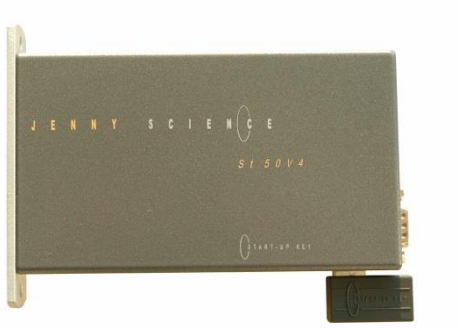
INSTRUCTION MANUAL
Stepper motor controller

St 50V4

Edition July 2015



2 Phase Stepper motors

Micro step

USB / RS232, Fieldbus RS485 / CANopen

12 Input, 8 Output

Plug-in Start-up Key which contains a copy of the application data

Jenny Science AG
Sandblatte 7a
CH-6026 Rain

Phone +41 (0) 41 455 44 55
Fax +41 (0) 41 455 44 50

www.jennyscience.ch
info@jennyscience.ch

General

This instruction manual describes the St 50V4 stepper motor controller for 2 phase stepper motors.

It contains the necessary information about set up, electrical connections, control, bus operation and error handling etc.

The firmware is already installed and the stepper motor controller is ready for use.

The controller can be put into operation simply and quickly with the intuitive user-software WINMOTION®.

We will gladly answer any questions you may have or supply additional information.

Alois Jenny
Jenny Science AG

Contents

1 Starting up with WINMOTION®

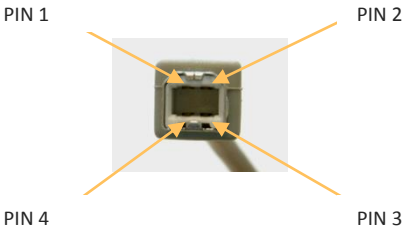
1.1 Connect Power, Stepper motor

Connect DC-power supply at the “PWR” plug, pin 1 is 0V and pin 2 is power voltage i.e. 24V. After switching on, the St 50V4 stepper controller displays a „0“ in the 7-segment display. This shows that the firmware initialization was successful and the device is ready for operation. Connect the stepper motor to the controller plug “MOTOR”
Phase 1, pin 1(+), pin 2(-)
Phase 2, pin 3(+), pin 4(-)

1.2 RS232 serial interface

The serial interface RS232 is connected with the USB B plug.

USB B plug	COM bush PC/Laptop
Pin 2	Pin 3
Pin 3	Pin 2
Pin 4	Pin 5



The cable is available by Jenny Science
Xvi Computer Cable PC/Laptop for RS232
D-Sub 9 Pol to USB-B 1,8m
Art. No. 50 20 00

1.3 USB serial interface

Optional order

With the version USB interface a standard USB cable is required. Connect USB A plug to the PC/Laptop and USB B plug to the St 50V4 controller

1.4 Auto connection with WINMOTION®

Start user-software WINMOTION®. Using auto connection, the St 50V4 controller will be searched for through the connected COM Port. Afterwards click on MENU. Equipment identification then takes place.

1.5 Set up

SETUP

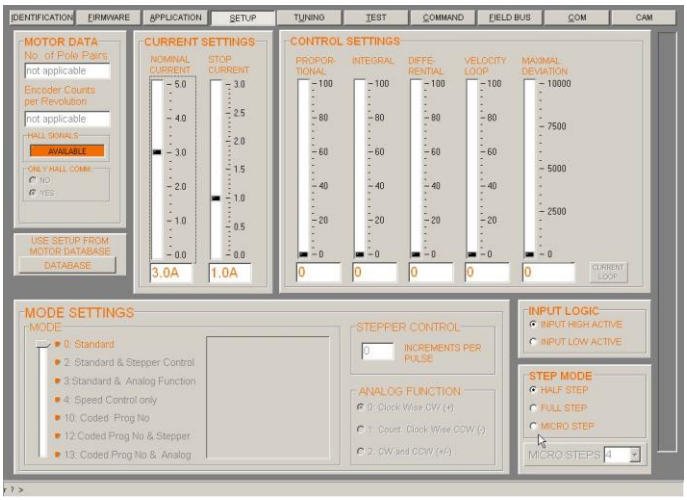
CURRENT SETTINGS

NOMINAL CURRENT

STOP CURRENT

STEP MODE

HALF STEP
FULL STEP
MICRO STEP



1.6 Starting the motor

POWER
POWER OFF

JOG POSITIVE
STOP MOTION

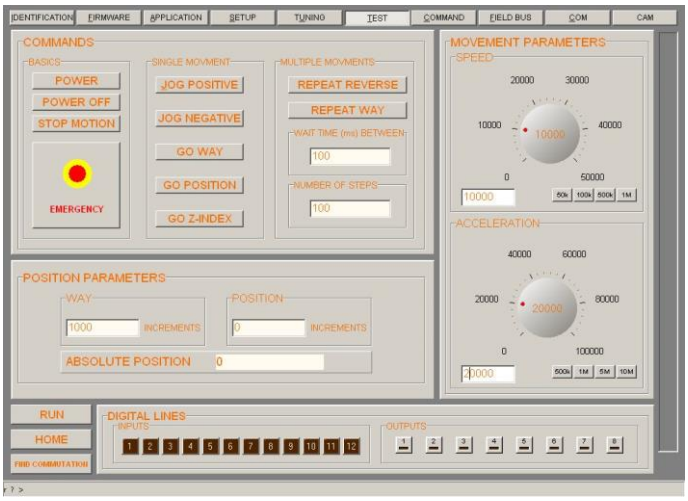
WAY, give a way (relative)
GO WAY

NUMBER OF STEPS, give number of repeats
REPEAT REVERSE

ABSOLUTE POSITION, give a position
GO POSITION

SPEED (rotary button)
ACCELERATION (rotary button)
etc.

All commands are also directly capable of running under COMMAND. See also the Command Set in the WINMOTION® instruction manual.



2 Electrical connections

DESCRIPTION	PLUG	TYPE
Serial interface RS232/USB	4 Pole jack	USB Type B
BUS RS485easy	9 Pole	D-SUB
CAN Open	9 Pole	D-SUB
Stepper motor	4 Pole	Wago, 3,5mm pitch
Power, 12V-50V	2 Pole	Wago, 3,5mm pitch
External position counter (Encoder)	10 Pole	MINITEK, 2mm pitch
PLC 12 Input /8 Output free for user	26 Pole	MINITEK, 2mm pitch
Start-up Key	4 Pole jack	USB Type A

2.1 Pin configuration

MOTOR

Phase 1+	Pin 1
Phase 1 -	Pin 2
Phase 2+	Pin 3
Phase 2 -	Pin 4

PWR

GND	Pin 1
POWER 20 – 50V	Pin 2 (false polarity- and overvoltage-protection diode)

ENCODER

GND	Pin 1
VCC 5V	Pin 2
A - Signal	Pin 3, differential input, pull up 2,7kΩ to VCC 5V
A* - Signal	Pin 4, differential input, middle level 2,7kΩ up / 2,2kΩ down
B - Signal	Pin 5, differential input, pull up 2,7kΩ to VCC 5V
B* - Signal	Pin 6, differential input, middle level 2,7kΩ up / 2,2kΩ down
Z – Signal	Pin 7, differential input, pull up 2,7kΩ to VCC 5V
Z* - Signal	Pin 8, differential input, middle level 2,7kΩ up / 2,2kΩ down
NC	Pin 9, not connected
NC	Pin 10, not connected

PLC I/O

Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 1	Pin 1
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 2	Pin 2
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 3	Pin 3
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 4	Pin 4
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 5	Pin 5
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 6	Pin 6
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 7	Pin 7
Active low, NPN open collect. 50V/500mA, free wheeling diode	Output 8	Pin 8

Not connected	NC	Pin 9
2A	GND	Pin 10
2A	GND	Pin 11
250mA	5V	Pin 12

5V pull up or 24V pull down *) Bit 0 binary coded	Input 9	Pin 13
5V pull up or 24V pull down *) Bit 1 binary coded	Input 10	Pin 14
5V pull up or 24V pull down *) Bit 2 binary coded	Input 11	Pin 15
5V pull up or 24V pull down *) Bit 3 binary coded	Input 12	Pin 16

When MODE <10 Input 9-12 normal, when MODE >=10
input 9-12, binary coded for program numbers 1-15

5V pull up or 24V pull down	Input 1	Pin 17
5V pull up or 24V pull down	Input 2	Pin 18
5V pull up or 24V pull down	Input 3	Pin 19
5V pull up or 24V pull down	Input 4	Pin 20
5V pull up or 24V pull down	Input 5	Pin 21
5V pull up or 24V pull down	Input 6	Pin 22
5V pull up or 24V pull down	Input 7	Pin 23
5V pull up or 24V pull down	Input 8	Pin 24 (program start)

5V pull up 2.7 kΩ on 5V internal VCC or
24V pull down 2.7 kΩ / 10 kΩ, for PNP initiators,
please specify when ordering

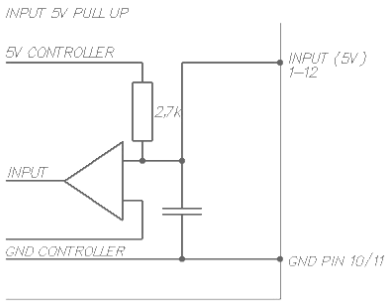
Input 8 is intended for program start with binary coded program numbers 1-15 (MODE >= 10)

2A	GND	Pin 25
250mA	5V	Pin 26

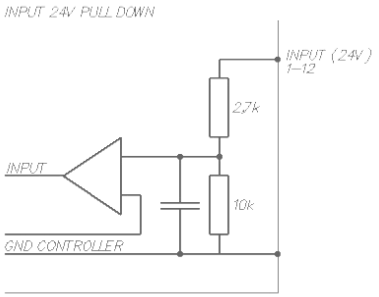
2.2 I/O Schematic

INPUT 1-12

5V Pull Up

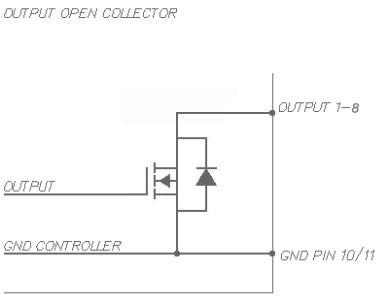


or
24V Pull Down



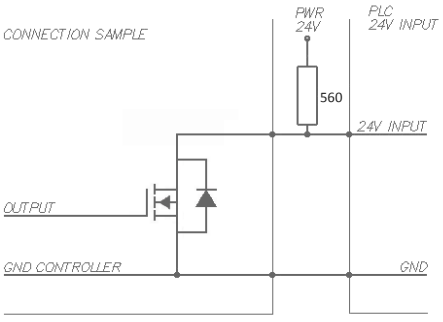
OUTPUT 1-8

50V / 500mA



Example connecting to a PLC

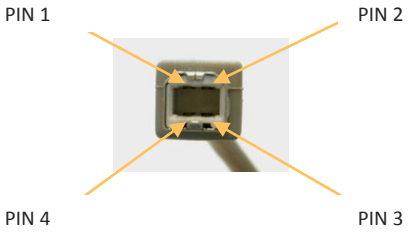
Controller OUTPUT to a 24V PLC Input



2.3 Interface RS232, USB B

The serial interface RS232 is connected with the USB B plug.

USB B plug	COM D-SUB PC/Laptop
Pin 2	Pin 3
Pin 3	Pin 2
Pin 4	Pin 5

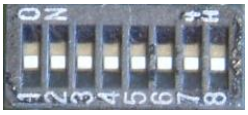


2.4 Interface RS485, D SUB 9 Pole

Bus termination	CAN	Pin 1
CAN Low	CAN	Pin 2
GND	CAN	Pin 3
Bus termination	CAN	Pin 4
Shield	CAN	Pin 5
Receiver R	RS485	Pin 6
Receiver R*	RS485	Pin 7
Transmitter T	RS485	Pin 8
Transmitter T*	RS485	Pin 9

2.5 Baudrate RS232

Set the baud rate RS232 using the 8-bit CONFIG switch S1 (remove the cover from St 50V4)
By turning the system off and then back on the new baud rate will be activated.

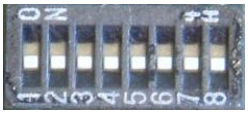


Data 8Bit
Parity none
Stop 1Bit

Baudrate	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
RS232 9600 baud (default)	x	x	x	x	x	x	OFF	OFF
RS232 4’800 baud	x	x	x	x	x	x	OFF	ON
RS232 2’400 baud	x	x	x	x	x	x	ON	OFF
RS232 19'200 baud	x	x	x	x	x	x	ON	ON

2.6 Baudrate RS485

Set the baud rate RS485 using the 8-bit CONFIG switch S1 (remove the cover from St 50V4)
By turning the system off and then back on the new baud rate will be activated.



Data 8Bit
Parity none
Stop 1Bit

Baudrate	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
RS485 19200 baud (default)	x	x	x		OFF	OFF		
RS485 9'600 baud	x	x	x		ON	OFF		
RS485 38'400 baud	x	x	x		OFF	ON	x	x
RS485 free	x	x	x		ON	ON	x	x

3 Viewing operation conditions

Description	Display
Firmware active, power stage OFF	0
Power stage ON, motor active	1
01-12 waiting for Input	01 - 12 flashing
Overtemperature power stage	60 flashing
Overvoltage power supply	61 flashing
No firmware installed	F

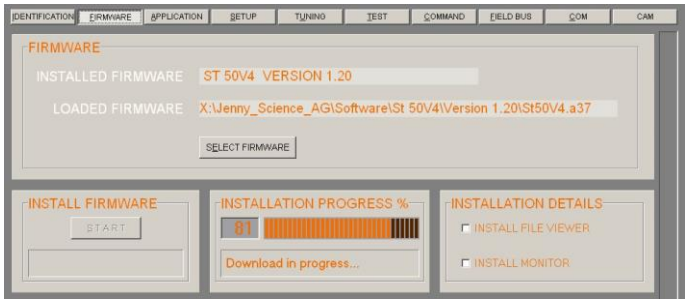
4 Installed Software

4.1 Firmware xxxx_yyy.a37

The firmware contains calculation of position and offers the user many functions and programming possibilities.

After power on of the St 50V4 controller the Firmware is active

Installation or Update firmware is carried out with WINMOTION®

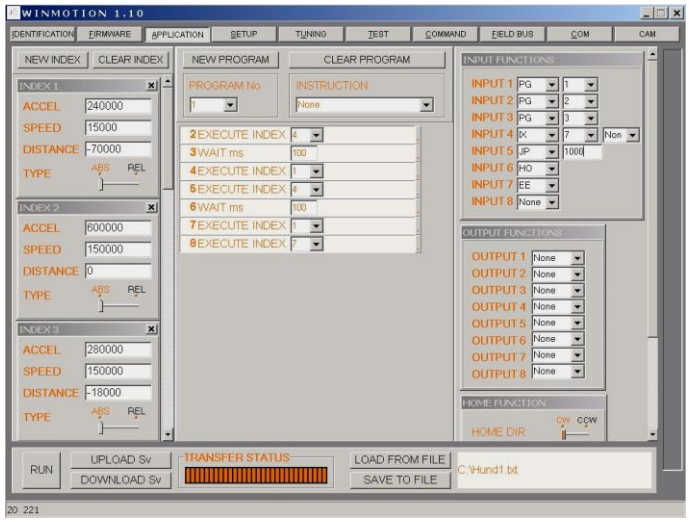


4.2 Application program

The application program contains all data, functions and programs created by the user such as:

SETUP
HOME FUNCTION
INDEX
INPUT FUNCTION
OUTPUT FUNCTION
PROGRAM MOTIONS

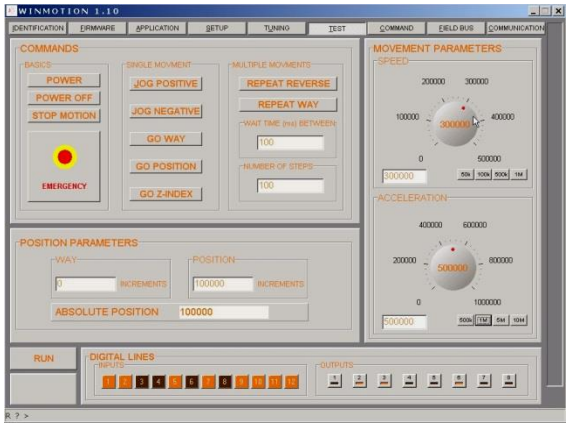
Programming and save/load with WINMOTION®



5 Programming and controller activation

5.1 GUI WINMOTION®

The controller is supplied with the WINMOTION® graphical user interface on CD.
WINMOTION ® has to be installed on a PC/Laptop. It communicates via serial COM or USB with the St 50V4 controller.



5.2 ASCII command set

The St 50V4 controller can be controlled directly by using the ASCII command set. See also the commands in the WINMOTION® instruction manual.

Connect the serial RS232 or USB interface of the controller with the PC/Laptop. After start up send a <CR> (ENTER key), and the St controller will respond with the prompt ">". Now the system operates from the command set.

Sample	Command	[Parameter]		Response command accepted
Power	PW		<CR>	PW <CR> <LF> >
Speed	SP	25-2'000'000	<CR>	SP <CR> <LF> >
Acceleration	AC	1'000-100'000'000	<CR>	AC <CR> <LF> >
Tell Position	TP		<CR>	TP <CR> <LF> >XXXXXXX<CR> <LF> >
				Response command not recognized <CR> <LF> ?

For the complete command set, see WINMOTION® instruction manual

5.3 Program start from RS232/USB

Via RS232/USB the programmed functions can be started directly by ASCII command

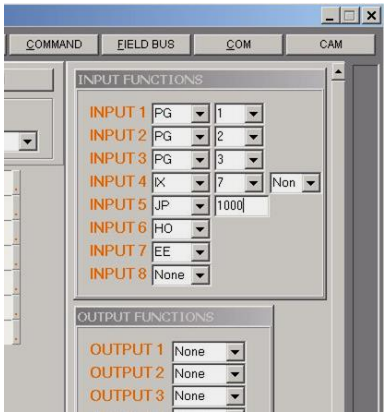
Command	[Parameter]		Description
HO		"CR"	Start HOME FUNCTION according to programmed sequence
IX	1-50	"CR"	Start INDEX xx, predefined move profile (speed, acceleration, distance)
PG	1-15	"CR"	Start PROGRAM xx

5.4 Program start from INPUT

INPUT FUNCTIONS

With this simple and efficient tool the most varied functions can be assigned directly to an Input.

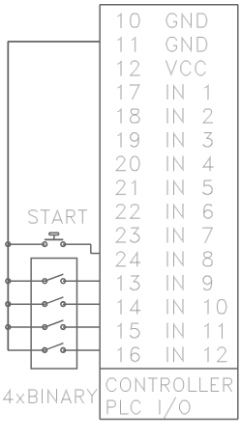
With activation of the corresponding Input the function will be activated.



5.5 Program start binary coded

Should several programs be called up over the input lines, the MODE in SET-UP VALUES can be set to >=10.
Now the input lines 9 – 12 are evaluated as binary coded program numbers. Input line 8 in this case is acting as the trigger to start each pre-selected program. Program number 0 is not used.

Pre-select program number with binary-switch (No. 1-15).
Start program with start button.



6 Bus RS485easy

An "axis manager" (PC or programmable control) can control up to 32 St 50V4 stepper motor controllers (position, handle I/O etc.) with a simple RS485 interface.

6.1 Bus adapter RS485easy

Option Bus Adapter RS485easy
2 x Modular RJ45

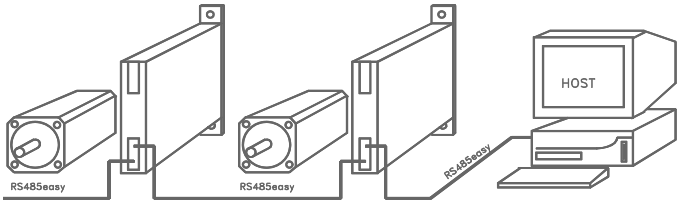
	NC	Pin 1
	NC	Pin 2
	NC	Pin 3
Receiver R*	**RS485**	**Pin 4**
Receiver R	**RS485**	**Pin 5**
	NC	Pin 6
Transmitter T*	**RS485**	**Pin 7**
Transmitter T	**RS485**	**Pin 8**

Modular RJ45 Ethernet cables shielded
Wiring 1:1
Twisted pair 1&2, 3&6, 4&5, 7&8
foil-shielding

These cables are widely available in computer accessory shops in different lengths and moderately priced.

6.2 Equipment connection

The connection can be realized with normal Ethernet network cables. The RS 485easy bus adapter can be plugged into the serial interface D-SUB connector. A 560 Ω bus termination is already installed in the controller.



6.3 Installation RS485easy

1. Set the CI (Card Identifier) via RS232 e.g. to 5, test with CI? <CR> (under COMMAND in WINMOTION®)

2. Carry out the connection on RS485 and PC/Laptop, set baud rate to 19'200.

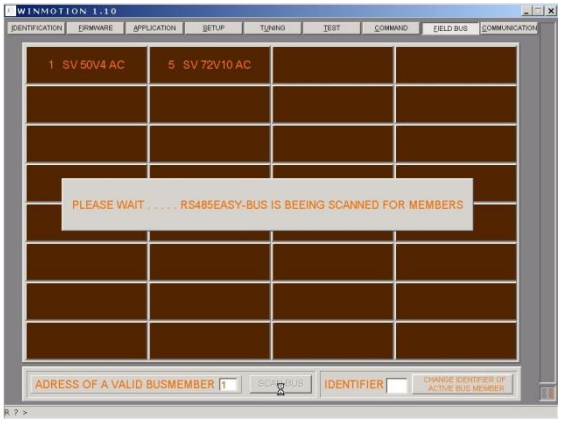
3. As the first command, set “RI” (Required Identifier) to 5, no echo is produced, but the unit ”listens in“ and recognizes its own address.

4. After an additional <CR> an echo occurs and the connection to the unit CI 5 exists. (If there is no echo: check the connection RS485, check the baud rate, the default should be 19'200 with RS485).

Field bus with WINMOTION®

. First, all connected Sv/St controllers in the RS485 easy bus can be automatically searched for with FIELD BUS in WINMOTION®.
The model types are showed in the bars.

By clicking in the appropriate bar the St controller can be accessed directly.



6.4 Simple functioning of the RS485easy

Every controller has been initialized with an „original“ Card Identifier (>CI ##) via RS232.
Thus an Identifier number may be assigned only once.
The Card Identifier "CI" remains stored in the controller.

Controller is loaded with Card Identifier CI

The axis manager (PC, PLC etc.) addresses the individual controllers with a Required Identifier (>RI ##). The unit which has the Required Identifier corresponding to the Card Identifier becomes active and receives the Bus. The axis manager remains connected to the corresponding controller until a new Required Identifier is recognized.
All controllers coupled to the RS485easy bus have their receiver constantly active and “listen in”.

A maximum of 32 St stepper motor controllers can be connected to the same RS485easy bus system.

Addressing controller using Required Identifier RI

In the Bus operating mode commands and parameters are identical to the normal RS232 point-to-point connection.

Load Card Identifier
>CI## <CR> (Value 1-99)
Request Card Identifier >CI?

Load Required Identifier
>RI## <CR> (Value 1-99)
Request Required Identifier check
>RI?

Device identification commands

By means of the RS485easy Bus the Card Identifier “CI“ can be changed afterwards, provided the present CI is known.

Via the RS485easy it is possible to send commands to all connected controllers simultaneously.
In this case the Required Identifier must be set to zero (“RI = 0“).
I.e. the simultaneous initializing of a system can be started using the command “>HO”.

Simultaneous operation with RS485 easy

After Power ON, the device memory for the Required Identifier is set to the value 0.

Note: Only the device with CI = 1 (Card Identifier on 1) will send an echo to the axis manager in the simultaneous mode. If no controller has the value 1, no echo will be received.

7 Troubleshooting

7.1 Error viewing in 7-segment display

Error messages for the St 50V4 are shown on the 7-segment display as a 2-digit flashing number. It is distinguished between “wait for external condition” (WH, Wait High/ WL, Wait Low) and “trouble in the controller”. With error codes below 50 the program can be continued, above this it will be stopped.

7.2 Error codes

1	Description	Remarks
01 to 12	Waiting for Input xx (low or high)	Continues if status has been reached or restarts new if HO, SM or PQ, PW
60	Over temperature power stages	Above 85° detected by separate temperature sensor on power stage. Power stage will be switched off.
61	Over voltage, DC power supply	Power supply voltage too high or retarding energy from stepper motor too high
70	Over current in the power stages	Short circuit or ground contact in the motor cable / motor coil

7.3 Status queries with command

Command	Description	Remarks
TS	Tell Status	Status: 0 = Power OFF 1= Power On 2= in motion 3 = Prog active 9= Error
TE	Tell Error	Error number 01-99
TI	Tell Input	Status Input, all 12 inputs

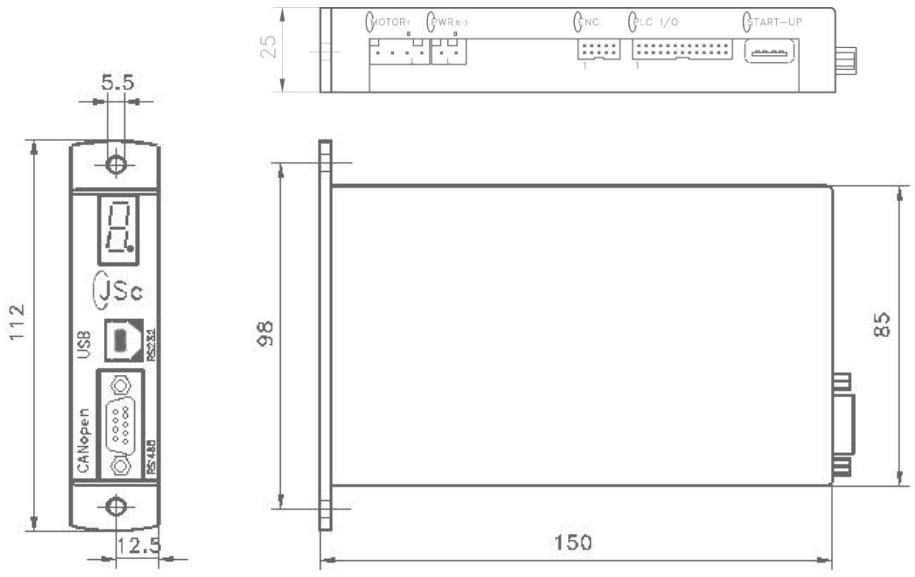
8 Technical data

8.1 Electronics, Firmware

Descriptions	Data
Supply voltage DC	20-50V
Nominal current	IN 0 – 5A
Stop	IS 0 – 3A
Status display	7-segment display
Inputs	12, 5V pull up or 24V pull down
Outputs	8, 8x500 mA, 50V
Interfaces	RS232/ RS485 /USB, binary coded digital inputs
Bus RS485easy	integrated RS485easy field bus
Firmware up-date	via serial interface, WINMOTION®
Application and parameter, store / load	via serial interface, WINMOTION®
Program memory	256kx8 ,16-bit access
Application-programs	15 x 50 lines
Index (predefined travel motion)	50 x acceleration, speed, distance
Home Function (seek predefined zero point)	yes, flexible, incl. home sensor
I/O pre-selected application programs in MODE >=10	15, select program with 4 binary coded digital inputs start via input 8
Fuse power	7A
Fuse logic	1A

8.2 Dimensions St 50V4

Weight St 50V4	320g



Notes

Jenny Science AG
Sandblatte 7a
CH-6026 Rain

Phone +41 (0) 41 455 44 55
Fax +41 (0) 41 455 44 50

www.jennyscience.ch
info@jennyscience.ch