

**R&R CONTROL BOX ST107
Technical Data Sheet**

R&R GmbH
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R&R CONTROL BOX ST107**DESCRIPTION****1. GENERAL**

The motor-control box St107 is used to control up to 2 brushless dc motors with brakes.
Control of 2 separate axis or used as electrical shaft.



FIGURE 1: R&R CONTROL BOX ST107

TABLE 1 TECHNICAL PRINCIPLES

Housing	Aluminum, black anodized
W x H x D in mm	160 x 97 x 300 mm ³
W x H x D in inch	6.30 x 3.82 x 11.81 inch ³
weight	Approx. 2,5 kg (5,5 lbs)
Operating temperature	-20°C - +70°C
Storage temperature	-20°C ... +85°C
Humidity	10% - 85% non-condensing
power supply / consumption	115 -230 VAC / 50..800 Hz
Power consumption	350 W
Software	TBD
Controller PCB	RR-P-569 see datasheet DNR22854

2. INTERFACES AND PIN ASSIGNMENTS

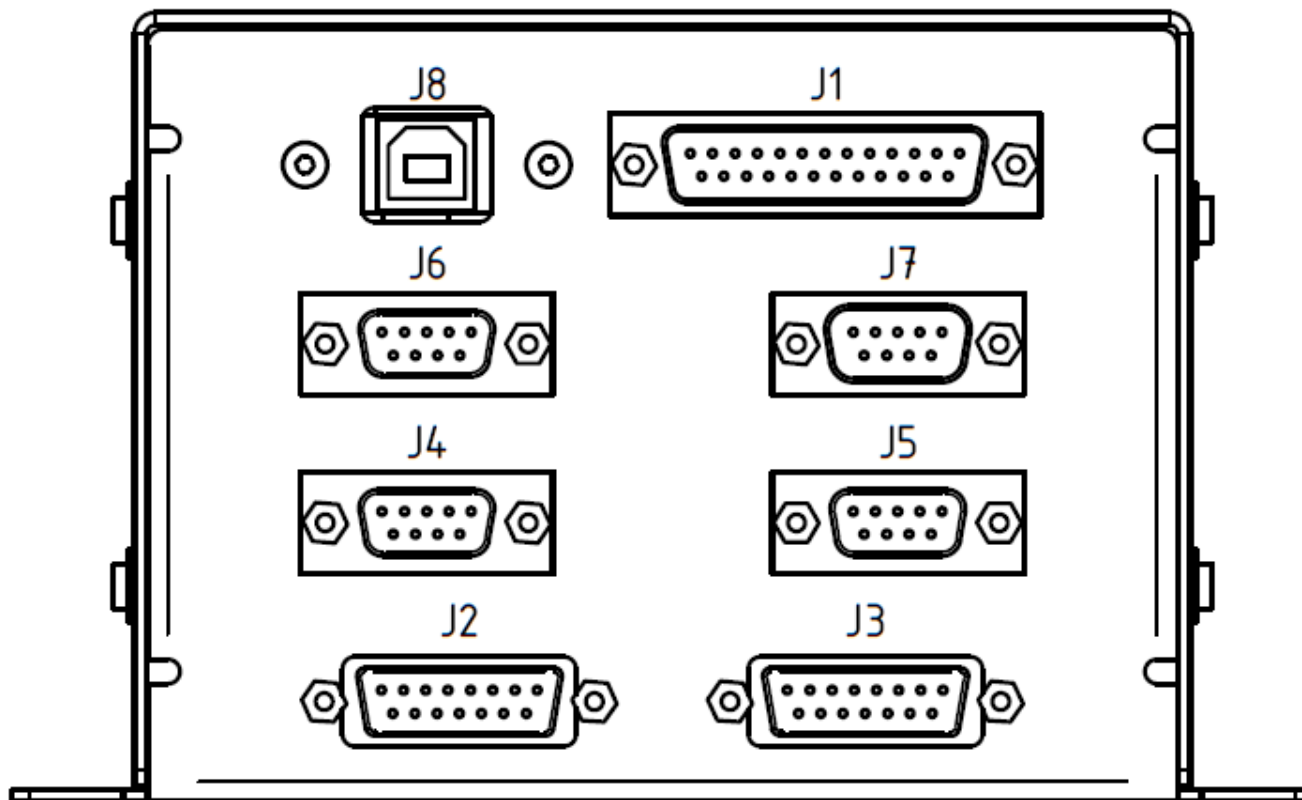


FIGURE 2: ST107 CONNECTOR LAYOUT

TABLE 2: ST107 LIST OF CONNECTORS

Connector	designation	Interface type
Control interface 1	J1	
Motor interface 1	J2	
Motor interface 2	J3	
Brake 1	J4	
Brake 2	J5	
Control interface 2	J6	RS422 / RS485
Service interface 1	J7	RS232C
Service interface 2	J8	USB

2.1 CONTROL INTERFACE 1

TABLE 3: PIN ASSINGMENT CONNECTOR J1 (CONTROL INTERFACE 1)

J1: CONTROL INTERFACE 1						
Connector type:				25 pin sub-D male		
digital inputs:				0/24V internal pull-up resistors 4.7 k ohms		
AC input	PE, shield	14	●	1	Line in	115V 400Hz
				2	Neutral in	0V AC
	not connected	15	●	3	not connected	
	not connected	16	●	4	not connected	
	not connected	17	●	5	not connected	
	not connected	18	●	6	not connected	
push button return	0V	19	●	7	Test-mode	push button
push button return	0V	20	●	8	stow	push button
push button return	0V	21	●	9	deploy	push button
	not connected	22	●	10	not connected	
	not connected	23	●	11	not connected	
	not connected	24	●	12	not connected	
	not connected	25	●	13	not connected	

- the shield-pins are connected with the frame of the D-sub header
 The functions of the push buttons are controlled by software.
 Software TBD

2.2 MOTOR INTERFACES

TABLE 4: TECHNICAL DETAILS MOTOR INTERFACE

power stage	3 half bridges
Voltage	24 up to 48V DC
Nominal current	7A
Absolute max. Current *1	10A
Over current shut down	Average current 0 – 10A (adjustable) Peek current 20A (fix)
Hall-sensors	3
end-switches	Contact bounce suppression by hardware. (NO)-(NC)-(COM) for none delay. Internal pull-up resistors 5 volts operation
over-current shutdown direction 1	Shutdown is hardware controlled. Controlled by Digital potentiometers with none volatile memory. Adjust via setup (see below)
over-current shutdown direction 2	Shutdown is hardware controlled. Controlled by digital potentiometers with none volatile memory. Adjust via setup (see below)
delay	Delay time begins with the motor start. During Delay time the over-current shutdown is disabled. The delay is hardware controlled. Digital potentiometers with none volatile memory Adjust via setup (see below)
Special function	Relays are used to disconnect the power stages from the motors. This prevents problems with the manual override.

*1) Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device or a malfunction of the device.

TABLE 5: PIN ASSINGMENT CONNECTOR J2 (MOTOR INTERFACE 1)

J2: MOTOR INTERFACE 1				
Connector type: 15 pin sub-D female				
(housing) PE	1	O		
			O 9	motor line U
motor line V	2	O		
			O 10	motor line W
hall 0V	3	O		
			O 11	hall A
hall B	4	O		
			O 12	hall C
hall +5V	5	O		
			O 13	stop1 COM
stop1 NC	6	O		
			O 14	NO stop1
stop2 COM	7	O		
			O 15	NC stop 2
stop 2 NO	8	O		

TABLE 6: PIN ASSINGMENT CONNECTOR J3 (MOTOR INTERFACE 2)

J3: MOTOR INTERFACE 2				
Connector type: 15 pin sub-D female				
(housing) PE	1	O		
			O 9	motor line U
motor line V	2	O		
			O 10	motor line W
hall 0V	3	O		
			O 11	hall A
hall B	4	O		
			O 12	hall C
hall +5V	5	O		
			O 13	stop1 COM
stop1 NC	6	O		
			O 14	NO stop1
stop2 COM	7	O		
			O 15	NC stop2
stop 2 NO	8	O		

2.3 BRAKES

TABLE 7: PIN ASSINGMENT CONNECTOR J4 (BRAKE 1)

J4: BRAKE 1					
Interface type:		digital I/O			
Digital output		0/24V high side switches short circuit proof function defined by software			
Connector type:		9 pin sub-D female			
brake+	1	O			
			O	6	(housing) PE
breake-	2	O			
			O	7	
	3	O			
			O	8	
	4	O			
			O	9	
	5	O			

TABLE 8: PIN ASSINGMENT CONNECTOR J5 (BRAKE 2)

J5: BRAKE 2					
Interface type:		digital I/O			
Digital output		0/24V high side switches short circuit proof function defined by software			
Connector type:		9 pin sub-D female			
brake+	1	O			
			O	6	(housing) PE
breake-	2	O			
			O	7	
	3	O			
			O	8	
	4	O			
			O	9	
	5	O			

2.4 CONTROL INTERFACE 2

Software TBD

Used to connect several controllers and for remote control.

Customized Software and protocol.

TABLE 9: PIN ASSINGMENT CONNECTOR J6 (CONTROL INTERFACE 2)

J6: CONTROL INTERFACE 2					
Interface type:		isolated RS422 asynchronous serial up to 38400 baud			
Connector type:		9 pin sub-D female			
Purpose:		Bus interface			
B	1	O			
receiver pair			O	6	R _t
A	2	O			
			O	7	(housing) PE
Z	3	O			
transmitter pair			O	8	R _t
Y	4	O			
			O	9	(housing) PE
isolated GND	5	O			

2.5 SERVICE INTERFACES

To access the service screen use a terminal program (VT100 mode).

We are using Tera Term (shareware).

Parameters: 19200, 8, N, 1 (Baud, Bits, Parity, Stopbits)

Follow the instruction on the service screens.

TABLE 10: PIN ASSINGMENT CONNECTOR J7 (SERVICE INTERFACE 1)

J7: SERVICE INTERFACE 1				
Interface type:		RS232C		
Parameters		19200, 8, N, 1 (Baud, Bits, Parity, Stopbits)		
Connector type:		9 pin sub-D male		
Purpose:		programming and setup		
		●	1	program mode
+5V	6	●		
		●	2	RX
RTS	7	●		
		●	3	TX
CTS	8	●		
		●	4	reset
setup	9	●		
		●	5	0V (GND)

TABLE 11: PIN ASSINGMENT CONNECTOR J8 (SERVICE INTERFACE 2)

J8: SERVICE INTERFACE 2	
Interface type:	USB
Connector type:	USB B
Purpose:	programming and setup
1	5V-USB
2	D-
3	D+
4	GND

3. DRAWINGS

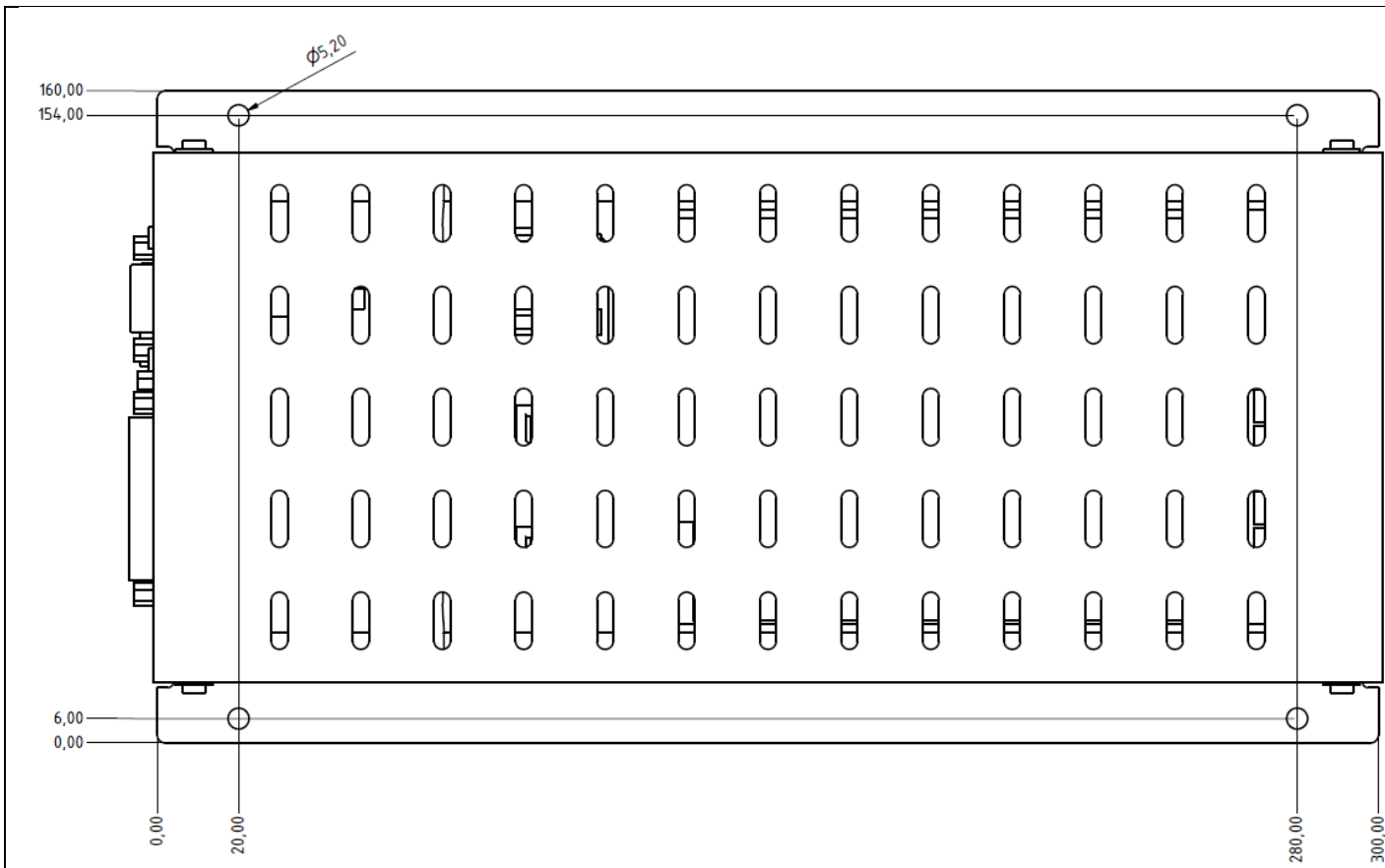


FIGURE 3: ST107 TOP VIEW

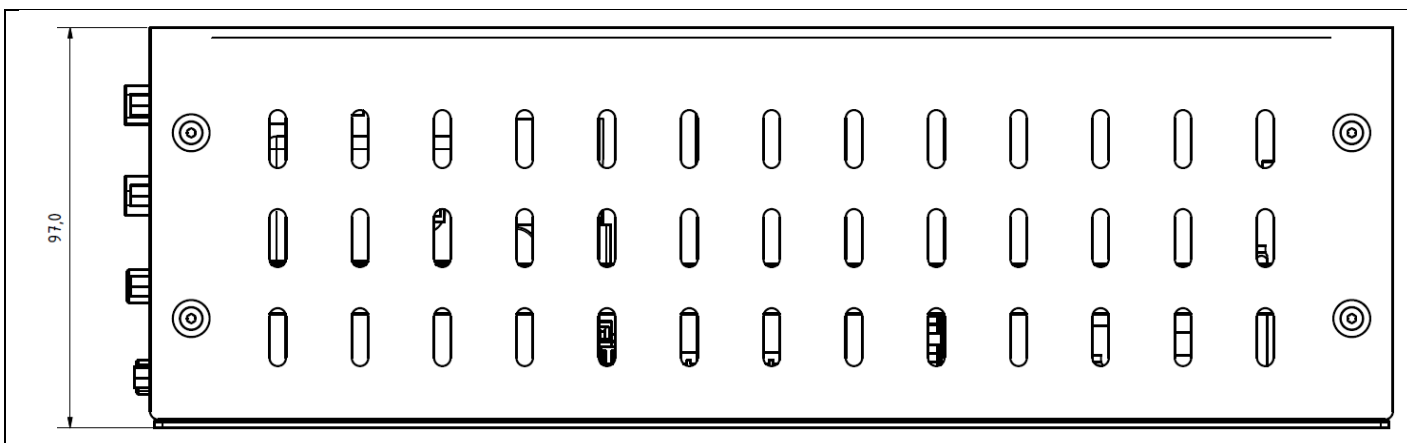


FIGURE 4: ST107 SIDE VIEW

4. ST107 SETUP

The ST107 (motor controller RR-P-569) does have an USB to serial converter on board.
Use a VT100 compatible terminal program (TeraTerm or comparable).

Procedure:

The Motor controller and the pc are switched off.
Connect the USB or serial cable on both sides.
Switch on the pc.

Start the terminal program.

Select the correct com port.

The TeraTerm terminal program does support only COM1, COM2, COM3, COM4!

Use the following Parameters: 19200, 8, NONE, 1, NONE, 0ms, 20ms

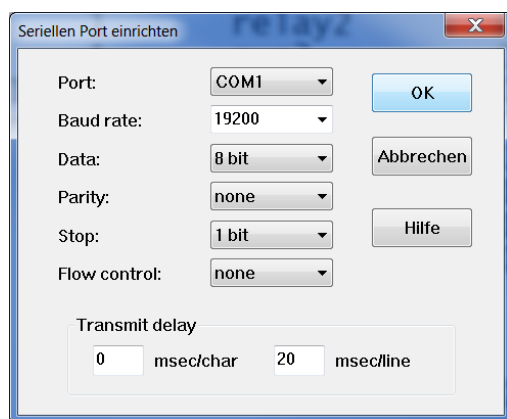


FIGURE 5: TERATERM SERIAL PORT SETUP

Save the setup

Switch on the motor controller ST107.

Note:

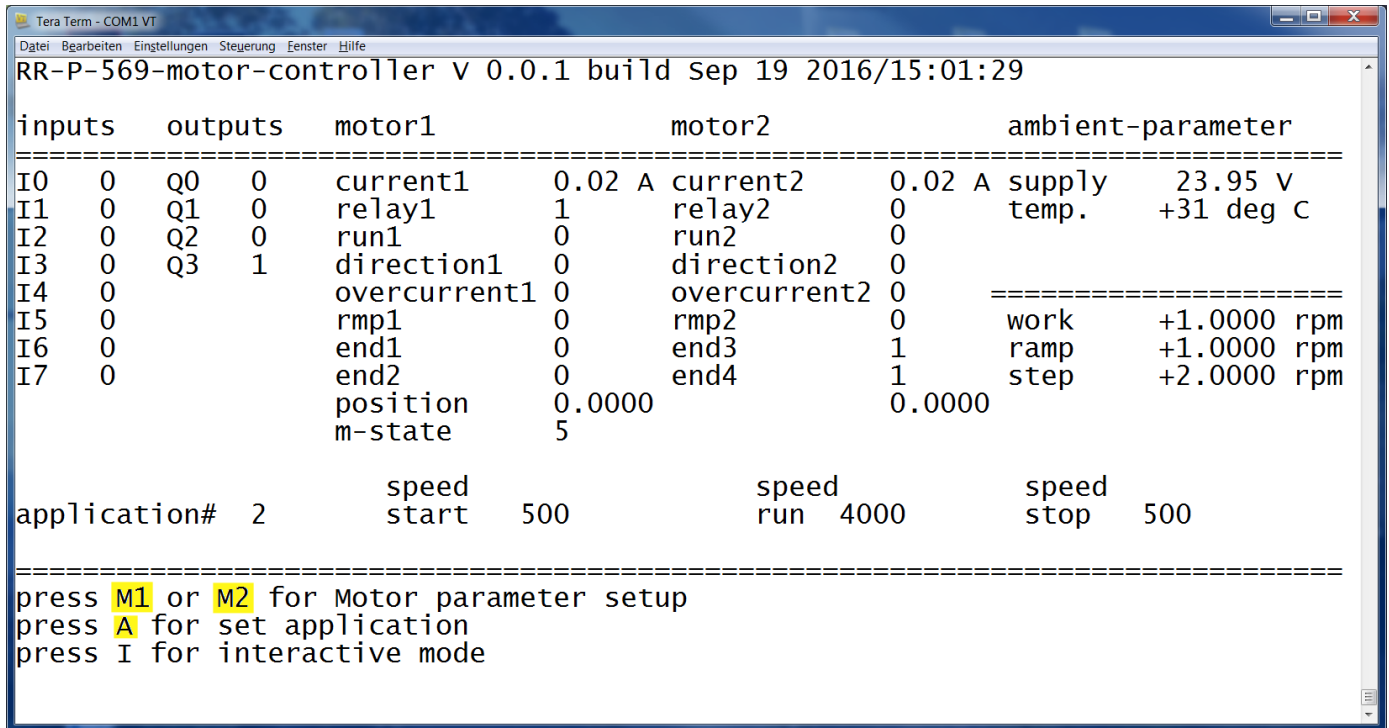
The controller RR-P-569 is streaming data on the serial port.

The Windows operating system may try to install a mouse driver when streaming data is detected on a serial port during boot up! (Jumping mouse pointer)

Then menu may vary for different applications.

Example:

The following menu will appear:



```
Tera Term - COM1 VT
Datei Bearbeiten Einstellungen Steuerung Fenster Hilfe
RR-P-569-motor-controller v 0.0.1 build Sep 19 2016/15:01:29

inputs  outputs  motor1          motor2          ambient-parameter
=====
I0  0  Q0  0  current1  0.02 A  current2  0.02 A  supply  23.95 v
I1  0  Q1  0  relay1    1       relay2    0       temp.  +31 deg C
I2  0  Q2  0  run1      0       run2      0
I3  0  Q3  1  direction1 0       direction2 0
I4  0          overcurrent1 0       overcurrent2 0
I5  0          rmp1        0       rmp2        0       work    +1.0000 rpm
I6  0          end1        0       end3        1       ramp    +1.0000 rpm
I7  0          end2        0       end4        1       step    +2.0000 rpm
          position 0.0000          0.0000
          m-state  5

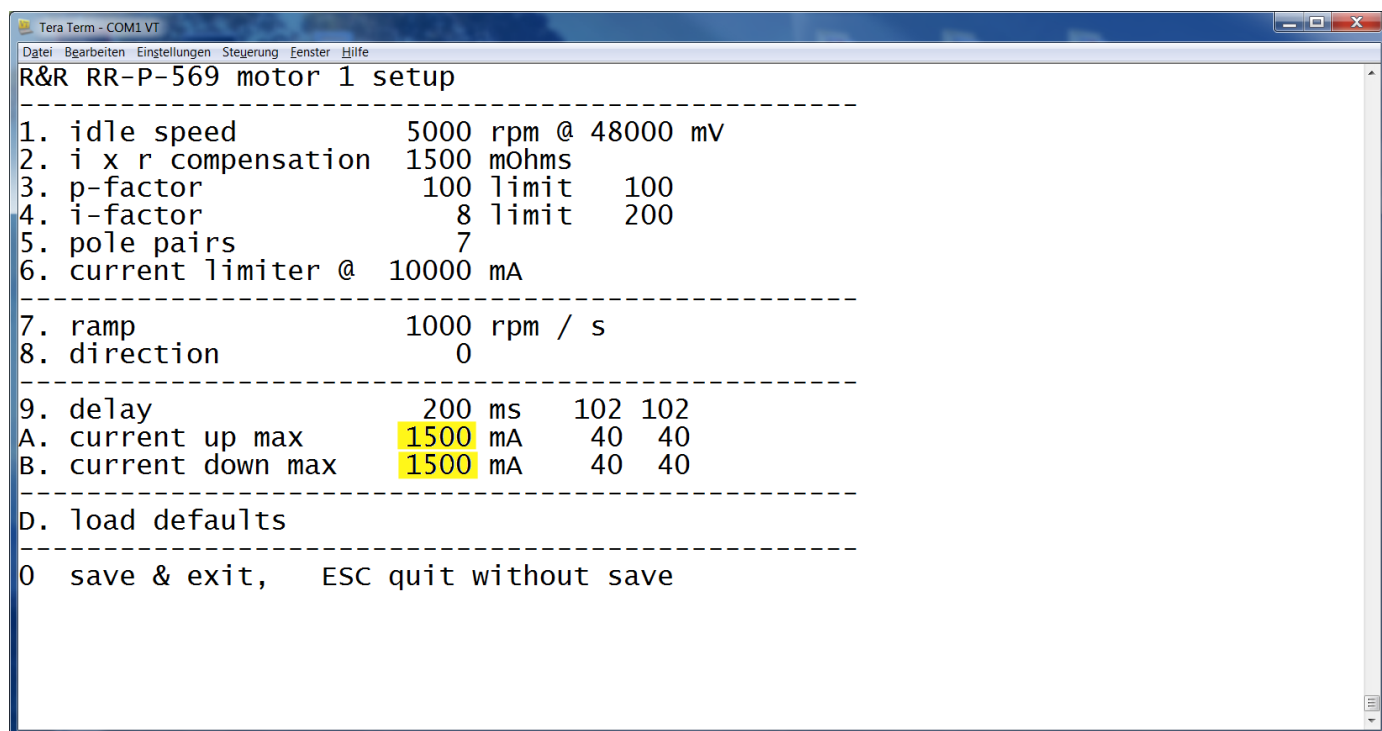
application#  2          speed start  500          speed run  4000          speed stop  500

=====
press M1 or M2 for Motor parameter setup
press A for set application
press I for interactive mode
```

FIGURE 6: MENU RR-P-569 MOTOR CONTROLLER

If necessary press space to redraw.

Press M1 to modify the current max values of Motor 1.
Press M2 to modify the current max values of Motor 2.
Use the same parameters for both motors
The menu is case sensitive!
The following menu will appear:



```
Tera Term - COM1 VT
Datei Bearbeiten Einstellungen Steuerung Fenster Hilfe
R&R RR-P-569 motor 1 setup
-----
1. idle speed          5000 rpm @ 48000 mV
2. i x r compensation 1500 mOhms
3. p-factor           100 limit   100
4. i-factor           8 limit   200
5. pole pairs         7
6. current limiter @ 10000 mA
-----
7. ramp                1000 rpm / s
8. direction           0
-----
9. delay                200 ms   102 102
A. current up max      1500 mA   40 40
B. current down max    1500 mA   40 40
-----
D. load defaults
-----
0 save & exit,   ESC quit without save
```

FIGURE 7: MENU RR-P-569 MOTOR 1 SETUP

Increase the values in steps of 100mA.

Press A to change current up max.
Press B to change current down max.

Don't change other parameters.
Press key "0" (Zero) to save the changes.
Use ESC to exit without saving.

5. ST107 SOFTWARE UPDATE

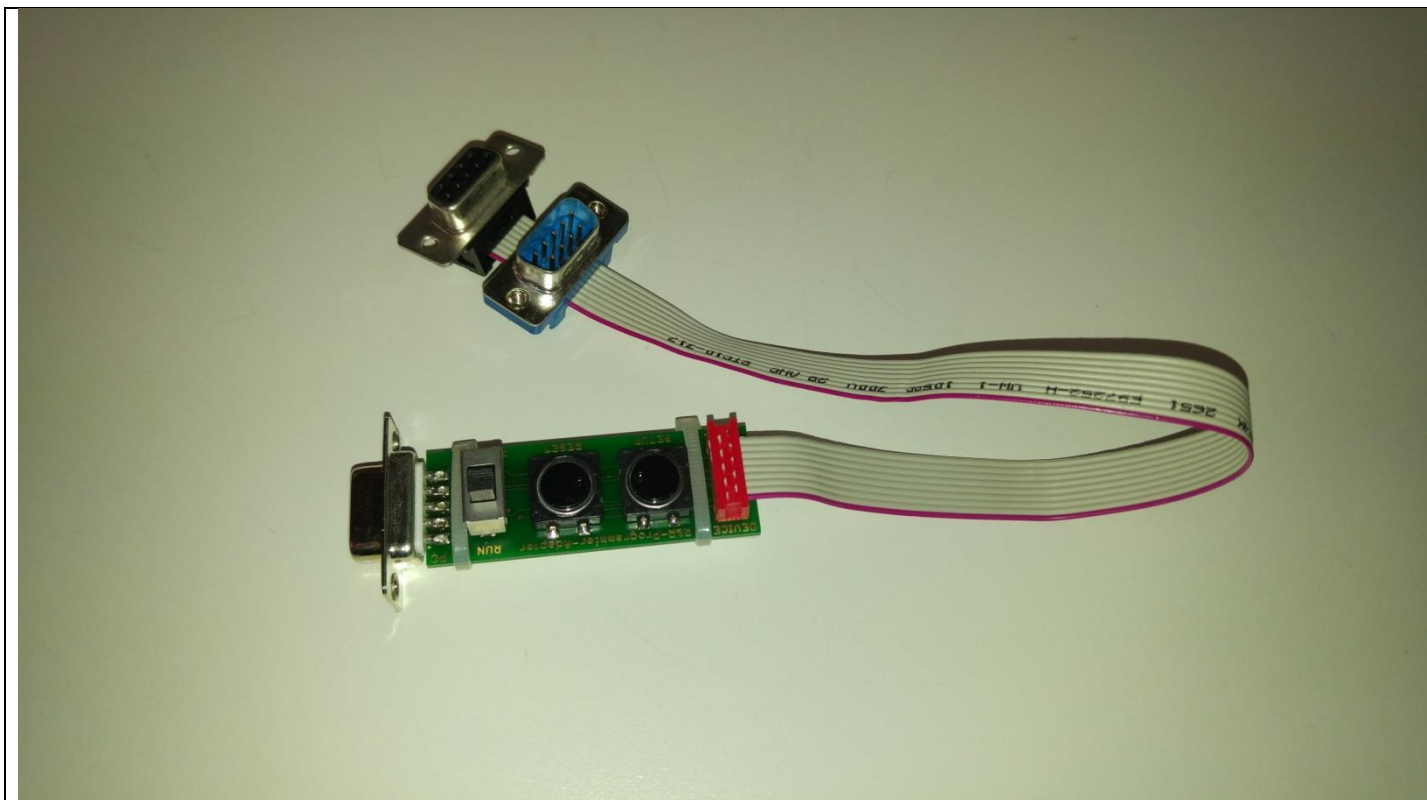


FIGURE 8: PROGRAMMING ADAPTER RR-P-570

Use Program adapter RR-P-570

Connect the adapter to J7 (service interface 1)
Connect the serial port to a windows PC.
Set the Switch to position "PROG".
Switch on the PC.
Wait until PC finished booting up.
Switch on the controller ST107 (RR-P-569).
Use the supplied flash utility for FX series.
Start the program.
Load the firmware file.
Download the new firmware by using the FULL-OPERATION
Wait until the download is completed.
Set the Switch to position "RUN".
Press "RESET" button.