Digital DRIVE for Brushless motors
SMD Series

Quick Start guide

Read manual before installing and follow all instructions with this icon:

SMD-Quick Start Guide-2229-EN

Quick Start Guide

Table of contents

Revision	Edited by	Date	Modification
R2229	SC (SERAD)	12/11/2020	Add motor inversion
R2046	AG (SERAD)	12/11/2020	Update screenshot with DriveStudio v1.3.5
R1910	SC (SERAD)	04/02/2019	First edition

Before begin

Safety Precautions

Before install the SMD motion drive, review the safety instructions included in the SMD General Instruction Manual. Failure to follow these safety instructions may result in personnel injury or damage to equipment.
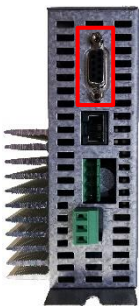The SDM GI Manual is available on the SERAD website: http://www.serad.fr

Hardware Installation

For reference, detailed wiring diagram is included at the end of this Quick Start guide.

Step1: Secure the drive and connect the Protective Earth

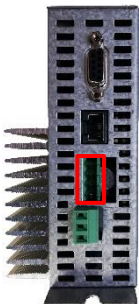- Connect the protective earth (PE) to the conductive metal plate of the SMD motion Drive.

Step 2: Connect Motor feedback

X8: Motor Feedback (Encoder, Resolver)

Connector type (device side) : Sub-D 9 female

Step 3: Connect Motor power supply

X10: Motor power supply

N°	Name	Description
1	PE	Motor earth
2	U	Motor phase U
3	V	Motor phase V
4	W	Motor phase W

Step 4: Connect Auxiliary 24 Vdc supply
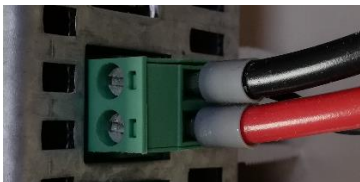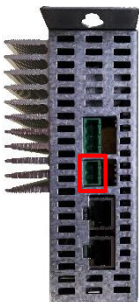
X6: Auxiliary 24Vdc supply

N°	Name	Description
1	XGND	0V
2	+24V	Control card supply, backup motor position

Step 5: Connect Safety STO inputs
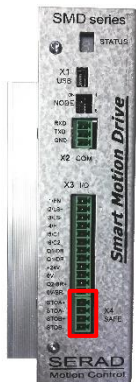
X4: Safety STO inputs

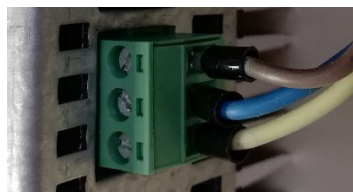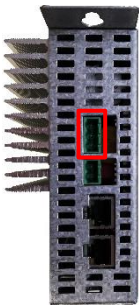| N°	Name	Description
1	STOA+	Safe Torque Off input A. Must be hold to 24V (60 mA typical)
2	STOA-	Safe Torque Off input A. Must be hold to 0V
3	STOB+	Safe Torque Off input B. Must be hold to 24V (60 mA typical)
4	STOB-	Safe Torque Off input B. Must be hold to 0V

Step 6: Connect USB Communication
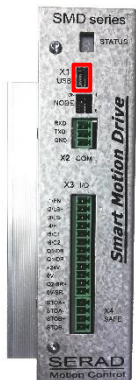
X1: USB port for communication with Drive Studio software

Connector type (device side) : Mini USB female

Step 7: Connect Power supply 230Vac

X7: Power 230Vac supply

N°	Name	Description
1	L1	Line L1
2	N	Neutral
3	PE	Supply earth

⚠️ *Neutral system: TN or TT only. Neutral system IT is prohibited*
Care must be taken when making connections to connector X7.
An incorrect connection can seriously damage the drive. Dangerous voltages are present on X7.

Step 8: Confirm Connections

- After completing Steps 1 through 7, you can turn on logic power to the drive through the X6 connector (bus voltage on X7 is not needed for communications).

- After power is supplied, the drive displays a sequence of LED flashes
    1. Initialization sequence
    2. Software version
    3. Node ID (when the motion drive is with a fieldbus)

Software Setup

Step 9: Install and Start Drive Studio

- Drive Studio is available on the SERAD Web site: www.serad.fr
- To install Drive Studio, run Setup.exe and following the wizard.
- Once installation is complete, click the DriveStudio shortcut to start the program.
- When the DriveStudio is started the window below appear. Click [New project]

- Drive studio is now started and ready to work
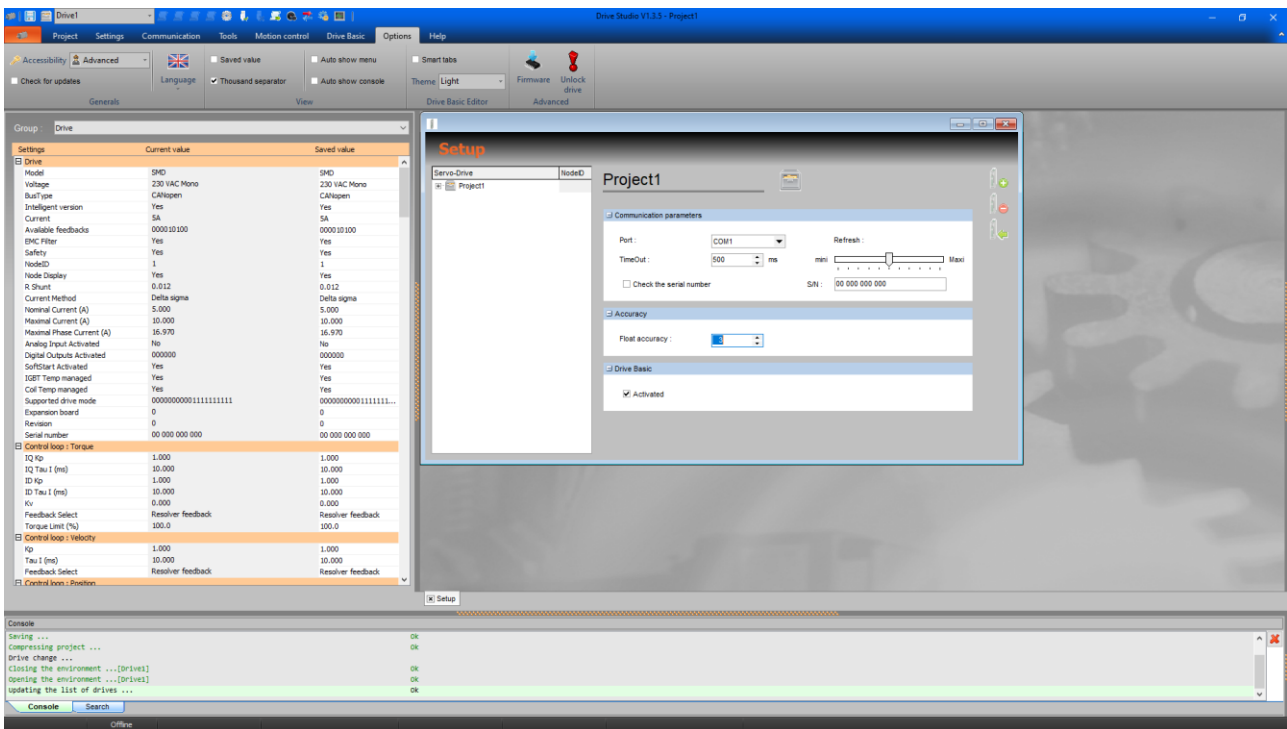
Step 10: Establish the communication

- Connect the USB cable from the SMD device to the PC.
  (The first time the SMD is connected to the PC the USB driver must be installed. For more information refer to the **SMD -USB Driver Installation Guide,** available on the SERAD Web site: www.serad.fr)
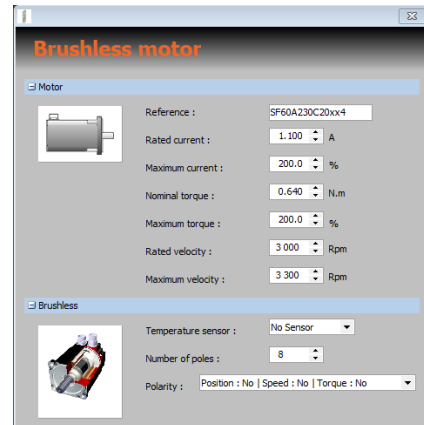- Go to tab <Communication> and click at left to [Online] button

- The status of the enable, and Faults is displayed in the right toolbar of the DriveStudio software.
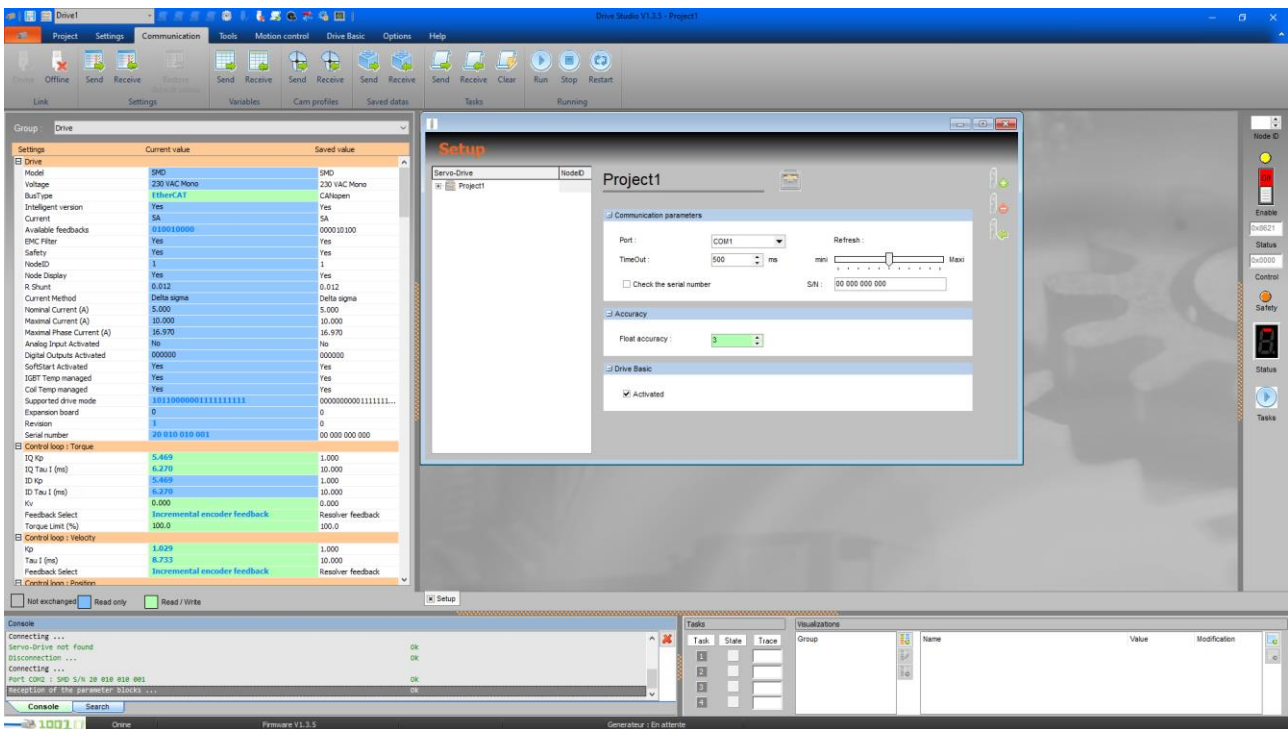
Step 11a: Define the motor parameters

- Go to tab settings and click to [Brushless] button into "Motor" section
- Fill the form with the information indicated on the motor nameplate, or the manufacturer's datas.
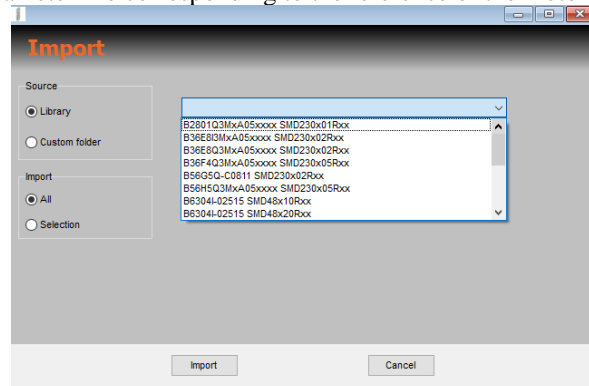

If the motor is referenced in the motors library, then the parameter file matched can be loaded, without any other settings input.

Step 11b: Import the motor parameters

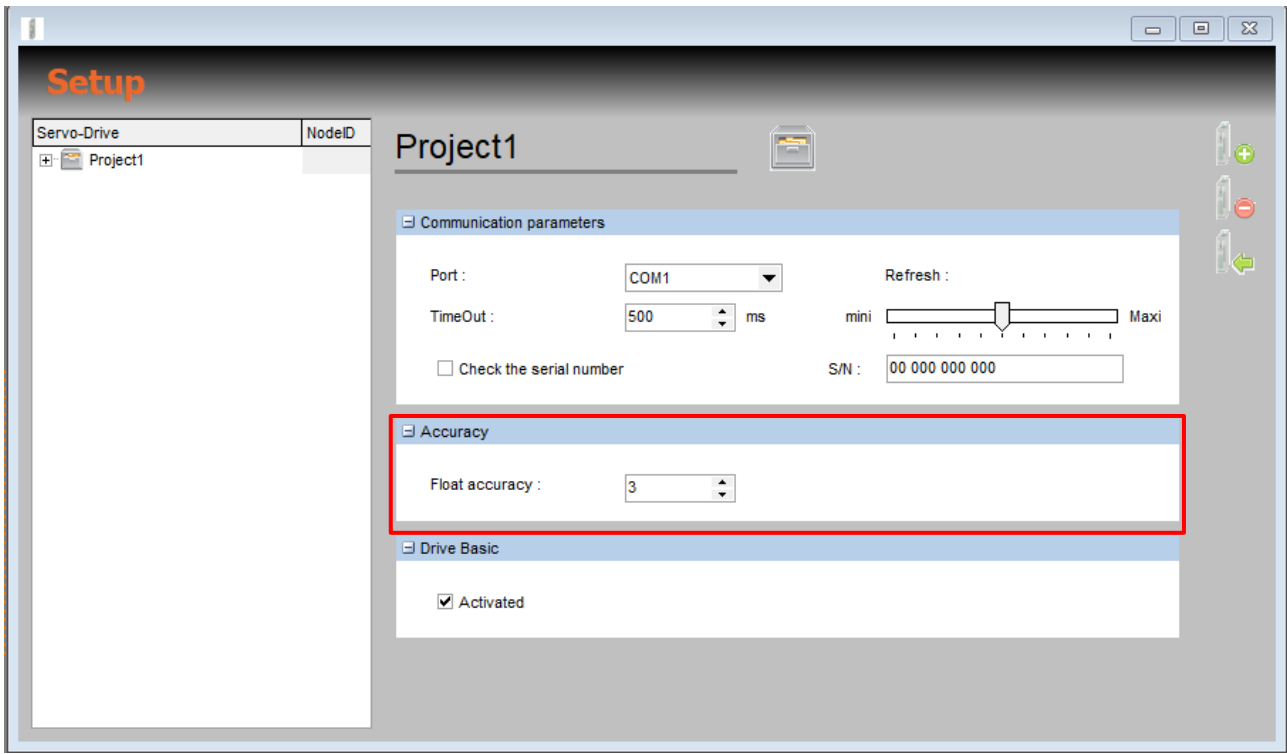- Go to tab <Settings> and click to [Import from library Settings] button.

- Select in the library the parameter file corresponding to the reference of the motor used

Step 12: Define the motion control settings

Float Accuracy

- Go to tab <Project> and click to [Setup] button and [Accuracy] topic.
- Configure float accuracy for displaying position and velocity of movements.

Units

- Go to tab <Motion control> and click to [Setup] button and [Units] topic.
- Configure the encoder increments and number of motor revolutions for the position feedback.

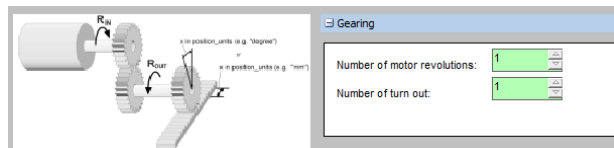| Position	
Resolution (increment):	100000
Number of tour:	1

Optional, used only for special case

- Configure the encoder increments and number of motor revolutions for the velocity feedback.

Velocity	
Resolution (increment / s):	100000
Number of turns / s:	1

Optional, used only for special case

- Definition of the gear ratio of the mechanics connected to the motor

Gearing	
Number of motor revolutions:	1
Number of turn out:	1

- Definition of units and scaling

Scale factor			
Position		**Velocity**	
Movement:	1.0000 Rev	Numerator:	1
Number of tour:	1	Divisor:	1
Unit:	Rev	Unit:	Rev / s
Acceleration		**Jerk**	
Numerator:	1	Numerator:	1
Divisor:	1	Divisor:	1
Unit:	Rev / s²	Unit:	Rev / s3

- Definition of limits
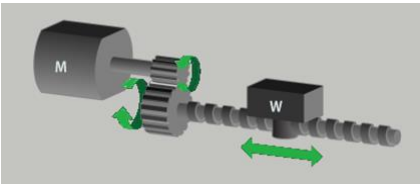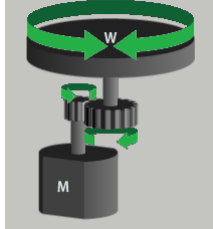
Limits			
Positionrange		**Software limits**	
Mini position:	-200000.0 Rev	Negative limit:	-200000.0 Rev
Max position:	200000.00 Rev	Positive limit:	0 Rev

Velocity profile

- Go to tab <Motion control> and click to [Setup] button and [Velocity Profile] topic.
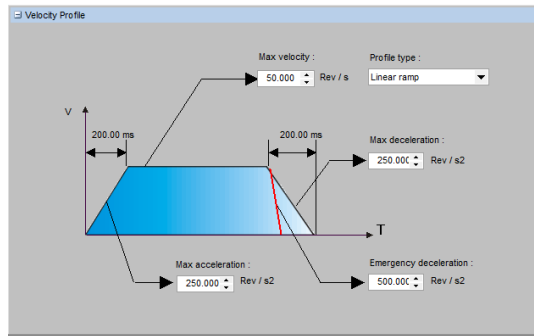
Examples

|	Motor with ball screw 5mm pitch, accuracy 1/100 mm	Motor with gear i=10/1 turret 360deg modulo, accuracy 1/10 deg
Setup - Accuracy		
Float accuracy	2	1
Gearing		
Number of motor revolutions	1	10
Number of turn out	1	1
Scale factor - Position		
Unit	mm	Degree
Number of revolution	1	1
Movement	5.00	360.0
Scale factor - Velocity		
Unit	mm/s	Degree/s
Divisor	1	1
Numerator	1	1
Scale factor - Acceleration		
Unit	mm/s2	Degree/s2
Divisor	1	1
Numerator	1	1
Scale factor - Jerk		
Unit	mm/s3	Degree/s3
Divisor	1	1
Numerator	1	1
Limits - Position Range		
Min. position	0.00 mm	0.0 Degree
Max. position	1000.00 mm	360.0 Degree
Limits – Software limits		
Min. position	0.00 mm	0.0 Degree
Max. position	1000.00 mm	0.0 Degree
Velocity Profile		
Max. Velocity	250.00 mm/s	1800.0 Degree/s
Max. Acceleration	1000.00 mm/s2	6000.0 Degree/s2
Max. Deceleration	1000.00 mm/s2	6000.0 Degree/s2
Final Velocity	0.00 mm/s	0.0 Degree/s
Emergency deceleration	1500.00 mm/s2	8000.0 Degree/s2

Step 13: Define the regulation settings

- On <Settings> tab click to [Regulation] button
- Select the type of position feedback from those proposed (Serial Tamagawa; Resolver; Biss; EnDAT; incremental).
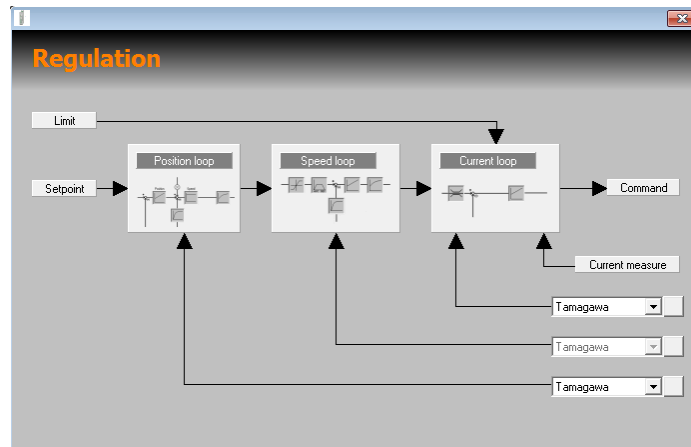
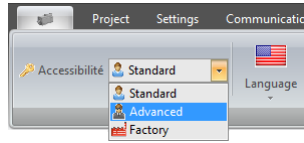- Go to the <Tools> tab and click to [Motor] in the Instrument Panel topic.

- Turn by hand the motor shaft and check that the position value change (range between 0 to 359.9).
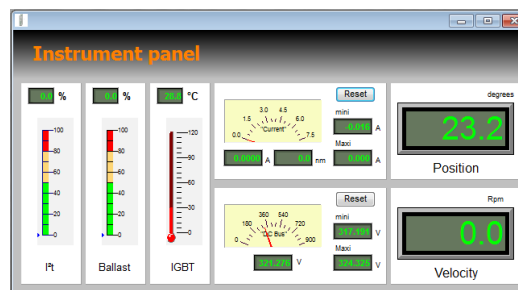
Step 14: Execute the autotuning of regulation control loops

- Go to the <Options> tab and select accessibility advanced.

- Before motor powering, check on status panel at right :

  The status of the safety led is off (grey state).
  If the status of the safety led is flashing red, the safety STO inputs circuit is opened. Check the safety circuit.
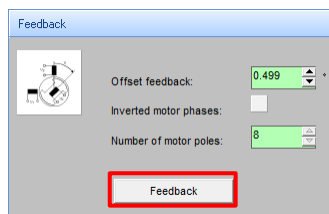
  The status led of the enable is in state ready to switch on (yellow state).

- Go to the <Tools> tab and click to [Autotuning] in the Setup tools topic.
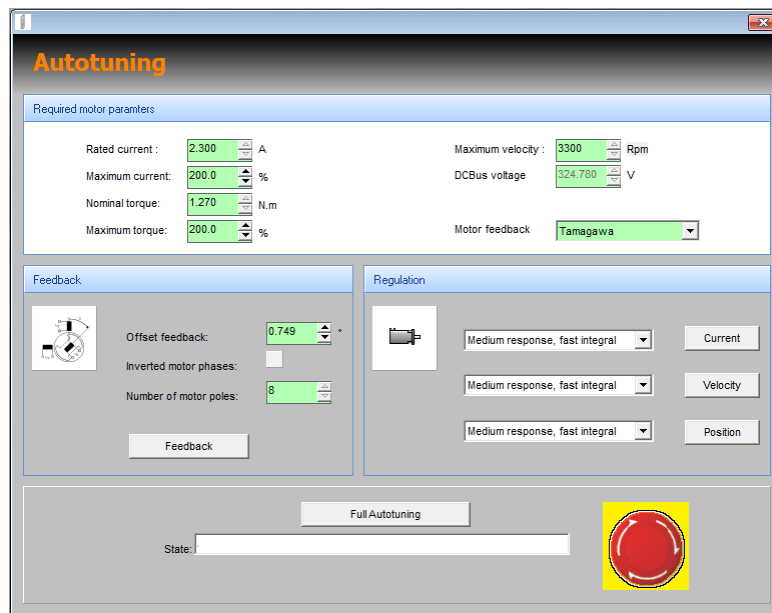
Feedback

- Check the motor parameters and click to [Feedback]

- Once the autotuning of the feedback is complete, continue with the autotuning of the current loop.

Current loop

- Autotuning of the current loop, click to [Current].
  During this phase the motor will make very small movements to calculate the limit of vibrations then higher amplitude movements (as a function of inertia)
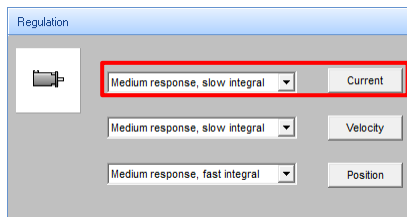
Select the autotuning mode adapted to the type of feedback

Tamagawa : Medium response, slow integral
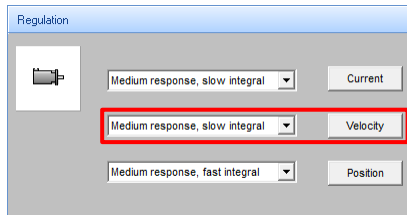**Resolver** : Fast response, fast integral

The current loop autotuning of the motor must be done without the mechanics.

- Once the autotuning of the current loop is complete, continue with the autotuning of the velocity loop.

Velocity loop

- Autotuning of the velocity loop, click to [Velocity].
  During this phase the motor will perform a few vibration.

Select the autotuning mode adapted to the type of feedback

Tamagawa : Medium response, slow integral
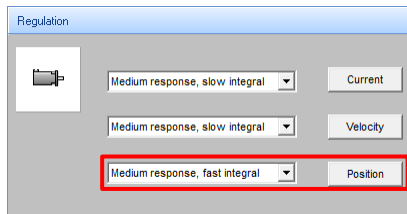**Resolver** : Slow response, fast integral

The velocity loop autotuning of the motor must be done without the mechanics.

- Once the autotuning of the velocity loop is complete, continue with the autotuning of the position loop.

Position loop

- Autotuning of the position loop, click to [Position].
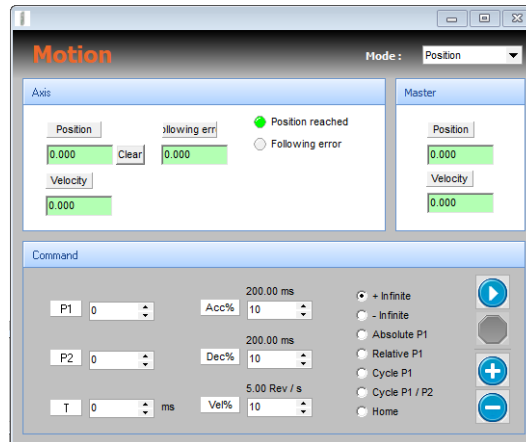 During this phase the motor will perform a few small movement.

Select the autotuning mode adapted to the type of feedback

Tamagawa : Medium response, fast integral
Resolver : Medium response, fast integral

Step 15: Motion the axis

- Go to the <Tools> tab and click to [Motion].
  This tool allows to execute motion commands

- Set the parameter of the motion tool as follows :
  - P1 = 5.00 (example with a ball screw) or P1 = 36.0 (example with a gear)
  - Acc% = 10
  - Dec% = 10
  - Vel% = 10
  - Type of movement: Relative P1
- Click to [Start] button, the motor must make a one-turn movement
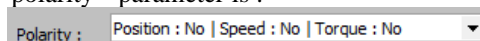
Reversing the motor direction

- To reverse the direction of rotation of the motor, select the <Settings> tab and click on the [Brushless] button in the "Motor" section.
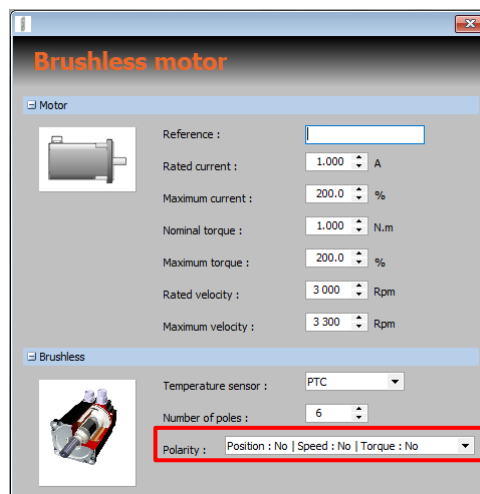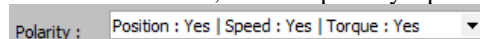

- Change the value of the " Polarity " parameter to correspond to the desired direction of rotation.

  By default the value of the " polarity " parameter is :

  To reverse the direction of rotation of the motor, set the " polarity " parameter to the value :

Annex

Minimum Wiring Diagram for Drive Operation