

DRIVE PARAMETERIZATION



STEPCONTROL
HARDWARE AND SOFTWARE FOR STEPPING MOTOR

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NOTES ON SAFETY

Products for automation manufactured by AEC must be handled, installed and maintained only by skilled and authorized personnel, that must be qualified and instructed to install components for automation. Devices must be installed only for the purposes described in the user's guide. The installer should pay particular attention to potential risks caused by mechanical and electrical hazards.

It is very important that all applications and installations meet all applicable safety requirements.

The installers must take responsibility to verify their knowledge and understanding of all applicable safety standards.

Installations which are not complying with safety requirements can damage equipment and injure the user.

AEC s.r.l. will not be liable and will not take any responsibility for damages caused by products handled or installed improperly, or if the customer have given permission or performed modifications and/or repairs not authorized from AEC s.r.l.

AEC's motion control equipment are high-performances devices for automation, able to producing high forces and rapid movements.

Pay high attention, in particular during installation and development of applications.

Use properly sized equipments for the type of application.

AEC's devices must be considered as components for automation. They are sold as end-user products, and must be installed only by qualified personnel, in accordance with all applicable safety requirements.

Skilled staff must be able to recognize possible dangers that may result from programming, modifying parameter's values and, generally, that may result from using mechanical, electric and electronic equipment.

The drive must be installed in closed cabinets, so that any parts thereof is not reachable while system is powered on.

AEC s.r.l strongly recommends to always follow safety requirements and security rules. Failure to follow this instruction may cause and/or injuries.

General precautions

- The images contained in this manual are for demonstration purposes, and may differ from the products received.
- This manual is subject to changes due to improvement of the products, modification of specifications, or manual thereof improvement.
- AEC s.r.l. is not responsible for any damage to property or injury that could result from improper installation and/or not authorized modification to products.



*AEC's drive systems are products for general use that conform to the state of the art in technology and are designed to prevent any dangers. However, drives and drive controllers that are not specifically designed for safety functions are not approved for applications where the functioning of the drive could endanger persons. **The possibility of unexpected or unbraked movements can never be totally excluded without additional safety equipment.** For this reason personnel must never be in the danger zone of the drives unless additional suitable safety equipment prevents any personal danger. This applies to operation of the machine during production and also to all service and maintenance work on drives and the machine. The machine design must ensure personal safety. Suitable measures for prevention of property damage are also required.*



To prevent personal injury and damage to property, damaged drive systems must not be installed. Changes and modifications of the drive systems are not permitted, and if made all no warranty and liability will be accepted.

REVISIONS

Version	Date	Notes
rev. 01	May 2018	First draft
rev. 02	June 2018	Adds: New subroutine button on programming section
rev. 03	January 2019	Corrections and addition of the "Firmware update" chapter
rev. 04	April 2019	Adds: SMD2204L configuration
rev. 05	May 2020	Update of chapters "Introduction" and "Installation", sections "Inputs/Outputs parameters" and "Save command"

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INTRODUCTION

ADVANCED GRAPHICAL USER INTERFACE (GUI)

The modern systems of drive and control for stepper motors require a more detailed parameterization than the traditional pulses systems.

In order to simplify the approach with the drives for the user, AEC has designed an advanced development environment which permits to access and edit the parameters and the operation mode of the drives, in a quick and intuitive way.

The graphic interface allows to access to the diagnostic and the status information of the drive, assign or edit the functions of the I/O, parameterize up to 64 movements, or write an applicative program for the management of complex sequences of movement.

StepControl permits to store and organize the parameters, the applicative program and any other setting in a single file.

STEPCONTROL ©

StepControl permits to access to the system diagnostic, and allows to set the parameters of the drive (ie. nominal, reduced and boost current, operation mode, regulator gains), the parameters of the motor (ie. step resolution, encoder resolution), the parameters of the communication, the intervention levels of alarms and warnings, the polarity of the I/O.

It also possible to create a new project, or open an existing one, edit the parameters of the drive and send it to the drive itself.

StepControl, in addition to these features, permits to create applicative programs, in order to create complex sequences of movements, also in stand-alone mode.

SYSTEM REQUIREMENTS

- Supported operating systems: Windows Server 2003¹; Windows Server 2008¹; Windows Vista¹; Windows XP¹; Windows 7¹; Windows 8¹; Windows 8.1¹; Windows 10¹
- Framework: .NET Framework 3.5
- Processor: Pentium at 400 MHz or higher (minimum); Pentium at 1 GHz or higher (recommended)
- RAM: 96 MB (minimum); 256 MB (recommended)
- Hard disk: up to 500 MB free space
- CD or DVD: Not required
- Display resolution: 800x600, 256 colors (minimum); 1024x768, 65.536 colors, 32 bit (recommended)

The package .NET Framework 3.5¹¹ can be downloaded for free from Microsoft¹ website.

¹ .Windows Server 2003, Windows Server 2008, Windows Vista, Windows XP, Windows 7; Windows 8; Windows 8.1, Windows 10, NET Framework 3.5 and Microsoft are registered trademarks of Microsoft Corporation.

INSTALLATION AND STARTUP

DOWNLOAD AND INSTALLATION PROCESS

Enter our website <http://www.aec-smd.it/>

Select the English language, then click on “Login”-“Register”:

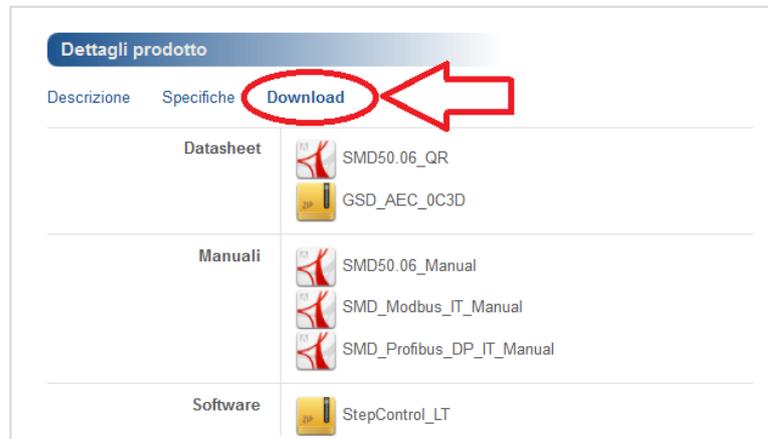
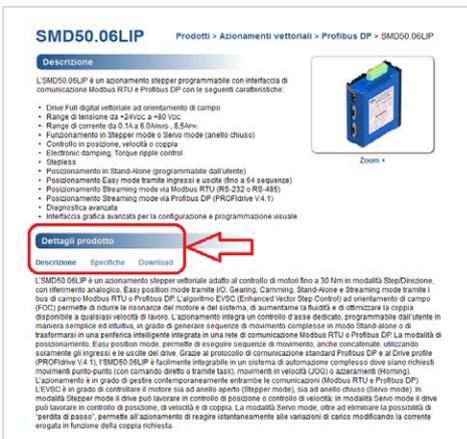


Fill out registration form and click on “Register”.

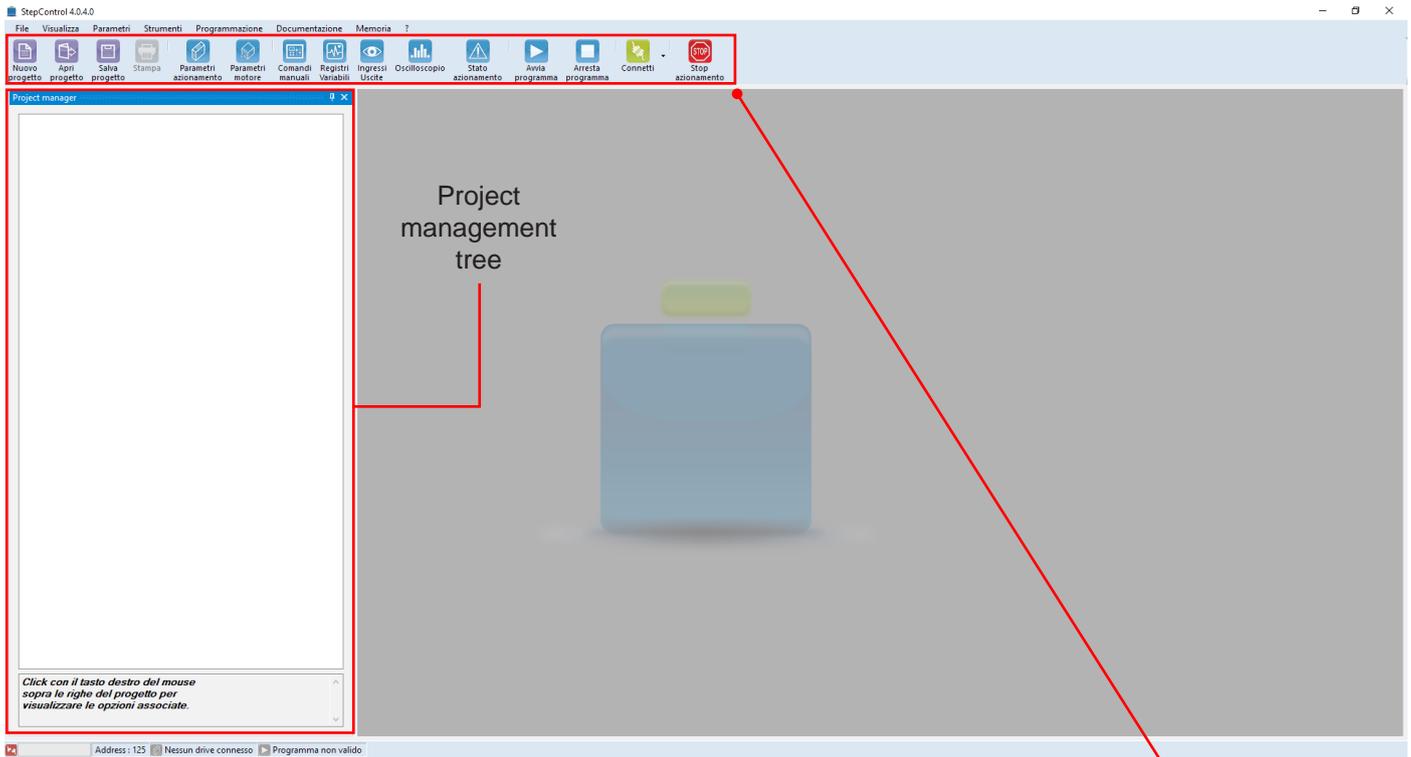
An e-mail confirming the successful registration will be sent to the indicated e-mail address. Follow the instructions contained in the e-mail.

Log-out and log-in to refresh the account.

Click on “Products” - “Software” - “StepControl”. Click on the ZIP archive.



STARTUP SCREEN



Active connection /
No connection

Type of drive and status
(Enabled/Disabled)

Program status
(Valid/Running/in Stop)

Comand icons

ICONS DETAIL



Icon	Function	Description
	New project	Creates a new project.
	Open existing project	Opens an existing project.
	Save project	Save the active project. In case of a new project, it will ask the name to be assigned to the project.
	Drive parameters	Displays, loads, sets and sends the configuration parameters of the drive. It is possible to load and save a parameter set directly from a configuration file.
	Motor parameters	Displays, loads, sets and sends the configuration parameters of the motor. It is possible to load and save a parameter set directly from a configuration file.
	Manual management console	Sets the movement parameters and permits to move the motor controlling it directly with StepControl.
	Registers and variables management	Displays and sets the registers and the internal variables of the connected drive.
	Inputs and outputs management	Displays and sets the parameters of the inputs and outputs of the drive.
	Scope	Displays the scope.
	Drive status	Displays the status of the drive and possible active alarms or warnings. Permits to access to the alarms setting window.
	Start program	Starts the user program saved in the drive.
	Stop program	Stops the user program saved in the drive.
	Connect to drive	Enables the communication between StepControl and the drive.
	Disconnect from drive	Disables the communication between StepControl and the drive.
	Connection parameters	Sets the communication parameters of StepControl
	Emergency stop	Sends ABORT command, stops the running program and disables the drive.
	Selected axis	Axis selection (only for multi-axis drive mod. SMD2204L)

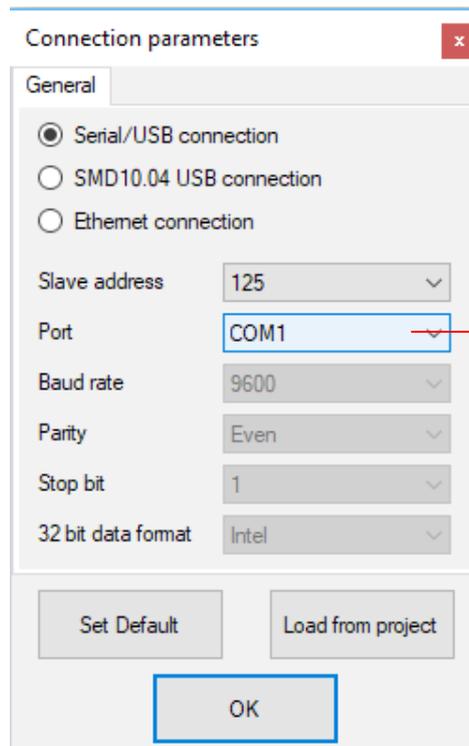
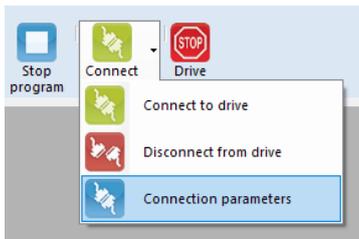
CONNECTION

WHAT IS NEEDED

To connect with an AEC drive, you need a PC with StepControl installed and a mini-USB type B cable.

SETTING OF CONNECTION PARAMETERS

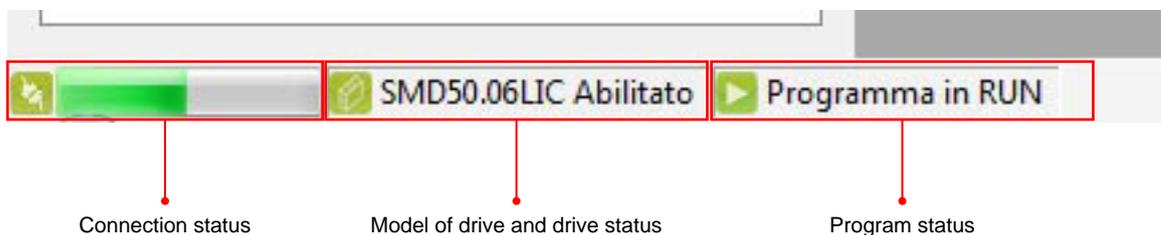
Connect the USB cable and set the communication parameters



Communication port in use

Click on the icon “Connect”  to enable the communication.

In the status bar are displayed information regarding the status of communication, the type of the connected drive and the status of the user program.



SEND A PROGRAM

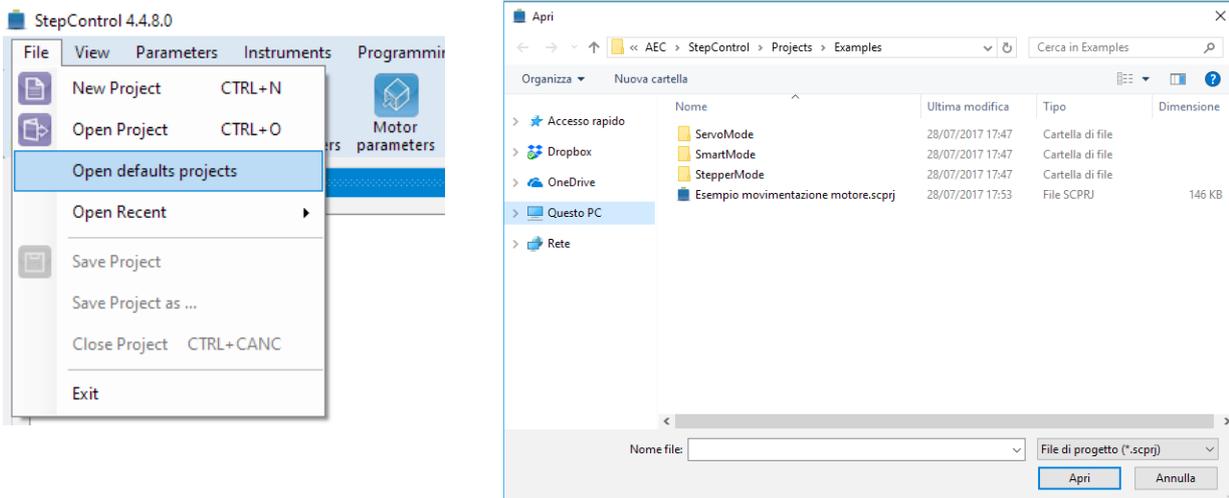
WHAT IS A PROJECT

The project is a “container” that gathers in a single file all the information needed to parameterize, program and configure the drive.

In this way, storing, managing and editing parameters and programs of the applications becomes simpler.

OPEN A DEFAULT PROJECT (SINGLE AXIS DRIVES MOD. SMD1104, SMD1204, SMD5106 AND SMD5206)

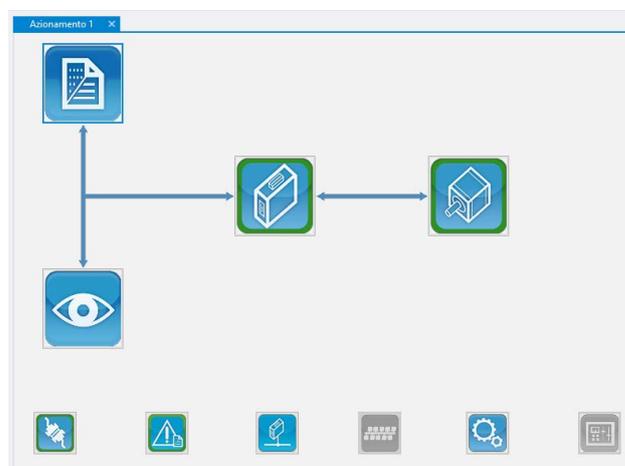
To open a default project, select “File” - “Open default projects” from the menu bar.



A dialog box will appear. Select the operation mode between the following options (see chapter “Drive parameters” for a complete explanation):

- “StepperMode”, to parameterize the drive with open loop mode.
- “ServoMode”, to parameterize the drive with closed loop mode. This mode permits to control the stepper motor like a brushless motor (a motor with AEC encoder is required).
- “SmartMode”, to parameterize the drive with closed loop mode. This mode is a combination between the StepperMode and the ServoMode (a motor with AEC encoder is required).

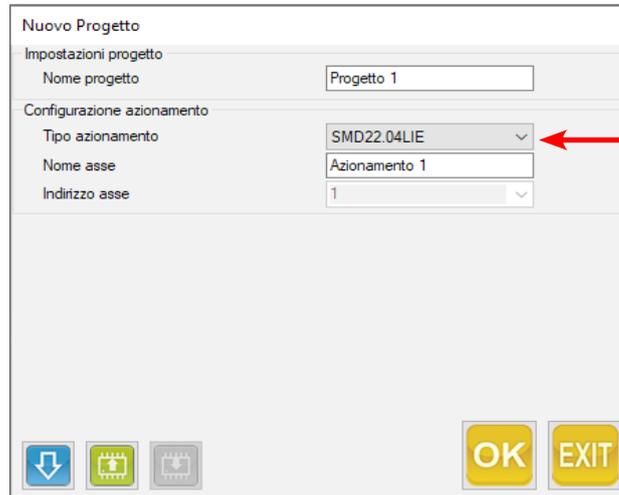
Select the operation mode, the model of the drive and the model of the motor, then open the .scrpj file.



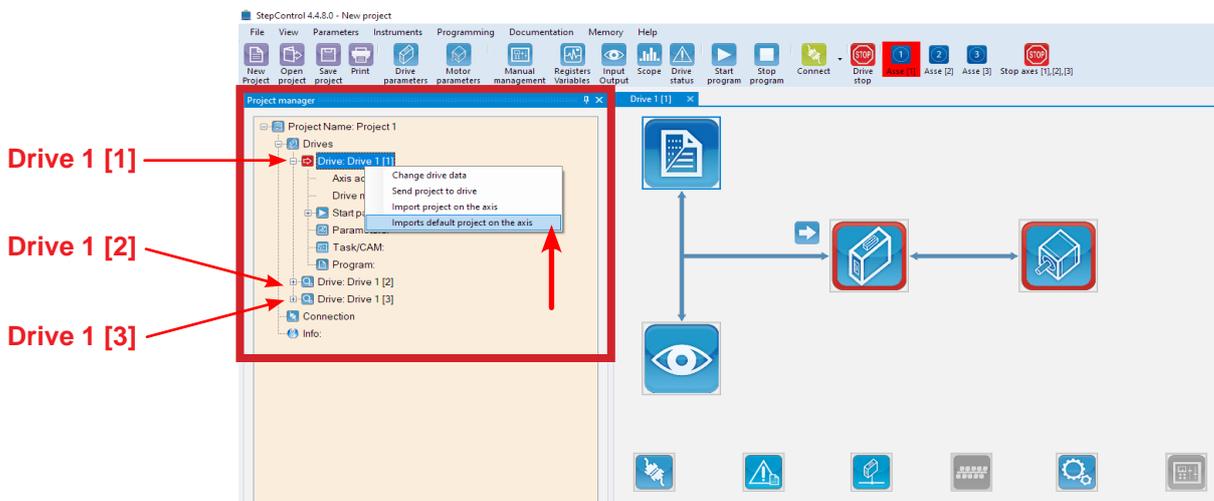
The main screen of the project will appear. The default parameters of the selected drive and motor will be loaded. All the parameters can be edited by accessing the relevant sections. For instructions see chapters “Drive parameters” and “Motor and encoder parameters and microsteps setting”

OPEN A DEFAULT PROJECT (MULTI-AXIS DRIVE MOD. SMD2204)

To open a default project of each single axis, select “File” - “New project” from the menu bar, select “SMD2204xxx” from “Drive model”, then press 



The main screen of the project will appear. Right click on “Drive 1 [1]” on the project manager, select “Import default project on the axis”, then confirm the operation by clicking on “Yes”.



A dialog box will appear. Select the operation mode between the following options (see chapter “Drive parameters” for a complete explanation):

- “StepperMode”, to parameterize the drive with open loop mode.
- “SmartMode”, to parameterize the drive with closed loop mode. This mode is a combination between the StepperMode and the ServoMode (a motor with AEC encoder is required).

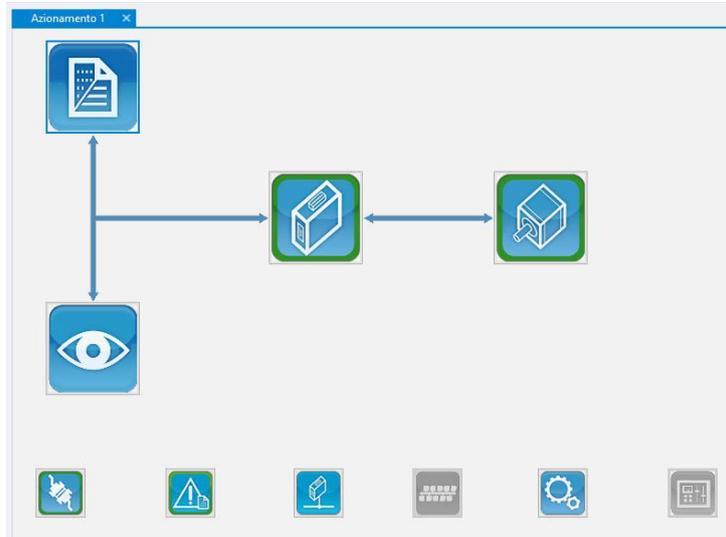
Select the operation mode, the model of the drive and the model of the motor, then open the .scprj file.

Repeat the operation for “Drive 1 [2]” and “Drive 1 [3]” .

Save the project by selecting “File” - Save project as...” from the menu bar.

TRANSMISSION OF THE PROJECT

Open an existing project or a default project. The main screen of the project will appear.



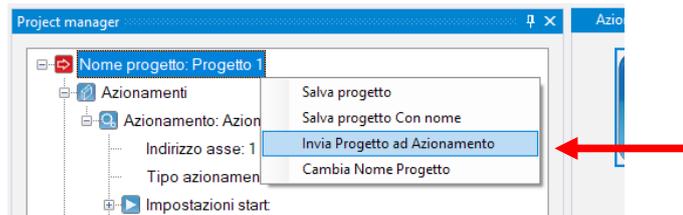
It is advisable to save your project to a local folder of your PC, in order to store changes to the standard project. On the menu bar, click on “File” - “Save Project as...”.

Power the drive and connect the USB cable.

Enable the communication (see chapter “Setting of connection parameters”)

Initialize the memory of the drive by selecting “Intruments” - “Drive Eeprom initialize” on the menu bar.

From the “Project manager” menu, on the left of the screen, right click on the name of the project, and select “Download project to the drive”.



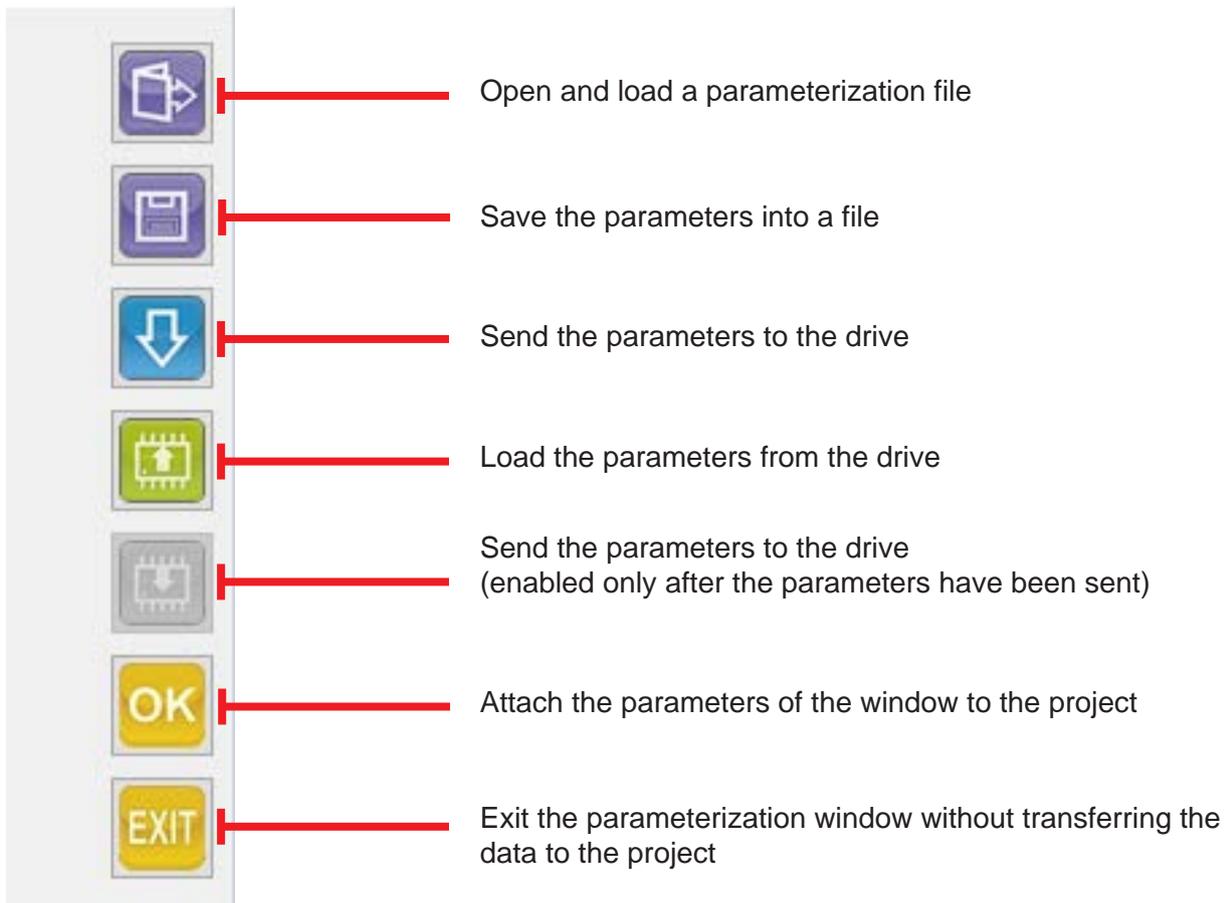
All the parameters and the eventual program are sent to the drive.

At the end of the transmission, a dialog box will appear, asking if parameters and program must be saved into the static RAM. Click yes if you want to store the project in the drive.

Disable the connection, shut down and re-power the drive.

ICONS FUNCTIONS

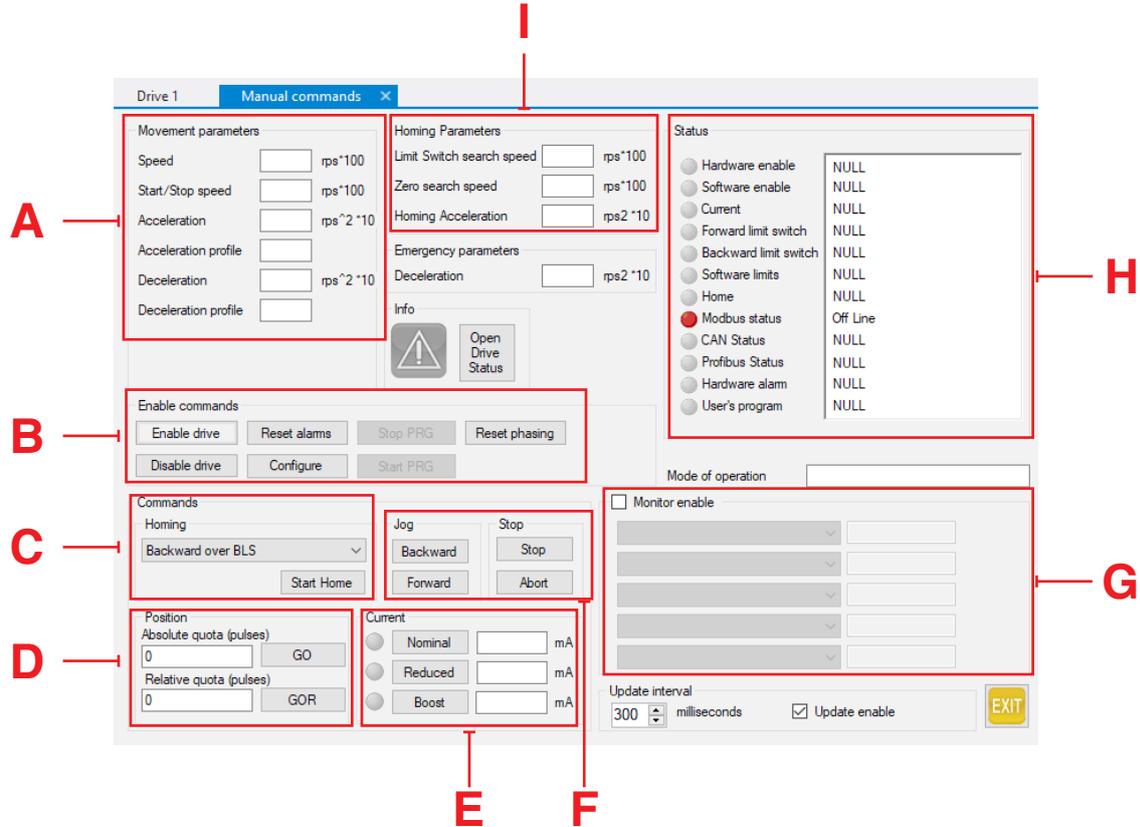
PROJECT WINDOW ICONS



MANAGEMENT AND SYSTEM MONITOR

MANUAL MANAGEMENT OF THE DRIVE

To open the Manual Commands console, select "View" - "Manual commands" from the menu.

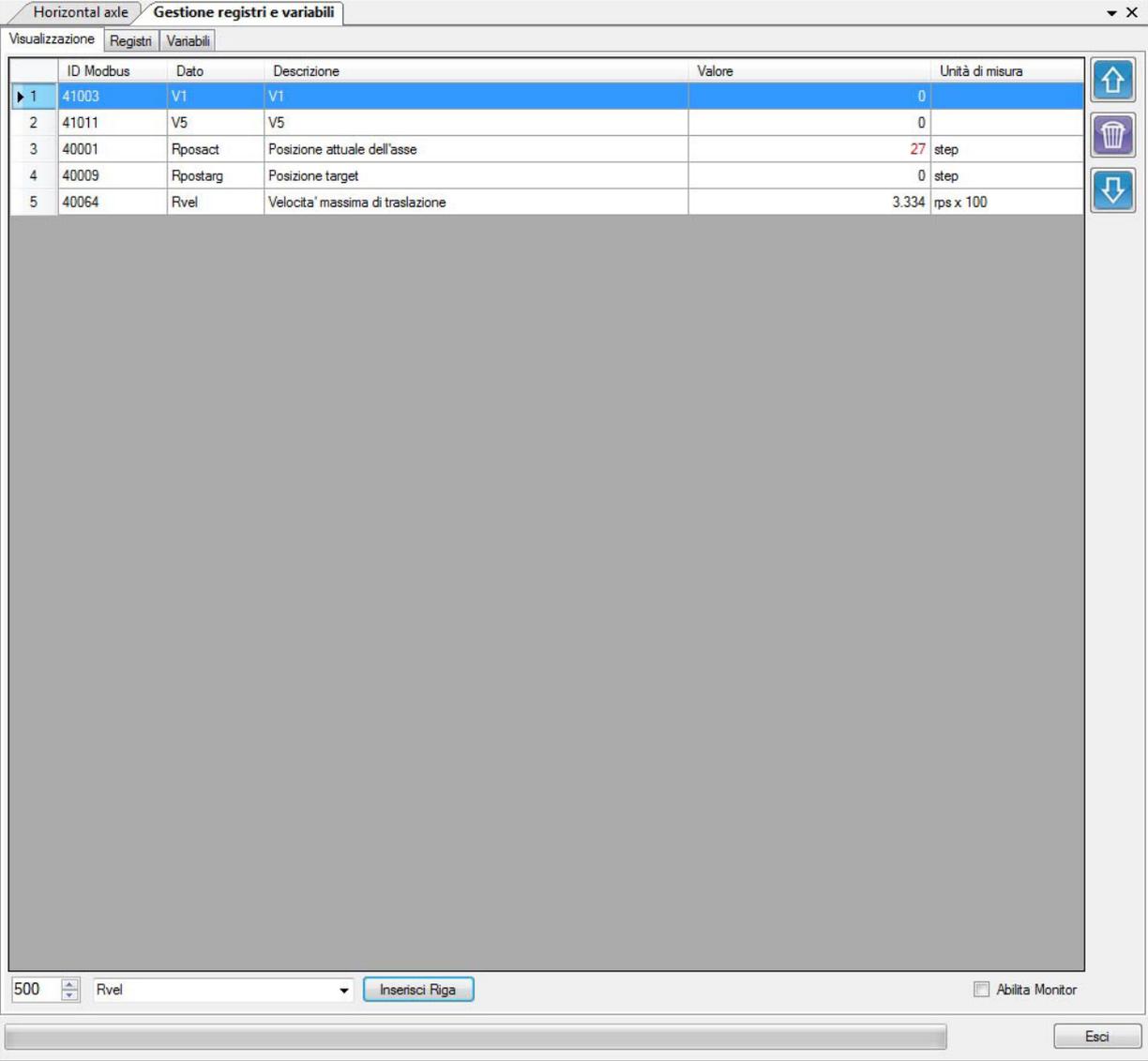


ATTENTION!!! THE MANUAL COMMAND OF THE DRIVE IS RESERVED TO TECHNICAL PERSONNEL PROPERLY SKILLED AND INSTRUCTED ABOUT THE RISKS ARISING FROM THE INSTALLATION AND THE MOVEMENTS OF MOTOR CONTROLLER UNITS.

IT'S EXPRESSLY FORBIDDEN TO STAND IN THE WORK AREAS OF THE DRIVE DURING THE MANUAL COMMAND.

- A** "Movement parameters" - Allows to set the profile to perform. The speed is expressed in rps*100 (100 = 1 rev/sec).
- B** "Enable commands" - Allows to enable and disable the output current to the motor, enable or reset possible alarms.
- C** "Commands" - Sets the homing method.
- D** "Position" Positioning commands. "Absolute quota" is absolute compared to 0, "Relative quota" is relative compared to the actual position.
- E** "Current" - Allows to modify current levels.
- F** "Jog" Jog commands.
- G** "Monitor enable" - Displays information about encoder, position, etc.
- H** "Status" - Status information of the drive.
- I** "Homing parameters" - Allows to set the profile to perform during the homing phase. The speed is expressed in rps*100 (100 = 1 rev/sec).

Click on the “Registers and variables management” icon  .



The screenshot shows a software window titled "Horizontal axle" with a sub-tab "Gestione registri e variabili". The window has two tabs: "Registri" and "Variabili". Below the tabs is a table with the following data:

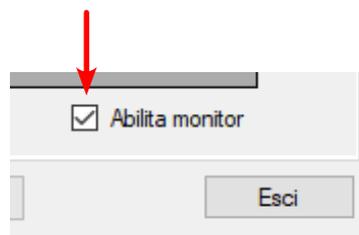
	ID Modbus	Dato	Descrizione	Valore	Unità di misura
▶ 1	41003	V1	V1	0	
2	41011	V5	V5	0	
3	40001	Rposact	Posizione attuale dell'asse	27	step
4	40009	Rpostarg	Posizione target	0	step
5	40064	Rvel	Velocita' massima di traslazione	3.334	rps x 100

At the bottom of the window, there is a text input field containing "500", a dropdown menu with "Rvel" selected, and a button labeled "Inserisci Riga". To the right of these elements is a checkbox labeled "Abilita Monitor". An "Esci" button is located at the bottom right corner of the window.

In the lower side of the window, write the name of the variable to be displayed, then click on “Row insert”



Click on the “Monitor enable” checkbox to update the values in a continuous way.

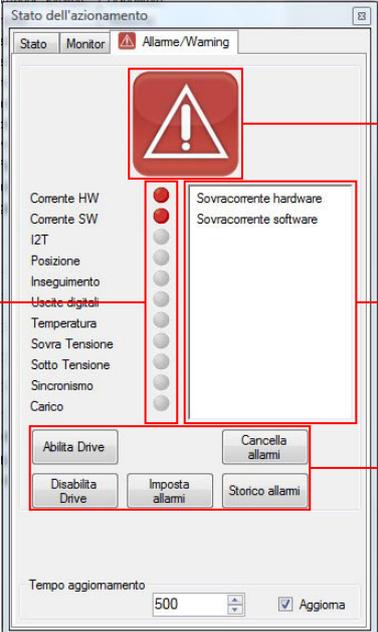


Click on the value to be modified, enter the value, then press “Enter” on the keyboard to send the new data to the drive. (This operation must be made without the enabling of the continuous update).

To save the new values into the drive, stop the program by clicking the “Stop” icon on the icons menu. Then select “Memory” - “Save data into NVRAM” - “Save all” from the menu bar.

Shut down and re-power the drive.

Click on the "Drive status" icon .



Alarms or warning indicator (red icon = alarm; yellow = warning)

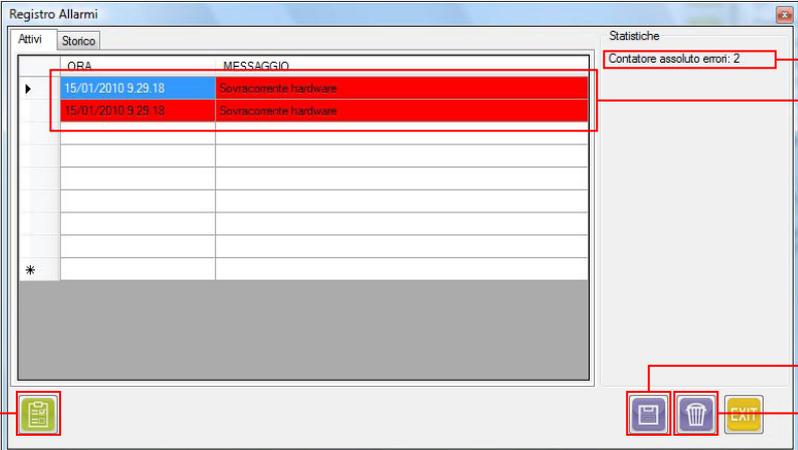
Alarms or warning indicator (red icon = alarm; yellow = warning)

Alarm type

Alarm management and drive enable commands

The VectorStep drives store the alarms in an 8 position buffer, keeping track of possible anomalies occurred during the operation.

To display the stored alarms, open the alarms register.



Number of stored alarms

Active alarms

Save alarms register

Delete alarms register

Aknowledge of the active alarms

ORA	MESSAGGIO
15/01/2010 9:29:18	Sovraccorrente hardware
15/01/2010 9:29:18	Sovraccorrente hardware

PARAMETERS

POWER-ON AND LIMIT SWITCHES PARAMETERS

To edit the power-on parameters and to enable the limit switches, select “Parameters” - “Power-on parameters” from the menu bar.

Configuration of the drive at power on

- Operation mode at power on (Drive model: SMD11_04LIE)
- Function modes at power on (Drive name: Drive 1, Axis address: 125)
- Current level at power on (Nominal current)
- Software limits and limit switches enabling (Enable lower software limit, Enable upper software limit, Enable backward limit switch, Enable forward limit switch)
- Movement parameters at power on (Velocity: 100 rps x100, Start velocity: 10 rps x100, Acceleration: 500 rps^2 x10, Acceleration profile: 5, Deceleration: 500 rps^2 x10, Deceleration profile: 5, Emergency decel.: 1000 rps^2 x10, Target position: 0 counts)

The settings at power on permit to modify the status of the drive at the start-up:

Drive set up: The drive loads the operation parameters, but it doesn't supply current to the motor.

Drive enable: The drive loads the operation parameters and enables the output current to the motor.

Start program: The drive loads the operation parameters, enables the output current and starts the user program.

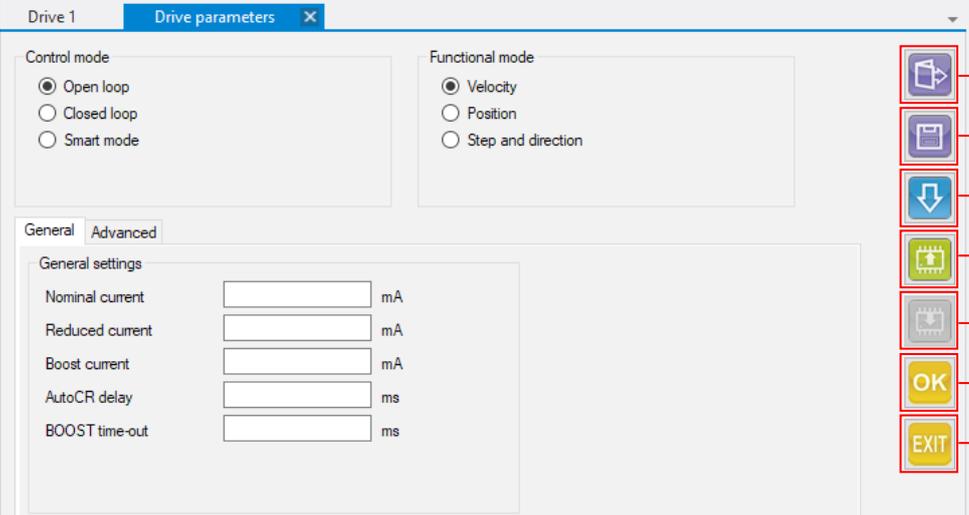
The parameter “Current level” defines the current settings at power up. There are four possible settings: (Nominal current, Reduced current, Boost or current off).

Parameter	Value	Unit	Description
Velocity	100	rps x100	Translation velocity at power on
Start velocity	10	rps x100	Start velocity at power on
Acceleration	500	rps^2 x10	Acceleration at power on
Acceleration profile	5		Acceleration profile at power on
Deceleration	500	rps^2 x10	Deceleration at power on
Deceleration profile	5		Deceleration profile at power on
Emergency decel.	1000	rps^2 x10	Emergency deceleration at power on
Target position	0	counts	Target quota at power on

Movement	Homing	
Velocity to find the zero switch	100 rps x100	Limit switch search velocity at power on
Velocity to find the zero point	10 rps x100	Zero point search velocity at power on
Acceleration	500 rps ² x10	Homing acceleration at power on
Homing mode	Backward over BLS	Homing mode at power on
Maximum space	0 counts	Homing maximum space at power on
Offset	0 counts	Homing offset at power on

DRIVE PARAMETERS

Click on the "Drive" icon .



The screenshot shows the 'Drive parameters' window for 'Drive 1'. It includes sections for 'Control mode' (Open loop, Closed loop, Smart mode) and 'Functional mode' (Velocity, Position, Step and direction). Below these are 'General settings' with fields for Nominal current, Reduced current, Boost current, AutoCR delay, and BOOST time-out. On the right side, a vertical toolbar contains several icons: a folder icon for opening/loading files, a save icon, a drive icon for sending/receiving parameters, a static memory icon, an OK button, and an EXIT button. Red lines connect these icons to their respective functions listed on the right.

- Open and load a parameterization file
- Save the parameters to a file
- Send the parameters to the drive
- Load the parameters from the drive
- Save the parameters in the static memory (enabled only after the parameters have been sent)
- Attach the parameters to the project
- Exit the parameterization window

 If a field is not set, the drive will use default values.

 The parameters "Control mode" and "Functional mode" are sent to the drive only if the drive is disabled. The other parameters can be sent in any moment.

Control modes

Stepper mode (open loop): this operation mode is similar to the traditional stepper motor control method. The drive works in open loop and generates the movement profile and the current levels basing itself to the internal registers (without direct feedback from the motor).

The drive operates like a constant current generator. Independently by the torque required by the movement, the drive supplies the configured nominal current.

The indexer updates the movement parameters in real-time, permitting to execute velocity movements (JOG) or position movements (absolute and relative GO).

The VectorStep is a micropstep drive with high resolution (1/1024th step. 204.800 steps/revolution). However, while keeping unchanged the physic resolution, it's possible to modify the working resolution (via software), up to a 1/1 ratio.

Servo mode (closed loop): the servo-mode is made by equipping the stepper motor with an encoder, permitting to obtain a position feedback. The encoder doesn't just control the position of the motor, but, thanks to the EVSC algorithm, it becomes an electronic collector, allowing the drive to react in real-time to the load variations.

The control in closed loop permits to optimize the management of the current and the torque of the motor, reducing the thermal dissipations and fully exploiting the motor suppliable torque.

The servo-mode allows to operate in torque control, in velocity control also with external velocity references (analogue input or through fieldbus), or to obtain an high-performance positioner in terms of response time and dynamics.

The resolution of the motor is not given by the configured microsteps, but by the encoder resolution. The AEC integrated encoders has a fixed resolution of 512 ppr. Read in quadrature, it is possible to obtain a fixed resolution of 2048 steps/rev.

Smart Mode: this mode is an hybrid between the Steppr-mode and the Servo-mode. The drive works by using the encoder of the stepper motor to obtain a the position feedback, but at the same time it operates like a constant current generator, supplying the configured nominal current independently by the torque required by the movement.

This permits to manage the torque at the motor shaft, but with a current which is constant both during the movement and during the standstill moments, eliminating the oscillations due to the current regulation.

The Smart mode allows to operate in torque control, in velocity control also with external velocity references (analogue input or through fieldbus), or to obtain an high-performance positioner in terms of response time and dynamics.

Regarding the “step splitting” and the current control, the Smart mode works like the Stepper mode.



Smart mode is recommended in case of torque control operation, thanks to its easier configuration.

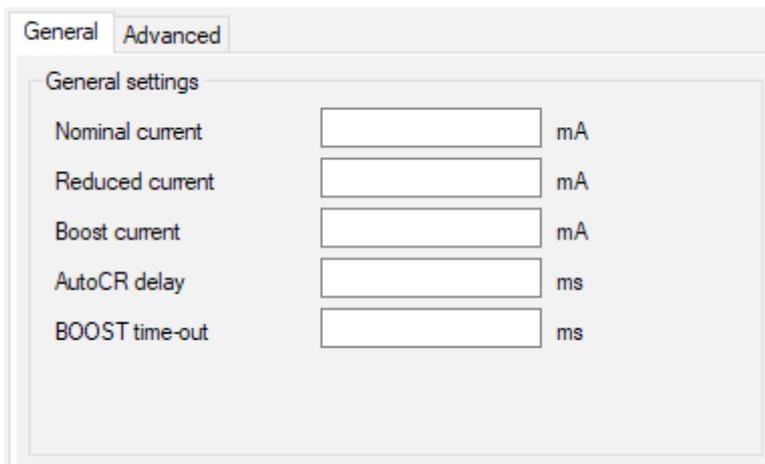
Function modes:

Velocity: this mode is used in case the motor has not a positioner function, but only a continuous rotation function. Once enabled, the motor will rotate continuously at the value set in the velocity register. To stop the motor, set the value to 0.

Position: this mode is used in case the motor has a positioner function. Entering a position target and the acceleration/deceleration ramps, the trajectory generator of the drive will create the movement profile to be executed.

Step and direction: in this mode, the drive is an executor of the position profile received by the step input. Setting this function mode will configure the default step and direction inputs.

Current settings:



Nominal current: maximum current level supplied to the motor during the movement.

Reduced current: current level supplied to the motor during standstill.

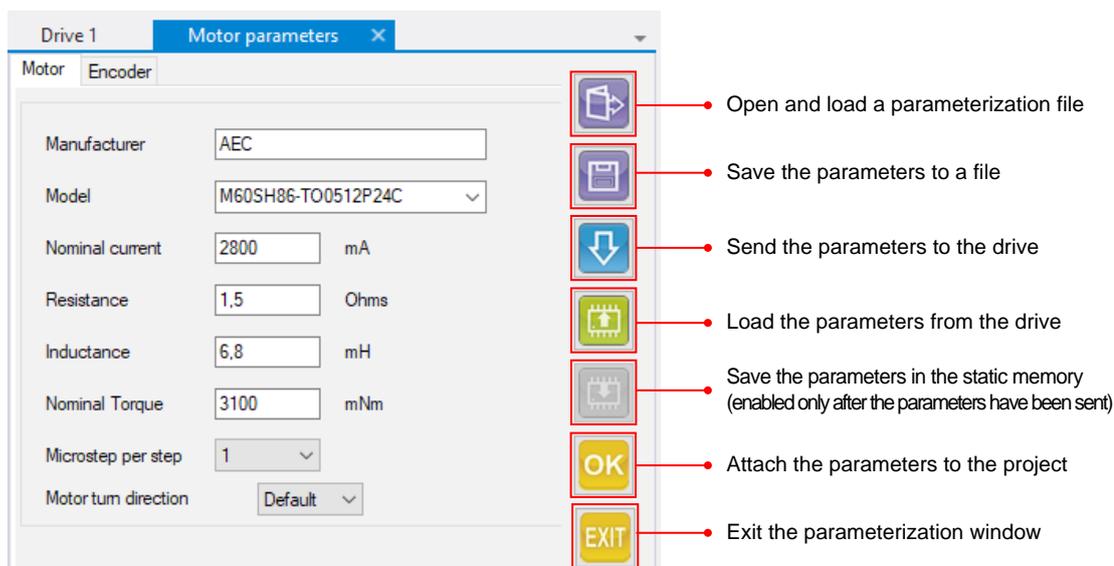
Boost current: current level supplied to the motor during ramps (if boost function is enabled).

AutoCR delay: reduced current intervention delay.

BOOST time out: maximum duration of the boost current.

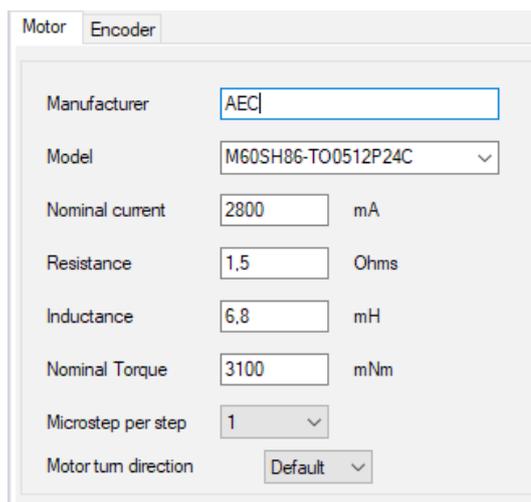
MOTOR AND ENCODER PARAMETERS AND MICROSTEPS SETTING

Click on the “Motor” icon .



In case a motor is not included in the database, it is possible to add it.

Motor parameters:



Model: Model of the motor. For AEC motors, it is possible to load the parameters of motor and encoder by selecting the model.

Nominal current: Nominal current of the motor.

Resistance: Resistance of the motor.

Inductance: Resistance of the motor.

Nominal torque: Nominal torque of the motor.

Microstep per step: The “VectorStep” drives always work in “microstep” mode. Each physical step of the motor (200 steps/rev) is divided in 1024 parts, obtaining a resolution of 204.800 steps/rev. In order to avoid the management of massive quotas, it is possible to virtualize the working resolution, bringing the splitting of the physical step from 1/1 to 1/1024.

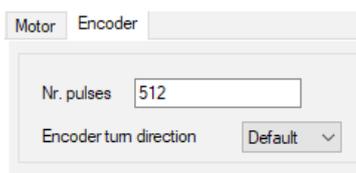
Example:

steps per revolution = physical steps of the motor \times microsteps

steps per revolution = $200 \times 2 = 400$ steps/rev

Motor turn direction: with this setting, it is possible to reverse the rotation direction of the motor, without any modification to the wiring. **Caution:** in case the motor is equipped with an encoder, it is necessary to reverse the rotation direction of the encoder (see instructions below).

Encoder parameters:

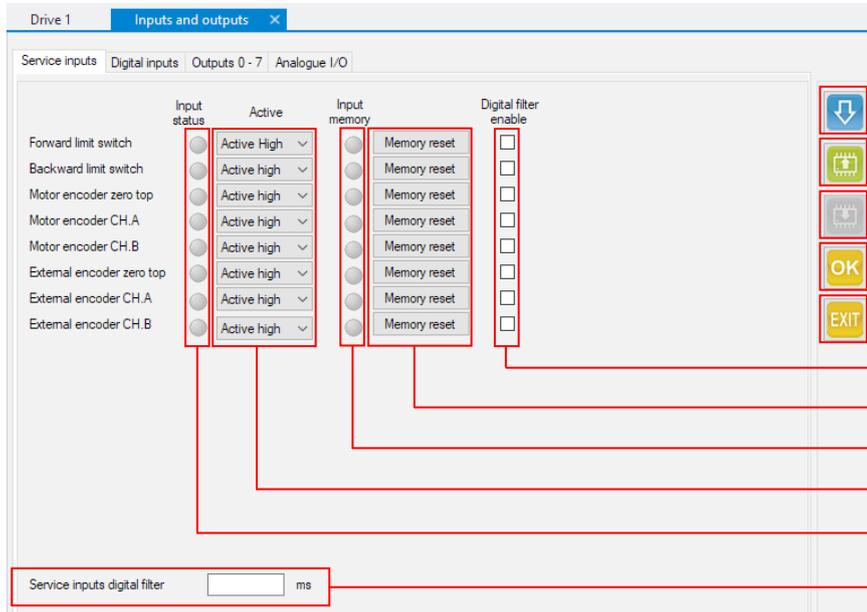


Nr. pulses: Pulses per revolution of the motor encoder

Encoder turn direction: with this setting, it is possible to reverse the rotation direction of the encoder, without any modification to the wiring. **Caution:** if the encoder rotation direction is reversed, it is necessary to reverse the rotation direction of the motor (see instructions below).

Click on the "IN/OUT" icon .

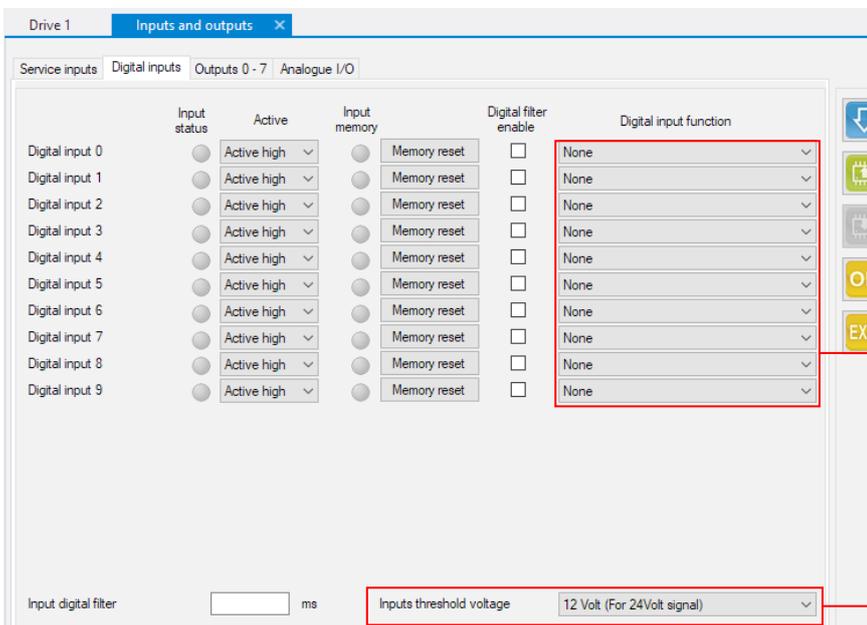
Service inputs



Service inputs digital filter ms

- Send the parameters to the drive
- Load the parameters from the drive
- Save the parameters in the static memory of the drive
- Attach the parameters to the project
- Exit the parameterization window
- Digital filter enabling mask
- Reset command of the input memory
- Input memory status
- Definition of input activation stauts
- Input status
- Digital filter configuration

Digital inputs



Input digital filter ms

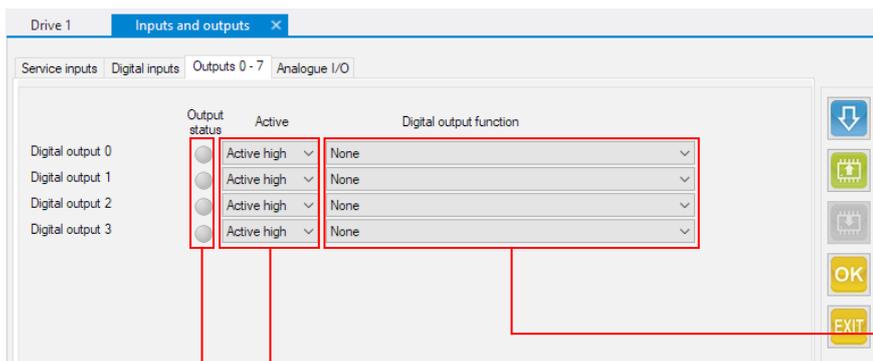
Inputs threshold voltage 12 Volt (For 24Volt signal)

- Setting of digital input function
- Setting of input voltage threshold

 Input functions are activated on the front, not on the state.

 Each data field not set is not attached to the project or sent to the drive. In case of empty fields, the drive uses default values.

Digital outputs

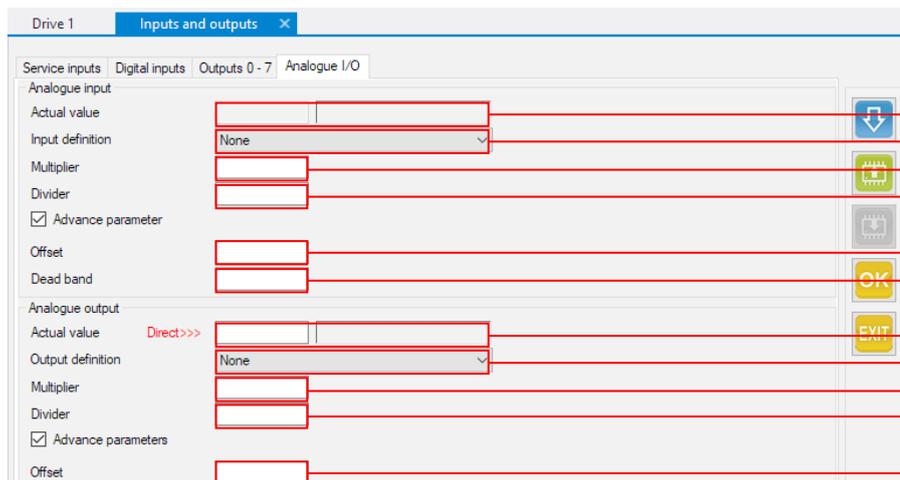


Setting of digital input function

Definition of activation stauts

Status/Setting of the output
(double click on LED to enable or disable the output)

Analog input/output



Analogue input status

Setting of input function

Multiplier coefficient of the input

Divider coefficient of the input

Offset for 0 point shift

Dead band

Status/Setting of the analog output

Setting of output function

Multiplier coefficient of the output

Divider coefficient of the output

Offset for 0 point shift



Each data field not set is not attached to the project or sent to the drive.
In case of empty fields, the drive uses default values.

ALARMS/WARNINGS PARAMETERS

Select "Parameters" - "Alarms parameters" from the menu bar.

The screenshot shows the 'Alarm parameters' window with two tabs: 'Alarm' (selected) and 'Warning'. The 'Alarm' tab contains a list of alarm types with checkboxes and corresponding threshold input fields. The 'Warning' tab is currently inactive. The window has a toolbar at the bottom with several icons and two buttons labeled 'OK' and 'EXIT'.

Annotations:

- Alarms enable:** Points to the checkboxes for 'Over Voltage', 'Under Voltage', 'Temperature', 'Over Current', 'I2T', 'Following', 'Position alarm delay', 'Positioning timeout', and 'Motor Encoder error for anomaly'.
- Alarms threshold configuration:** Points to the input fields for 'V', 'V', 'C', 'mA', 'mA^2ms', 'counts', 'ms', 'ms', and 'pulse'.
- Open and load a parameterization file:** Points to the first icon in the toolbar (a folder with an arrow).
- Save the parameters to a file:** Points to the second icon in the toolbar (a floppy disk).
- Send the parameters to the drive:** Points to the third icon in the toolbar (a downward arrow).
- Load the parameters from the drive:** Points to the fourth icon in the toolbar (an upward arrow).
- Exit the parameterization window:** Points to the 'EXIT' button.
- Attach the parameters to the project:** Points to the fifth icon in the toolbar (a gear).
- Save the parameters in the static memory (enabled only after the parameters have been sent):** Points to the sixth icon in the toolbar (a memory chip).

Warnings: like alarms, warnings have adjustable thresholds, permitting to modify the sensitivity and the intervention point. When a warning event occurs, there is no effect on the execution of commands and programs. The purpose of the warning is to notice a potentially critical situation to the user.

Alarms:

Alarm parameters

Alarm Warning

<input checked="" type="checkbox"/> Over Voltage	<input type="text"/>	V
<input checked="" type="checkbox"/> Under Voltage	<input type="text"/>	V
<input checked="" type="checkbox"/> Temperature	<input type="text"/>	C
<input checked="" type="checkbox"/> Over Current	<input type="text"/>	mA
<input checked="" type="checkbox"/> I2T	<input type="text"/>	mA ² ms
<input checked="" type="checkbox"/> Following	<input type="text"/>	counts <input type="text"/> ms
<input checked="" type="checkbox"/> Position alarm delay	<input type="text"/>	ms
<input checked="" type="checkbox"/> Positioning timeout	<input type="text"/>	ms
<input checked="" type="checkbox"/> Motor Encoder error for anomaly	<input type="text"/>	pulse

OK EXIT

Over voltage: over voltage intervention threshold.

Under voltage: under voltage intervention threshold.

Temperature: temperature intervention threshold.

Over current: over current intervention threshold.

I2T: I2T intervention threshold.

Following: the control constantly verify the actual position and the encoder quota during a positioning profile (not when the motor is in standstill), in order to notice a warning or an alarm in case the difference between the two quotas exceeds the configured threshold (expressed in encoder steps). When the following alarm trips, it stops every movement leaving the motor in torque, and notifies the fault state.

In this case, it will be necessary to take an action and reset the alarm to restore the system.

Position alarm delay: maximum admissible time of out of position shifting when the motor is stopped. The encoder steps quota indicating that the axis in position is defined by the register Rdeadpos.

Position timeout: maximum positioning delay between theoretic and actual positioning.

Motor encoder error for anomaly: maximum error between motor encoder count and motor step (expressed in encoder steps).

Note: “Over voltage”, “Undervoltage”, “Temperature”, “Over current” and “Motor encoder error for anomaly” alarms disable the current to the motor.

On the contrary, “Following”, “Position alarm delay” and “Position timeout” alarms, maintain the motor in current also after the intervention of the alarm.

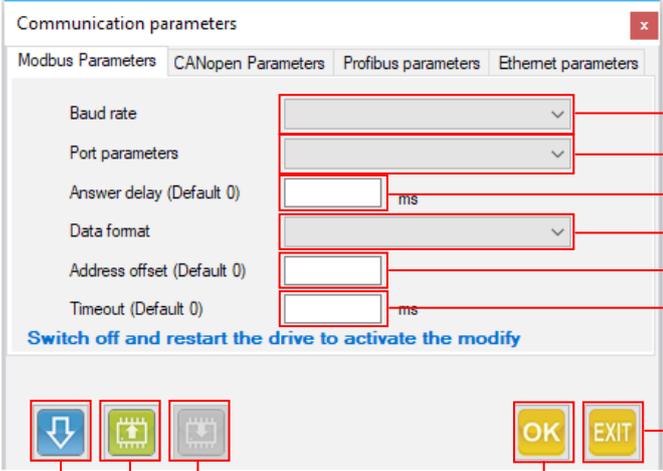
COMMUNICATION PARAMETERS

Select "Parameters" - "Communication parameters"

This window permits to modify the communication parameters used by the drive.

To establish a connection between the drive and a master (PL, PLC or HMI), the parameters of the drive and the master must be equal.

Modbus RTU:



The screenshot shows the 'Communication parameters' window with the 'Modbus Parameters' tab selected. The parameters are as follows:

- Baud rate: [Dropdown menu]
- Port parameters: [Dropdown menu]
- Answer delay (Default 0): [Text input] ms
- Data format: [Dropdown menu]
- Address offset (Default 0): [Text input]
- Timeout (Default 0): [Text input] ms

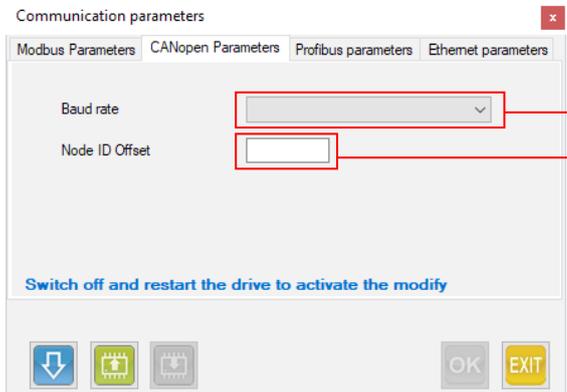
Buttons at the bottom: [Send to drive], [Save to static memory], [Load from drive], [OK], [EXIT].

Annotations:

- Baud rate setting
- Port parameters setting
- Answer delay setting
- 32-bit data format setting
- Address offset setting
- Timeout in ms setting
- Exit the parameterization window
- Attach the parameters to the project
- Save the parameters in the static memory (enabled only after the parameters have been sent)
- Load the parameters from the drive
- Send the parameters to the drive

Switch off and restart the drive to activate the modify

Can-open:



The screenshot shows the 'Communication parameters' window with the 'CANopen Parameters' tab selected. The parameters are as follows:

- Baud rate: [Dropdown menu]
- Node ID Offset: [Text input]

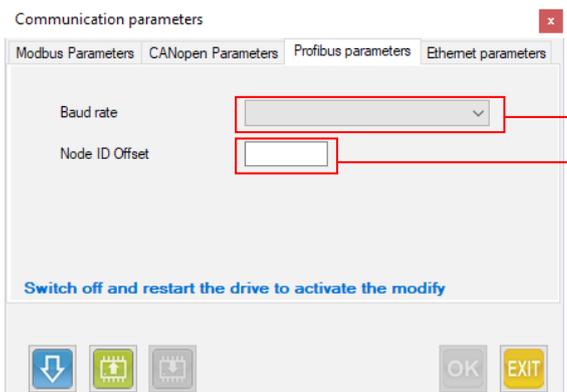
Buttons at the bottom: [Send to drive], [Save to static memory], [Load from drive], [OK], [EXIT].

Annotations:

- Baudrate setting
- Offset address setting (default=0)

Switch off and restart the drive to activate the modify

Profibus:



The screenshot shows the 'Communication parameters' window with the 'Profibus parameters' tab selected. The parameters are as follows:

- Baud rate: [Dropdown menu]
- Node ID Offset: [Text input]

Buttons at the bottom: [Send to drive], [Save to static memory], [Load from drive], [OK], [EXIT].

Annotations:

- Baudrate setting
- Offset address setting (default=0)

Switch off and restart the drive to activate the modify

Modbus TCP:

Communication parameters

Local IP Address

Subnet Mask

Gateway Address

Modbus TCP Port (Default 502)

Data format

MAC Address

Apply now

- IP address setting (Default is 192.168.1.1)
- Subnet Mask setting
- Gateway address setting
- Data format
- MAC Address

Modbus TCP:

Communication parameters

Ethercat ID

EtherCAT ID

AUXILIARY ENCODER PARAMETERS

Select "Parameters" - "Auxiliary encoder parameters".

Auxiliary encoder parameters

CW Quadrature

CCW Quadrature

Sensor + Direction (x1)

Sensor + Direction (x2)

Parameters GEAR

Multiplier

Divider

- Sensor type configuration
- "Gear" function settings
- Exit the parameterization window
- Attach the parameters to the project
- Save the parameters in the static memory (enabled only after the parameters have been sent)
- Load the parameters from the drive
- Send the parameters to the drive

CREATE A PROGRAM

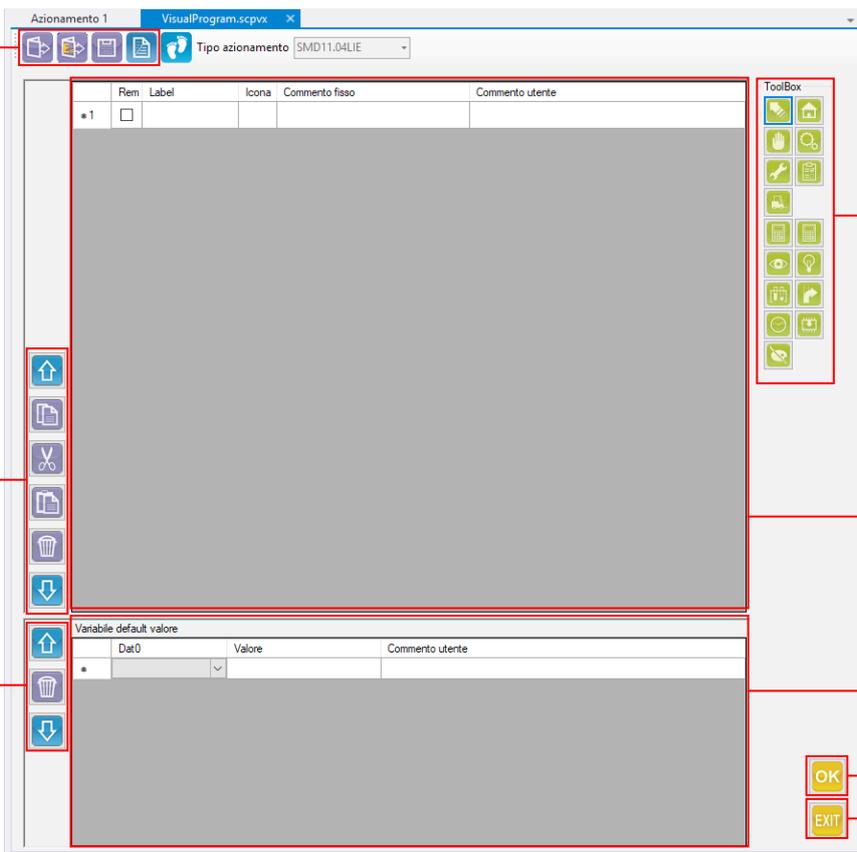
WHAT IS A PROGRAM

A program is a list of instructions that the drive uses to execute one or more movement sequences, or to manage external peripherals, according to the needs of the user.

The possibility to create a user program makes VectorStep drives particularly flexible and suitable for each type of application.

CREATE A NEW PROGRAM

Click on the "Program" icon  or select "Programming" - "New program" - "Graphic programming" from the menu bar.



The screenshot shows the VisualProgram software interface. The main window is titled "Azionamento 1" and "VisualProgram.scpvx". It features a menu bar with "Tipo azionamento" set to "SMD11.04LIE". The interface is divided into several sections:

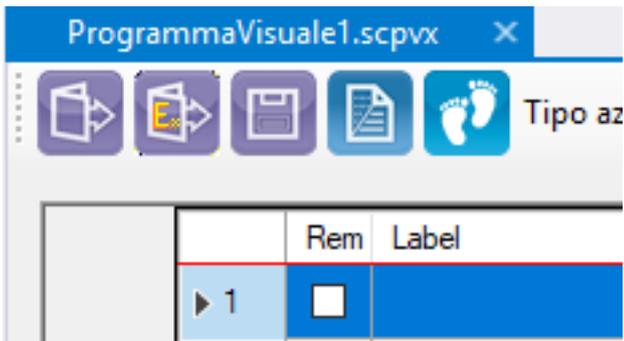
- File management icons:** Located at the top left, including icons for file operations like open, save, and print.
- Program grid management icons:** Located on the left side, including icons for home, copy, paste, delete, and refresh.
- Variables grid management icons:** Located on the left side, below the program grid, including icons for home, delete, and refresh.
- Programming toolbox:** Located on the right side, containing various icons for programming functions.
- Program grid:** The central area where the program steps are defined.
- Variables definition grid:** Located at the bottom, used for defining variables and their default values.
- Attach the program to the project:** An "OK" button at the bottom right.
- Exit:** An "EXIT" button at the bottom right.

	Rem	Label for jump commands	Icona	Command	Notes
▶ 01	<input type="checkbox"/>			Abilita l'uscita di corrente al motore	Abilita azionamento e dai corrente al motore
02	<input type="checkbox"/>			Abilita corrente nominale	Abilita la corrente nominale
03	<input type="checkbox"/>	Loop		Testa ingresso 7	Testa ingresso digitale 7 (pulsante di azzeramento)
04	<input type="checkbox"/>			Salta a Azzeramento se valida la condizione NE	Se digital input 7 alto, vai ad azzeramento
05	<input type="checkbox"/>			Testa ingresso 5	Testa ingresso digitale 5 (pedale)
06	<input type="checkbox"/>			Salta a Ciclo se valida la condizione NE	Se digital input 5 alto, vai ad eseguire un ciclo
07	<input type="checkbox"/>			Salta a Loop se valida la condizione A	Se nessuno dei test precedenti valido, ritorna al ciclo di scansione ingressi Loop
08	<input type="checkbox"/>	Azzeramento		Azzerasse in modo -1	
09	<input type="checkbox"/>			Salta a Loop se valida la condizione A	
10	<input type="checkbox"/>	Ciclo		Assegna il valore 0 a Rposact	Azzerasse la posizione dell'asse
11	<input type="checkbox"/>			Sposta di 800 passi	Esegui un movimento del motore di 800 passi e attendi fine movimento
12	<input type="checkbox"/>			Attendi per 1000 millisecondi	Attendi 1 secondo
13	<input type="checkbox"/>			Salta a Loop se valida la condizione A	Ritorna al ciclo di scansione degli ingressi Loop

Excludes the line from the compilation of the program

Command icon

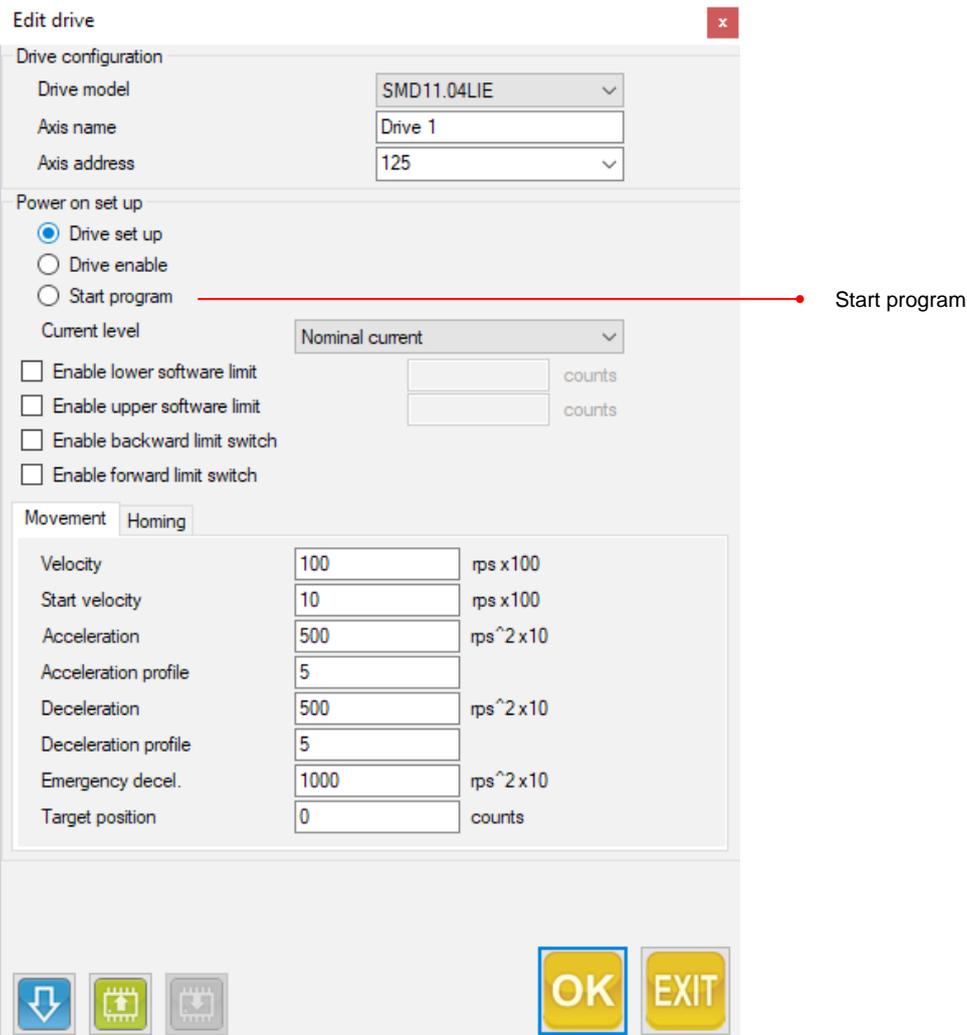
OPEN, SAVE AND COMPILE A PROGRAM



-  Open an existing program
-  Open the tutorial program
-  Save the program
-  Compile, save and send the program

PROGRAM AUTOMATIC START AT THE POWER-ON

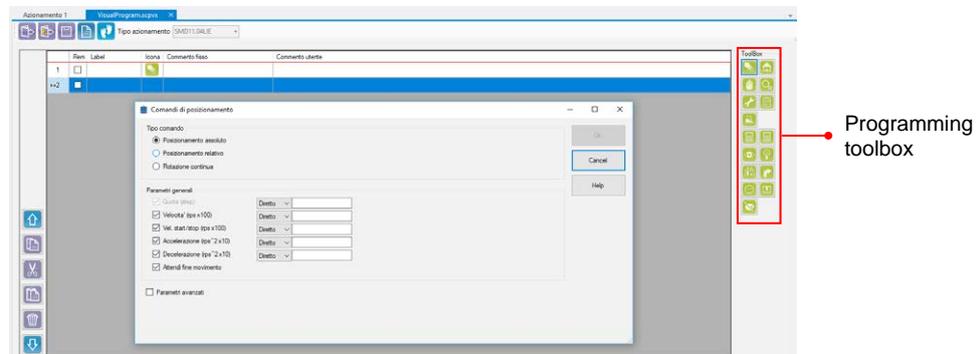
To set the automatic start of the program at the power on, select “Parameters” - “Power-on parameters” from the menu bar, then select “Start Program” from “Power on set up” section.



ENTER A PROGRAM LINE

To enter a new instruction, press on the desired icon of the Programming toolbox and drag it to the desired point of the grid by keeping the button pressed (drag&drop).

By releasing the mouse button, a new row is inserted in the point indicated by the red line. The command parameterization window will be automatically opened.



Programming toolbox

SHIFT A PROGRAM LINE

Press on the line to be shifted and drag it to the desired point of the grid by keeping pressed the button of the mouse (drag&drop). By releasing the button, the selected line will be inserted into the point indicated by the red line.

It is also possible to use the UP and DOWN icons beside the grid, or select UP and DOWN from the context menu (by right clicking on the selected row), or cut and paste the line in the desired point (from the context menu).

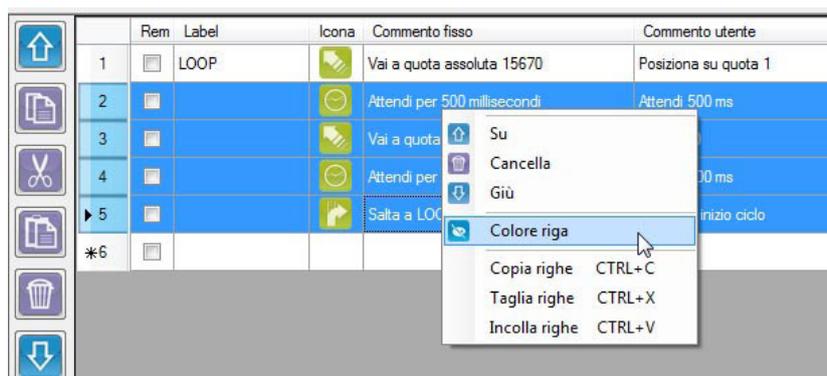
SHIFT A ROW BY DRAGGING IT (DRAG&DROP)

	Rem	Label	Icona	Commento fisso	Commento utente
Shift upward the selected line	1	LOOP		Vai a quota assoluta 15670	Posiziona su quota 1
Copy the selected line	2			Attendi per 500 millisecondi	Attendi 500 ms
Cut the selected line	3			Vai a quota assoluta 0	Toma a 0
Paste the selected line	4			Attendi per 500 millisecondi	Attendi 500 ms
Erase the selected line	5			Salta a LOOP se valida la condizione A	Toma ad inizio ciclo
Shift downward the selected line	*6				

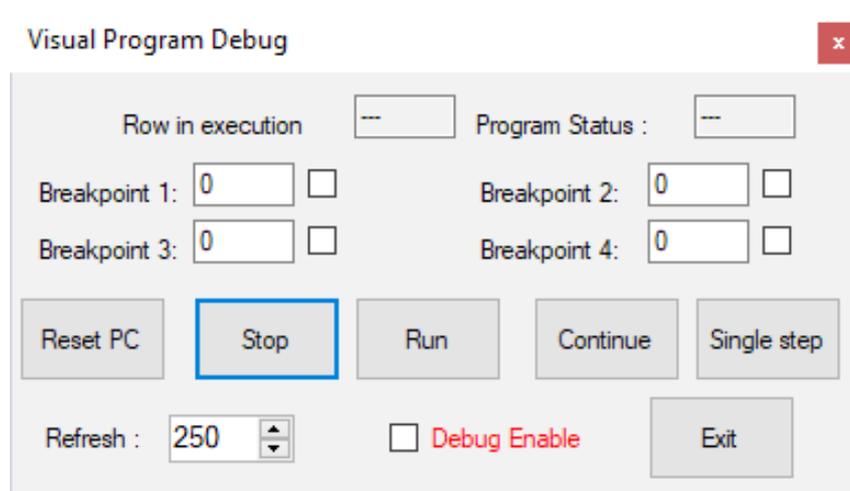
CHANGE THE BACKGROUND COLOR

It is possible to modify the background colour of a row (or a group of rows) to divide the movement sequences and to permit a quicker and most immediate read of the program.

Select the desired row (or rows) and click on the "Row colour" icon in the context menu.



It is possible to debug the program, by clicking on the  icon.



Breakpoint: indicated the row where the execution of the application must be stopped.

Reset PC: this function permits to reset the “Program counter”, so as to restart to execute the program from the first row.

Stop: stop the program.

Run: start the program after a stop command, starting from the first row.

Continue: after a stop command or a breakpoint, permits to continue the program from the row in which it was stopped.

Single step: Permits to let the program take forward at single step.

COMMANDS

COMMANDS LIST

Icon	Type of command	General description
	Positioning	Groups absolute positioning, relative positioning and continuous rotation (JOG) movements commands. It is possible to modify the movement parameters (velocity, acceleration, deceleration, ramps profile) and define if it is required to wait the end of the movement before processing the next program line.
	Homing	Several automatic homing sequences are available. It is possible to modify the movement parameters (velocity, acceleration, deceleration, maximum homing space, homing offset) and define if it is required to wait the end of the movement before processing the next program line.
	Stop	Groups stop and abort commands of the movement in progress. It is possible to modify the stop parameters (deceleration), define if it is required to wait the end of the movement before processing the next program line and link the stop to an event.
	Gearing	Enables the management of an electronic cam movement with the master encoder (Auxiliary encoder input).
	Setup	Groups the setup commands like: current enable, current level and motor step resolution.
	Interrupt management	Groups the enables of the interrupt management of asynchronous events. The interrupts are automatically managed in background compared to the main program.
	Data management	Groups data movement commands, bit set, reset and toggle, and variables index.
	Mathematical	Groups the arithmetic, logic, increment, decrement and value invert operations of a variable or a register. It is possible to group up to 4 operations in a single block.
	Input management	Groups test and wait commands of service inputs, general purpose digital inputs and latch registers of the inputs.
	Output management	Groups the management commands of outputs: activation, deactivation, toggle and test.
	Test	Permits to compare values or check bit status on registers and variables.
	Jump	Groups the commands of program flow management: conditional and unconditional jumps, subroutine calls, returns from subroutines and returns from interrupts.
	Jump	Groups the commands of program flow management: conditional and unconditional jumps, subroutine calls, returns from subroutines and returns from interrupts.
	Timer	Interrupts the execution of the program for the indicated time.
	Save	Saves the indicated variable into the static memory.
	Custom	Permits to create a custom command by using MIL direct commands.



The VectorStep drives permit to move the motor in absolute or relative quota, or work in velocity (JOG).

Positioning type:

Absolute (GO): execute a movement in order to reach an indicated quota, with respect to the zero point.

Relative (GOR): performs a movement of length equal to the indicated quota, with respect to the actual point.

JOG: execute a forward or backward movement (JOG + o JOG -) without a destination quota.

Type of data: specifies the type of data (direct, from variable, from register or form Modbus ID).

Data: specifies the direct value or the data source.

Wait end of movement: if selected, the drive won't execute the subsequent command until the positioning is done.



VectorStep drives implement several automatic homing modes:

The screenshot shows a 'Homing command' dialog box with the following structure:

- Command type:** Axis homing
- General parameters:**
 - Homing mode: Backward over BLS (dropdown)
 - Vel. to find limitswitch (rps x100): Direct (dropdown)
 - Vel. to find zero point (rps x100): Direct (dropdown)
 - Accel./Decel. (rps² x10): Direct (dropdown)
 - Wait end of homing
- Advanced:**
 - Inversion delay (ms): Direct (dropdown)
 - Homing max space (step): Direct (dropdown)
 - Homing offset (step): Direct (dropdown)
 - Set the quote forced after: Direct (dropdown)

Homing mode: select the homing mode (for hard-stop homings it is necessary to have an encoder and to set the torque control operation mode).

Type of data: specifies the type of data (direct, from variable, from register or from Modbus ID).

Limit switch search velocity: Limit switch search velocity (rps x 100)

Zero point search velocity: sensor falling edge search velocity (rps x 100)

Wait end of homing: if selected, the drive won't execute the subsequent command until the homing procedure is done.



Activate the advanced parameters only if necessary

Inversion delay: inversion delay for falling edge search (ms)

Homing maximum space: maximum number of steps assumed during the search in homing procedure (step)

Homing offset: Offset after homing is executed (step)

Set the quote forced after: forced actual position quota after homing is executed (step)



“Stop” movement commands.

Stop with emergency ramp: interrupts the movement command using the emergency deceleration ramp defined in the power on parameters or by the Rdeceme register.

Stop with ramp: interrupts the movement command using the deceleration ramp defined in the stop parameters.

Stop with ramp on event (BIT): interrupts the movement command using the deceleration ramp defined in the stop parameters on the occurrence of an event on the selected bit.

Example:

(Stops the motor if bit 1 of V1 is equal to 0)



The condition of the bit is always referred to 0

Stop with ramp on event (Value): interrupts the movement command using the deceleration ramp defined in the stop parameters on the occurrence of an event on the selected value.

Example:

(Stops the motor if V1 is higher than 10)

Wait end of movement: if selected, the drive won't execute the subsequent command until the motor is in standstill.



The VectorStep drives are able to generate complex movements in electronic cam with respect to the auxiliary encoder.

The GEAR command permits to enable the PVT management of the trajectory, moving the motor according to the the profile defined by the cam or from the programmed cams group.

Gearing command

Command type

Electronic CAM

General parameters

Master encoder ppr (pulse) Direct 2048

Master enc. max. Freq(pulse/s) Direct 30720

Start Task Direct 5

Increments Kp gain Direct

CAM enable

Advanced

Ok

Cancel

Help

Master encoder ppr: specifies the number of pulses per revolution of the master encoder.

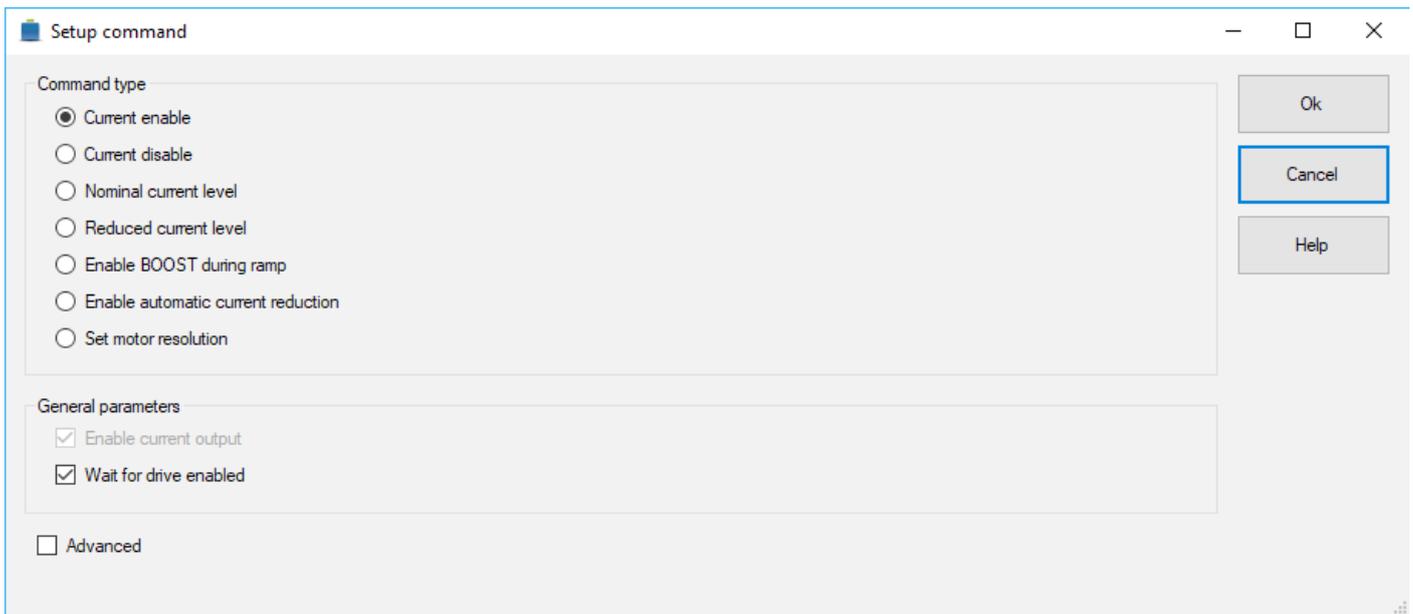
Master enc. max. freq.: maximum velocity of the encoder (used for trajectory calculations).

Start task: indicates the task number in which the movement profile is located

Increments Kp gain: trajectory generator proportional constant.



Setup commands



Current enable: enable the current output to the motor.

Current disable: disable the current output to the motor.

Nominal current level: set the nominal level current

Reduced current level: set the reduced level current

Enable BOOST during ramp: enable BOOST during ramp

Enable automatic current reduction: enable automatic current reduction

Set motor resolution: set the step resolution of the motor

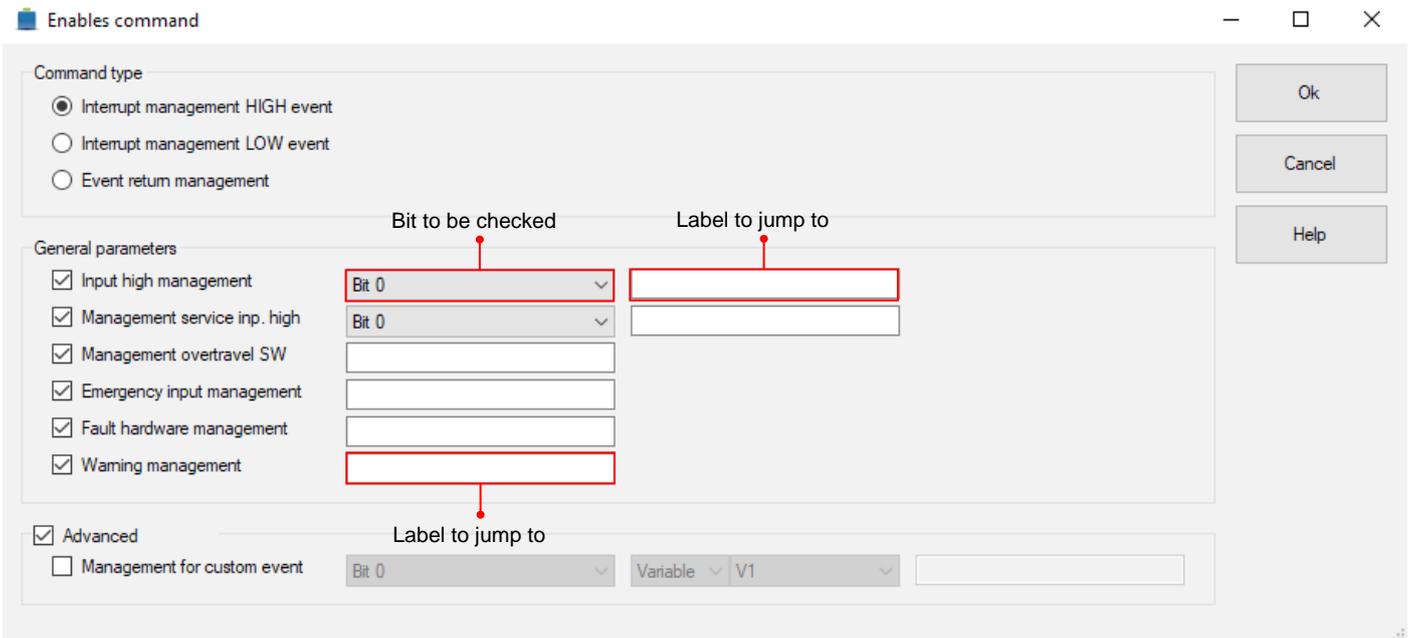
Wait for drive enabled: if selected, the drive won't execute the subsequent command until the drive is enabled (recommended choice)



It is possible to enable the management of some events in background, so that in any phase of the user program the drive can interrupt the operation in progress and handle that events. The interrupt management is particularly indicated to monitor the asynchronous circumstances, or the fault and emergency situations. The VectorStep drives are able to manage up to 10 enabled interrupt events; the enable of an higher number of interrupts causes the stop with error of the user program. An event can be managed on both the rising edge or the falling edge, or be enabled on both the cases.



Each interrupt event must end with a “Event return management”



Interrupt management HIGH event: enable interrupt on high event of a bit or an input.

Interrupt management LOW event: enable interrupt on low event of a bit or an input.

Event return management: located at the end of an interrupt routine, jump to the label (if present) or to the call point of the main program

Input high management: enable interrupt on a input event. The bit number corresponds to the input number



(enable interrupt on event of the input 0 and jump to “start”)

Management service inp. high: enable interrupt on a service input event.

Bit 0	FLS forward overtravel
Bit 1	BLS reverse overtravel
Bit 2	TOP motor encoder
Bit 3	CH.A motor encoder
Bit 4	CH.B motor encoder
Bit 5	TOP external encoder
Bit 6	CH.A external encoder
Bit 7	CH.B external encoder

Management overtravel SW: enable interrupt on a overtravel software event. The limit switched can be enabled from “Power-on parameters”.

Emergency input management: no longer supported.

Fault hardware management: enable interrupt on a “fault hardware” event.

Warning management: enable interrupt on a warning event.

Management for custom event: enable interrupt on a custom event.



To disable an Interrupt function, copy the enable function and set “NULL” as jump label.

DATA MANAGEMENT COMMANDS



Permit to assign, move or copy data between variables and registers, or work in bit mode on a data.

The screenshot shows a dialog box titled "Data management command". It has a "Command type" section with radio buttons for "Move or assign data" (selected), "Set bit", "Reset bit", "Toggle bit", and "Index variable or register". Below this is a "General parameters" section with a checked box for "Copy or assign value to". There are two dropdown menus: "Type of data" set to "Direct" and "Variable" set to "V1". There are also "Advanced" and "Ok", "Cancel", "Help" buttons.

Move or assign data: assign a direct value to a variable/register, and move or copy data between variables/registers.

This is a close-up of the "Copy or assign value to" section. It shows the checked checkbox, the "Direct" dropdown, the text box containing "10", and the "Variable" dropdown set to "V1".

(Assign value 10 to the variable V1)

Set bit: set to 1 the bit of a variable or a register.

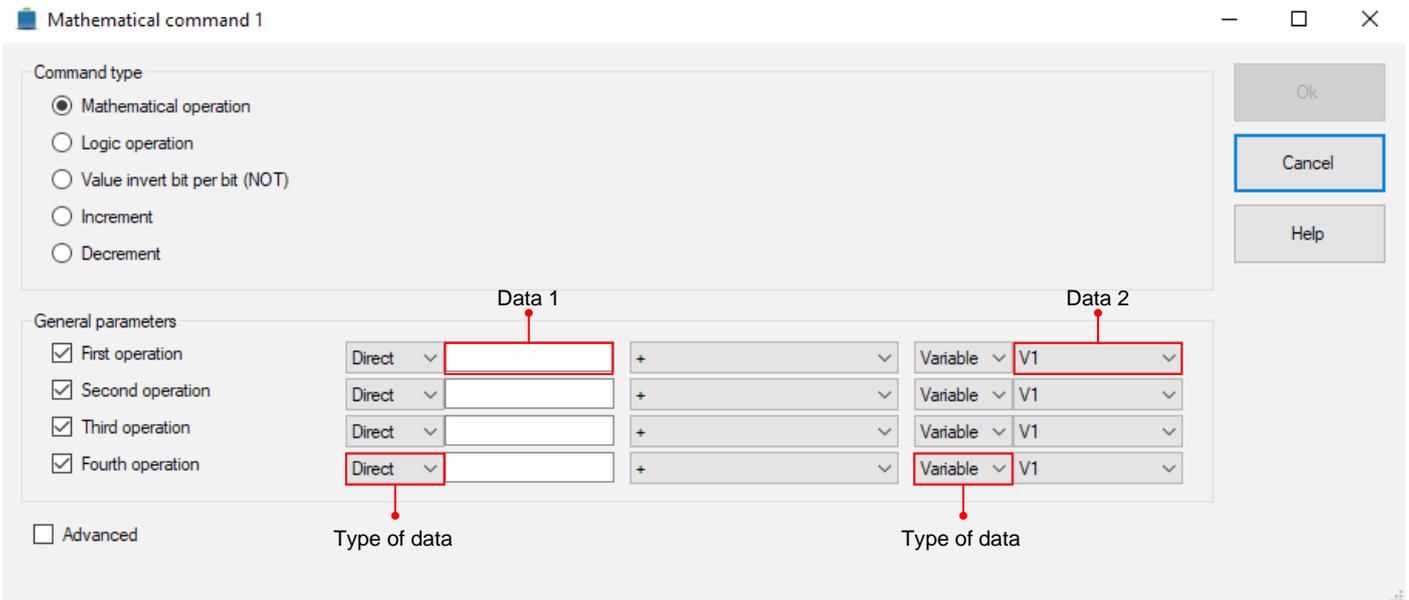
Reset bit: set to 0 the bit of a variable or a register.

Toggle bit: invert the status of the bit of a variable or a register.

Index variable or register: load the pointer to a variable.



Permit to execute arithmetic and logic operations between direct values, variables and registers.



Mathematical operation: Execute the mathematical operation between Data1 and Data2; the result is stored in Data2



Example with V1= 10 and V2=5

First operation: $V1 = V1 * 10 = 100$

Second operation: $V1 = V1 / V2 = 20$

Logic operation: perform logic operations between Data1 and Data2; the result is stored into Data2.

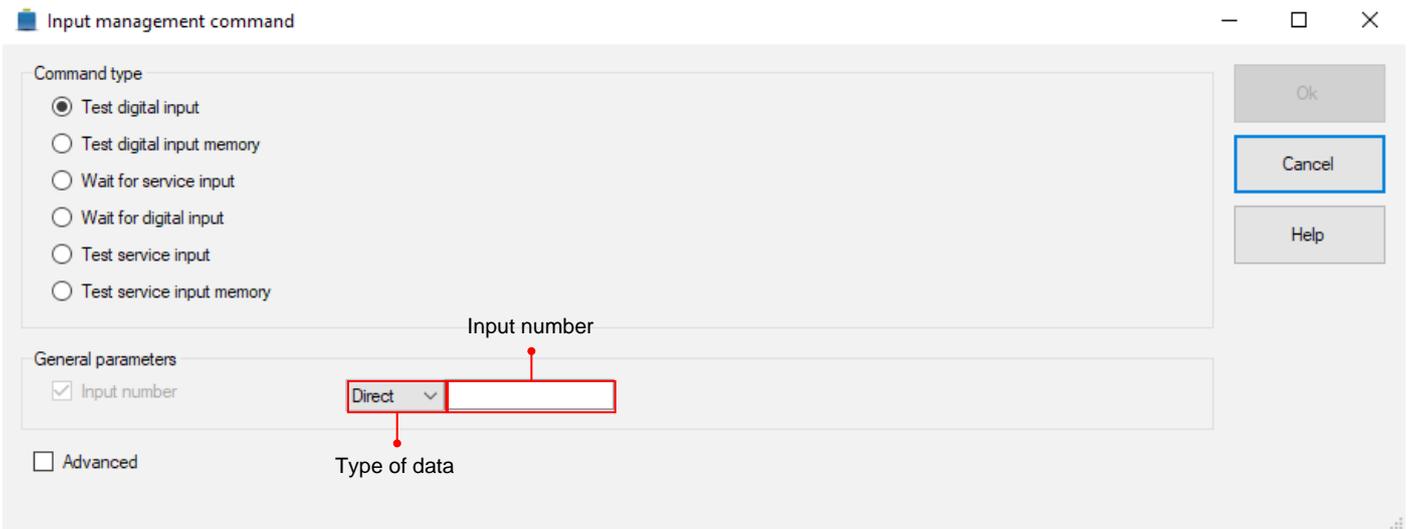
Value invert bit per bit: invert the logic level bit per bit of a variable or register (perform the ones' complement of data's bits)

Increment: add 1 to the selected variable or register

Decrement: subtract 1 to the selected variable or register



Permit to test or stop the program waiting for a specific state of the inputs.

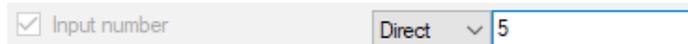


TEST instructions must always be followed by a jump instruction or a sub-routine call (Example: test input 1, if not equal jump to label “start”)



Wait commands keep the program blocked until the configured condition becomes valid.

Test digital input: test the state of a digital input



(Test digital input 5)

Test digital input memory: test the state of the memory register of a digital input.

Wait for service input: wait for the logic state high (or low) of a service input.

0	FLS forward overtravel
1	BLS reverse overtravel
2	TOP motor encoder
3	CH.A motor encoder
4	CH.B motor encoder
5	TOP external encoder
6	CH.A external encoder
Bit 7	CH.B external encoder

Wait for digital input: wait for the logic state high (or low) of a digital input.

Test service input: test the state of a service input

Test service input memory: test the state of the memory register of a service input.

OUTPUTS MANAGEMENT COMMANDS



Permit to modify or test the status of a digital output.

Output management command

Command type

- Activate digital output
- Deactivate digital output
- Toggle digital output
- Test digital output

General parameters

Output nr.

Direct []

Output number

Type of data

Advanced

Ok

Cancel

Help

Activate digital output: activate the specified digital output.

Deactivate digital output: deactivate the specified digital output.

Toggle digital output: toggle the status of the specified digital output.

Test digital output: tests the status of the specified digital output.

 TEST instructions must always be followed by a jump instruction or a sub-routine call (Example: test output 1, if not equal jump to label "start")

TEST COMMANDS



Permit to compare two values or check the bit status on registers and variables of the drive.

Test command

Command type

- Compare two numbers
- Check bit status

General parameters

Compare values

Direct []

Variable V1

Data 1

Data 2

Type of data

Type of data

Advanced

Ok

Cancel

Help

Compare two numbers: compare the value of Data 2 with respect to Data 1

Check bit status: test the status of the bit indicated in Data 1 of the variable or register indicated in Data 2



TEST or COMPARE instructions must always be followed by a jump instruction or a sub-routine call



Permit to modify the execution flow of the program, on the basis of a previous test.

Jump commands

Command type

- Conditional jump
- Wait for event (value)
- Wait for event (bit)
- Return from interrupt
- Stack Pointer Reset

General parameters

If condition TRUE jump to

Jump ALWAYS

Condition

Label

Advanced

Ok

Cancel

Help

Conditional jump: jump to the indicated label if jump condition has occurred.

Wait for event (value): block the program until the indicated event occurs (values comparison)

Wait for event

Direct

10

Equal

Variable

V1

Example : (Wait V1 =10)

Wait for event (bit): block the program until the indicated event occurs (test of a bit)

Return from interrupt: located at the end of an interrupt routine, jump to the label (if present) or call point of the main program.

Stack Pointer Reset: delete the information stored in the stack pointer (to be used carefully)



Exit from a sub-routine (or an interrupt routine) without using the proper instructions (return from interrupt or event return) may result in a failure in restoring of the conditions saved in the stack pointer, with the consequent filling of the stack pointer itself.

The full filling of the stack pointer may result in a stop of the user program or in incorrect jumps.

SUBROUTINES COMMANDS



Permit to manage subroutine calls.

Subroutines call commands

Command type

- Subroutine call
- Return from subroutine
- Stack Pointer Reset

General parameters

If condition TRUE jump to

Jump ALWAYS

Condition

Label

Advanced

Ok

Cancel

Help

Subroutine call: jump to the indicated sub-routine if jump condition has occurred.

Return from subroutine: this command must be located at the end of a sub-routine, in order to close it and jump to the call point of the main program.

Stack Pointer Reset: delete the information stored in the stack pointer



Exit from a sub-routine (or an interrupt routine) without using the proper instructions (return from interrupt or event return) may result in a failure in restoring of the conditions saved in the stack pointer, with the consequent filling of the stack pointer itself.

The full filling of the stack pointer may result in a stop of the user program or in incorrect jumps.

TIMER COMMAND



Permit to suspend the execution of the program for the indicated time.

The delay, expressed in milliseconds, can be inserted as a direct value, or through variable or register.

Timer command

Command type

- Insert delay

General parameters

Wait for (ms)

Direct

Timer (ms)

Type of data

Advanced

Ok

Cancel

Help

SAVE COMMAND



Permit to save into the static memory the indicated variable.

The number of the variable can be inserted as a direct value, or through variable or register.

Save command

Command type

- Save in non volatile ram

General parameters

Save variable nr.

Direct

Variable number

Type of data

Ok

Cancel

Help

CAUTION! The EEPROM static memory supports a maximum number of 1 million of savings. Pay attention in case of repeated savings.

TASK MANAGER

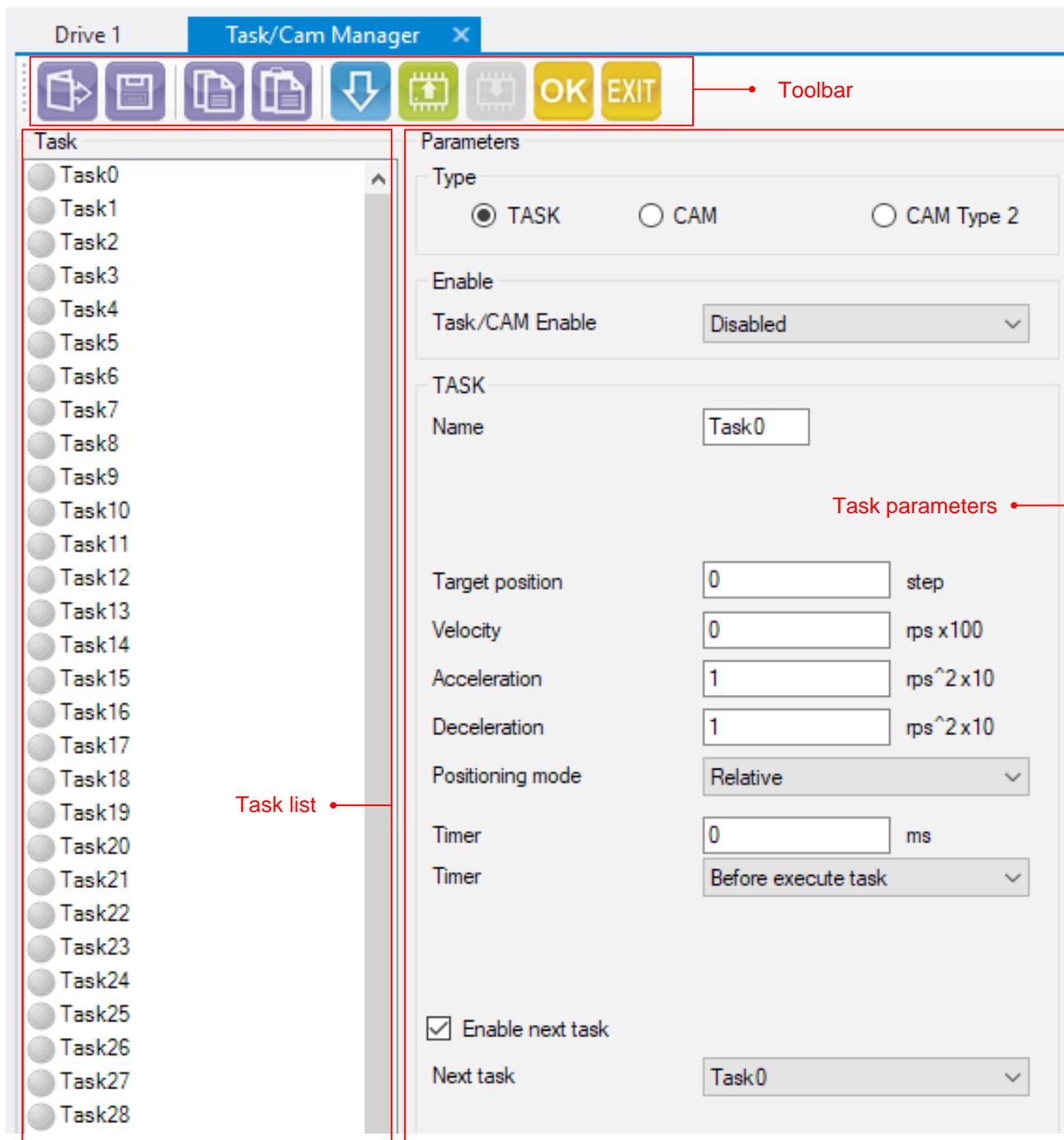
GENERAL CHARACTERISTICS

- In addition to the programming with the MIL language (text-based or visual), the VectorStep drives make available 64 configurable task movements.
- Each task, recallable from fieldbus (Modbus RTU, Modbus TCP/IP, CANopen or Profibus DP), user program or I/O, is associated to a series of data which define a specific target movement:
- Target position
- Velocity
- Acceleration
- Deceleration
- Positioning mode (relative or absolute quota)
- Timer (delay before and after the execution of a task)
- Concatenation

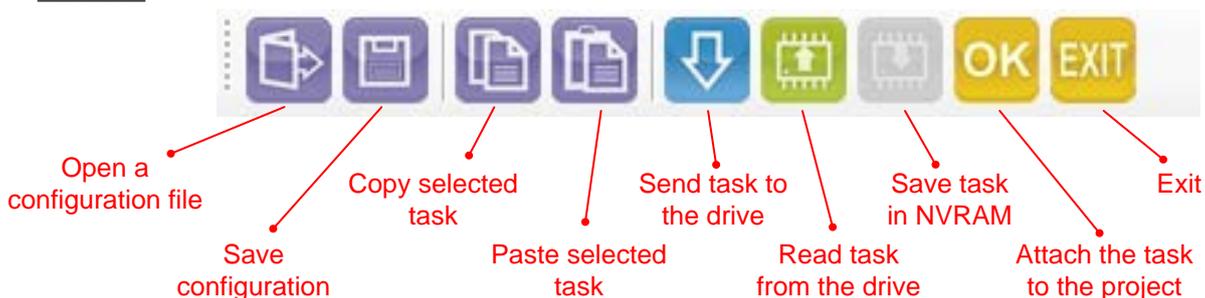
Parameter	General description
Task name	Indicates the unique name of the selected task.
Target position	Defines the target position, expressed in counts (motor steps in open loop; encoder pulses in closed loop)
Velocity	Defines the rotation velocity of the motor, expressed hundredths of a revolution per second (100 rps x100 = 1 revolution per second)
Acceleration	Defines the acceleration of the motor, expressed in tenth of a revolution per second squared. Indicates the increase of velocity per second (100 rps ² x10 → the velocity of the motor increases of 10 revolutions in a second.) The acceleration time is obtained: $t_{acc} = (V_f - V_i)/a$ where V_f = Final vel. , V_i = Initial vel. , a = acceleration
Deceleration	Defines the deceleration of the motor, expressed in tenth of a revolution per second squared. Indicates the decrease of velocity per second (100 rps ² x10 → the velocity of the motor decreases of 10 revolutions in a second.) The deceleration time is obtained: $t_{acc} = (V_f - V_i)/a$ where V_f = Final vel. , V_i = Initial vel. , a = deceleration
Positioning mode	Defines if the target quota indicates a relative or an absolute shift with reference to the zero point.
Timer	Permits to insert a wait time before or after the execution of a task. Expressed in milliseconds.
Concatenation (Enable next task)	Permits to indicate the number of the task to be automatically executed after the end of the selected task.

The task programming window is divided into three sections:

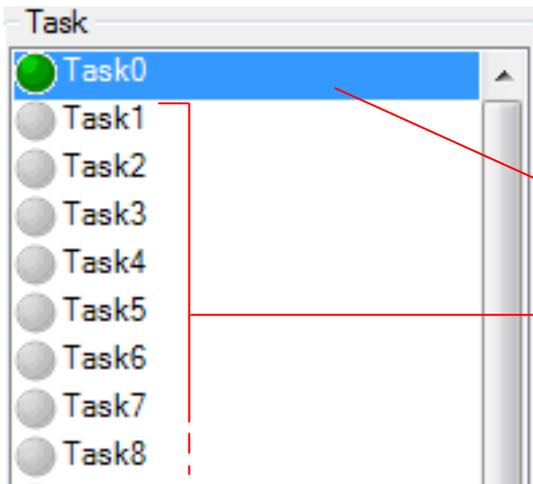
1. Toolbar
2. Task list
3. Task parameters



Toolbar



Task list



Contains the list of all the tasks.

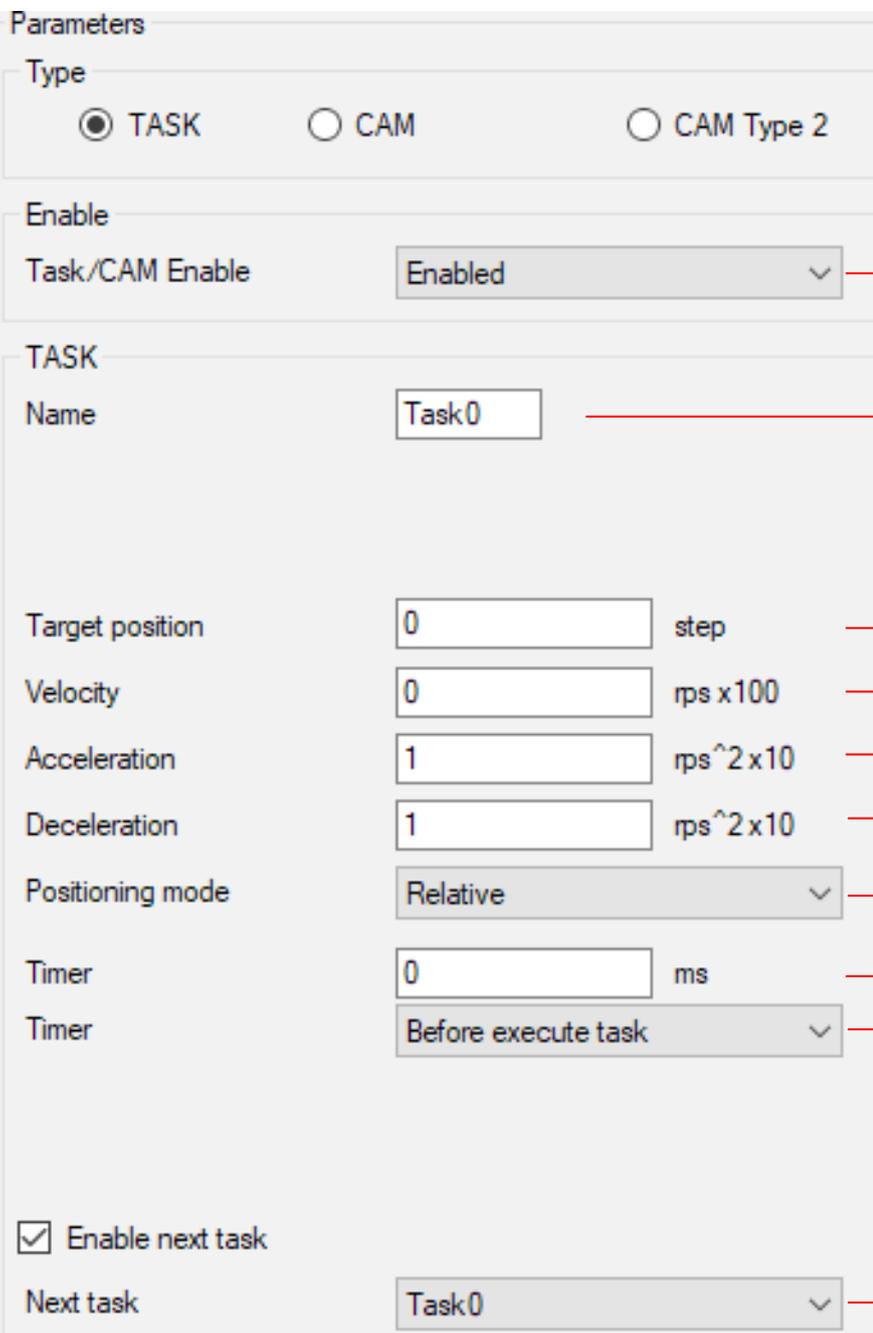
The led indicated which tasks are enabled.

By clicking on one of the task, the task parameterization window will appear.

Enabled task

Disabled tasks

Task parameters



Task enabling

Task name

Target position

Velocity

Acceleration ramp

Deceleration ramp

Positioning mode

Wait time

Wait timer settings

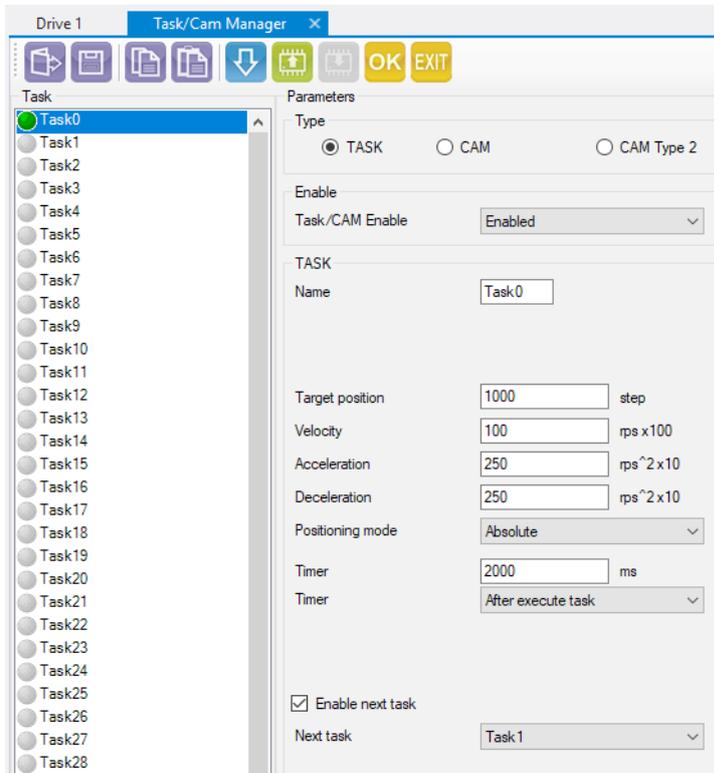
Task concatenation

Target:

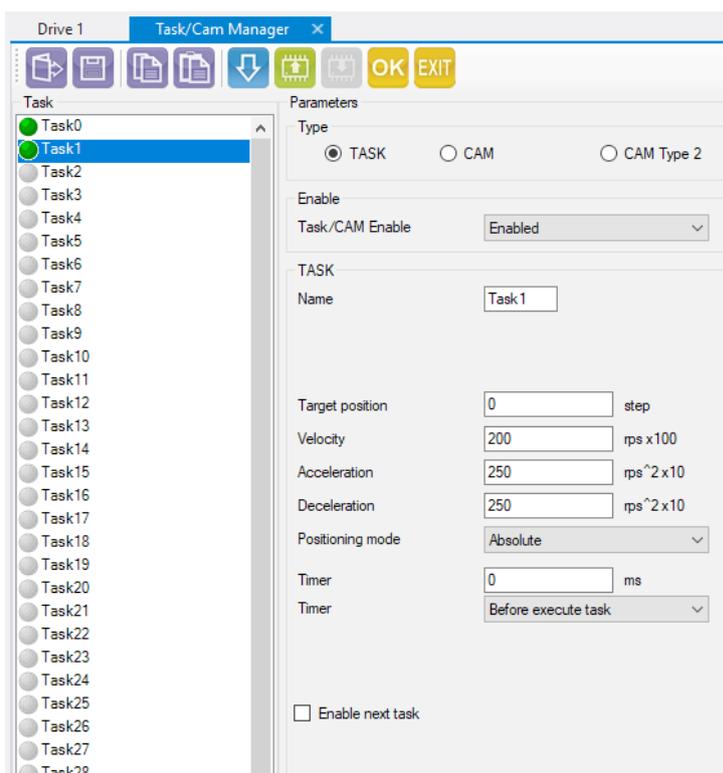
Move to absolute quota 1000, with velocity 100 rps x100, acceleration and deceleration 250 rps² x10; wait 2 seconds then return to zero position with velocity 200 rps and same accelerations as the previous movement.

Task parameterization:

The first task moves the motor to the target quota, waits 2 seconds after the end of the movement and then automatically starts the return task to zero quota (Task1).



The second task brings back the motor to the zero quota and completes the positioning cycle. In case of concatenated tasks, the flag “task in progress” will be reset after the end of the last task of the block.



A positioning task can be started in three ways:

- through digital inputs
- through user program
- through fieldbus

Execution through digital inputs

To execute a task through digital inputs, it is necessary to associate to a digital input the selection functions through the configuration parameters of the I/O.

It is possible to configure up to 6 inputs for the selection, which permit, in binary code, to identify the 64 task.

The inputs can also be configured as “Start” of the selected task; in this case, the task is launched on the rising edge of the “start task” signal and interrupted on the falling edge of the signal itself (the “start task” input must remain high during the whole execution of the task).

The end of the execution is indicated by the flag “Task in progress”, associable to a digital output.

Execution through user program

To execute a task through the user program, write the number of the desired task in the register Rtasknum and raise the bit 13 (TASK) of the register Rcmdwr.

The end of the execution of a task is indicated by the bit 4 “Task in progress” of the register Rststflg1.

The interruption and the cancellation of a task occurs on the rising edge of the bit 2 of the register Rcmdwr (ABORT) or on the bit 3 of the same register (STOP).

Execution through Modbus RTU and Modbus TCP/IP

To execute a task through Modbus RTU, write the number of the desired task in the register Rtasknum (40106) and raise the bit 13 (TASK) of the register Rcmdwr (40059).

The end of the execution of a task is indicated by the bit 4 “Task in progress” of the register Rststflg1 (40200).

The interruption and the cancellation of a task occurs on the rising edge of the bit 2 of the register Rcmdwr (40059) (ABORT) or on the bit 3 of the same register (STOP).

Execution through CANopen

To execute a task through CANopen, write the number of the desired task in the Object Tasknum (ObjID 0x206A) and raise the bit 13 (TASK) of the Object Cmdwr (ObjID 0x203B).

The end of the execution of a task is indicated by the bit 4 “Task in progress” of the Object Ststflg1 (ObjID 0x20C8).

The interruption and the cancellation of a task occurs on the rising edge of the bit 2 of the Object Cmdwr (ObjID 0x203B) (ABORT) or on the bit 3 of the same register (STOP).

Execution through Profibus DP

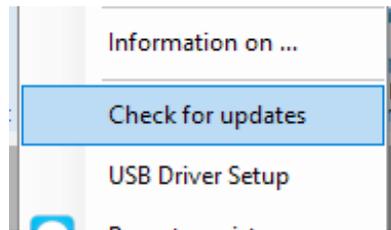
To execute a task through Profibus DP, write the number of the desired task in the word SATZANW and raise the bit 6 (Activate Traversing Task) in the word STW1.

The end of the execution of a task is indicated by the bit 10 “Target Position Reached” of the word ZSW1, while the word AKTSATZ indicates the active task.

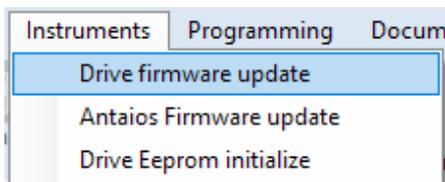
The interruption and the cancellation of a task occurs on the falling edge of the bit 4 of the word STW1.

FIRMWARE UPDATE

- Update StepControl to the latest version, by clicking on “Help“ - “Check for updates” from the menu bar.



- Power the drive and connect the USB cable.
- Click on “Instruments->Drive firmware update” from the menu bar.



- Select the model of the drive.
- Select the “Serial port”.
- Load the firmware update file, by clicking on the button 
- Click on “Start Programming”.
- If the update has been completed correctly, the loading bar will stop and a dialog box with the message “Switch off the drive” will appear.
- Shut down and re-power the drive.

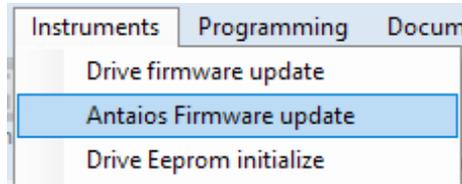
- Enable the communication by clicking on the icon  which will turn red.

- Disable the drive by clicking on the icon .
- Select the function “Instruments-> Drive Eeprom initialize” to reset the data that may be remained into the drive.
- Now it is possible to upload a project into the drive.

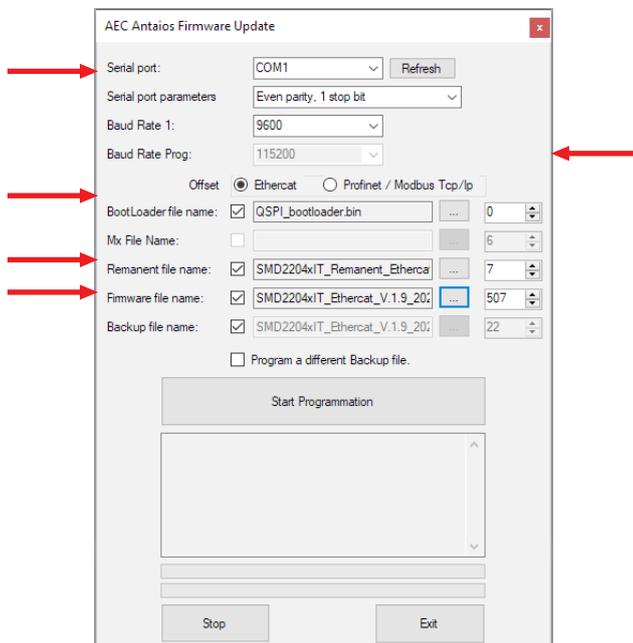
- Disable the communication by clicking on the icon  which will turn green.
- Shut down and re-power the drive. The drive has been updated.

EtherCAT DRIVES

- Power the drive and connect the USB cable.
- Click on “Instruments->Antaios firmware update” from the menu bar.



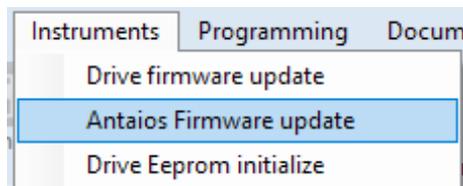
- The following dialog box will appear.



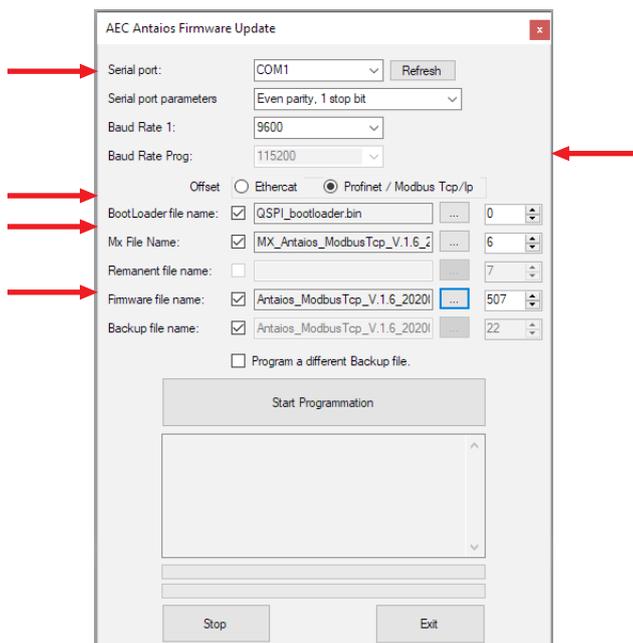
- Select the “Serial port”.
- Select the protocol.
- Load the “Bootloader” file from the update folder, by clicking on the button 
- Load the “Remanent” file from the update folder, by clicking on the button 
- Load the firmware update file from the update folder, by clicking on the button 
- Click on “Start Programming”.
- If the update has been completed correctly, the loading bar will stop and a dialog box with the message “Programming sequence completed” will appear.
- Shut down and re-power the drive. The drive has been updated.

Modbus TCP/IP / Profinet DRIVES

- Power the drive and connect the USB cable.
- Click on “Instruments->Antaios firmware update” from the menu bar.



- The following dialog box will appear.

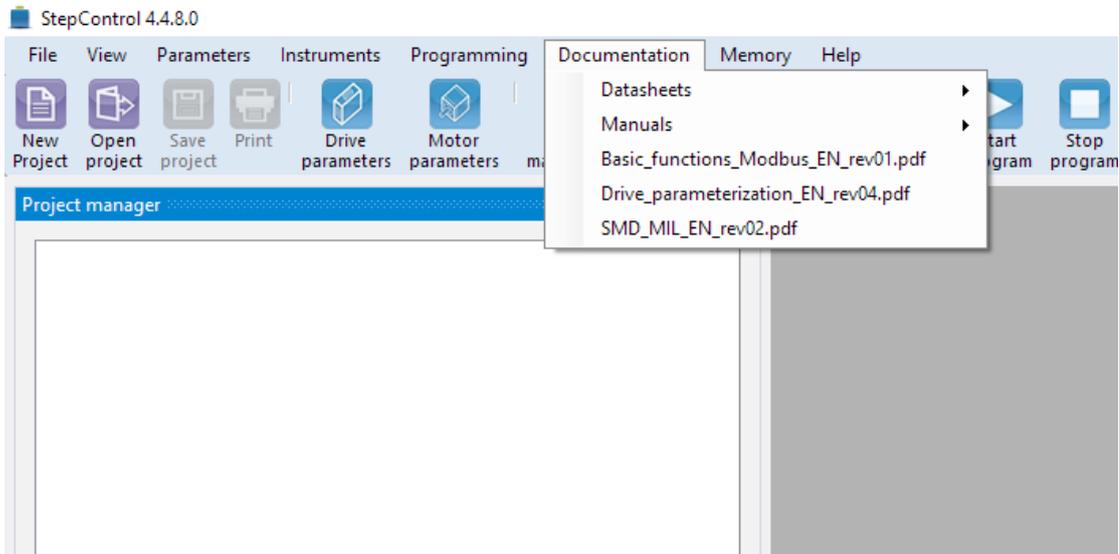


- Select the “Serial port”.
- Select the protocol.
- Load the “Bootloader” file from the update folder, by clicking on the button 
- Load the “Mx” file from the update folder, by clicking on the button 
- Load the firmware update file from the update folder, by clicking on the button 
- Click on “Start Programming”.
- If the update has been completed correctly, the loading bar will stop and a dialog box with the message “Programming sequence completed” will appear.
- Shut down and re-power the drive. The drive has been updated.

MANUALS AND REMOTE SUPPORT

MANUALS

The main datasheets and manuals of AEC products are available by selecting “Documentation” from the menu bar.



REMOTE SUPPORT

It is possible to launch the remote support tool directly from Step Control, by selecting “?” - “Remote assistance” from the menu bar.

