

USER MANUAL



SMCD14

STEPPER MOTOR CONTROLLER SMCD14



OPERATING MANUAL

Original version

SMCD14

STEPPER MOTOR CONTROLLER SMCD14

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1 INTRODUCTION

Please read this manual carefully to ensure the optimum operating conditions and safety of the user. This user manual handbook contains important information about functionality, installation, start-up and operation of the SMCD14 device.

1.1 INTENDED USE

SMCD14 is a stepper motor controller with ModbusRTU control interface in 19" rack mounted in 3U chassis, width 1/4.

It is suited to power 2-phase bipolar stepper motor with current up to 3A/phase. It is equipped with limit switches input, incremental encoder input, reference position (home) input and enabling input.

1.2 SAFETY

The owner of the device must ensure that all the users have been informed about the safety requirements contained in this manual. In the event of sale or transfer of the device to another owner this manual should be attached.

1.2.1 PERSONNEL QUALIFICATIONS

All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the final user of the device.

1.2.2 ILLUSTRATION OF RESIDUAL DANGERS

This user manual illustrates safety notes concerning dangers as follows:

1. Information on potential serious accident or personal injury.



2. Information on possible damage to the device.



3. Information on correct handling or use. Disregarding safety notes can lead to malfunctions or device damage.



4. **Note.** Indicates particularly important, but not safety-relevant information.

1.2.3 GENERAL SAFETY INSTRUCTIONS

The SMCD14 has been designed to maximally protect the user and his environment against burns or electric shocks, mechanical hazards, high temperature and fire spreading out of the device.

The environmental conditions different from those specified below may pose a threat to the user and his environment:

- Use inside buildings.
- Elevation above sea level of up to 2000 metres.
- Temperature range of safe operation: 5°C to 40°C.
- Maximum relative humidity: 80% (to 31°C), decreased linearly down to max. 50% at 40°C.
- Fluctuations of supply voltage cannot exceed $\pm 10\%$ of the rated value.
- Protection class 1.

During all the operations carried out with the use of the device described in this manual, observe the applicable safety regulations. Observe all the safety notes given in this document and forward the information to all other users of the device. Pay particular attention to the following safety notes:



Supply voltage.

Contact with live parts is extremely hazardous when any objects are introduced or any liquids penetrate into the device.

Make sure that no objects enter through the vent holes of the device. Keep the device dry.



Fire of device.

If smoke or flames coming from the device are sighted, disconnect power supply immediately (by unplugging the power cord, or if it is not possible by disconnecting a relevant circuit in the switchboard powering the device). Remove flammable materials at a safe distance. Start extinguishing the fire. If the power supply could not be disconnected use only E-type extinguishers or dry-powder extinguishers designed to extinguish equipment under voltage.

WARNING**Improper installation, operation or use.**

Improper installation, operation or use may damage the SMCD14 . Strictly adhere to the stipulated installation and operation data.

**Self-configuration of the device.**

Self-configuration of the SMCD14 by the user through the service application results in waiver of the PREVAC's liability for proper functioning of the device.



Figure 1.1: Make sure that no objects enter through the vent holes of the device. Keep the device dry.

Failure to observe the general safety instructions may result in potentially dangerous situations.

1.2.4 GROUNDING

The SMCD14 is the class 1 device. To minimize a risk of electric shock connect the device to the mains with a 3-conductor mains cable. Conductor cross-section should be min. 1 mm² (17AWG). Plug the mains cable into wall sockets with protective ground only.

1.2.5 INTERNAL CIRCUITS OF DEVICE

The operating personnel cannot remove the device covers. The device does not contain any internal control systems and replaceable elements, which could be operated by unauthorized persons. Replace any attached components only after disconnecting the mains cable. To avoid electric shock always disconnect the mains cable, any external voltage sources and discharge the output circuits.

1.2.6 SPARE PARTS AND MODIFICATIONS

Replacement of spare parts, modifications and repairs may be carried out only by the PREVAC's authorized personnel. Therefore, the device must be delivered to the PREVAC's service.

1.2.7 VENTILATION

The device has vent holes located on the side panels of the enclosure. Do not cover the vent holes during the operation of the device.

1.2.8 OPERATION IN EXPLOSIVE ATMOSPHERES

DANGER



Operation in explosive atmospheres.

The device cannot be used in the presence of flammable gases or vapours.
The device cannot be used in potentially explosive atmospheres.

1.2.9 CLEANING

Keep the device dry. For cleaning device's enclosure, use only moistened cloth. Do not use any aggressive or abrasive cleaning agents.

1.3 TECHNICAL DATA

1.3.1 SPECIFICATION

PARAMETER	DESCRIPTION
Power supply	Rated voltage: 230VAC 50/60Hz Rated power: 70W
Dimensions [mm]	128 x 106 x 240 (height x width x depth)
Mounting	For 19" 3U chassis, 1/4 width
Compatible stepper motors	2 phase bipolar, motor current up to 3 A/phase. Motor power supply 24V. Default microstepping mode: 1/16 step (3200 steps per motor rotation). Other modes available.
Encoder options	Quadrature incremental encoder with or without differential RS422 line driver. Default for on-shaft rotary encoder 500CPR (2000 imp/rev).
External inputs	2 limit switches inputs for over-travel protection. Reference position signal, for accurate position detection. Enabling signal for interlocking motor movement.
Communication	ModbusRTU protocol over dedicated RJ45 connector.

Table 1.1: Device specification

1.3.2 OPERATION

Device can only be operated via ModbusRTU interface. This interface gives many options regarding control and user interface.

When device is delivered as standalone controller, most preferable way to operate it is with dedicated GUI (Graphical User Interface) in form of the MS Windows application. The application will be described further below.

Beside that any Modbus-compatible control system may be used.

1.3.3 STANDARDS

- The SMCD14 conforms to the following standards and harmonised standards:
 - PN-EN 61326-1:2013-06 (EN 61326-1:2013) - Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements.
 - PN-EN 61000-6-4:2008/A1:2012 (EN 61000-6-4:2007/A1:2011) - Electromagnetic compatibility (EMC) – Part 6-4: General standards – Emission standard for industrial environments.
 - PN-EN 61010-1:2011 (EN 61010-1:2010) - Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements.

- Conforms to the essential requirements of the following directives
 - EMC 2014/30/EU - Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
 - LVD 2014/35/EU - Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

2 INSTALLATION

This chapter describes the procedures for unpacking, mechanical installation and electrical installation. Take care when lifting the unit that the weight and position do not exceed comfortable limits.

2.1 UNPACKING

1. Visually inspect the transport packaging for signs of external damage.
2. Unpack the SMCD14 .

Note: Retain the packaging materials for later use. The SMCD14 must be stored and transported in the original packaging material only.

3. Examine the SMCD14 for completeness.
4. Visually inspect the SMCD14 for signs of damage.

DANGER



Damaged product.

Using the destroyed or damaged device or connection cables can result in electric shock. Never attempt to put a damaged product into operation. Secure the damaged product from unintended operation. Send a damage report to the courier company or the insurer.

2.2 MECHANICAL INSTALLATION

The SMCD14 is designed for installation into a rack according to DIN 41 494 (19", 3 HU) and occupying the whole width of the cassette. Before taking any actions read the safety notes below.

WARNING



Ambient temperature.

Exceeding the maximum permitted ambient temperature may damage the device. Make sure that the maximum permitted ambient temperature is not exceeded and that the air can flow freely through the louvers. Do not expose the device to direct sunlight.

DANGER



Protection class of the rack.

If the product is installed in a rack, it is likely to lower the protection class of the rack (protection from foreign bodies and water) e.g. according to the EN 60204-1 regulations for switching cabinets. Take appropriate measures to restore the required protection class of the rack.

2.3 ELECTRICAL INSTALLATION

2.3.1 MAINS CONNECTION

The mains connection is designed for a mains cable which contains a European appliance connector IEC C14 on the device side. A mains cable is supplied with the device. To improve grounding, connect controlled mechanical assembly to the ground screw, using additional ground cable as short as possible with cross-section of 4mm².

Device is equipped with circuit breaker (fuse) installed in power socket.

DANGER

Mains power.



Improperly grounded devices can be extremely dangerous in the event of a fault. Use three-wire mains or extension cables with protective ground only provided with SMCD14 . Plug the mains cable into wall sockets with protective ground only.

- Connect the European appliance connector of the mains cord with the mains connection of the device
- Connect the plug of the mains cable with the wall socket

NOTE: If the device is installed in a switching cabinet, the mains power can be supplied via a switchable central power distributor.



Figure 2.1: Power connector

DANGER



Risk Of electric shock - fuse replacement.

To avoid electrical shock or personal injury, disconnect the power cord before replacing the fuse or opening the device case for any reason.

2.3.2 POWER CORD

The SMCD14 comes with a detachable, three-wire power cord for connection to a power source with protective ground. The SMCD14 chassis is connected to the power ground to protect against electrical shock. Always connect to an AC outlet which has a properly connected protective ground. If necessary, or when in doubt, consult a certified electrician.

2.3.3 POWER SWITCH

The power switch is located on the front of the SMCD14 . The switch is a toggle type, marked with **I** and **O**. The **I** (on) position applies the power to the instrument. The **O** (off) position cuts off the power to the instrument. However, turning the power switch off does not fully remove the AC power from inside the instrument.

Always disconnect the power cord to fully remove AC power from inside the instrument.

DANGER



Risk of Electric Shock.

Do NOT use the power switch as a disconnecting device; disconnect the power cord from the power entry module to fully remove hazardous voltage from inside the SMCD14 .

2.3.4 GROUNDING TERMINAL

The ground terminal is installed on the rear panel next to mains connection. It is used to connect the device directly with the protective ground of the structure through an additional conductor to provide protection against electric shock.

DANGER



Screw for internal protective conductor.

The internal protective conductor is connected with the enclosure through a screw.

Do not turn or loosen this screw.

2.3.5 DEVICE REAR PANEL

This section contains a description of available sockets and connectors on the rear panel.

Rear panel consists of:

- a. **Mains connector** – IEC C14 type socket for mains power, with fuse socket
- b. **Grounding stud** – for Protective Earth connection
- c. **ENCODER** connector – for connecting encoder with dedicated cable
- d. **MOTOR** connector – for connecting stepper motor with dedicated cable
- e. **CONF.USB** – USB connector for configuration/firmware update
- f. **LIMITS/ENC** – connector for external limit switches and reference signals
- g. **I/O** – auxiliary connector with various signals depending on application
- h. **RS485-BUS** – 2 connectors for communication bus, connected internally for “daisy chain” cabling

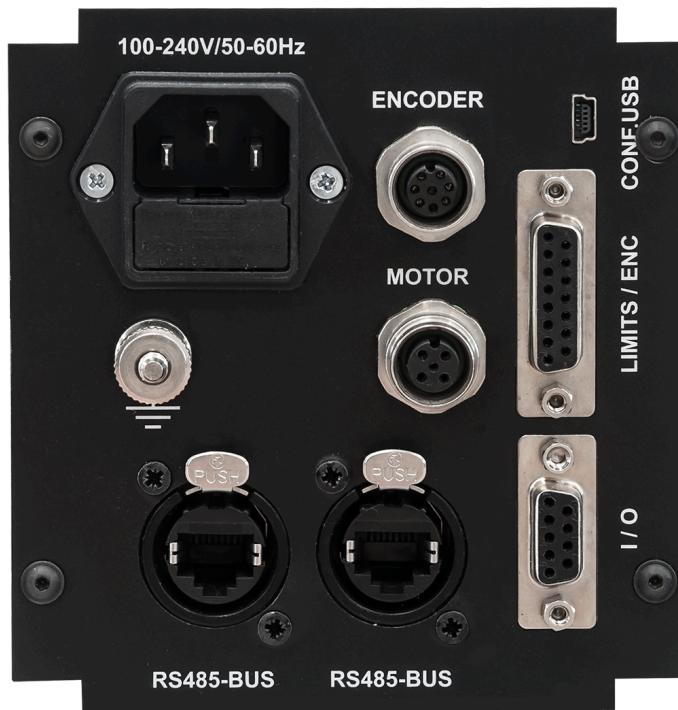
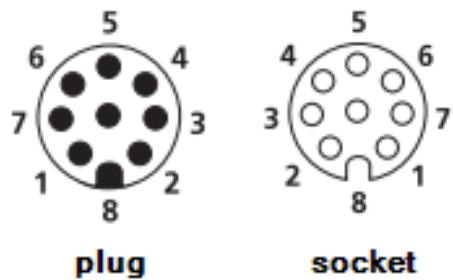


Figure 2.2: Rear view of SMCD14

2.3.6 ENCODER CONNECTOR

To connect a quadrature incremental encoder, use “ENCODER” connector.

Use a circular M12 type 8 pin connector. For full compatibility with standard Nanotec AS-series motor, use ready-made cable type RSTS 8-RKTS 8-299 or similar.



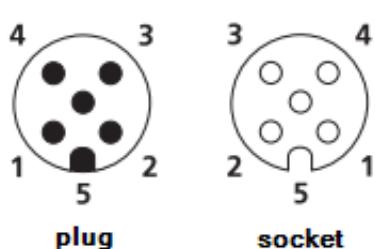
PIN ASSIGNMENT:		
1	A+	signal A positive side
2	A-	signal A negative side
3	B+	signal B positive side
4	B-	signal B negative side
5	GND	power supply ground
6	C+	signal C (index) positive side
7	C-	signal C (index) negative side
8	5V	5V power supply

Figure 2.3: Scheme of circular M12 type 8 pin connector and a table with pins description

2.3.7 MOTOR CONNECTOR

To connect a bipolar 2-phase stepper motor, use “MOTOR” connector.

Use a circular M12 type 5 pin connector. For full compatibility with standard Nanotec AS-series motor, use ready-made cable type RST 5-RKT 5-228 or similar.



PIN ASSIGNMENT:		
1	A-	negative terminal of coil A
2	A+	positive terminal of coil A
3	B+	positive terminal of coil B
4	B-	negative terminal of coil B
5	PE	protective earth connector, connected to motor chassis

Figure 2.4: Scheme of circular M12 type 5 pin connector and table with pins description

2.3.8 LIMITS CONNECTOR

To connect external limiting switches, and/or position reference signal, use "LIMITS/ENC". It is a standard D-subminiature 15pin female socket. This connector also includes encoder signals pins which can be used alternatively to ENCODER connector.

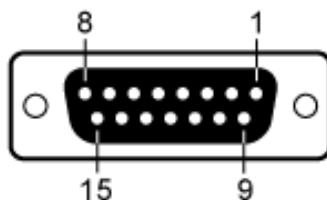


Figure 2.5: Scheme of a standard D-subminiature 15 pin female socket (all numbered pins are described in table below)

PIN ASSIGNMENT:		
1	FLS	Forward (positive) limit switch signal input. Connect a mechanical N.C. switch or other signal source. Use switch or sensor that outputs high (5V-24V) when not activated, and 0V or floating when activated. When not using limit switches, shorten to pin 7 or 10.
2	BLS	Forward (positive) limit switch signal input. Logic is the same as for BLS.
3	GND	Ground/common terminal for all inputs and power supplies.
4	C-	Encoder C- signal (index) negative side
5	B-	Encoder B- signal negative side
6	A-	Encoder A- signal negative side
7	5V	5V power supply output
8	GND	Ground/common terminal for all inputs and power supplies.
9	REF	Position reference signal input. Connect a signal source that will output high (5V-24V) when activated, and 0V or floating when not activated.
10	5V	5V power supply output
11	EN	ENable signal input. When held high (5V-24V) motor can be switched on. When 0V or floating, motor will be switched off. When not using Enable signal, shorten to pin 7 or 10.
12	C+	Encoder C+ signal (index) positive side
13	B+	Encoder B+ signal positive side
14	A+	Encoder A+ signal positive side
15	24V	24V power supply output

Table 2.1: Description of pins in standard D-subminiature 15 pin female socket

2.3.9 RS485 CONNECTOR

There are 2 pcs. of 8P8C (also known as RJ45) socket.

Use it to connect the driver to RS485 Modbus RTU bus. Two sockets are internally connected in parallel, to facilitate a daisy-chain connection of many devices on common bus.

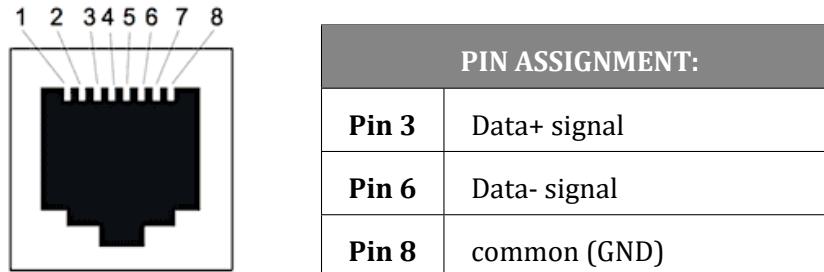


Figure 2.6: Pin description in RS485 connector

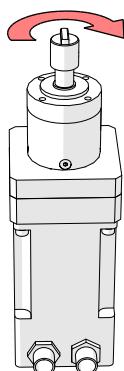
2.3.10 MOTOR ROTATION AND LIMIT SWITCHES ORIENTATION

WARNING



Proper operation of device.

For device to operate correctly, limit switches assignment must be corresponding to motor rotation direction.



When axis is performing a travel towards forward (positive) direction, motor must rotate in direction as shown.

The mechanism must be moving toward limit switch designated as forward or positive (see LIMITS connector description).

If limit switches are connected incorrectly, axis will fail to stop which will result in damaging the drive.

2.3.11 COMMUNICATION PROTOCOL

Device has a Modbus RTU interface over an RS485 serial port.

Serial communications parameters are:

- Baudrate: 38400 (default)
- Stop bit: 1
- Parity: None

Baudrate and Modbus slave ID is configurable over USB link.

User can communicate with device using standard Modbus functions:

- Read Holding Registers (function 0x03)
- Write Single Register (function 0x06)
- Write Multiple Registers (function 0x10)

Each Modbus-accessible register is a 2 byte word. Available registers are listed in separate document.

2.3.12 CHANGING DRIVE PARAMETERS

SMCD14 controller should be delivered properly configured for specific manipulator mechanics.

If it is necessary to alter the configuration parameters such as:

- motor current
- encoder resolution
- motor step resolution

please contact PREVAC support division.

3 OPERATING

Interaction with the SMCD14 takes place mainly via SMCD14 Control Application Software. The front panel also contains LED status indicators describing the current state of the power supply.

3.1 SWITCHING ON THE DEVICE

In order to turn on the device make sure that all of the connections on the rear panel are made correctly and that the AC connection meets the criteria provided in the AC source requirements section. If all the requirements are met, set **Power Switch** into **ON** position on the front panel.

3.2 FRONT PANEL

There are several principal parts of the SMCD14 user interface:

- LED diode indicators
- Power switch
- Backlight logo

Front panel of the SMCD14 device is shown in fig. 3.1 below.

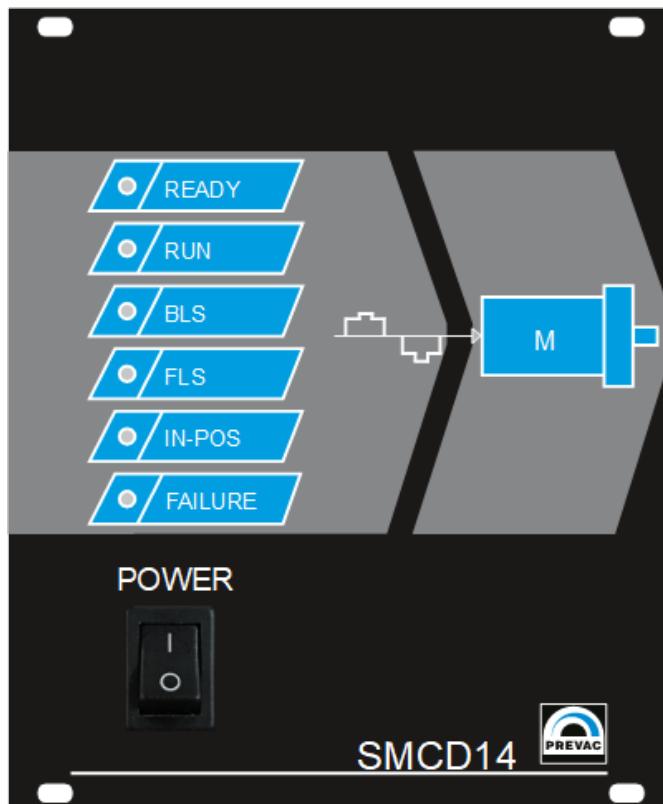


Figure 3.1: Front panel

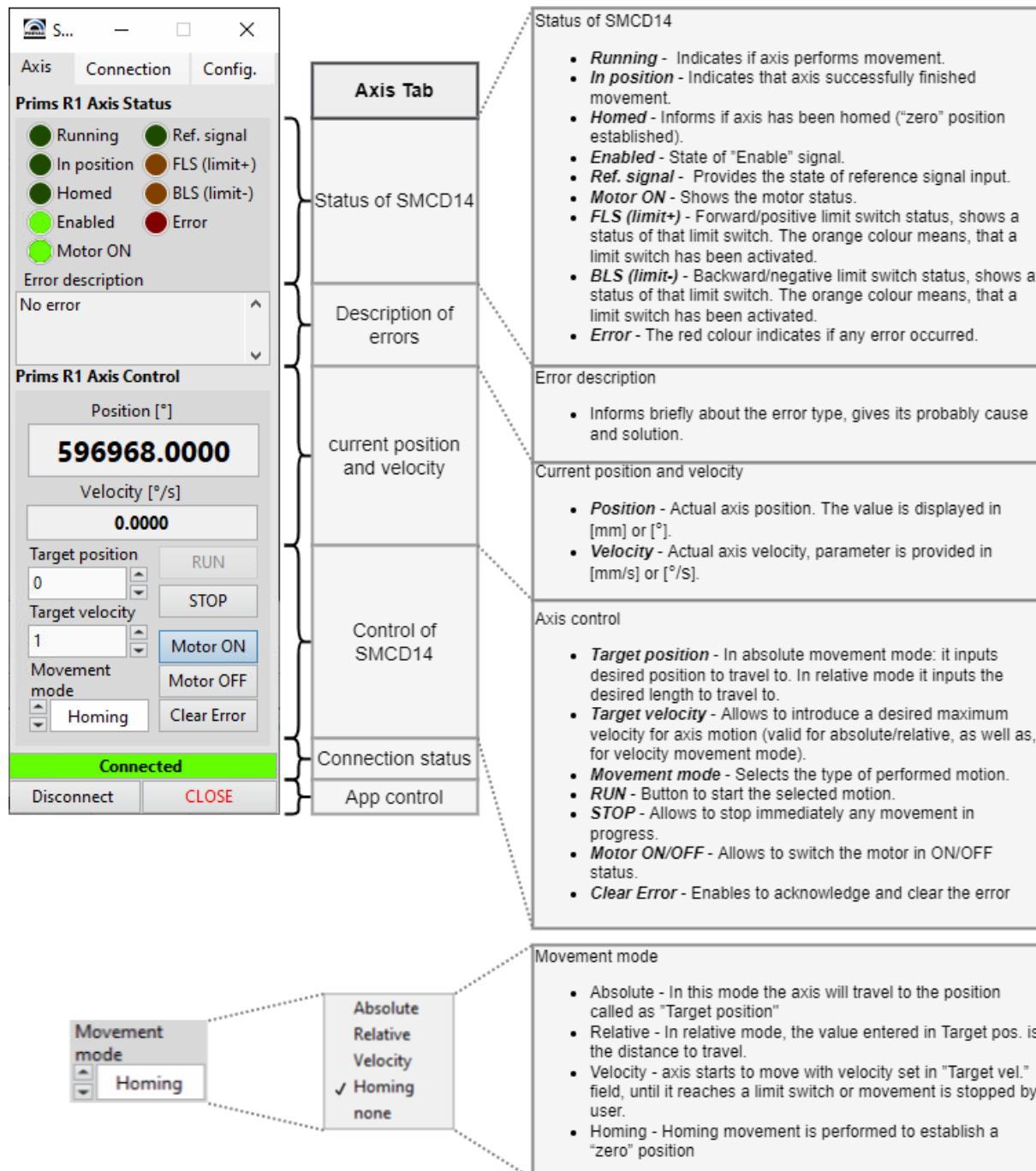
LED indicators inform about the operating state of the SMCD14 device:

- a. **READY** – indicates that device is powered on and Enabling signal is externally activated
- b. **RUN** – indicates that driver is currently performing motion
- c. **BLS, FLS** - Backward, Forward Limit Switch – indicates that one of the travel limiting sensors has been activated
- d. **IN-POS** - indicates that driver successfully executed movement to desired position
- e. **FAILURE** – indicates that an error occurred

3.3 SMCD14 AXIS CONTROL

3.3.1 Axis tab

This tab contains a set of controls to interact with axis.



To perform any movement:

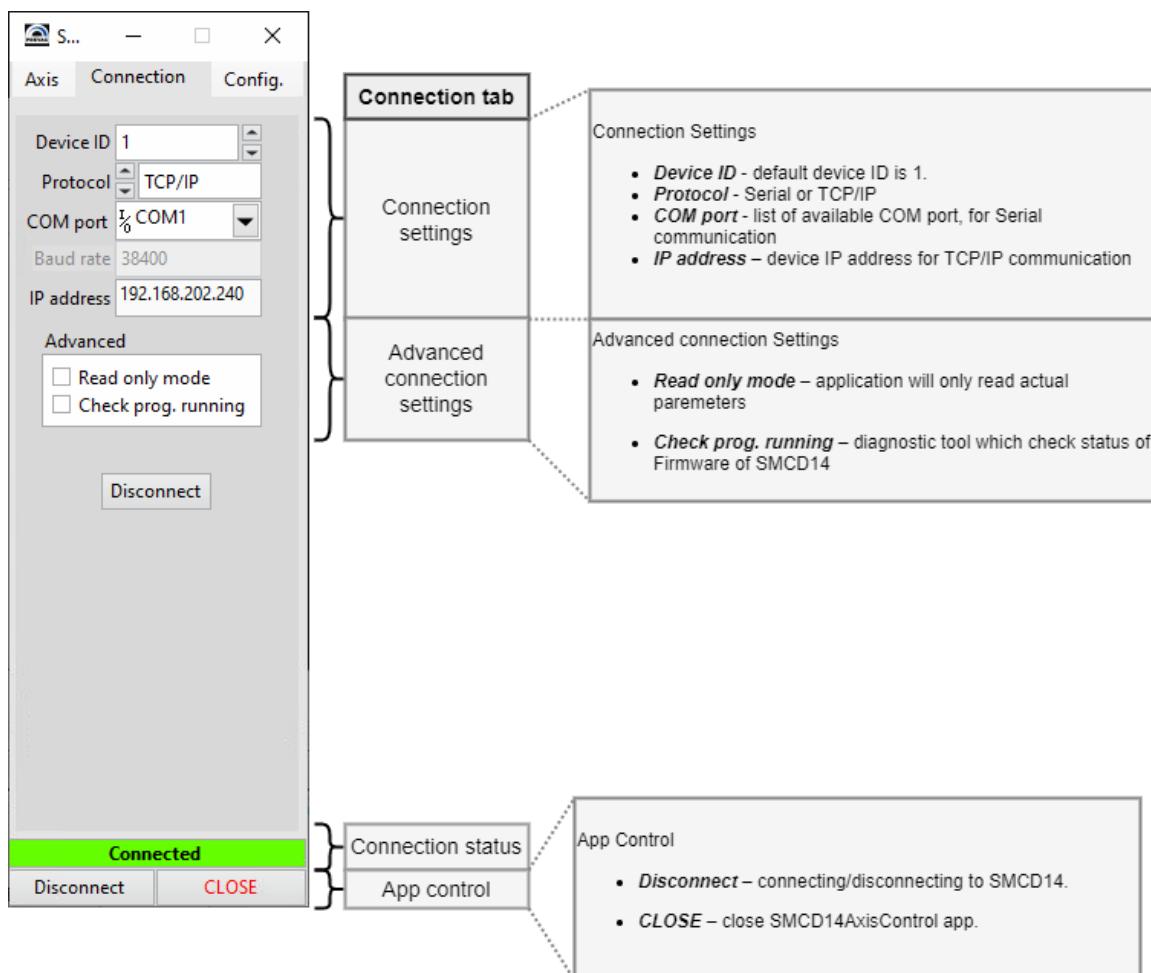
- Select movement mode.
- Enter the target velocity.
 - For Absolute/relative mode enter values >0.
 - For Velocity mode, positive and negative values are valid.
 - For Homing mode this value is not applicable.
- In case of Absolute or Relative mode, enter the desired target position.
- Make sure the motor is "ON" and there is no error state.
- Click **Run** button.

If **Run** button is greyed out, check if:

- there is any axis error, if so, remove the error cause and click **Clear Error**,
- selected target velocity is 0 for absolute/relative or velocity mode. Enter a non-zero value.

3.3.2 Connection tab

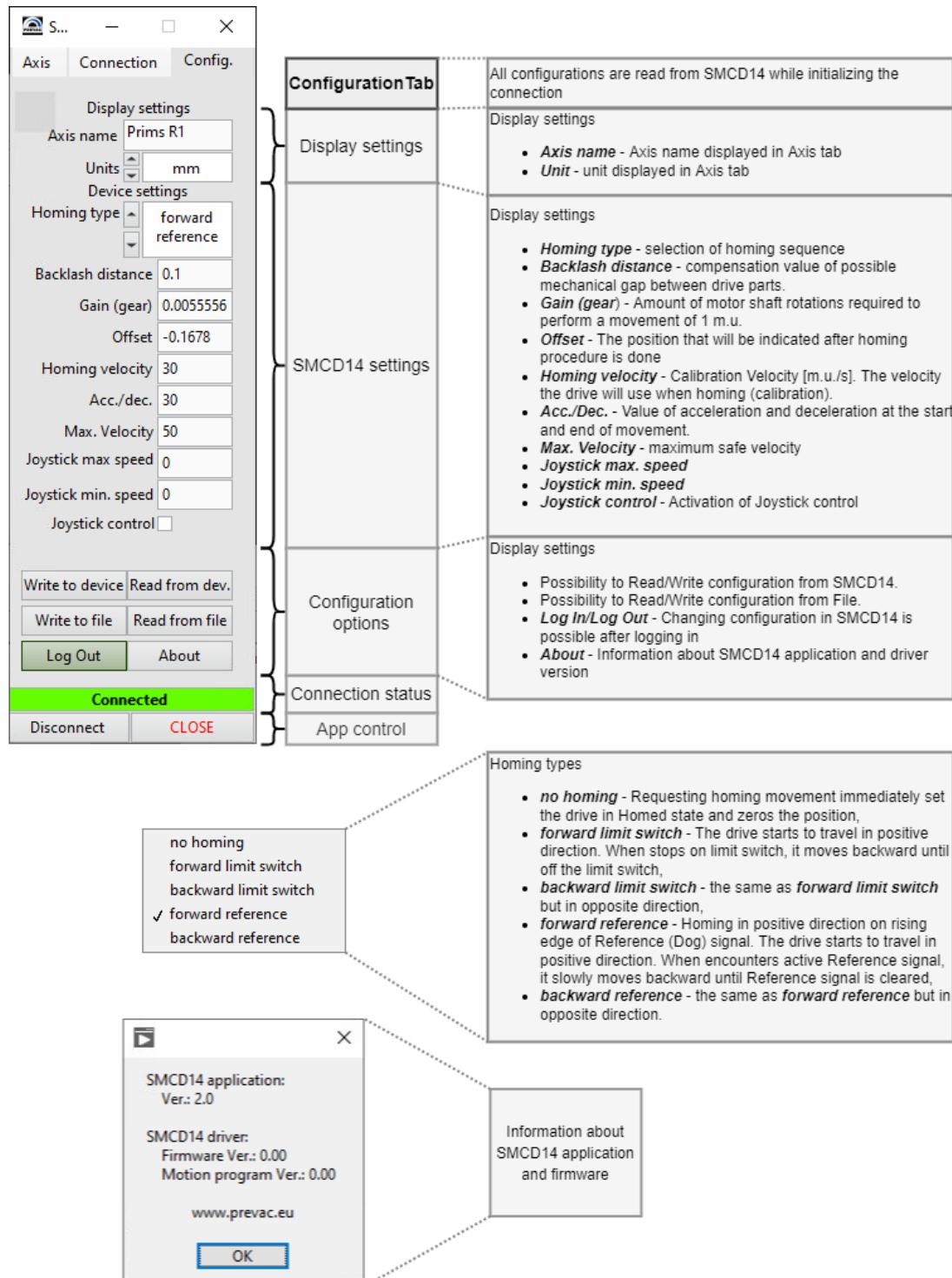
This tab is used for parameterization communication parameters.



- By default, application uses Modbus RTU over RS485 port selected in "COM port" field.
- Default Device ID for every SMCD14 is 1.
- After selecting proper COM port click "Connect".
- When connection is successful, a connection status indicator on the bottom of window will change to "Connected".

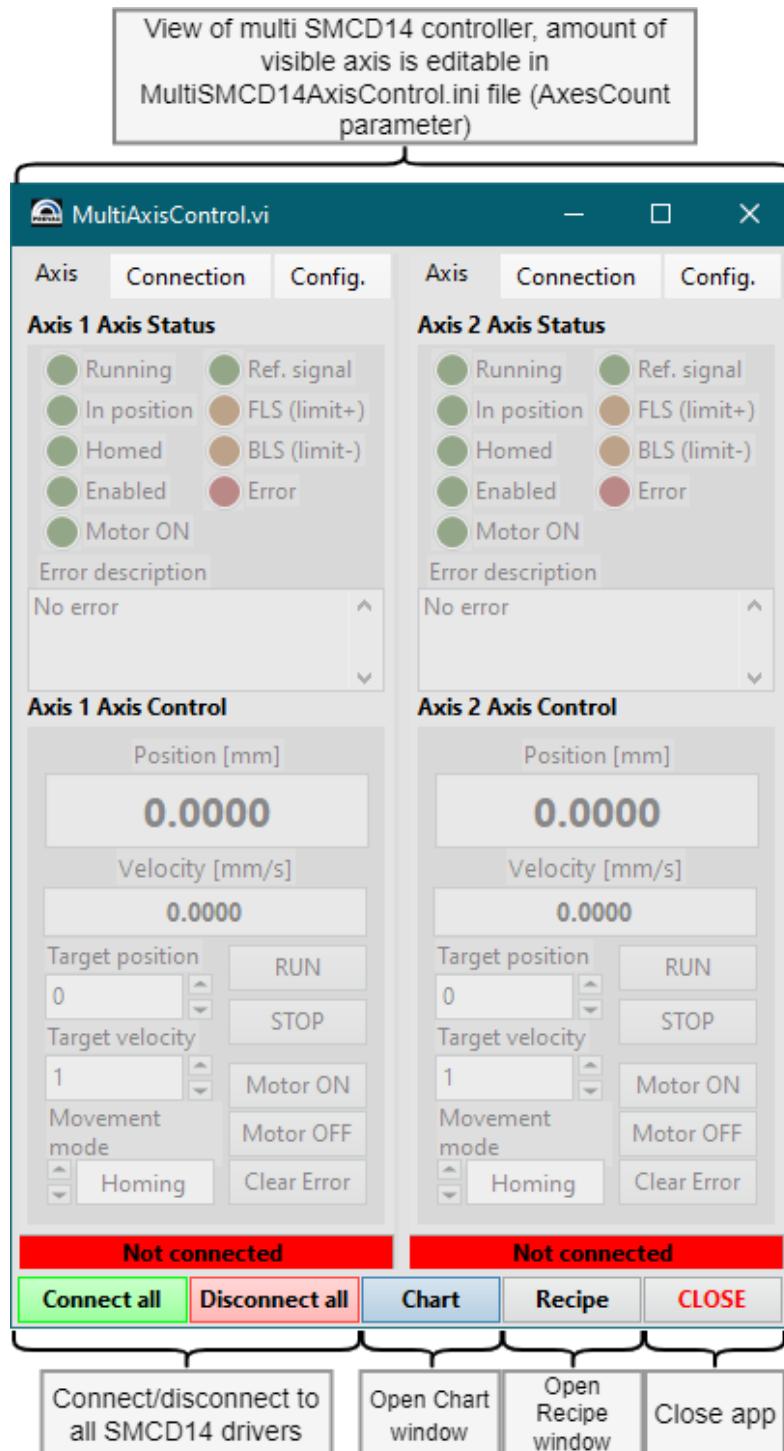
3.3.3 Configuration tab

This tab contains configuration of SMCD14 driver.



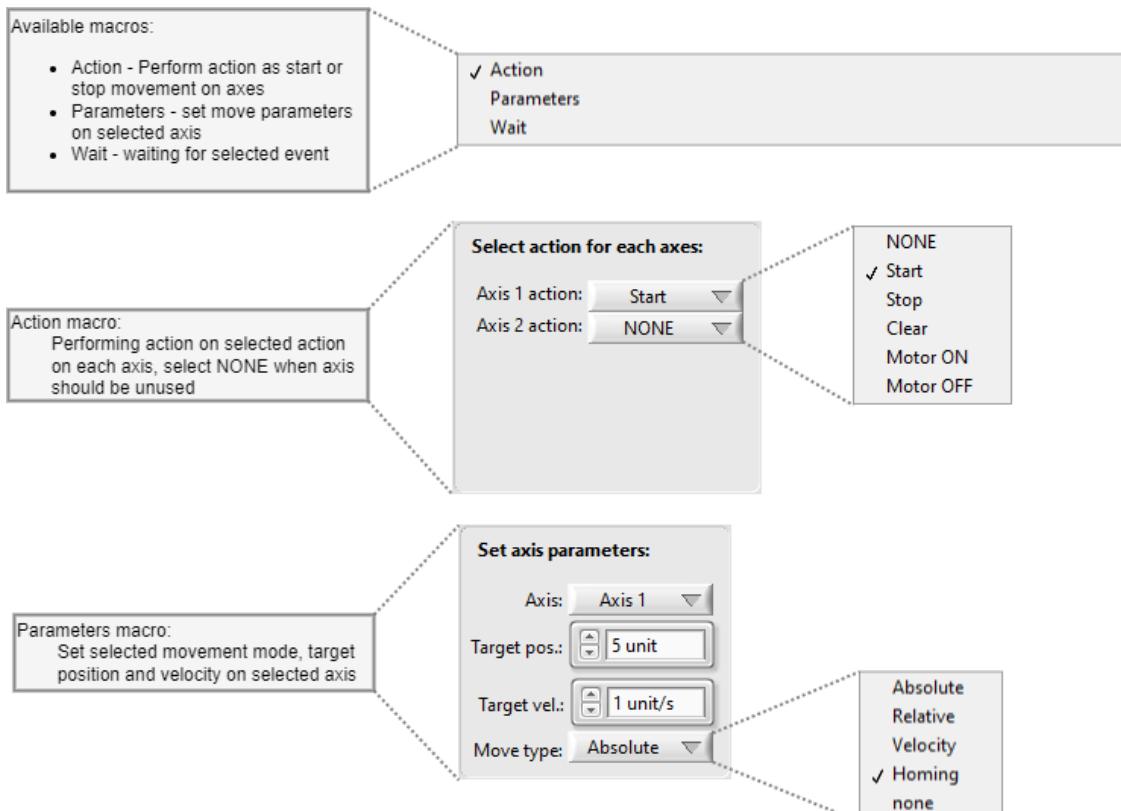
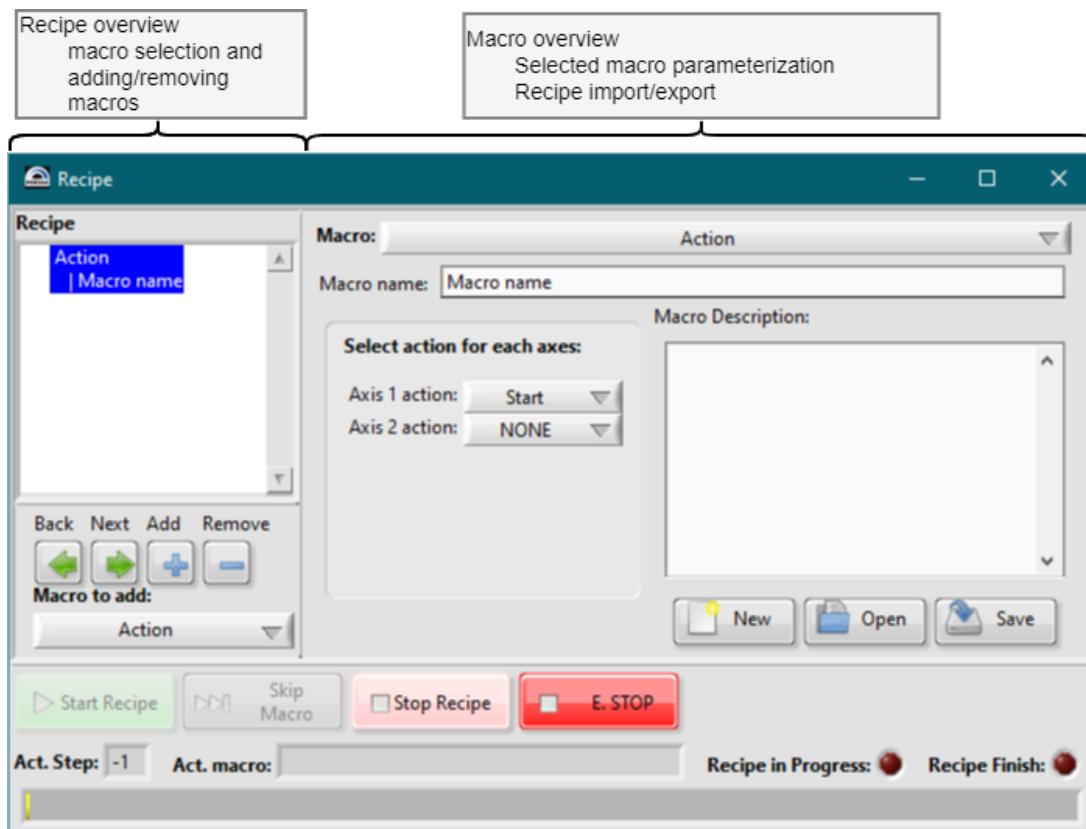
3.4 MULTI AXIS CONTROL APPLICATION

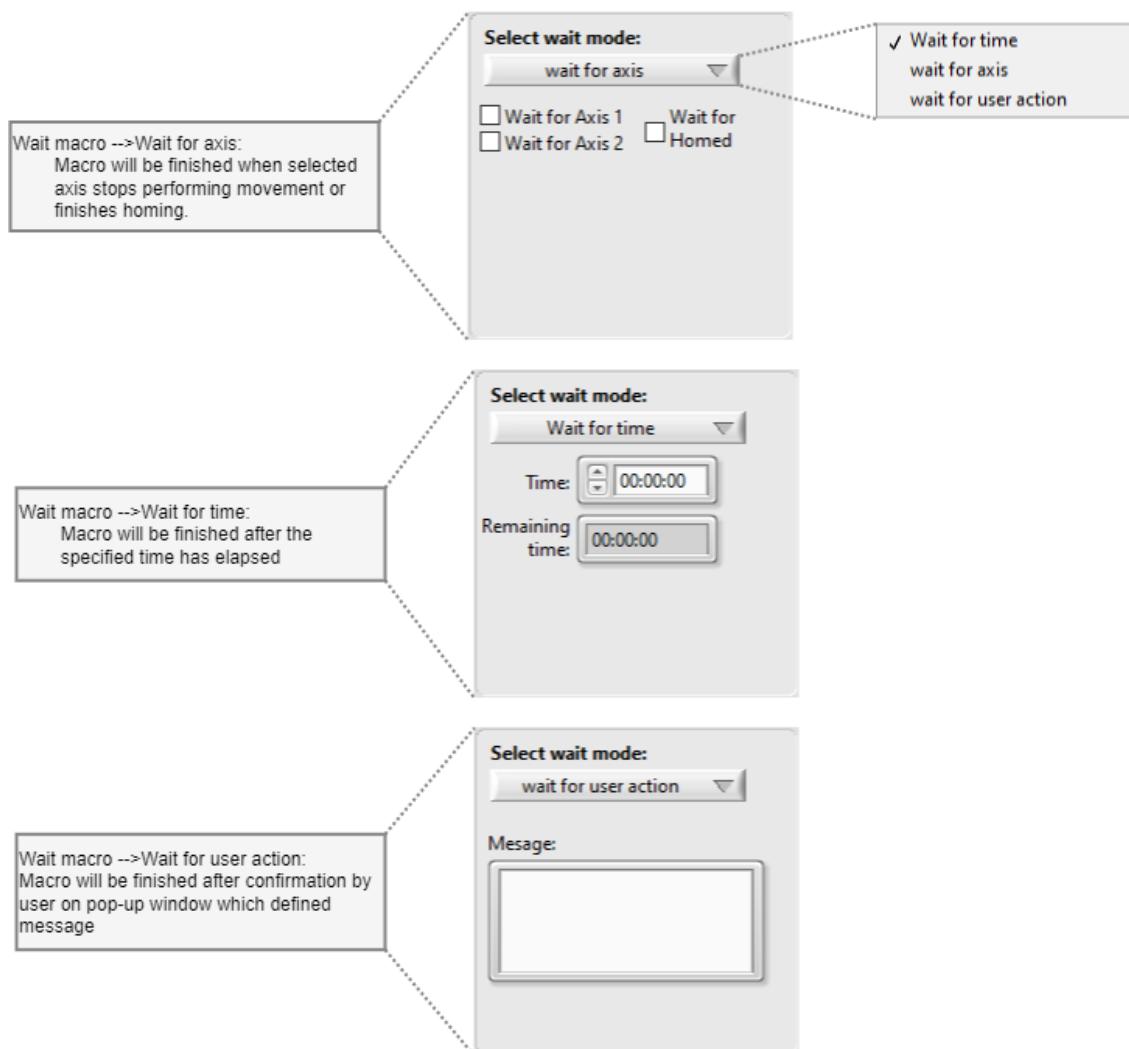
This application contains multi SMCD14 axis control view, it also allows to generate chart of position and perform simple recipes of movement.



3.4.1 Recipe window

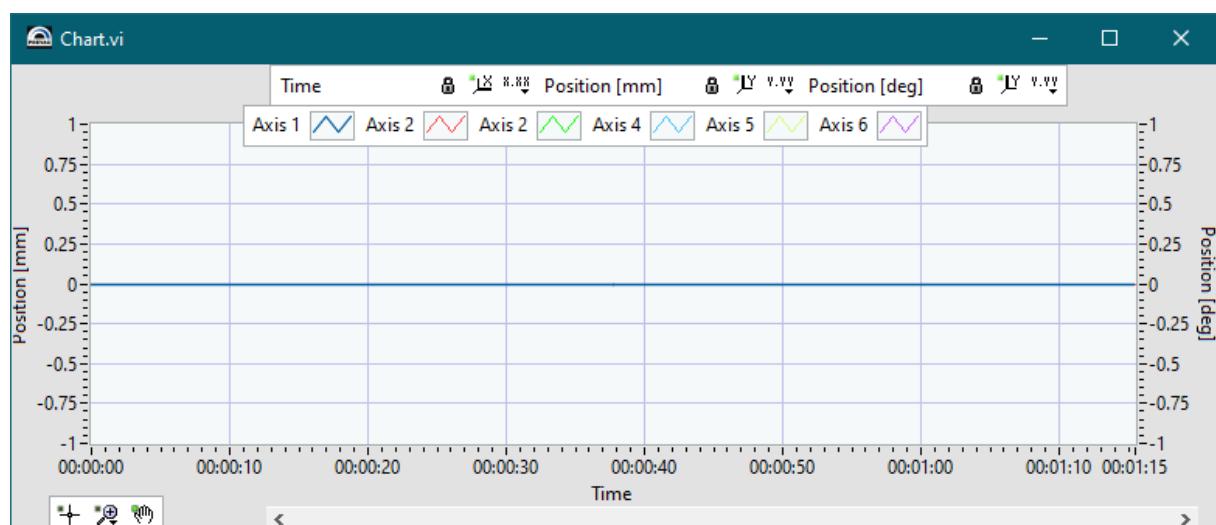
In this window you are able to create and perform own recipe based on simple macros, there is also possibility to export and import recipes.





3.4.2 Chart window

In this window you are able to get timebase chart of axes position.



3.5 MOVEMENT TYPES

3.5.1 ABSOLUTE MODE

In this mode the axis will travel to the position called as "Target position", as depicted below in fig. 3.2:

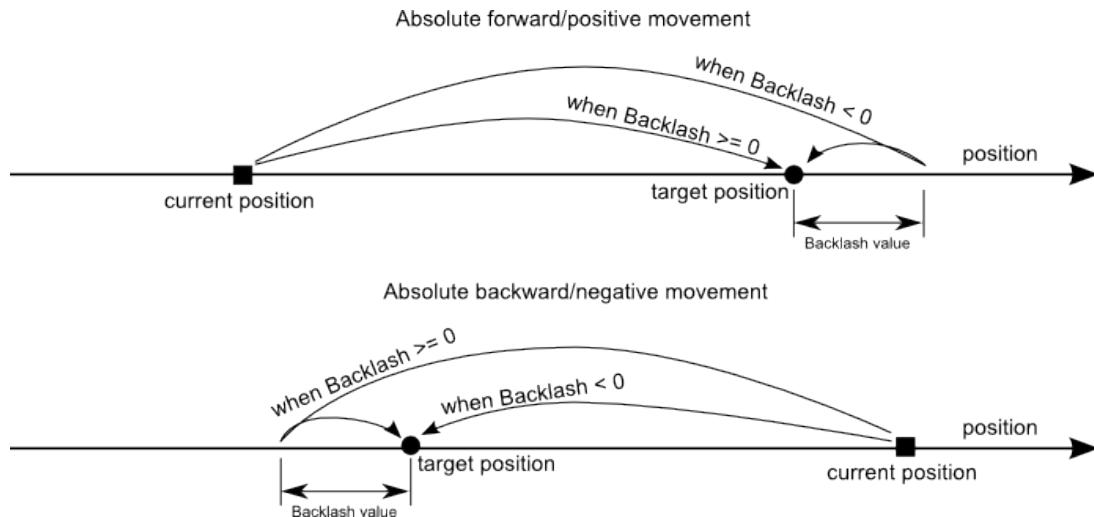


Figure 3.2: Axis motion in absolute mode

The Backlash parameter is taken into consideration to compensate for any possible mechanical gap between drive parts. It is equal to the distance that axis will travel to achieve this compensation. It can be set to negative, positive value, or 0 in Axes Configuration window. During movement the axis will not exceed a velocity set in "Target vel." field.

3.5.2 RELATIVE MODE

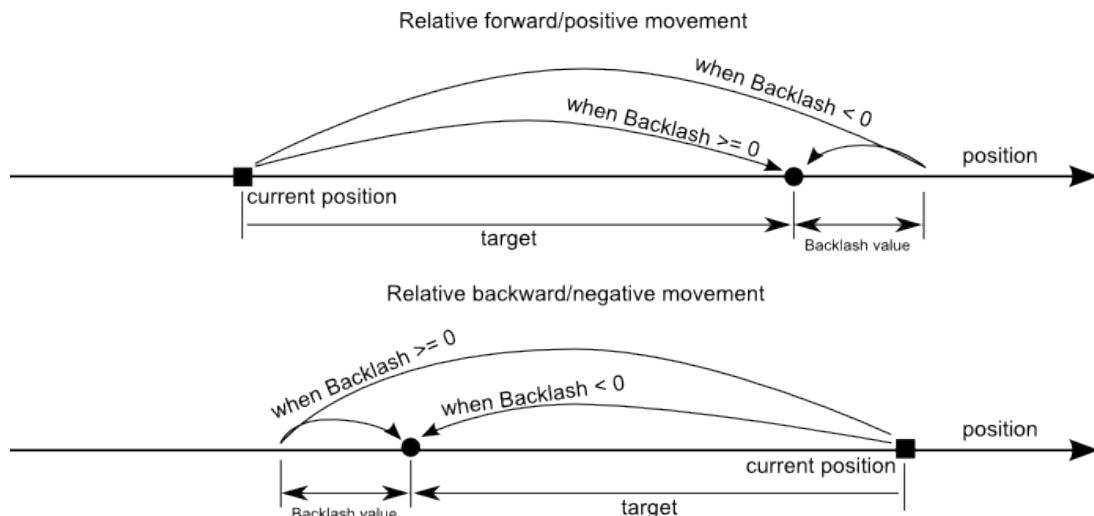


Figure 3.3: Axis motion in relative mode

In relative mode (see fig. 3.3), the value entered in Target pos. is the distance to travel. It can be positive or negative. Backlash compensation also applies as in relative mode.

3.5.3 VELOCITY MODE

In Velocity mode, the axis starts to move with velocity set in "Target vel." field, until it reaches a limit switch or movement is stopped by user. It can be set to positive or negative values.

3.5.4 HOMING MODE

Homing movement is performed to establish a "zero" position, a position that acts as a reference for all absolute movements. Homing procedure usually involves hitting limit switch or reference position sensor, and then slowly backing up. After successful homing procedure, "Homed" indicator lights up, and current position is set to predefined value.

3.6 AXIS ERRORS

When any error occurs, a red indicator "Error" will light up, and corresponding error code will be shown in "Error code" text field. The reason of error appearance can be established by placing the mouse pointer over "Error code" field, where a brief explanation will pop-up. Detailed errors description is given below in table 3.1.

ERROR CODE	DESCRIPTION
0	No error occurred.
20	Position error. The drive failed to reach target position or target velocity, most likely due to losing some steps by a stepper motor. It is often caused by: <ul style="list-style-type: none"> • movement velocity is too high, • acceleration/deceleration value is too high, • mechanical load is too high or motor torque is too low, • motor current is too low.
30	Both limit switches are activated. It most likely indicates that limit switches cable connector is disconnected.
40	Axis is not enabled. "Enable" signal is missing or not active. See section 2.3.8.
50	Axis is not homed. In order to perform movement in Absolute mode, the axis has to be homed – it's "zero" position has to be established. Other movement modes do not require axis being homed.
60	Motor is off. Before any movement command, switch the motor on. To turn it on, two conditions must be fulfilled: <ul style="list-style-type: none"> • axis has no error, • Enable signal is active.

Table 3.1: Code errors description

3.7 CONFIGURATION TAB

SMCD14 is intended to be delivered already configured to one specific mechanical drive, therefore no alterations should be necessary.

If any reconfiguration is required, please contact PREVAC support division.

3.8 MODBUS REGISTERS MAP

Device can be controlled with custom user application using ModbusRTU protocol and RS485 connector available at the back panel.

The table below maps all registers of SMCD14 device.

ADDRESS	NAME	ACCESS	DATA TYPE	DESCRIPTION
Control Registers				
0	MoveType	Write/read (0x03, 0x06, 0x10)	Integer 2 bytes	Movement Type selection There are different movement modes available: 0 → no movement 1 → absolute movement 2 → relative movement 3 → velocity mode 4 → homing movement Select desired movement type before issuing Start Request.
2	Target	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	Target Position [m.u.]*) When using absolute movement mode, Target Position is the position to which the drive will travel to. When in relative mode, Target is the amount of movement the drive will travel.
4	Acc	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	Acceleration [m.u./s ²] Value of acceleration and deceleration at the start and end of movement.
8	Velocity	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	Velocity [m.u./s] In absolute and relative mode, this is the maximum velocity the drive can have. In velocity mode, this is the target velocity.
10	CalibVel	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	Calibration Velocity [m.u./s] The velocity the drive will use when homing (calibration).
<i>Continuation of table on next page →</i>				

*) movement unit (m. u.)

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ADDRESS	NAME	ACCESS	DATA TYPE	DESCRIPTION
Control Registers				
14	MotorON	Write (0x06, 0x10)	Integer 2 bytes	Motor ON Controls the motor current. Motor is turned on when register value changes from "0" to "1". Set "0" to turn off.
15	StartReq	Write (0x06, 0x10)	Integer 2 bytes	Start Request Write "1" to start movement, according to movement parameters set in other registers. Movement starts on rising edge. Clear request before next movement.
16	StopReq	Write (0x06, 0x10)	Integer 2 bytes	Stop Request Write "1" to immediately stop any movement. As long as request is held, no new movement will be started.
17	Status	Read (0x03)	Integer 2 bytes	Controller status Some most frequently read flags available in 1 byte (from LSB): bit0 → Running flag bit1 → Homed flag bit2 → Backward limit switch flag bit3 → Forward limit switch flag bit4 → In Position flag bit5 → Enable signal bit6 → Motor On flag
18	ActPos	Read (0x03)	Float 4 bytes	Actual Position of drive [m.u.]
20	ErrorCode	Read (0x03)	Integer 2 bytes	Error Code Code of last occurred error: 0 → No error. 20 → Position Error – the drive cannot achieve target position or target velocity. The movement was too fast and stepper motor lost its steps or there is some mechanical problem stopping the movement. 30 → Both Limit switches active – most likely the limit switches connecting cable is disconnected. 40 → Not ENabled – user tried to perform travel without ENabling signal active. 50 → Not Homed – user tried to perform absolute mode motion when drive is not Homed (not calibrated). 60 → Motor OFF – user tried to perform travel with motor being OFF.
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ADDRESS	NAME	ACCESS	DATA TYPE	DESCRIPTION
Control Registers				
22	ClearReq	Write (0x06, 0x10)	Integer 2 bytes	Clear Error Request In case any error occurs, controller will not start any movement. To continue operation, user must clear the error by writing "1" to ClearReq for a brief moment.
41	Run	Read (0x03)	Integer 2 bytes	Run flag "0" → Drive is stopped "1" → drive in currently performing motion
42	InPos	Read (0x03)	Integer 2 bytes	In Position flag "0" → position not reached yet "1" → drive reached target position
43	ENabled	Read (0x03)	Integer 2 bytes	Enabled flag (see LIMITS/ENC connector description) "0" → ENable signal not active, operation not possible "1" → operation permitted
45	FLS	Read (0x03)	Integer 2 bytes	Forward Limit Switch "0" → limit switch not active "1" → limit switch active, motion possible only in backward (negative) direction
46	BLS	Read (0x03)	Integer 2 bytes	Backward Limit Switch "0" → limit switch not active "1" → limit switch active, motion possible only in forward (positive) direction
47	Dog	Read (0x03)	Integer 2 bytes	Reference signal status word bit0 = 0 → reference signal not active bit1 = 1 → reference signal active
50	Homed	Read (0x03)	Integer 2 bytes	Homed flag Indicates if the drive has performed successful homing (calibrating) procedure. "0" → drive no homed "1" → drive homed Without homing, absolute movement mode is not available.

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ADDRESS	NAME	ACCESS	DATA TYPE	DESCRIPTION
Configuration Registers				
70	HomeType	Write/read (0x03, 0x06, 0x10)	Integer 2 bytes	<p>Homing Type Defines the way that drive performs homing procedure.</p> <p>0 → No homing. Requesting homing movement when HomeType=0 immediately set the drive in Homed state.</p> <p>1 → Homing on Forward Limit Switch. The drive starts to travel in positive direction. When stops on limit switch, it moves backward until off the limit switch.</p> <p>2 → Homing on Backward Limit Switch.</p> <p>4 → Homing in positive direction on rising edge of Reference (Dog) signal. The drive starts to travel in positive direction. When encounters active Reference signal, it slowly moves backward until Reference signal is cleared.</p> <p>8 → Homing in negative direction on rising edge of Reference signal.</p>
72	Backslash	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	<p>Backlash compensation distance [m.u.] When set:</p> <p>>0 → the drives moves in positive direction directly, and in negative direction with slight overtravel, and then back to target,</p> <p><0 → negative direction movement is direct, and positive direction movement has an overtravel.</p> <p>The amount of overtravel is defined by the value of Backlash. Use with axes with significant amount of mechanical play. Set to "0" when not relevant.</p>
74	Gain	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	<p>Position Gain Amount of motor shaft rotations required to perform a movement of 1 m.u. Ex.: when driving a lead screw with 4mm pitch, and desired movement unit [m.u.] is 1mm, set Gain=0.25.</p>
76	Offset	Write/read (0x03, 0x06, 0x10)	Float 4 bytes	<p>Position Offset [m.u.] The position that will be indicated after homing procedure is done. Equals to the distance between mechanical "0" and user scale "0".</p>

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ADDRESS	NAME	ACCESS	DATA TYPE	DESCRIPTION
Parameters memory				
499	MemoryCtrl	Write/read (0x03, 0x06, 0x10)	Integer 2 bytes	<p>Memory Control Register Certain axis parameters can be stored in non-volatile memory. These parameters are:</p> <ul style="list-style-type: none"> • Gain/gear • Offset. • Backslash • HomeType <p>To store these values in memory, write a value of “1” to MemoryCtrl register, hold it for 1s and write back to “0”. To recall stored parameters, write a value of “2”, hold for 1s and write back to “0” value. These values are loaded after reset.</p>

Table 3.2: SMCD14 controller Modbus registers map

4 MAINTAINCE AND SERVICE

4.1 MAINTANCE

The SMCD14 unit does not require any special maintenance work.

4.2 CLEANING

For cleaning of the outside of the device, a slightly moistened cloth will usually do. Do not use any aggressive or abrasive cleaning agents.

DANGER



Mains voltage.

Components inside of the SMCD14 are components at mains voltage. Do not insert any objects through the louvers of the device. Protect the device from liquids. Do not open the device.

5 STORAGE AND DISPOSAL

5.1 PACKING

Please retain the original packaging. The packaging is required for storing the SMCD14 device and for shipping it to an authorized PREVAC service center.

5.2 STORAGE

The SMCD14 should only be stored in a dry room. The following requirements must be met:

PARAMETER	VALUE
Ambient temperature	-20°C - 50°C
Humidity	as low as possible; preferably in an air-tight plastic bag with a desiccant

Table 5.1: Storage parameters

5.3 DISPOSAL

The product must be disposed of in accordance with the relevant local regulations for the environmentally safe disposal of systems and electronic components.