally, the DDS1 drives series is able to manage the limit switches and the motor current proportional to the load (only DDS12 model provided with encoder).

1.4 Series

The series develops in 10 models different in functionalities and power.

Power Supply / Motor Current 24Vdc Auxiliary Power Supply	5 Digital Inputs, 2 Digital Outputs 1 Analog Input	8 Digital Inputs, 3 Digital Outputs 1 Analog Input 1 Encoder Input A, B, I
20..50Vdc / 0,2..1,4Arms	**DDS1141**	**DDS1241**
20..50Vdc / 1,0..4,5Arms	**DDS1144**	**DDS1244**
20..50Vdc / 2,0..10,0Arms	**DDS1148**	**DDS1248**
24..90Vdc / 1,0..4,5Arms	**DDS1174**	**DDS1274**
24..90Vdc / 2,0..10,0Arms	**DDS1178**	**DDS1278**

1.5 Terms, symbols and abbreviations

To indicate features common to a whole group of products the character “x” is used in place of any other character. For example, the term DDS1x44 implies the models DDS1144 and DDS1244.

The terms manual and document have the same meaning, moreover the words drive, device and product always refer to the DDS1 Series.

In the manual some symbols are used to underline necessary topics of particular concern or deserving interest. The meaning of each one of them is detailed here below:

<u>It refers to a dangerous conditions that must be accurately evaluated and avoided. Failing to follow instructions marked with this symbol can be cause of serious damages to people, animals and things.</u>

It draws the attention to important issues that if not understood or implemented may affect the good functioning of the product.

It highlights a valuable feature or functionality of the product that is difficult to find elsewhere or shows a shortcut to reach a target.

1.6 Documents

The present manual applies to the standard series of DDS1 drives with Hardware and Firmware revisions as shown on the cover. Customized products or with a different Hardware or Firmware revision may have features and behaviors different to what herein described. It is technician and user’s responsibility to use the documents appropriate to the products used.

LAM Technologies reserves the right to modify at any moment the present document without obligation to give prior notice. This includes, for example, but not limited to, diagrams, images, organization of chapters, technical specifications of the product, features, warranty, etc.

The information contained herein replace any previously issued document.

This document contains reserved and proprietary information. All rights are reserved. It may not be copied, disclosed or used for any purposes not expressly authorized by LAM Technologies.

The manual has been compiled with the intention to make it clear and complete. LAM Technologies, in order to continuously improve its products and documents, will appreciate any suggestion, be in change, addition or else.

LAM Technologies is a registered trade mark.

1.7 Contents of the pack

The device is supplied with all connectors and ready to be mounted on DIN rail.

Technical documentation and software can be downloaded from the website www.lamtechnologies.com or may be required writing to support@lamtechnologies.com .

1.8 Safety and use conditions

This manual is intended for technicians specialized in automation or similar disciplines. In case the arguments, the terms, or the concepts expressed should not be clear you can contact our technical support writing to support@lamtechnologies.com. It is prohibited to use the products herein described if you are not sure to have understood their features and how to use and install them.

ATTENTION
The following are safety warnings and practices of primary importance that need to be fully understood and applied by the user. The user who does not fully understand the content below, or was not able to apply it totally, should not use the product for any reason.

The devices described in this manual are components. The user is responsible of the installation and use of the product that must be used only if in compliance with the rules and regulations in force. Furthermore, the user must have the technical skills needed to fully understand the features, the setting parameters and the instructions given herein. The user must also apply all the laws and specific rules of the Country and/or application in which the product is used.

The user must make the drive housing inaccessible when the drive is powered on. The user must also consider that, because of the capacitors inside the drive, it is necessary to wait at least 30 seconds from the power off before accessing the drive. According to the external capacitors eventually mounted on the power supply circuit, it is possible that the wait time is considerably longer.

During operation the product generates heat that can raise the temperature of certain parts (the heat sink for example, but not only) to values which can cause burns. Such condition persists for a long time even after the product has been turned off. The user must provide protections and appropriate warnings as well as instructing the user, the technical support and maintenance staff. The user must also describe this condition in the service manual of the finished product.

The high performance drive is able to generate strong accelerations, with high motor torque. It is therefore essential to never touch the mechanical parts with the drive powered on. The user must provide the application so that this condition is always granted.

Because of a incorrect wiring, incorrect configuration or else, the drive can command to the motor unexpected movements. Before supplying the drive, assure that an unexpected movement of the motor does not represent danger for people, animals and things.

The power supply of the product must be isolated from the mains supply (for example through a transformer). In series to the power supply circuit, the user must always provide a protective fuse.

In normal working conditions, many control signals are isolated from the power supply; however consider that, under fault conditions, these lines can reach the same potential of the power supply and it is therefore necessary to design the application giving attention to this eventuality.

The EMC interferences can cause unexpected behavior in the whole application, therefore it is essential to minimize the spread of the EMC interferences with the use of a shielded cable, through a correct connection of the shields and of the equipotential points, etc. Furthermore, at installation completed, it is important to execute a complete setting to work test.

The product could be permanently damaged by corrosive substances (such as gas, salts, etc.), liquid or corruptive dusts. Even a long and strong exposure to strong vibrations can cause its damage.

In some fault conditions, the drive can start sparks and fire. The housing and the components placed nearby the drive must be chosen to tolerate this eventuality and to avoid the spread of fire.

The products must never be used in explosive atmospheres (Ex areas).

The products must not be used in life support application or where the failure of the product, even in part, can cause death or damage to people, animals or things, or cause economic loss. The user not able to ensure this condition should not use the products described in this manual.

Do not dismantle the product, do not try and repair it and do not modify it unless expressly authorized by LAM Technologies.

Failure to follow the indications included in this manual can cause permanent damage to the product. For example, to power supply the product with voltage higher than the maximum one allowed, to invert the polarity of the same, to connect or disconnect the motor with the drive enabled, etc. are cause of permanent damage.

Even if the products have been designed and realized with extreme care, there is always the possibility that under unpredictable circumstances and modes the products show malfunctions. Therefore, for any reason, the products described in this manual must be used in life support application and in all those cases in which the unexpected failure of the product could be cause of death or damage to people, things, animals or cause economic loss.

LAM Technologies reserves the right to make changes without prior notice to the producs including design, technical specification, manufacturing process and functionality.LAM Technologies expressly declines any responsibility for any damage, whether direct or indirect, arising from the use of these products. The user who disagrees with the *user conditions* of the products, should not use them.

1.9 Warranty

LAM Technologies warrants the products described in this manual against defects in materials or workmanship for a period of 12 months. This warranty does not apply to defects, damages caused by improper use, incorrect installation or inadequate maintenance. This warranty does not apply in case the products are received modified or integrated with other parts and/or products not expressly authorized or provided for by LAM Technologies. This warranty does not apply also in case the product's label has been removed or modified.

Any request for assistance must be sent to the purchase source of the product. In case of direct purchase from LAM Technologies, a returned material authorization number (RMA) must be obtained, before shipping the device, from support@lamtechnologies.com clearly specifying the product's code, the serial number, the problem found and the assistance required. The RMA number must be clearly written on each shipping document otherwise the parcel could be rejected. The customer shall be responsible for the packaging and shipping of the defective product to LAM Technologies and shipment must be made charges prepaid. The product inspected, repaired or replaced will be available to be collected at LAM Technologies'. In case of repair under warranty LAM Technologies can, at its own discretion, repair or replace the product. No cost for material or service will be charged in case of repair under warranty.

The above warranty does not apply to the software. LAM Technologies shall not be liable for any direct or indirect damages such as, but not limited to, costs of removal and installation, lost profits, deriving from the use or the impossibility to use the software. The user who disagree with or cannot accept what stated herein, should not use or install the software.

2 Installation

The DDS1 Series drives are components. The user is responsible for the installation and use of the product that must be used only if in compliance with the rules and regulations in force. Furthermore, the user must have the technical skills needed to fully understand the features, the setting parameters and the instructions given herein.

The user must apply all the laws and specific rules of the Country and/or application in which the product is used.

The installation must be performed by expert staff and after having read and understood the instructions included herein.

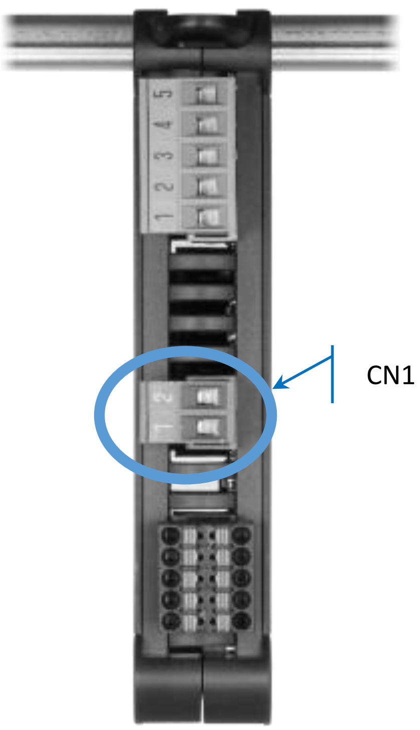
2.1 Connectors

The DDS12 models have 4 connectors for the connection of the power supply, of motor, of the encoder (optional) and of the control signals. The DDS11 models do not have the connector for the encode (only 3 connectors) and also the number of digital I/O is lower

Connector	Function
CN1	Power Supply
CN2	Motor
CN3	I/O Control Signals
CN4	Motor Encoder (only on DDS12)

2.1.1 CN1 – Power Supply

Reverse polarity connection can permanently damage the drive.

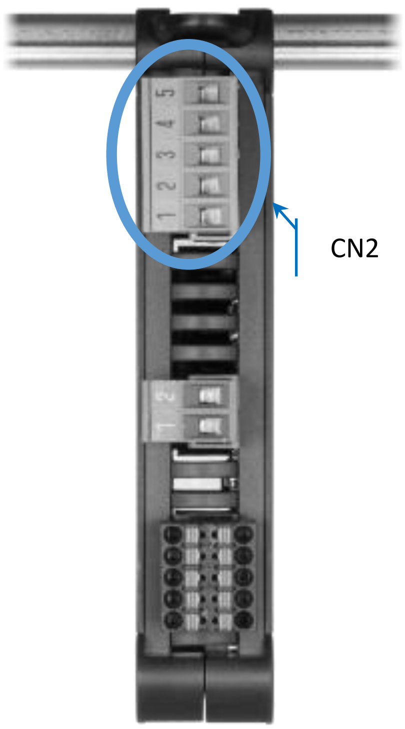


CN1 – Power Supply	
Pin	Description
1	+Vp, positive DC supply voltage
2	-Vp (GND), negative DC supply voltage

The VP power supply must be supplied according to the values specified in the following table:

Model	Symbol	Description	Unit	Value		
				Min	Typ	Max
DDS1141 DDS1241 DDS1144 DDS1244 DDS1148 DDS1248	Vp	DC supply voltage	V	20		50
	Vpbrk	Voltage causing permanent damage	V	-0.5		60
DDS1174 DDS1274 DDS1178 DDS1278	Vp	DC supply voltage	V	24		90
	Vpbrk	Voltage causing permanent damage	V	-0.5		105

2.1.2 CN2 – Motor

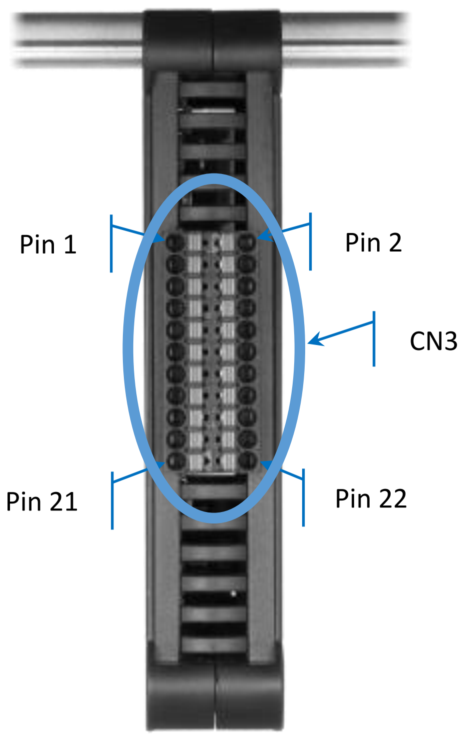


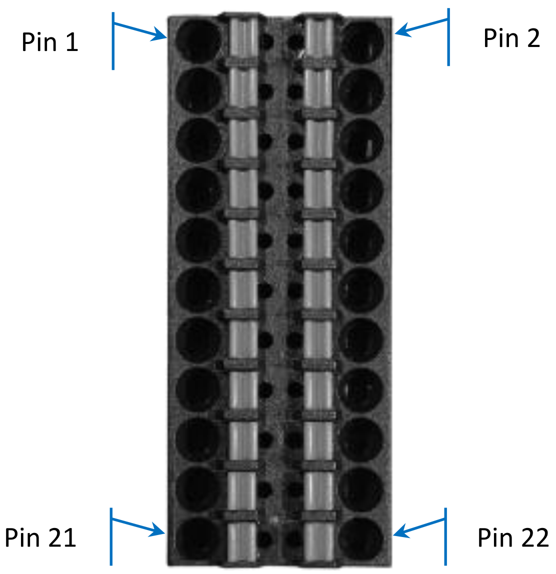
CN2 – Motor	
Pin	Description
1	FA-, negate output phase A
2	FA+, positive output phase A
3	FB+, positive output phase B
4	FB-, negate output phase B
5	SHIELD, (internally connected with GND)

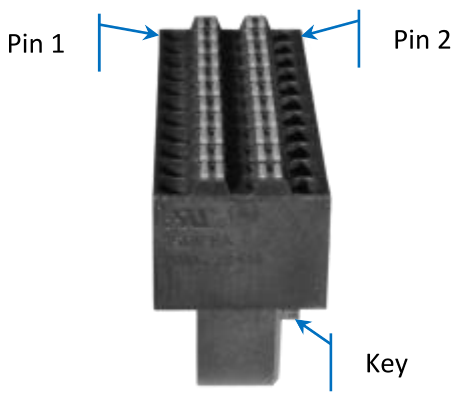
2.1.3 CN3 – I/O Control Signals

The connection with the control signals is through a removable spring terminal block at 22ct for the DDS12 models and at 16ct for the DDS11 ones. The terminal block can be easily oriented through the key, as shown in the picture below.

To insert the cable into the connector, press with a small screwdriver the orange presser and simultaneously insert the wire into the near hole, then release the presser. It is suggested to remove the wire covering to about 8mm.

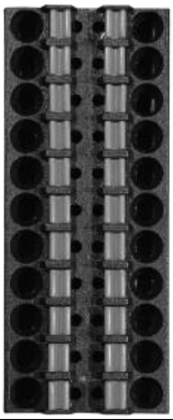






The DDS11 models have a connector at 16ct corresponding to the first 16 contacts of the 22ct connector used in the DDS12 models. Consequently, the signals DO2+, DO22, DI567COM, DI5, DI6 and DI7 are not present in the DDS11 models that, in fact, do not have the digital inputs DI1, DI2 and DI3 neither the digital output DO2.

The following table shows the assignment of the signals to the various terminal pins:

CN3 - I/O Control Signals					
Description	Pin		Pin	Description	
+24V Auxiliary Power Supply	1		2	0V (GND) Auxiliary Power Supply	DDS11 and DDS12
DI0+ (Digital Input 0)	3		4	DI0- (Digital input 0)	
DI1+ (Digital Input 1)	5		6	DI1- (Digital input 1)	
DI234COM (common DI2..DI4)	7		8	DI2 (Digital input 2)	
DI3 (Digital input 3)	9		10	DI4 (Digital input 4)	
DO0+ (Digital Output 0)	11		12	DO0- (Digital Output 0)	
DO1+ (Digital Output 1)	13		14	DO1- (Digital Output 1)	
AIN0+ (Analog Input0)	15		16	AIN0 GND (Analog Input0)	
DO2+ (Digital Output 2)	17		18	DO2- (Digital Output 2)	DDS12
DI567COM (common DI5..DI7)	19		20	DI5 (Digital input 5)	
DI6 (Digital input 6)	21		22	DI7 (Digital input 7)	

2.1.3.1 Alimentazione Ausiliaria

The auxiliary power supply is optional and, if provided, allows to maintain supplied the control section of the drive, even if the power supply is removed (for example to secure the application).

Keeping supplied the control section of the drive, the I/O lines, the signals and encoder reading are maintained powered.

The auxiliary power supply must be within the range shown in the table below:

Symbol	Description	Unit	Value		
			Min	Typ	Max
V24	Auxiliary Power Supply DC voltage	V	20		35
V24brk	Permanent damage voltage	V	-0.5		40

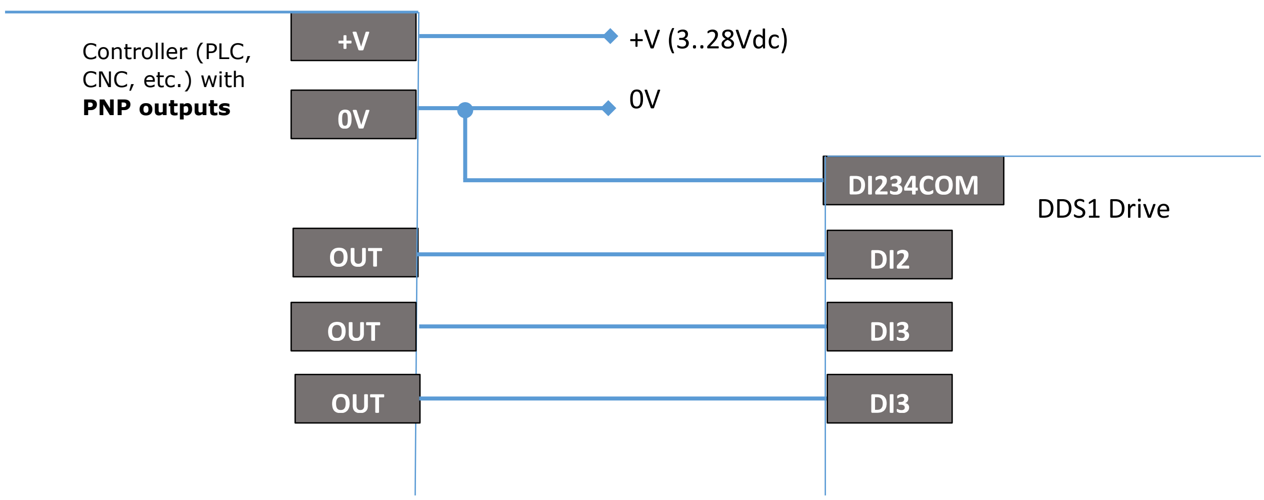
2.1.3.2 Digital Inputs

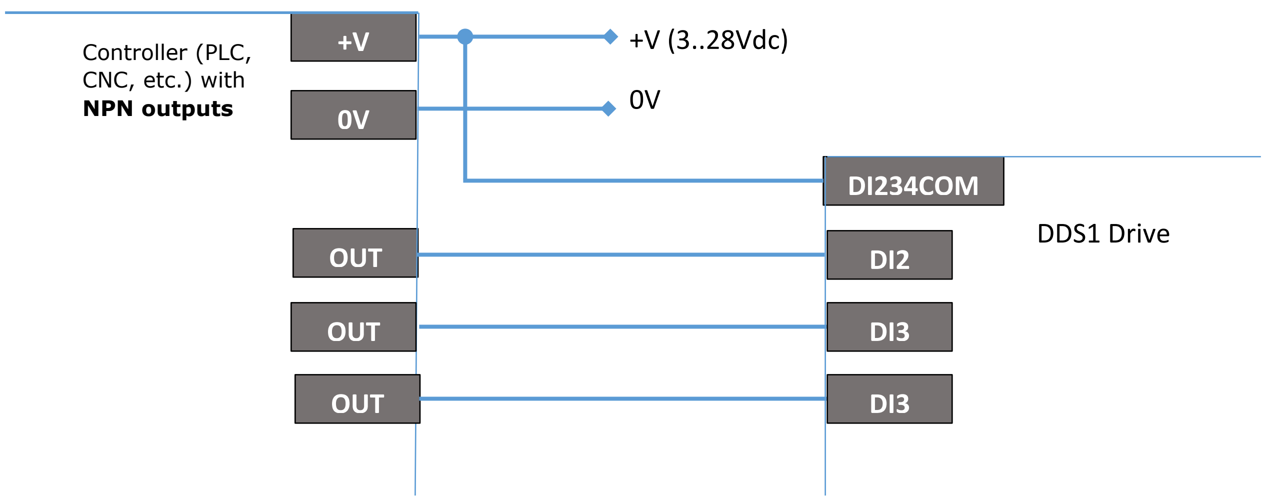
All the digital inputs are optocoupled and have a current regulation circuit which allows its use with voltages between 3Vdc and 28Vdc without the need to introduce any current limit resistor. The current in fact remains constant independently from the voltage applied to the input. This simplifies the installation and the wiring.

The DI0 and DI1 inputs have both connections and can be used in configuration NPN, PNP and Line Driver. To use the input in NPN configuration you just have to connect the + to the positive reference and the – to the output of the master controller (PLC, CNC, etc.), while in case of PNP connection just connect the – to the GND (0V) and the + to the output of the control system. Finally, in case of configuration in Line Driver you just have to connect the + of the input to the + of the output (also called direct signal) and the signal – to the – of the output of the control system (also called negate signal).

The other inputs are organized in two groups of 3 inputs each with a common and can be used both in NPN and PNP configuration. To use a group in NPN configuration simply connect the common of the group to the positive reference and each input to the output of the master controller (PLC, CNC, etc.), while in case of PNP connection connect the common of the group to the GND and each input to the output of the master controller.

The described NPN and PMP connections are shown in the below images:





Most of the inputs does not have a dedicated functionality and their use is defined during the configuration of the drive, however, some of the inputs have specific functions that can be assigned to other inputs.

The following table underlines the inputs with dedicated functions:

Input	Function	
DI0	DIO	Generic input
	STEP	Pulse input in *Step/Direction* mode
	CW	Pulse input for clockwise rotation in *CW/CCW* mode
	A	Phase A in *Quadrature* mode
DI1	DI1	Generic input
	DIRECTION	Direction input in *Step/Direction* mode
	CCW	Pulse input for counterclockwise rotation in *CW/CCW* mode
	B	Phase B in *Quadrature* mode
DI2	DI2	Generic input
DI3	DI3	Generic input
DI4	DI4	Generic input
DI5	DI5	Generic input
DI6	DI6	Generic input
DI7	DI7	Generic input

The following table shows the voltage values which correspond to the *Active* and *Inactive* input status, together with other parameters:

Symbol	Description	Unit	Value		
			Min	Typ	Max
Vdi	Active input voltage	Vdc	3		
Vdioff	Inactive input voltage	Vdc			1
Vdibrk	Digital inputs breakdown voltage	Vdc	-30		+30
Idi	Current absorbed by the digital inputs (24Vdc)	mA		5	

2.1.3.3 Digital Outputs

The digital outputs do not have a specific functionality and their use depends on how the drive is configured.

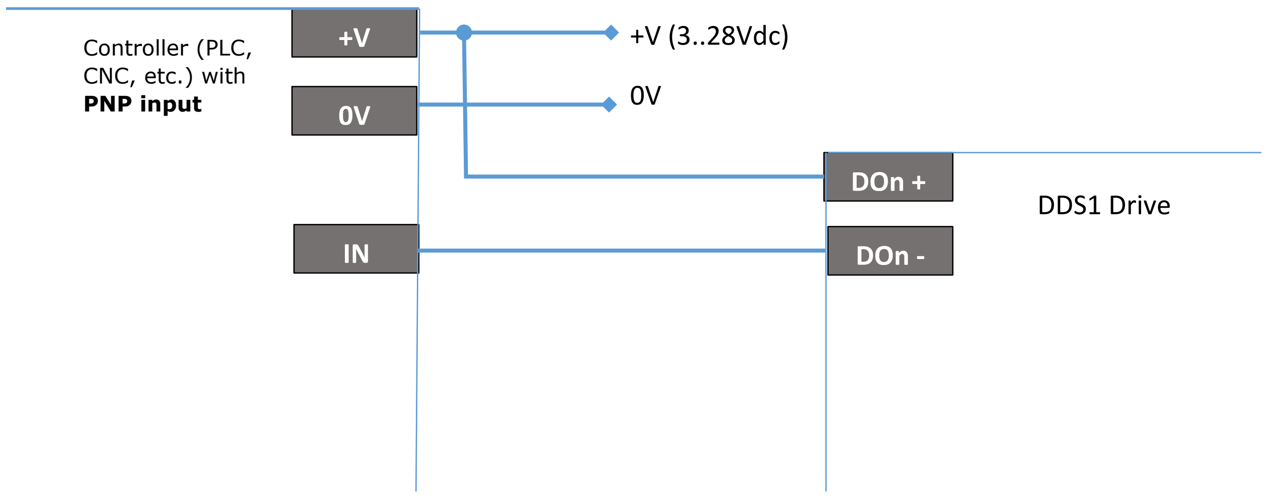
All the outputs are optocoupled and have both + and – connections, therefore they can be freely used in NPN and PNP configuration. In parallel to each output is placed a zener diode which allows the connection of medium entity inductive loads (for example signal relays) without the need to add an external recirculation diode.

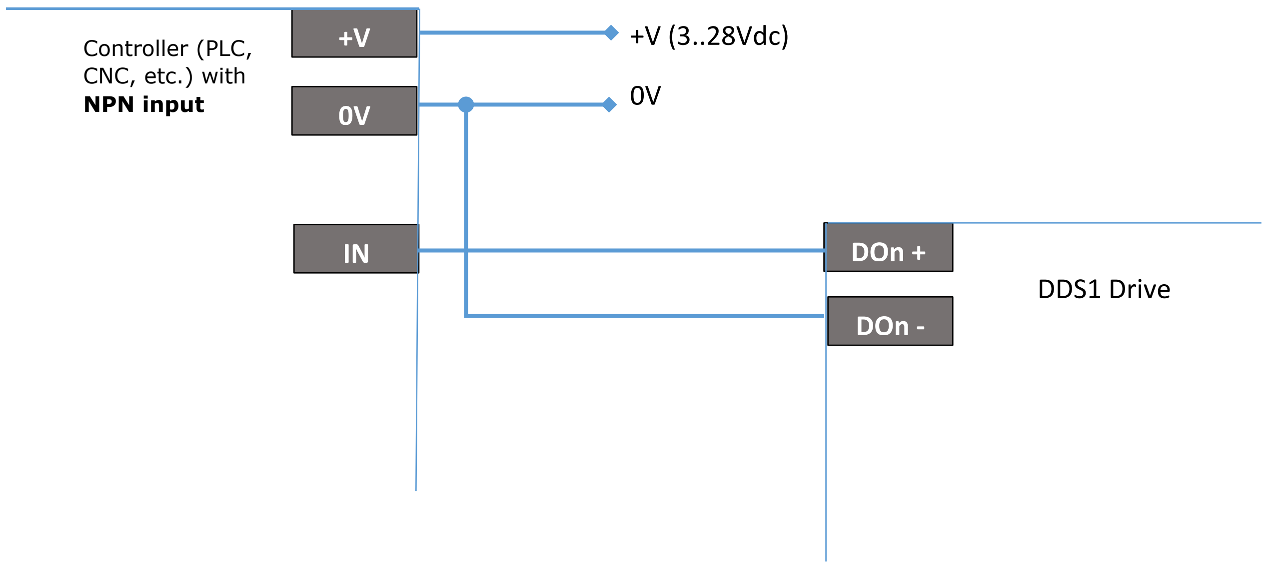
The following table shows the electrical characteristics of the digital outputs:

Symbol	Description	Unit	Value		
			Min	Typ	Max
Vdo	Digital output operating voltage	Vdc	1		30
Vdobrk	Digital output breakdown voltage	Vdc	-0.5		37
Vdoz	Zener diode voltage placed in parallel to each output	Vdc	37	39	42
Ido	Digital output available current	mA			80
Idobrk	Digital output breakdown current	mA	120		
Pwdo	Digital output dissipable power	mW			400

To use an output in NPN configuration simply connect the - to GND and the + to the input of the master controller (PLC, CNC, etc.), while in case of PNP connection connect the + to the positive reference and the – to the input of the control system.

The described NPN and PNP connections are shown in the below images:





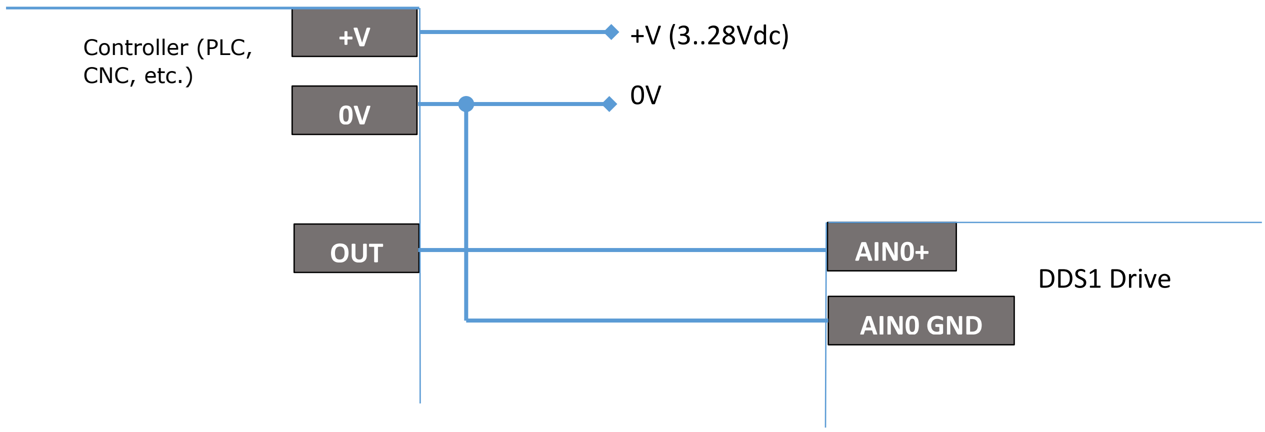
2.1.3.4 Analog Inputs

The analog input is able to can measure voltage between -10V and +10V.

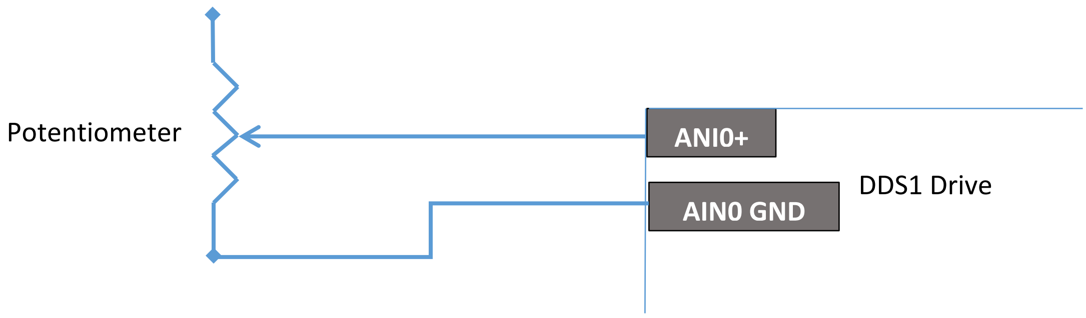
In order to drive the analog input from a control device (PLC, CNC, etc.) simply connect respectively the AIN0+ and AIN0 GND signals of the drive to the output voltage of the control device and to its ground reference. Please take note that the AIN0 GND signal is internally connected to the power ground.

The analog input is also connected to a constant current generator inside the drive which can be activated through the configuration. When the current generator is active, it is possible to connect a potentiometer to the analog input and read the voltage generated at the ends. We suggest to connect one end of the potentiometer to the AIN0 GND terminal block and the central slider to the AIN0+ input. The voltage generated can be easily calculated multiplying the current set in the generator for the potentiometer resistance. Using for example a 4K7 potentiometer and setting the current generator at 2.2mA you will obtain a maximum voltage of about 10.3V.

Example of connection of the analog input:



Example of connection of the potentiometer:



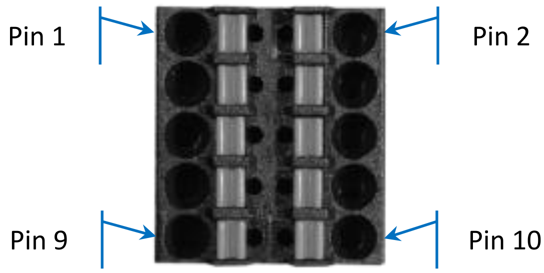
The following table shows the electrical characteristics of the analog input:

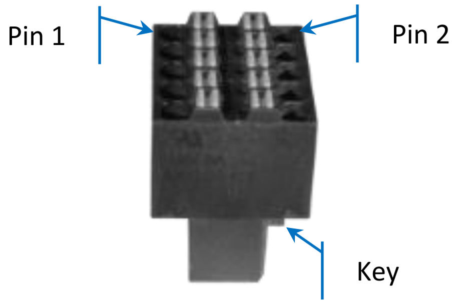
Symbol	Description	Unit	Value		
			Min	Typ	Max
Vai	Analog input operating voltage	Vdc	-10.2		+10.2
Vaibrk	Analog input breakdown voltage	Vdc	-45		+45
Rai	Analog inputs impedance	KΩ		47	
ADst	A/D converter conversion time	ms		1	
ADsoff	A/D converter start offset	%fs		1	
ADdoff	A/D converter offset drift	%fs		0.2	
ADline	A/D converter linearity error	%fs		1	

2.1.4 CN4 – Motor Encoder

The connection with the encoder is through a 10ct removable spring terminal block. The terminal block can be easily oriented through the key, as shown in the picture below.

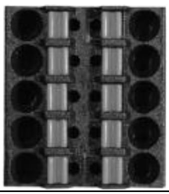
To insert the cable into the connector, press with a small screwdriver the orange presser and simultaneously insert the wire into the near hole, then release the presser. It is suggested to remove the wire covering to about 8mm.





The CN4 connector is present only on the DDS12 models.

The following table shows the assignment of the signals on the various terminal pins:

CN4 – Motor Encoder				
Description	Pin		Pin	Description
+V Encoder Power Supply	1		2	0V (GND) Encoder Power Supply
A+ (Encoder Phase A)	3		4	A- (Negate Encoder Phase A)
B+ (Encoder Phase B)	5		6	B- (Negate Encoder Phase B)
I+ (Encoder Index)	7		8	I- (Negate Encoder Index)
Not used (leave disconnected)	9		10	Not used (leave disconnected)

For the connection between the drive and the encoder, it is suggested to use a shielded cable, having care to connect the shield on the Pin2 together with the 0V reference.

It is possible to use any incremental encoder with or without Index (also called zero mark) provided that it has a resolution within the configuration's values.

To power the Encoder, the drive supplies a voltage of +5V with a current of 100mA suitable for the most encoders, however it is also possible to connect encoders with a different supply voltage, provided that they are externally supplied.

The signals inputs A, B and I are Line Driver type and usually they do not require terminating resistors. The drive internal circuits are realized to also allow the connection of other signals types, as shown in the table below:

Encoder output signals types	Encoder Signal	Drive Signal	Notes
Line Driver	A+	A+	
	A-	A-	
	B+	B+	
	B-	B-	
	I+	I+	
	I-	I-	
TTL/CMOS	A	A+	The inputs A-, B- and I- remains disconnected.
	B	B+	
	I	I+	
Open Collector	A	A+	The inputs A-, B- and I- remains disconnected.
	B	B+	
	I	I+	
Push-Pull (Encoder supplied at 24V)	A	A+	**ATTENTION, it is important to insert in series to each signal a diode (1N4148 for example) with the cathode facing the encoder, otherwise the drive itself could be damaged.**
	B	B+	
	I	I+	

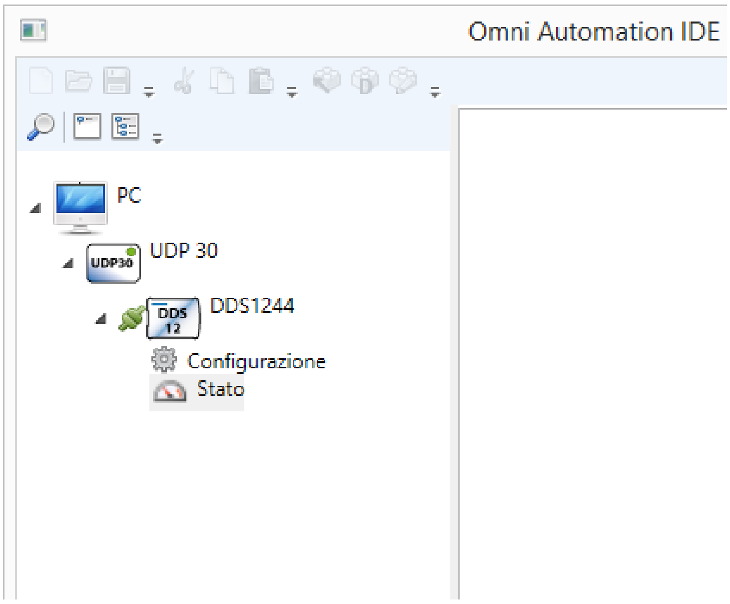
3 Configuration

The drive configuration is simple and assisted by the free software **Omni Automation IDE** (hereinafter OAI) running under Windows platform (Windows 7, Windows 8.1 and Windows 10 32bit or 64bit).

The connection between PC and drive is through the UDP30 interface which also galvanically isolate the PC from the device. The UDP30 interface is also able to supply the logic section allowing its configuration even without power supply.

After having connected the UDP30 interface to the DUP port, on the front of the drive, it is sufficient to press the button *Search* so that OAI starts scanning UDP30 interfaces and connected devices.

At the end of the research it appears the tree of the devices connected to the PC, similar to the image below:



Double-clicking on the drive name (DDS1244 on the image) it appears the tab with the characteristic data of the device such as the serial number, the firmware revision, etc. Through the link *Update* it is also possible to update the drive firmware

Double-clicking on *Configuration* (visible under the drive name) it opens the tab which allows to modify the device configuration.

If the value in a field of the *Configuration* differs from the one in the device, it appears a yellow frame around the field. Resting the mouse on the field it appears a tooltip that shows the value present in the device.

A red frame around the a field indicates a value not allowed. Resting the mouse on the field, it appears a tooltip that shows the error details.

On top you can see the *Name* field which allows to assign a name or a brief description to the configuration.

Then there is the *Device* section that also contains the *Name* field, this time referred to the drive. The string entered here is stored in the drive and it is useful to easily identify the device. For example, the drive adopted for raising the spindle could be called *Z Axis*.

Note that when you change the configuration you must press the *Write* button to store the same configuration in the device.

Follows a description of the remaining sections of the Configuration.

3.1 Pulse count

The drive integrates a speed counter able to count forward and backward the externally applied pulses. When the *Position* control mode is selected, the value of the counter is related to the motor position through the parameter *Pulses per Revolution*, described further in the *Motion* section.

The parameter *Motion* allows to define the counting technique used and the inputs involved, as shown in the table below:

Mode	Signals	Description
Step / Direction	DI0	Pulses Count
	DI1	Direction
Cw/Ccw	DI0	Clockwise advance pulses
	DI1	Counterclockwise advance pulses
Quadrature	DI0	Quadrature signal phase A
	DI1	Quadrature signal phase B
Off	---	Disabled counter

The field *Filter* allows you to modify the digital filter arranged to remove noise from the signals applied to the DI0 and DI1 inputs. The selected value corresponds to the time for which the signal level must remain stable so that it is validated and processed by the drive. In the calculation of the maximum frequency it is to be taken twice the time set in the *Filter* as it is necessary that this time elapses for both the active and inactive input condition. For example, setting a *Filter* value of 1us, you may apply a maximum frequency of 500KHz.

By selecting the option *Invert*, the counter counting direction is reversed.

The function *Enabling* allows to define an input signal to be used to enable the counter. When the selected signal is in the indicated status, for example *DI3 Active*, the counter is differently enabled, the counter is disabled and the pulses applied to the DI0 and DI1 inputs are ignored. It is also possible to select the value *Active*, to maintain the counter always enabled, or *Inactive*, to disable the counter.

3.2 Analog Input

The analog input can be used to control the speed or the torque of the motor when the *Velocity* or *Torque* control modes, described furtherly in the *Motion* section, are selected.

The torque control is only possible using the DDS12 models matched to a motor equipped with encoder.

The *Offset* field allows you to set a value that will be subtracted from the value read by the analog input. For example, if to the analog input is applied a signal of 4.355V and the field offset contains the value 25mV, the result of the reading will be 4.330V (4.355 – 0.025).

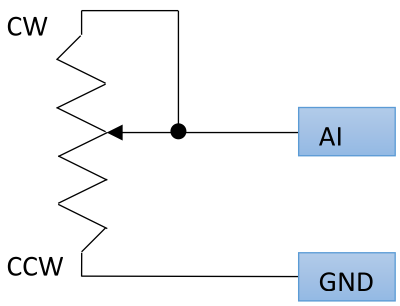
The *hysteresis* field allows you to define a hysteresis value useful to remove any unwanted oscillations of the measurement. Defining a hysteresis value, the value read by the analog input will vary only if the voltage applied shows a variation wider than the set hysteresis value. For example, if the voltage applied to the analog input is equal to 2.540V and the hysteresis is set to 100mV, there will be no variation of the read value for an oscillation of the applied voltage between 2.440V and 2.,640V. Only values lower than 2.440V or above 2.640V will produce an update in the reading. If you do not want a hysteresis influence on the reading, you just have to set the field to 0.

The value set in the *Average* field defines the number of readings (averaged among them) which contribute to form the final value. Increasing the value of the *Average* field, reduces the effect of any noise, but it also reduces the signal bandwidth (the value is then updated more slowly).

Inside the drive there is a current generator which allows to connect to the analog input a simple potentiometer to vary the input voltage.

The *Current* field allows you to set the current supplied by the generator itself or to disable it. The current must be chosen according to the resistance of the potentiometer connected to the analog input and to the wanted full scale. For example, if you want to get a voltage variation from 0 to 10V with a potentiometer of 4K7ohm, it is necessary to configure the generator for a current of about 2.1mA (10V/4700ohm).

Below is the wiring diagram of the potentiometer:



ATTENTION: Do not activate the Current Generator if the analog input is connected to a voltage source (PLC, CNC or else).

The *Preset* parameter allows to select a digital input to be used for presetting the analog input to a certain voltage. In other words, when the input used for the preset function is in the operative status, the analog input receives a virtual voltage as if it had been externally applied. This feature is useful, for example, to apply a certain value to the input, for example 0V, or to force a value not present in the applied voltage range (for example -2V with a voltage range 0..10V).

The *Value* field is only available when a digital input is selected to be used for the analog input preset and allows to specify the value to preset the analog input when the digital input is active. The inserted value is processed without considering the content of the Offset field.

3.3 Motor

The *Motor* section must be compiled very carefully as a correct setting of the characteristic data of the motor is essentially important to obtain a smooth movement, the best dynamic performances and the best efficiency of the motor.

If you are using a LAM Technologies motor just select it from the list and the drive will be automatically configured with the motor parameters.

The *Model* field allows to specify the motor connected to the drive. If the motor used is not listed, you can select *Others* and enter the characteristic data of the motor in the specific fields described here following.

The *Holding Torque* field must be compiled with the static torque value of the motor when supplied at the rated current. The value is expressed in Nm.

The *Current* field is used to specify the rated current of the motor. The entered value must correspond to the rated current for which the motor has been designed and must consider the connection chosen for the phases (for the motors that provide more possibilities). According to the connection chosen for the phases and to the configuration chosen from the manufacturer to characterize the current, it is necessary to consider one of the scale factors listed in the table below:

Phase connection with which the Manufacturer has characterized the current	Connection chosen for the phases		
	Unipolar	Bipolar Parallel	Bipolar Series
Unipolar	Not supported	1.41	0.707
Bipolar Parallel	Not supported	1	0.5
Bipolar Series	Not supported	2	1

For example, of the manufacturer specifies a phase current of 2A in unipolar connection and you choose to connect the motor to the drive in bipolar parallel, it is necessary to set the *Current* field with the value 2.80 (2*1,41).

For example, if the manufacturer specifies a current of 2A for a bipolar parallel connection and the motor is connected to the drive in bipolar parallel, no conversion is needed and the *Current* field can be set with 2A. Instead, if you choose a bipolar series connection the *Current* field will have to be compiled with value 1.0 (2*0.5).

If the motor has 4 wires it means that the type of connection has been already decided during production and the value of the rated current specified by the manufacturer is therefore the one to insert in the *Current* field without any further processing.

The unipolar connection is not take into account because not supported by the drive. In other words, the drive is able to drive the motor only if the phases are connected in bipolar parallel or bipolar series.

It is essential that the value in the *Current* field corresponds exactly to the rated current of the motor and that this field is never used to set the working current of the motor. The working current is set through the *Motion Current* field described later in the *Motion* section.

The *Inductance* field must be compiled with the correct value of the motor phase inductance.

The motor inductance is usually specified by the manufacturer and shown in the technical datasheet of the motor. As for the current, it is necessary to verify the phases connection which the inductance value refers to and, if necessary adequate it to the phases connection chosen to connect the motor to the drive. The following table shows the conversion factors to be used:

Phase connection with which the Manufacturer has characterized the inductance	Connection chosen for the phases		
	Unipolar	Bipolar Parallel	Bipolar Series
Unipolar	Not supported	1	4
Bipolar Parallel	Not supported	1	4
Bipolar Series	Not supported	0.25	1

If, for example, the motor has a characteristic inductance of 1.6mH in unipolar and is connected to the drive with the phases in bipolar parallel, the *Inductance* field must be compiled with the value 1.6 (1.6*1); instead, if you choose a bipolar series connection the value to be entered in the *Inductance* field will be 6.4mH (1.6*4).

If the motor has 4 wires it means that the type of phase connection has been already decided during production and the inductance value specified by the manufacturer is therefore the one to be entered in the *Inductance* field without any further processing.

In the event that the value of the motor inductance is unknown, it is possible to measure it through an inductance meter. We suggest you to carry out the measurement with the phases already connected in the configuration chosen for the drive, furthermore it is a good practice to average the value through repeated measurements on more motors, if available.

The *Gain* parameter allows to intervene on the current regulation control loop in the motor to manually modify its gain. Normally this operation is not necessary as the drive automatically determines the best value according to the motor characteristics, however, if necessary, it is possible to intervene manually by operating a correction of +/-50% (a factor 0.5 and 1.5 respectively.

The *Enabling* parameter allows to define the digital input to be used to enable or disable the motor and the logic level to be considered active.

It is also possible to select the *Active* option, which provides to automatically enable the motor each time that the drive is supplied, or *Inactive* which maintains the motor permanently disabled (this latest option is particularly useful for tests purposes).

Selecting the *Invert* control box the motor inverts the rotation direction. It is the same effect you can obtain changing the phase A+ with A- or the phase B+ with B-.

3.4 Motor Encoder

The drive is able to count the pulses coming from an incremental encoder applied to the motor to perform a feedback control (also called closed-loop) of the motor itself. In this way it eliminates the problem of loss of step, it improves the motor performance and it is possible to also adjust the torque, in addition to speed and position.

The *Motor Encoder* section is available only for the DDS12 models provided with Encoder input.

The drive updates the pulse count at each edge of the encoder A and B signals and then performs the x4 multiplication of the pulses. For example, connecting a 500 pulses/revolution encoder, the drive will be able to identify 2000 positions/rev (500*4). The drive is finally prepared to read the encoder Index signal (also called zero mark). The Index feature is useful for best homing execution and for the constant verifying of the proper working of the encoder.

Within the *Pulses* field it is possible to enter the number of pulses/rev of the encoder connected to the motor. The drive is able to count each pulse edge in order to obtain a resolution 4 times higher than the native of the encoder.

The *Filter* field allows you to configure the digital filter arranged to remove noise from the encoder signals. The selected value corresponds to the time for which the signal level must remain stable so that it is validated and processed by the drive. In the calculation of the maximum frequency it is to be taken twice the time set in the *Filter* field as it is necessary that his time elapses for both the active and inactive signal condition. Setting, for example, a *Filter* value of 1us, you may apply a maximum frequency of 500KHz (1+1=2us ie 500KHz).

Activate the *Power Supply* box if the drive must activate the power supply for the encoder.

Activate the *Index* control box if the encoder mounted on the motor connected to the drive has the Index signal (also called zero mark).

By the *Activate* control box the drive is able to monitor the correct operation of the encoder.

Activating the Invert box the encoder pulse count is inverted. Practically, you obtain the same result that would be obtained by exchanging between them the A and B signals.

3.5 Motion

The *Motion* section allows to adapt the drive to the application configuring the motor control mode and the characteristic parameters of the motion.

The *Feedback* parameter can be set to *Disabled*, if you want a normal open-loop control of the motor, or *From Encoder* if the system has to work at closed-loop.

Take present that the latter mode is possible only if an encoder is installed on the motor and enabled in the *Motor Encoder* section.

The *Feedback* parameter is available only for the DDS12 models with Encoder input.

The *Control Mode* parameter allows you to define how the motor must be controlled. The options are in *Position*, in *Velocity* or in *Torque* (the last one available only for the DDS12 models). Consider that it is possible to select the *Torque* control mode only if an encoder in installed on the motor and enabled in the *Motor Encoder* section.

According to the chosen *Control Mode* function, the settings required by the configuration will change, therefore they will be described below for each single *Control Mode*.

3.5.1 Position

The *Pulses for revolution* field must be compiled with the number of divisions you want to assign to the motor. It is possible to enter any value between 36 and 51200.

3.5.2 Velocity

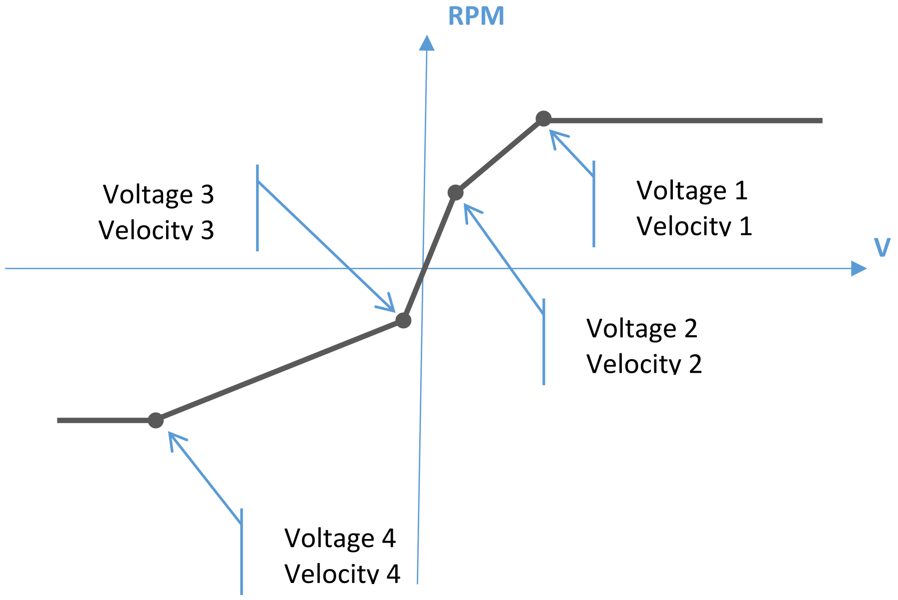
The motor speed can be linked to the signal applied to the analog input or selected from a table according to the status of two digital inputs. It is possible to control the start and the stop of the rotation with only one signal or with two digital inputs; one used for the start and the other for the stop.

The *Reference* parameter allows to choose if the speed reference must come from the analog input (*Analog* option) or from a table (*Table* option). In the first case they are shown 8 fields which allow to define 4 points of a broken line useful for correlating the voltage applied to the analog input to the motor speed; while in case the *Table* option is selected, they will be shown 4 fields useful to define up to 4 speeds selectable through the digital inputs.

The following parameters are visible only if the *Analog* option for the *Reference* parameter has been selected.

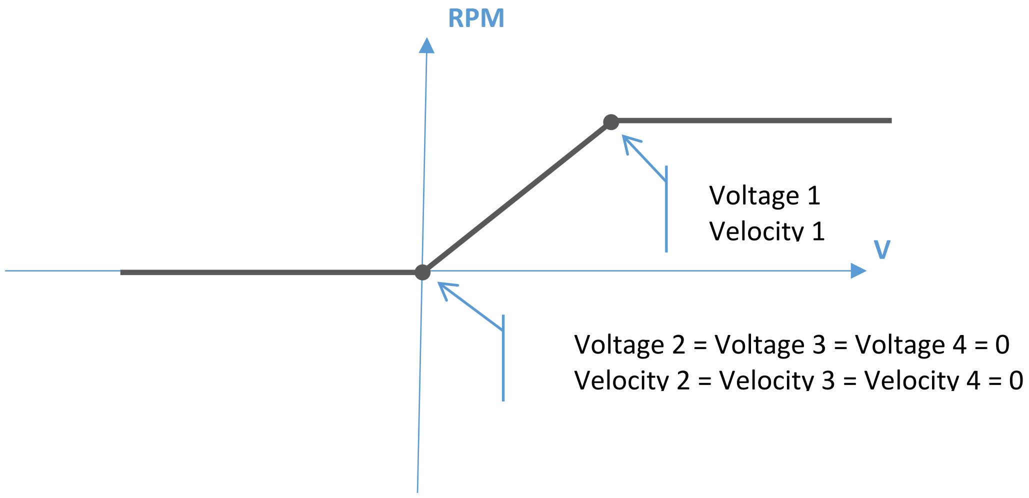
The field *Voltage 1, 2, 3* and *4* and the field *Velocity 1, 2, 3* and *4* allow to set the relationship between the voltage applied to the analog input and the motor speed.

Totally, it is possible to define 4 pairs of *Voltage/Velocity* values. For voltage values higher than *Voltage 1* the speed is maintained at the value *Velocity 1*. For voltage values lower than *Voltage 4* the speed is maintained at value *Velocity 4.* For voltage values between *Voltage 2* and *Voltage 1* the motor speed is linearly interpolated between *Velocity 2* and *Velocity 1*. For voltage values between *Voltage 3* and *Voltage 2* the motor speed is linearly interpolated between *Velocity 3* and *Velocity 2*. For voltage values between *Voltage 4* and *Voltage 3* the motor speed is linearly interpolated between *Velocity 4* and *Velocity 3*. The following diagram visually resumes what just described:

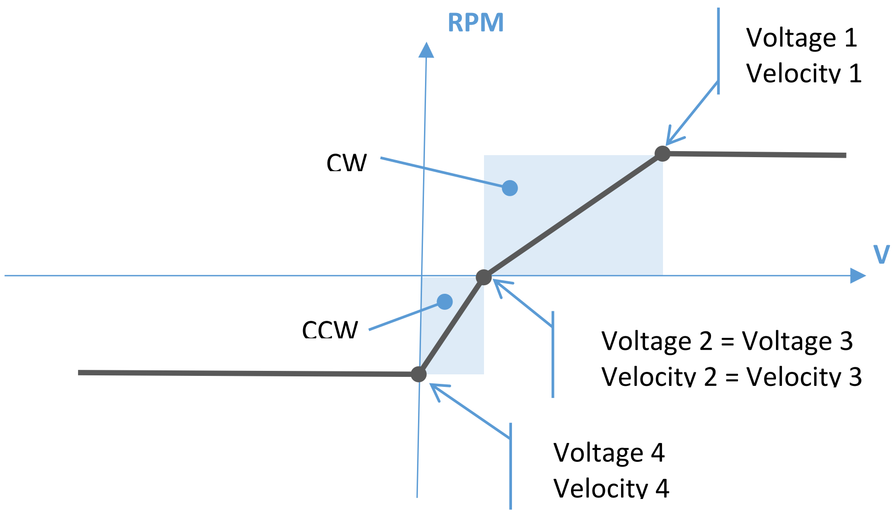


Practically, it is possible to correlate voltage and velocity through 3 straight lines which may have angular coefficients also different from each other.

Appropriately compiling the 4 pairs of *Voltage/Velocity* values, it is possible to adapt the drive to multiple uses and control signals. For example, if you want to use the analog input to set the speed in absolute value and use the *Invert Sign* input to define the rotation direction, it is sufficient to set to 0 (zero) the values *Voltage 2, 3* and *4* and *Velocity 2, 3* and *4* as graphically shown below:

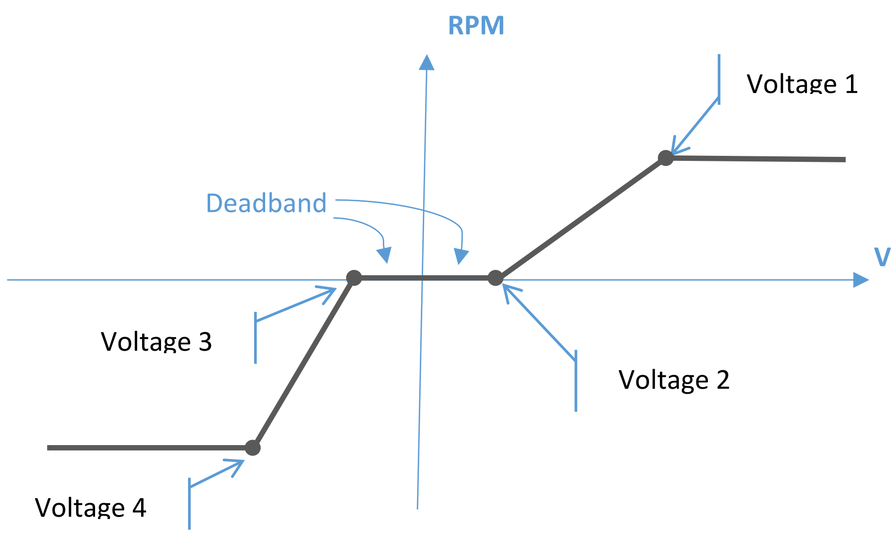


As a further example, if the available control signal is only positive but you want to control the motor speed in both directions of rotation, it is sufficient to define an intermediate point compiling the fields *Voltage 2* and *Voltage 3* with a value between *Voltage 1* and *Voltage 4* (both positive). The following image clarifies the concept:



It is also possible to use the 4 pairs of values to define a "dead zone" (also called Deadband) around which the speed of the motor does not change.

This feature is useful, for example, for ensuring the motor stop condition for a given input voltage value even if this is affected by noise or offset.



As can be observed, when the voltage applied to the analog input is contained between the values Voltage 3 and Voltage 2, the speed of the motor is always equal to 0.

The following parameters are visible only if the *Table* option for the *Reference* parameter has been selected.

The *Velocity* fields in the table contain the speed references that will be used when the inputs selected in the first and second column of the same table assume the status assigned to each field. For example, when both selected inputs are Inactive, it will be selected the speed reference inserted in the first field of the *Velocity* column of the table; while with both input Active it will be selected the speed reference in the last field of the *Velocity* column.

3.5.3 Torque

The drive can adjust the motor torque only if the motor is equipped with encoder and the *Feedback* parameter is set *From Encoder*.

The Torque control mode is available only for the DDS12 models provided with Encoder input.

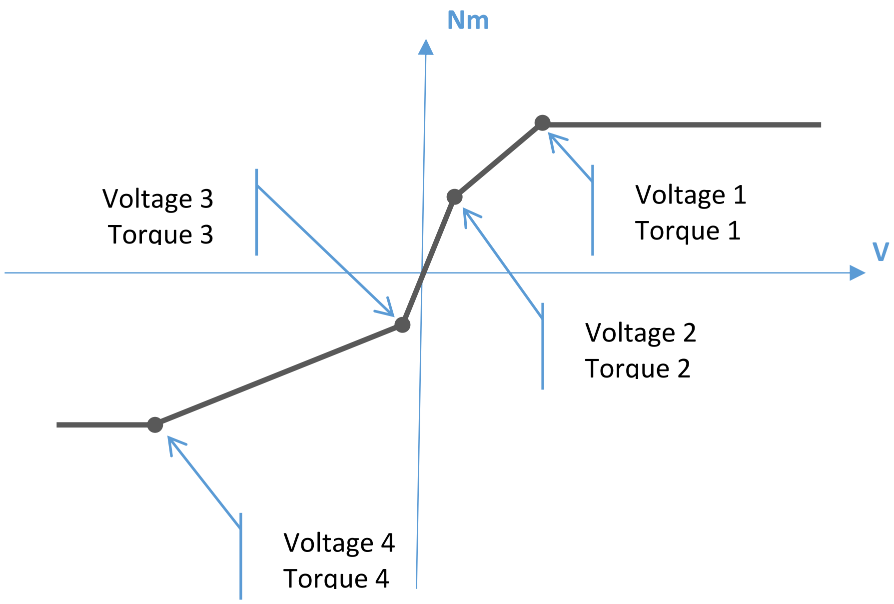
The torque supplied by the motor can be linked to the signal applied to the analog input or selected from a table, according to the status of two digital inputs. It is possible to control the start and the stop of the rotation with only one signal or with two digital inputs; one used for the start and the other for the stop.

The *Reference* parameter allows to choose if the torque reference must come from the analog input (*Analog* option) or from a table (*Table* option.) In the first case they are shown 8 fields which allow define 4 points of a broken line useful for correlating the voltage applied to the analog input to the torque supplied by the motor; while in case the *Table* option is selected, they will be shown 4 fields useful to define up to 4 different torque values selectable through the digital inputs.

The following parameters are visible only if the *Analog* option for the *Reference* parameter has been selected.

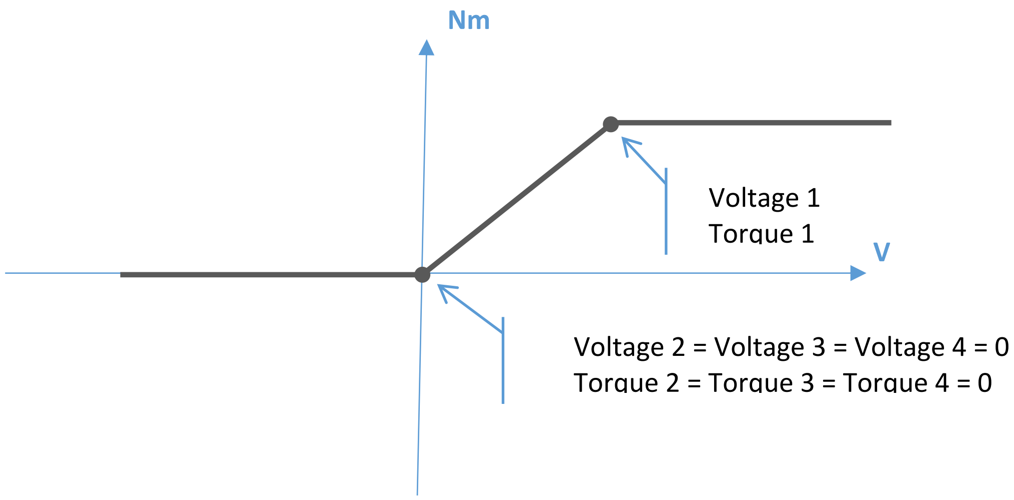
The field *Voltage 1, 2, 3* and *4* and the field *Torque 1, 2, 3* and *4* allow to set the relationship between the voltage applied to the analog input and the torque supplied by the motor.

Totally, it is possible to define 4 pairs of *Voltage/Torque* values. For voltage values higher than *Voltage 1* the torque is maintained at the value *Velocity 1*. For voltage values lower than *Voltage 4* the torque is maintained at value *Velocity 4.* For voltage values between *Voltage 2* and *Voltage 1* the torque supplied by the motor is linearly interpolated between *Velocity 2* and *Velocity 1*. For voltage values between *Voltage 3* and *Voltage 2* the torque supplied by the motor is linearly interpolated between *Velocity 3* and *Velocity 2*. For voltage values between *Voltage 4* and *Voltage 3* the torque supplied by the motor is linearly interpolated between *Velocity 4* and *Velocity 3*. The following diagram visually resumes what just described:

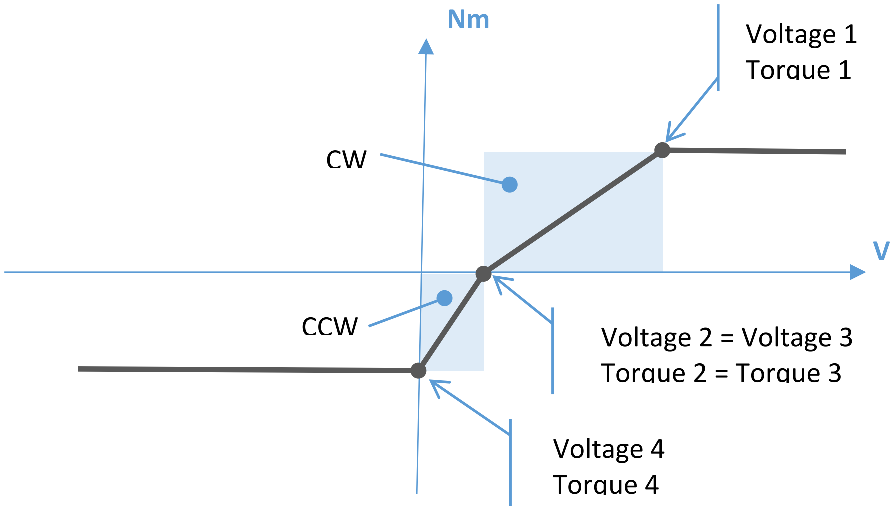


Practically, it is possible to correlate voltage and torque through 3 straight lines which may have angular coefficients also different from each other.

Appropriately compiling the 4 pairs of *Voltage/Torque* values, it is possible to adapt the drive to multiple uses and control signals. For example, if you want to use the analog input to set the torque in absolute value and use the *Invert Sign* input to define the sign of the supplied torque, and therefore the rotation direction, it is sufficient to set to 0 (zero) the values Voltages *2*, *3* and *4* and Torque *2*, *3* and *4* as graphically shown below:

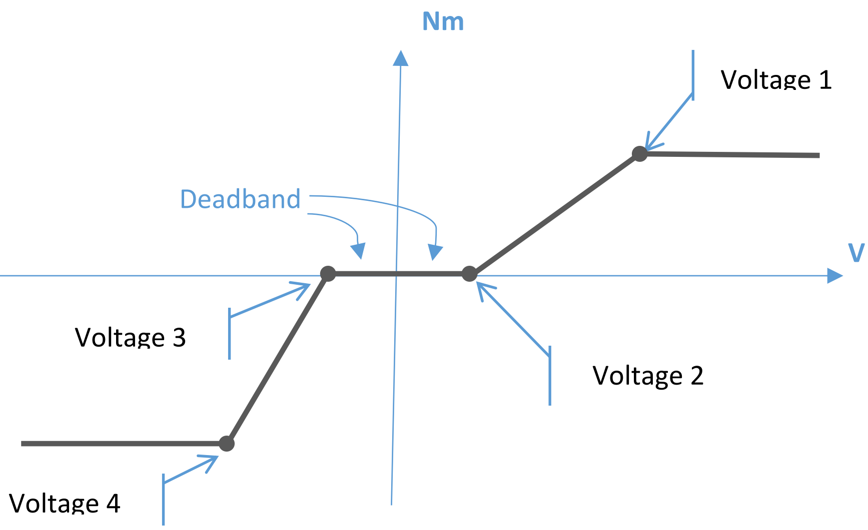


As a further example, if the available control signal is only positive but you want to control the motor torque in both directions of rotation, it is sufficient to define an intermediate point compiling the fields *Voltage 2* and *Voltage 3* with a value between *Voltage 1* and *Voltage 4* (both positive). The following image clarifies the concept:



It is also possible to use the 4 pairs of values to define a "dead zone" (also called Deadband) around which the torque of the motor does not change.

This feature is useful, for example, for ensuring the motor stop condition for a given input voltage value even if this is affected by noise or offset.



As can be observed, when the voltage applied to the analog input is contained between the values Voltage 3 and Voltage 2, the torque supplied by the motor is always equal to 0.

The following parameters are visible only if the *Table* option for the *Reference* parameter has been selected.

The fields in the *Torque* column of the table contain the torque references that will be used when the inputs selected in the first and second column (of the same table) assume the status assigned to each field. For example, when both selected inputs are Inactive, it will be selected the torque value inserted in the first field of the *Torque* column of the table; while with both input Active it will be selected the torque value of the last field of the *Torque* column.

The following parameters are visible only when the *Control Mode* is set to *Velocity* or *Torque*.

The Invert Sign parameter makes it possible to choose a digital input to be used for inverting the reference sign (velocity or torque) with consequent inversion of the rotation direction of the motor.

The *Start/Stop Mode* parameter is useful to define the stop mode of the motor. When the *Control Signal* value is selected, the motor stops when the reference (velocity or torque) assumes a value of 0. When *One Input* is selected, the start and stop of the motor can instead be controlled through the digital input selected in the *Start/Stop* field. Finally, selecting *Two Inputs* it is possible to define two different digital inputs used one for the start of the motor and the other for its stop. Il parametro *Modalità Start/Stop* è utile per definire la modalità di arresto del motore. Quando è selezionato il valore *Segnale di Controllo* il motore si arresta quando il riferimento (velocità o coppia) assume valore 0.

The *Start/Stop* parameter is visible when *Start/Stop Mode* is set to *One Input* and allows to choose the digital input to be used for the start and stop of the motor. When the selected input is in the chosen status, the motor rotate according to the reference value (velocity or torque); while when the input is at the opposite logic level the motor stops.

The *Start* parameter is visible when the *Start/Stop Mode* is set to *Two Inputs* and allows to choose the digital input to be used for the start of the motor. When to the selected input is applied the chosen switching edge, the motor is free to rotate according to the reference value (velocity or torque).

The *Stop* parameter is visible when the *Start/Stop Mode* is set to *Two Inputs* and allows to choose the digital input to be used for the stop of the motor. When to the selected input is applied the chosen switching edge, the motor stops independently from the reference value.

The following parameters are visible only if the *Control Mode* is set to *Position* or *Velocity*.

The *Proportional to the load current* control box allows to configure the drive so that it drives the motor with a current proportional to the resistant torque produced by the load. The option is available only if the *Feedback* parameter is set *From Encoder*.

The following parameters are visible only if the *Proportional to the load current* control box has been selected.

The *Minimum Current* field configures the current impressed to the motor with no load and is expressed as percentage of the rated current of the motor. For example, if we set a value of 30% and the motor has a rated current of 4.2Arms, with no load the motor will be supplied with a current of about 2.9Arms. The field is visible only if the *Proportional to the load current* control box has been selected.

The Maximum Current field configures the current impressed to the motor when the load reaches the torque supplied by the motor. For example, if we set a value of 100% and the motor has a rated current of 4.2Arms, in maximum load condition the drive will power supply the motor at its rated current of 4.2Arms. The field is visible only if the *Proportional to the load current* control box has been selected.

The following parameters are visible only if the *Proportional to the load current* control box has not been selected or the same is not visible.

The *Motion Current* field configures the current impressed to the motor during rotation and is expressed as percentage of the rated current of the motor. For example, if we set a value of 80% and the motor has a rated current of 4.2Arms, during rotation the motor will receive from the drive a current of about 3.4Arms.

The *Idle Current* field configures the current impressed to the motor in rest status and is expressed as percentage of the rated current of the motor. For example, if we set a value of 40% and the motor has a rated current of 4.2Amrms, with the motor in standstill it will receive from the drive a current of about 1.7Arms. The Idle Current becomes active after the time set in the Delay Field near placed.

The *Delay* field is useful for setting the waiting time from the stop of the motor before the current is reduced to the Idle Current value.

3.6 Limits

The value inserted in the *Maximum Vel.* field determines the maximum speed at which the motor can rotate independently from the selected *Control Mode* or from the value assumed by the reference (velocity or torque).

The value inserted in the *Acceleration* field determines the maximum acceleration impressed to the motor, independently from the selected *Control Mode*.

The value inserted in the *Deceleration* field determines the maximum deceleration impressed to the motor, independently from the selected *Control Mode*.

The *Rapid Dec.* field is visible when the *Control Mode* is set in *Position* or *Velocity* and allows to define the deceleration used during the emergency stop of the motor, as it happens for example after a limit switches intervention.

The *CCW Limit Switch* parameter allows you to select a digital input to be used as counterclockwise limit switch. When the selected input is in the chosen status, the motor is prevented from rotating counterclockwise and if it is already rotating in this direction the motor is stopped.

The *CW Limit Switch* parameter allows you to select a digital input to be used as clockwise limit switch. When the selected input is in the chosen status, the motor is prevented from rotating clockwise and if it is already rotating in this direction the motor is stopped.

When the motor is stopped by an intervention of a limit switch, the pulse count continues and the position is maintained.

3.7 Errors

The *Errors* section contains the settings for the errors and faults which can be configured.

When an error occurs the drive is disabled and the error condition saved. At the cessation of the error condition, the error memory must be reset so that the drive can be re-enabled. The error memory reset can be made automatically when the option *Automatic* is selected, through a digital input with the option *ResetAlarm* selected, or following a Power-on cycle if the error is configured with the option *Permanent*. For some errors it is also possible to disable the detection by selecting the option *Disabled*.

The Parameter *Error Position* defines the memory reset mode of the error which occurs when the difference between the commanded position and the one detected by the Encoder in absolute value exceeds the value entered in the field *Limit* placed near.

The field *Limit* is visible only if the *Error Position* is not set on *Disabled* and allows to define the max allowed difference between the commanded position and the one detected by the Encoder. Exceeded in absolute value that threshold, the error position intervenes.

The parameter *Error Position* and the field *Limit* are available only for the DDS12 model provided with Encoder.

The parameter *Under-voltage* defines the memory reset mode of the error which occurs when the power supply voltage drops under the minimum allowed value.

The parameter *Over-voltage* defines the memory reset mode of the error which occurs when the power supply voltage rises beyond the maximum allowed value.

The *Over-temperature* parameter defines the memory reset mode of the error which occurs when the power stage temperature of the drive exceeds the maximum allowed value.

The parameter *Over-current* defines the memory reset mode of the error which occurs when the current supplied by the drive to the motor output exceeds the allowed value.

The parameter *Interrupted Phases* defines the memory reset mode of the error which occurs when there is no connection with a motor phase.

The parameter *Encoder* defines the memory reset mode of the error which is activated when the drive detects an anomaly in the Encoder, such as an excessive absorption or the lack of the Index signal in the waited position.

The parameter *Hardware Error* defines the memory reset mode of the error which occurs when the drive detects an anomaly in its own hardware components.

The parameter *Reset Alarm* allows to choose a digital input to be used for the resetting of the errors and to specify the edge (rising or falling edge, ie inactive-active or active-inactive transition) that will be considered valid to remove the error memory. If there is still the error condition when the signal *Reset Alarm* is activated, the error will not be removed.

3.8 Outputs

The drive has digital inputs that can be configured to give a feedback on the status of the drive and the motor.

The parameter *Digital Output* allows to select the internal signal of the drive to be matched with the relative digital output.

In the following table are described the signals that can be selected:

Signal	Description
Active	The output is always active
Inattivo	The output is always inactive
Error	The output is activated if there are no error In memory
Drive Active	The output is activated when the drive is ready to move the motor
Zero Speed	The output is activated when the motor is stopped
In Position	The output is activated when the motor reaches the commanded position

Selecting the signal with the prefix *No* (for example *No Error*) you get the negative negation of the output.

4 Status and Diagnostics

In the Omni Automation IDE, on the left in the tree view list of the connected devices, double-clicking on the voice Status visible under the drive, a window opens showing the status of the device and the eventual errors.

The check box *Periodic Update*, when selected, maintains updated the device status display. By removing the check mark from the box, to update the status you will need to click on the near link *Update*.

The link *Update* is activated when the check box is not selected and allows you to manually update the device status display.

Under the section *Device,* the field *Vp* shows the voltage value of the power DC bus inside the drive.

Under the section *Digital I/O,* it is shown the status of the digital inputs and outputs. When the signal is associated with the yellow color it means that the input or the output is in the Active status, while if the color is grey it means that it is in the Inactive status.

Under the section *Analog Input,* the field *Input 0* shows the voltage value applied to the analog input.

Under the section *Pulses Count,* the field *Counter* shows the value reached by the counter *Pulse Count*. Clicking with the right button of the mouse on the field it is possible to execute the counter reset. This operation does not affect the position of the motor but only the displayed value.

Under the section *Pulses Count*, the field *Frequency* shows the frequency of the pulses applied to the counter *Pulses Count*.

Following is the descriptions of the fields inside the section *Motor*.

The field Position shows the actual position reached by the motor. The integer part of the value indicates the number of complete revolution, while the decimal part shows the fraction of the revolution reached by the motor with a resolution of 1/10000 rev. For example, the value 0.5000 indicates that the motor is half revolution forward with respect to 0 position, while the value -3.7500 indicates that the motor is 3 and 3 quarters of revolution backward with respect to the 0 position. Clicking with the right button of the mouse on the field you can reset the displayed value. This action does not change the physical position of the motor but simply reset the displayed value.

The field *Speed* shows the actual speed reached by the motor.

The field *Current* shows the actual phase current which flows in the motor phases. It is not surprising if the field value is different from the configuration because, particularly at high speed, or with low power supply voltage, because of the inductance and of the counter-electromotive force of the motor, the current cannot reached the set rated value.

The field *Load Ratio* becomes visible when the parameter *Feedback* is set to *From Encoder* and indicates the relation between the torque supplied by the motor and load resistant torque. The value is expressed in percentage and when it reached

100% the motor stops. This condition, in fact, indicates that the load resistant torque has exceeded the one supplied by the motor. If the value is positive it means that the load applies a resisting torque in the direction opposite to that of the motor rotation, while if the value is negative it means that the load is trying to drag the motor, in the same direction of the rotation, beyond its position.

Following is the descriptions of the fields inside the section *Motor Encoder*.

The section *Motor Encoder* is available only for the DDS12 models provided with Encoder.

The field *Value* indicates the cyclical position of the encoder on a revolution. The value, expressed in 4x encoder resolution, is reset at each revolution of the encoder itself.

The field *Frequency* indicates the frequency of the encoder A and B signals.

It is also possible to know the logic level of the *Phases* A, B and I of the encoder according to the associated color. When a signal is associated with the yellow color it means that it is in the Active status, while if the color is grey it means that the signal is in the Inactive status.

The section *Errors/Fault*, in table form, shows the history of the errors occurred from the last power on and the errors in the memory or active. When the error is active, the column *Active* of the table contains an exclamation mark, while when the error is stored but no more active the column *Active* is empty and the line background is red. When the error reset is executed the background becomes white. In the table are stored up to the latest 10 errors, then the latest replace the oldest. The column *Time* shows the moment when the error occurred after the power on of the drive. The column *Code* contains the error numeric code while the column *Description* shows a brief description of the error. Simply positioning the mouse pointer over the content of each column a tooltip provides further more details.

LAM Technologies
Viale Ludovico Ariosto, 492/D
50019 Sesto Fiorentino
Firenze - ITALY

Ph. +39 055 4207746
Fax +39 055 4207651

www.lamtechnologies.com

General information info@lamtechnologies.com
Technical support support@lamtechnologies.com
Sales information sales@lamtechnologies.com

rev. 0.21 (preliminary)