Positioner BLDC-R1-24VDC

General

The electronic AGS-positioner BLDC-R1 is used to control the electric actuator with a continuous current or voltage signal.

During operation of the positioner, the pre-set setpoint is compared with the actual value (actual position of the drive). If there are no matching values, the drive to the position specified by the set-point is dealt.

If a procedure of the actuator caused by overload or blocking is not possible, is a safety shutdown of the drive with simultaneous fault message.

Control computer

A microcontroller assesses the SET, MR and ML operating keys, the Man/Auto and Inv/Norm configuration switches and the activation of the electro-mechanic limit switches.

As a controlled variable, the microcontroller determines the absolute position of the drive and the externally introduced setpoint. An analogue actual value will be generated as power and voltage for the current drive position and provided on the terminals.

The control computer part comprises a blue status LED for the signalling of certain end position programming or operating conditions and a yellow LED that indicates the predefined setpoint / actual value range. The control computer is pre-programmed with the firmware over its 6 pole programming interface at the factory.

Power Part

The power part comprises the jumper switching stages for the motor, the respective LEDs as indicators for the active clockwise and counter-clockwise rotation and inputs with LED indicators for the detection of the motor discontinuation by the electro-mechanic end-switches of the drive.

Analogue Front-End

In the analogue circuit, the power or voltage setpoints fed externally into the terminals 12/13/14 will be converted into voltages that can be used by the control computer. However, a selection must be made via a jumper whether the voltage or power input terminal should be used.

The actual values of voltage and power will be generated from a PWM signal of the control computer and will be provided to the terminals 15/16/17.

A fault signal relay with indicator LED will be controlled directly by the control computer and provides a potential-free fault signal contact (1xUM) at terminals 9/10/11.

The setpoint input and the actual value output are galvanically connected and connected with the 24VDC supply voltage at the earth-side and/or with the minus-side!

Technical data:

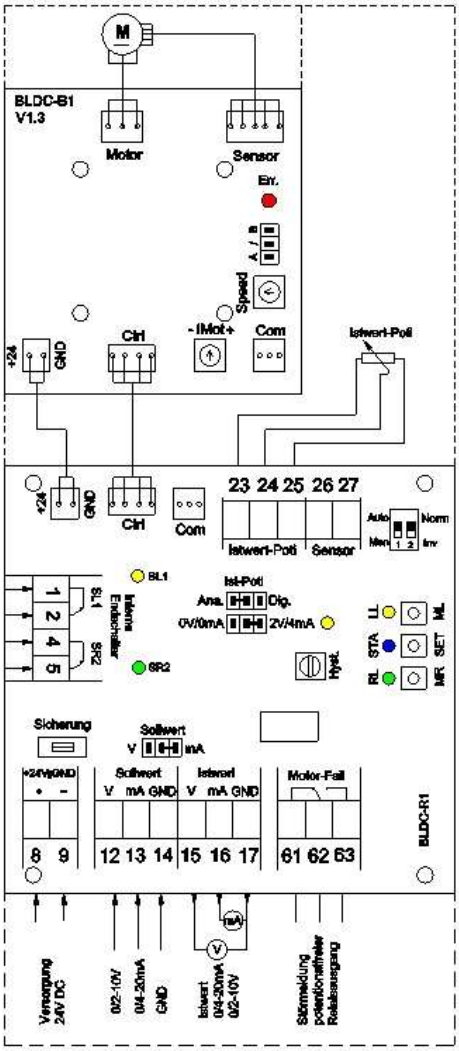
Power supply:
24VDC, stabilized

Set value-In:
0/2 - 10V DC (Ri = 10 kΩ)

0/4 - 20mA (Ri = 250 Ω ≙ 0/1-5V)
Voltage >5V may lead to damages!

Actual value-Out (active):
0/2-10V (burden min. 5 kΩ)
0/4-20mA (burden max. 500Ω)

Control accuracy:
ca. 1 - 6 % of the max. displacement depending on the regulating time, adjustable via Poti „Hyst%“



Overview of all LEDs

SM	Fault signal relay	RED during active fault message
LL	Motor in counter-clockwise rotation	YELLOW when motor is switched to counter-clockwise rotation
RL	Motor in clockwise rotation	GREEN when motor is switched to clockwise rotation
STA	Status	BLUE or BLUE FLASHING as status indication of the control computer
2V/4mA	Setpoint	YELLOW at 2V/4mA, OFF at 0V/0mA, flashing when below value 2V/4mA
SL1	End-switch, left	YELLOW when end-switch is activated with counter-clockwise rotation
SR2	End-switch, right	GREEN when end-switch is activated with clockwise rotation

Overview of Keys, Switches and Fuses

M/A	Manual/Automatic	Configuration slide switch for operational mode
Inv / Norm		Norm: 0/2-10V or 0/4-20mA, Invers: 10-0/2V or 20-0/4mA
ML	Manual counter-clockwise rotation	Key for counter-clockwise rotation or configuration
SET	Setting	Key for configuration or blocking reset
MR	Manual clockwise rotation	Key for clockwise rotation or configuration
Poti HYST		Setting hysteresis
Set value		Jumper V/mA
Ist-Poti		Jumper Potentiometer or Initiator
Soll-Offset		Jumper 0V/0mA or 2V/4mA

Connection Terminals

- **1** End-switch SL1 (Open / Close)
- **2** End-switch SL1 (Com)
- **4** End-switch SR2 (Open / Close)
- **5** End-switch SR2 (Com)

- **8** Mains 24V +
- **9** Mains 24V GND

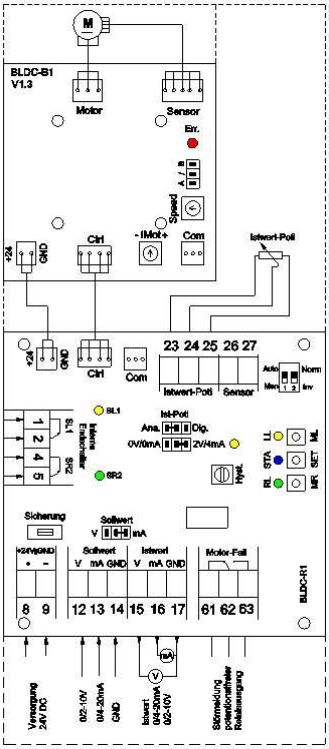
- **12** Setpoint voltage input (0/2 ... 10V)
- **13** Setpoint current input (0/4 ... 20mA)
- **14** Setpoint reference potential mass (GND)
- **15** Actual value voltage output (0/2 ... 10V)
- **16** Actual value currentoutput (0/4 ... 20mA)
- **17** Actual value reference potential mass (GND)

- **23** Position potentiometer reference potential mass (GND)
- **24** Position potentiometer Tap, Voltage between 0 ... 5V proportional to angle
- **25** Position potentiometer 5V
- **26** Sensor
- **27** Sensor

- **61** Fault indication relay NC (in the event of non-error, the relay is tightened)
- **62** Fault indication relay COM
- **63** Fault indication relay NO

Attention! Potential-free contacts for max 24VDC

Terminals 14, 17 and 23 (mass GND) are electrically connected
Terminals 12-17 and 23-25 are electrically mounted to the low voltage potential of the controller electronics.



Setting of the Manual mode (Man.)

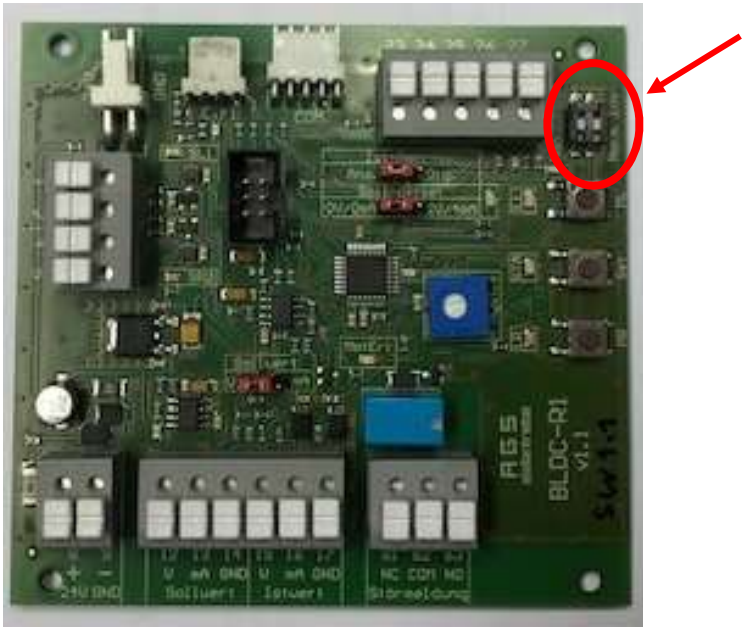
General

The selection between the automatic and manual mode is made via the jumper Man./Auto.
The BLDC-R1 positioner must be set to manual mode before commissioning.

The manual mode is used to program the drive end positions together with any manual method of the drive to the left or right until the electromechanical limit switches are reached.

In manual mode, the fault signal relay is always activated, the indicator LED "MotErr" (ROT) lights up.

In manual mode, the following functions are possible:
- manual driving in both directions
- switching of the analog setpoint/actual value range
- Programming of both end positions



Selection of the set value

First, the "SW" jumper must be inserted on the desired selection (voltage or current). For the selection of the setpoint value, please now enter the supply voltage to terminals 8 and 9.

Switchover of the analogue Setpoint / Actual Value Ranges (only in Manual Mode)

In general, two value ranges can be selected for the valid setpoints and actual values:
0 ... 10V and 0 ... 20mA or 2 ... 10V and 4 ... 20mA

The actual value at the respective terminals is always available both as voltage and as power.

Über die Steckbrücke „Soll-Offset“ kann folgender min. Sollwert gewählt werden:

The following lowest setpoints can be selected via the "Soll-Offset" jumper:

0V/0mA or 2V/4mA

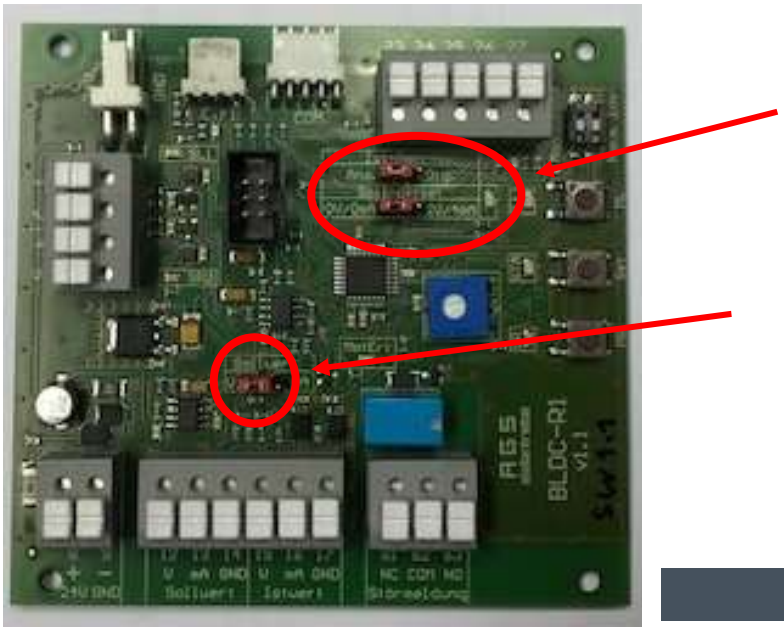
Über die Steckbrücke „Ist-Poti“ kann zwischen einem Istwert-Potentiometer oder einem Istwert-Sensor gewählt werden. Dies wird von AGS-Stellantriebe vorgeben.

The "Ist-Poti" jumper can be used to select between an actual value potentiometer or an actual value sensor. This is dictated by AGS-Stellantriebe GmbH.

Signalling of the Setpoint / Actual Value Range in the Manual and Automatic Mode

The state of the selected setpoint / actual value area is indicated by LED “2/4mA” (yellow).

LED “2/4mA” (yellow) off = Setpoint / actual value range 0 ... 10V and 0 ... 20mA
LED “2/4mA” (yellow) on = Setpoint / actual value range 2 ... 10V and 4 ... 20mA

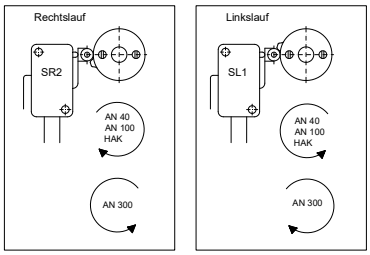


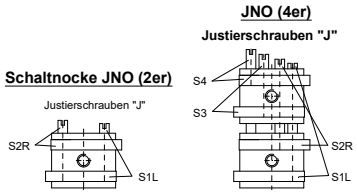
Programming of both End Positions (only in Manual mode)

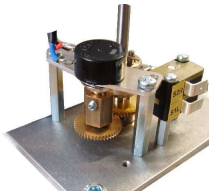
In manual mode, end positions can be programmed at any time using the SET, MR and ML keys.

Prior to the end position programming, the end-switches and the actual value potentiometer must be set.
Manually move the left end position and set the adjusting cam to the SL1 end-switch.
Then, manually move the right end position and set the adjusting cam to the SR2 end-switch.
The potentiometer will automatically make a rough setting via its slip clutch.

If the potentiometer is standing at its mechanical end stop upon arrival of the end-switch (outside of the coil), it must be re-adjusted using the slip clutch.
The voltage at terminals 23 & 24 should be approx. 0.2V (SR2) or 4.8V (SL1).







Programming of the right End Position

With the MR key, the drive is moved into the right end position and then the SET key is pressed. Then, the Status LED (BLUE) will flash to indicate that the end position can now be programmed. By pressing the MR key within approx. 3s, the current drive position will be saved as right end position. The Status LED (BLUE) goes back to flashing permanently.

Programming of the left End Position

With the ML key, the drive is moved into the left end position and then the SET key is pressed. Then, the Status LED (BLUE) will flash to indicate that the end position can now be programmed. By pressing the ML key within approx. 3s, the current drive position will be saved as left end position. The Status LED (BLUE) goes back to flashing permanently.

If the SET key has been accidentally pressed, you can wait until the flashing of the Status LED (BLUE) becomes permanent again. The permanent flashing indicates that the started end position programming has been completed or cancelled due to timeout.

Manual Movement in both Directions

With the MR key, the drive is manually driven to the right side until the mechanical end-switch has been activated. During operation, the SR2-LED (GREEN) is on. A programmed end position switch-off is ineffective. The activation of the end-switch is signalled by the SR2 LED (GREEN).

With the ML key, the drive is manually driven to the left side until the latest mechanical end-switch has been activated. During operation, the SL1-LED (YELLOW) is on. A programmed end position switch-off is ineffective. The activation of the end-switch is signalled by the SL2 LED (YELLOW).

Automatik-Modus (Auto)

The selection between the automatic and manual mode is made via the jumper Man./Auto.

The automatic mode is used for standard operation of the position controller by means of a setpoint control signal and an actual value feedback. It must be ensured that an inspection of the drive regarding the end-switches and the rotation direction as well as regarding the correct programming of the end positions has been performed successfully in advance.
The SET, MR and ML keys are completely locked in the automatic mode. Within the programmable end positions, the drive moves angle-proportionally according to the pre-set target size.

Normal Operation - “Inv / Norm“ switch on Norm
Minimum setpoint means right end position.
Maximum setpoint means left end position.

Invers Operation - “Inv / Norm“ switch on Inv
Minimum setpoint means left end position.
Maximum setpoint means right end position.

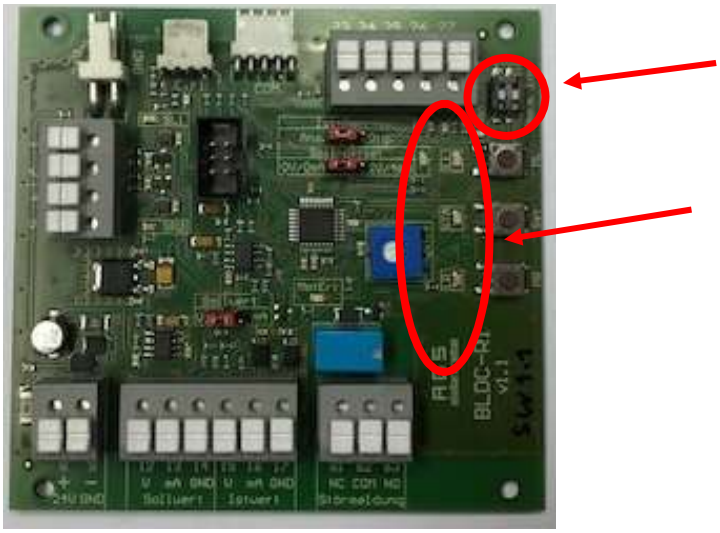
The LED (BLUE) status flashes permanently.
Die RL-LED (GREEN) only flashes during movements of the drive to the right.
Die LL-LED (GREEN) only flashes during movements of the drive to the left.

Lower Deviation / Discontinuation Setpoint

During selection of the setpoint / actual value range 2 ... 10V and 4 ... 20mA, the clear lower deviation of the minimum setpoint is detected as a discontinuation and is therefore signalled as an error.
Error condition: Setpoint 0 ... 1.6V or 0 ... 3.2mA at range selection 2 ... 10V and 4 ... 20mA

The fault signal relay reports faults with a delay of approx. 1s, the corresponding SM-LED (RED) flashes continuously. The Status LED (BLUE) flashes continuously in a 0.25s change.

The drive moves into the position of the right end position (assessment as minimum setpoint).



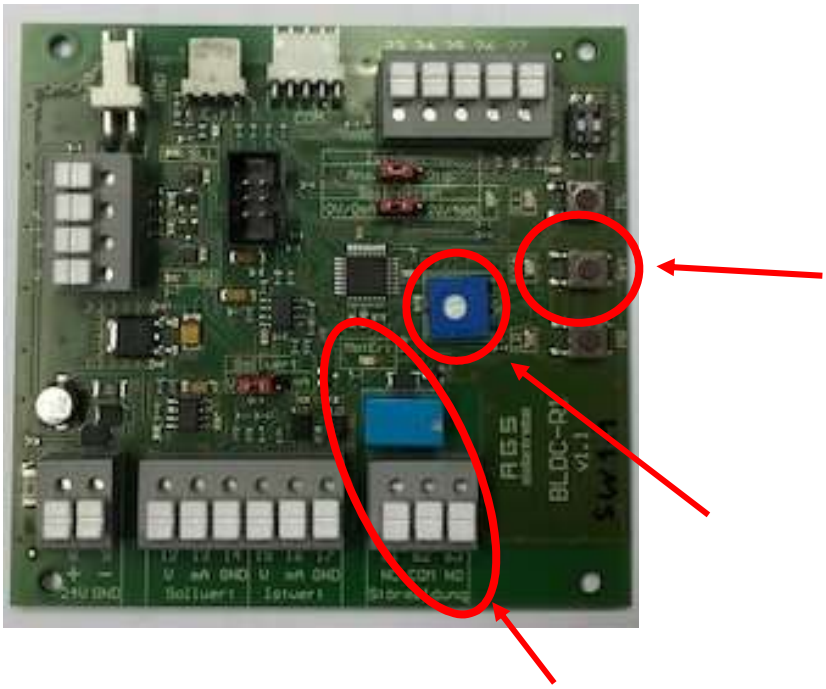
Blocking of the Drive, Overload Detection

A blocking of the drive is only detected via the current limit on the Base board BLDC-B1. If this set power limit is exceeded, the motor is switched off and the fault signal relay is activated and the LED „MotErr“ (RED) lits.

The Status LED (BLUE) is switched off, all keys besides SET are blocked.
For the removal of the fault, the drive can be switched to the manual mode.
After remedying the fault, the drive can be restarted by pressing the SET key and switching off and on of the 24VAC operating voltage.
In automatic mode, the drive reacts immediately after the restart to the defined setpoints.
In manual mode, the drive can be moved manually after the restart.

Hysteresis / Regulating accuracy

ca. 1 - 6 % of the max. displacement, depending on the regulating time, adjustable via Poti „Hyst%“
Only when reversing the potentiometer "Hyst%" adjustable hysteresis is effective for the assessment of the control signal.
Exception: After switching on the operating voltage, once no hysteresis is effective, the actuator will respond with minimum threshold.



Overview LED Functions

Manual mode

RED always on in manual mode

Set setpoint / actual value range:
BLUE 3x FLASHING, then OFF until none of the SET or MR and ML keys are pressed.

Manual motor operation:
RED, BLUE and GREEN for right turn or YELLOW for left turn

End position programming initiated:
RED and BLUE FLASHES until timeout or execution of the setting
End position programming executed: Immediate change after normal operation

Normal operation standstill:
RED and BLUE

Normal operation with motor movement:
RED, BLUE and GREEN for right turn or YELLOW for left turn
additionally: ESR GREEN for activation of right end-switch
ESL YELLOW for activation of left end-switch

Automatic mode

Clear lower deviation of the minimum control setpoint in the configuration 4...20mA and 2...10V (from approx. 3.2mA or 1.6V) as discontinuation detection:
RED and BLUE on, YELLOW flashing (as indication for the discontinuation)

Normal operation standstill:
BLUE

Normal operation with motor movement:
BLUE and GREEN for right turn or YELLOW for left turn

Blocking of the drive, blocking time reached:
RED (as fault indicator)