

# Positioner RWS2-115VAC

## General

The electronic AGS-positioner RWS2 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.

## Power Supply Unit

An internal voltage generator creates a stabilised operating voltage out of 115V AC for the operation of the controller assembly.

## Control Computer

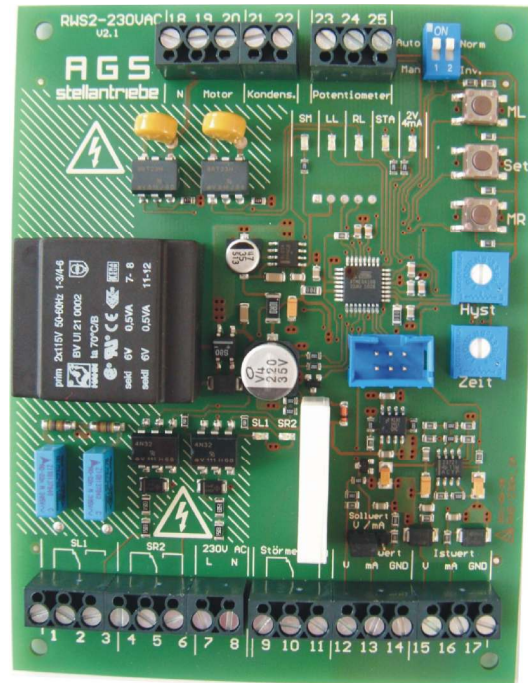
A microcontroller assesses the SET, MR and ML operating keys, the Man/Auto and Inv/Norm configuration switches, the active setting of the configuration potentiometers for hysteresis and blocking time as well as the activation of the electro-mechanic end-switches.

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 at 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 isolated Opto-TRIAC switching stages for the motor, the respective LEDs as indicators for the active clockwise and counter-clockwise rotation and Darlington optocouplers 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 separated from the supply voltage. However, the setpoint input and the actual value output are not separated from each other.

### 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
SL1	End-switch right	GREEN when end-switch is activated with clockwise rotation

### Overview of Keys and Switches

Man./Auto	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
ML	Manual clockwise rotation	Key for clockwise rotation or configuration
HYST potentiometer	Hysteresis Setting	
Time potentiometer	Setting of the switch off time when blocked	

### Overview of Connection Terminals

SL1	End-switch, left
SR2	End-switch, right
230VAC	Mains voltage
Fault message	potential-free 1xUM contact of the fault signal relay
Setpoint	Input for the setpoints for voltage or power
Actual Value	Output for the actual values of voltage and power
Motor	Motor connection (N, A, B)
Capacitor	Motor capacitor (internally connected with the motor connections A and B)
Potentiometer	10k potentiometer for the absolute position determination

### Technical data

#### Supply voltage:

115V +/-10% AC, 50-60Hz

#### 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!

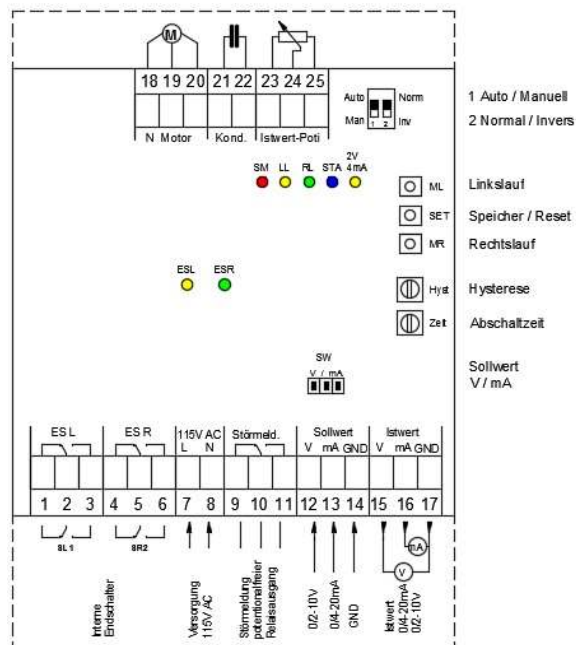
#### Actual value-Out (active):

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,



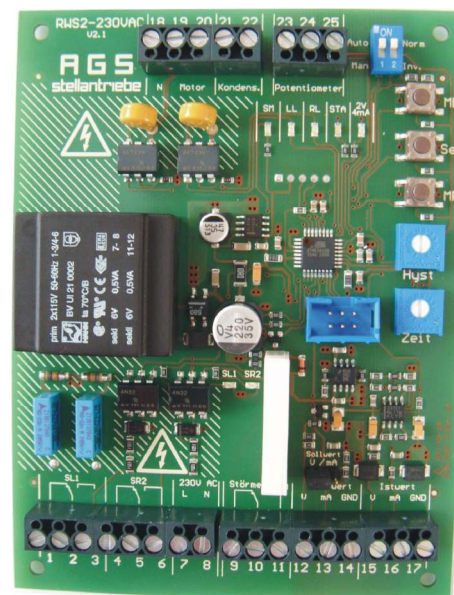
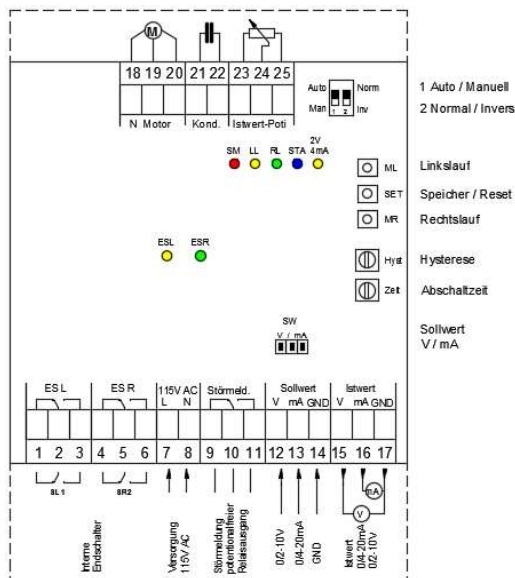
## Connection Terminals

- 01 End-switch SL1 (normally closed)
- 02 End-switch SL1 (Com)
- 03 End-switch SL1 (normally opened)
- 04 End-switch SR2 (normally closed)
- 05 End-switch SR2 (com)
- 06 End-switch SR2 (normally opened)
- 07 Mains 115V L
- 08 Mains 115V N
- 09 Fault signal relay NC (if no(!) fault is present the relay is closed)
- 10 Fault signal relay CO
- 11 Fault signal relay NO
- 12 Setpoint voltage input (0/4 ... 10V)
- 13 Setpoint power input (0/2 ... 20mA)
- 14 Setpoint reference potential mass (GND)
- 15 Actual value voltage output (0/4 ... 10V)
- 16 Actual value power output (0/2 ... 20mA)
- 17 Actual value reference potential mass (GND)

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.

- 18 Motor N
- 19 Motor A
- 20 Motor B
- 21 Motor capacitor
- 22 Motor capacitor
- 23 Position potentiometer reference potential mass (GND)
- 23 Position potentiometer pickoff, voltage between 0 ... 5V proportionally to the angle
- 25 Position potentiometer 5V



## Selection between Automatic and Manual Mode through the Slide Switch Man./Auto

### Manual Mode (Man.)

The manual mode is used for the programming of the drive end positions together with the random manual movement of the drive to the left or the right side until reaching the electro-mechanical end-switch.

In manual mode, the fault signal relay is always activated, the display SM-LED (RED) is on.

The following functions can be implemented in the manual mode:

- manual movement in both directions
- programming of both end positions

Special function at simultaneous connection of the operating voltage:

- switchover of the analogue setpoint / actual value area
- induction of a rotation direction detection

### Rotation Direction Detection

The rotation direction detection is used for control of the drive and the function of the position determining potentiometers. It is a prerequisite that the connection of the motor has been implemented free of errors and that the motor turns clockwise when the clockwise rotation has been selected.

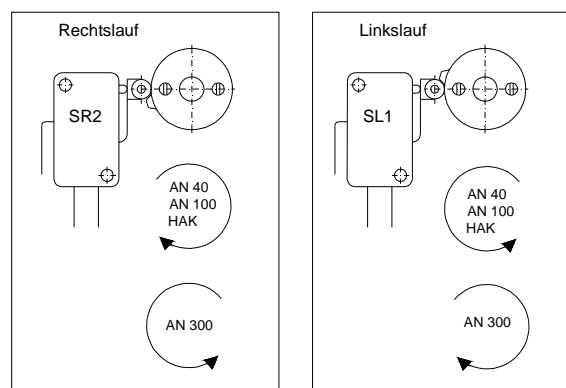
When simultaneously pressing only the SET key (at least for 1s) and connecting the operating voltage, the motor rotates acc. to the definition for the duration of 2s in clockwise direction. This determines the change in position on the potentiometer and the rotation direction of the potentiometer is calculated to "clockwise".

In case of a "counter-clockwise" potentiometer turn, this will be saved and automatically correctly calculated for the future.

In both situations, the Status LED (BLUE) flashes 3x for confirmation.

After releasing the SET key, the Status LED (BLUE) flashes permanently.

If the rotation direction cannot be determined, e. g. in case of a faulty potentiometer or drive position on the right end-switch, the Status LED (BLUE) flashes permanently.



### **Switchover of the analogue Setpoint / Actual Value Ranges**

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

For the selection of the setpoint as control voltage or control power, besides the correct terminal selection the jumper "SW" must be connected correctly.  
 The actual value at the respective terminals is always available both as voltage and as power.

In case of simultaneous pressing of the SET key and the ML key (for at least 1s) and connection of the operating voltage, the following setpoint / actual value range is selected:

2 ... 10V and 4 ... 20mA. LED "2V/4mA" flashes yellow.

In case of simultaneous pressing of the SET key and the MR key (for at least 1s) and connection of the operating voltage, the following setpoint / actual value range is selected:

0 ... 10V and 0 ... 20mA. LED "2/4mA" off.

### **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

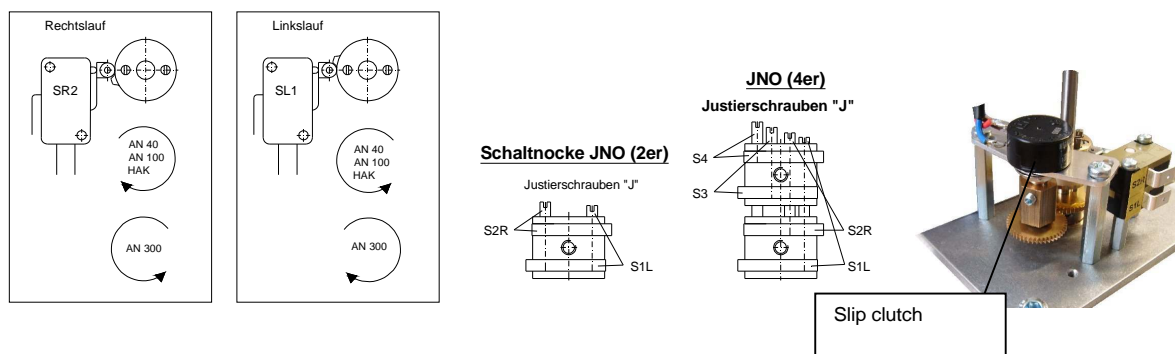
## Programming of both End Positions

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 implement a rough setting through 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 on the 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 in 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 key ML within approx. 3s, the current drive position will be saved as left end position. The Status LED (BLUE) goes back to flashing permanently.

When accidentally pressing the SET key, 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 SL1 LED (YELLOW).

### **Automatic Mode (Auto)**

The automatic mode is used for the 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 Status LED (BLUE) 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 and 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).

After the removal of the fault, the drive immediately goes back into the normal operating condition and moves acc. to the setpoint values.

### **Blocking of the Drive, Overload Detection**

A blocking of the drive is only detected in the automatic mode through the standstill of the position determining potentiometer. The duration of the blocking is determined and compared with a value set in the parameter for the Time potentiometer. If this set blocking duration is exceeded, the motor is switched off and the fault signal relay is activated. 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 the removal of the fault, the drive can be restarted by pressing the SET key and switching off and on of the 115VAC 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**

Only in case of a rotation direction change is a hysteresis to be set over the HYST potentiometer effective for the assessment of the control signal.

Exception: After the connection of the operating voltage, no hysteresis is effective initially, the position controller reacts with a minimum switching threshold.

## Overview LED Functions

### Manual Mode

RED always on in manual mode

Set setpoint / actual value range is implemented:

BLUE 3x FLASHING, then OFF until none of the SET or MR and ML keys are pressed.

Rotation direction detection started:

RED, GREEN and BLUE

Rotation direction detection implemented and detected:

RED and BLUE 3x FLASHES then OFF until SET key is released

Rotation direction detection implemented and NOT detected:

RED and BLUE FLASHES permanently

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 and 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)