Rotary switch for function

Set button

Solder bridge for control signal

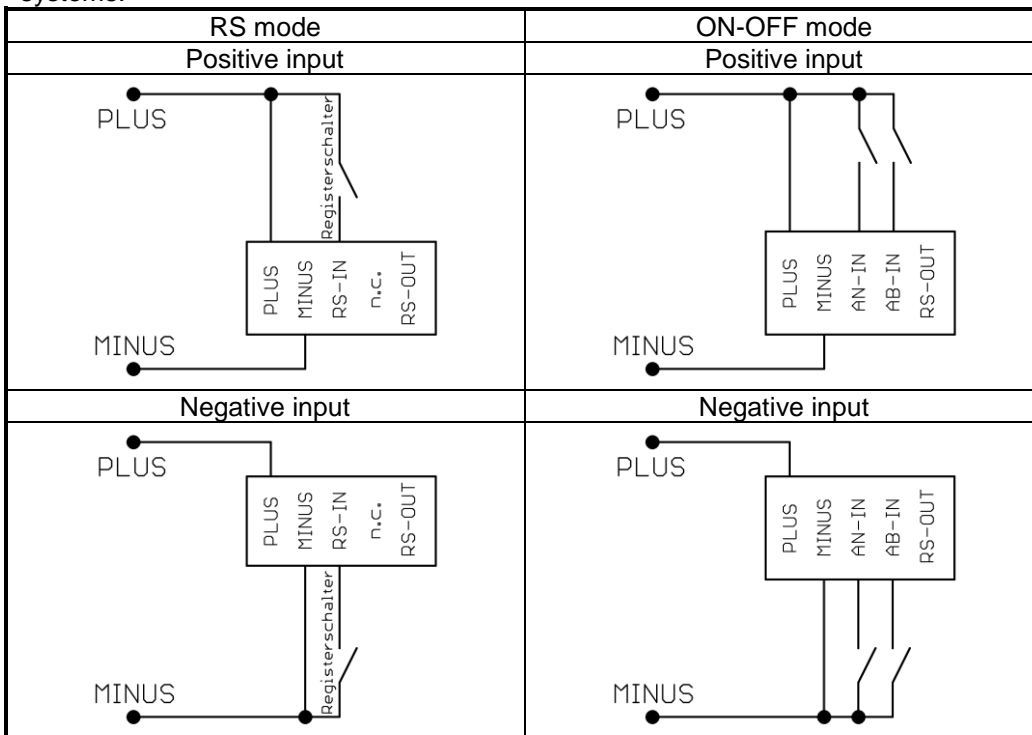**replaceable fuse TR5 - 6,3A slow**

The S.1 magnet sets the benchmark for the most advanced generation of slider solenoids. It uses four optical sensors for measuring the motion speed of the slider. The automatic force adjustment feature sets the perfect speed assuring that the magnet comes to a soft and silent stop at the end position. The control circuitry readjusts the force in case of load changes so that the slider moves at optimum speed and reaches the exact end position without fail.

Wiring:

The S.1 magnet is compatible with most standard controllers. The polarity of the control signal can be changed by a solder bridge on the circuit board.

Positive input (standard)	Negative input

The magnet can be controlled by way of a continuous RS signal (stop switch) which is applied as long as the stop is engaged, or by way of pulsed ON-OFF signals generated by some capture systems.
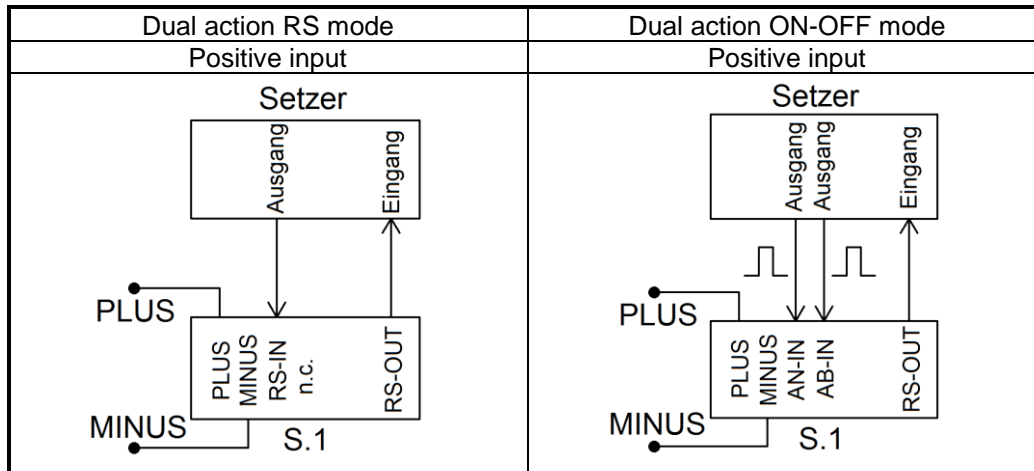
RS mode	ON-OFF mode
Positive input	Positive input
Negative input	Negative input

For dual action:

Dual action RS mode	Dual action ON-OFF mode
Positive input	Positive input
Setzer Ausgang Eingang PLUS PLUS MINUS RS-IN n.c. RS-OUT MINUS S.1	Setzer Ausgang Ausgang Eingang PLUS PLUS MINUS AN-IN AB-IN RS-OUT MINUS S.1

The RS-OUT provides a signal to the capture system to indicate stop engagement.

Set-Up

Setting the upper current limit
After magnet cabling, set the upper current limit as required by the expected force (see overview, feature 2). Standard setting is level 1. Level 1 corresponds to a force of approx. 45 N at a current of 1.4 A (24 V), the standard round slider action solenoid (cat.no. 3 010 30).
Level 4 provides approx. 65 N, which is similar to the standard rectangular magnets (cat.no. 3 010 60). On this level, the magnet can draw a current of up to 3 A. In extreme cases, up to 105 N can be supplied at a current of 6 A.
The automatic force regulation automatically increases the current in case of a higher mechanical slider resistance without, however, exceeding the preset limit. This limitation prevents any power supply overload. The upper current limit should be set in such a way as to allow the organ power supply to switch all magnets simultaneously. The power limit should be increased exclusively for those sliders which sometimes need more force than the others.
Higher speed settings (see feature 6) may also require a higher current limit.

Teaching the required force
Once the magnet has been installed and wired, use the TEACH function to initialize the teaching process (see feature 1).
In TEACH mode, the slider is moved back and forth until the correct working force parameter is set.
The LED chain indicates the currently required force in relation to the preset maximum current. If the indicator is already at the upper end of the scale, there may not be sufficient resources available for the compensation of a later sluggishness. In such a case, check the mechanical slider action and increase the current limit if indicated (this measure requires a new TEACH process).

Error indicators
If the slider has too much friction, the LED 8 lights up permanently (see functions 8, 9). If the Error-LED start flashing as well, the slider is either blocked completely or some of the optical sensors are defective. In this case, please check if the slider can be moved by hand and initiate a new teaching cycle. If the Error-LED continue to flash, please check the sensors using the diagnostics function 7.

Operating Modes and Functions

Feature 0: RUN

This is the standard operating mode. For testing, press the set button to move the magnet to the opposite position.

LEDs no.1 to 8 indicate the currently required force:
- LED 1 → force < 60%
- LED 2 → force > 60%
- LED 3 → force > 70%
- LED 4 → force > 75%
- LED 5 → force > 80%
- LED 6 → force > 85%
- LED 7 → force > 90%
- LED 8 → force > 95%

When the magnet moves towards ON, the force required for ON is displayed. When it moves towards OFF, the display outputs the necessary OFF force.

A large difference between the respective forces usually indicates a mechanical slider problem. In that case, check the movability of the respective slider.

Feature 1: TEACH

Teach process:

1. Switch the rotary switch to position "1"
2. LED 5 starts flashing
3. Press the set button to initiate the teach process
4. The magnet moves back and forth. LEDs show the required force (see feature 0)
   - 4a - the teach process is finished when the force indicator starts flashing.
   - 4b - the indicators show a running light moving from LED 1 to LED 8 if the slider motion is too sluggish or the maximum force is too low (see feature 2)
5. Return the rotary switch to position "0"

The teach process can be stopped and started any time by pressing the set button.

Feature 2: LIMIT / MAX. CURRENT

The maximum admissible current is set with the set button.

	12V		24V	
	Current	Force	Current	Force
Level 1	2.0A	approx. 30N	1.4A	approx. 45N
Level 2			2.0A	approx. 51N
Level 3	2.3A	approx. 34N	2.5A	approx. 58N
Level 4			3.0A	approx. 65N
Level 5	2.8A	approx. 41N	3.5A	approx. 72N
Level 6			4.0A	approx. 79N
Level 7	3.0A	max. 45N	4.5A	approx. 86N
Level 8			6.0A	max. 105N

Attention: Please note that a higher force always requires a higher current. This may overload the power supply or organ rectifier. Prior to any force increase make sure that the organ power supply can provide the current as needed for all magnets.

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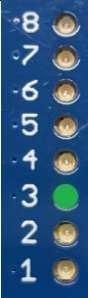
Feature 3: MODE (A)

The slider action solenoid has different operating modes for different applications

Mode 1	Mode 2	Mode 3	Mode 4
RS- Modd	RS-Modus **inverted**	RS-Mode without IP	RS-Mode without IP **inverted**

Mode 5	Mode 6	Mode 7	Mode 8
ON-OFF mode	ON-OFF mode **inverted**	ON-OFF mode without current feed when end position is reached	ON-OFF mode without current feed when end position is reached **inverted**

IP = Initial Positioning (for dual action)

The standard modes (with initial positioning) position the sliders upon activation. If, for example, the organ is switched on with the stop switch engaged, the slider is moved to ON position irrespective of its current position

The modes without initial positioning function do **not** position the sliders upon activation. If, for example, the organ is switched on with disengaged stop switch and a slider is in ON position, the slider remains where it is.

Should you discover after mounting the magnets, that the sliders operate in the oposite direction, it is very easy to invert the operating direction of the slider magnet.

LED 8 off   → normal direction of movement (on / off as indicated on the control board)
LED 8 on   → inverted direction of movement

When the direction is inverted, the magnet moves to the indicated OFF-position when the control signal is activated.

Feature 4: MODE (B)

Here, you can activate modes with holding force in different positions.

no holding force	holding force in ON position	holding force in OFF position	holding force ON and OFF	holding force ON with damped decay	holding force OFF with damped decay

The holding force serves for holding, for example, mechanical couplers. In the holding position, a current of 1A is applied to the magnet coil. The force cannot be adjusted.

If coupler assemblies return to their rest position by gravity, choosing damped decay may be useful. In these modes, the S.1 will ramp down the holding current gradually to make the coupler return more softly.

Feature 5: RS OUT MODE

The slider action solenoid has several sensors for slider position detection. RS signal output can thus be varied.
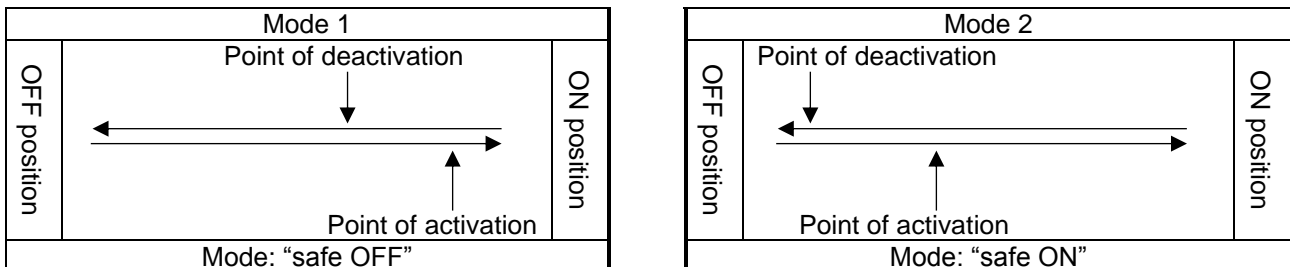
Feature 6: SPEED

Switch position 6 allows for the adjustment of the slider motion speed in 8 levels.
Standard speed setting is level 3. On this level, the operating noise is kept at a minimum. The S.1 magnet runs at reduced speed to avoid the typical thump during slider switching. It comes to a smooth stop at its end position and so enables an almost noiseless stop action.
This behavior may result in a movement which some customers perceive as sluggish, especially when dual action is operated. If a faster response is desired, raise the speed settings. The higher the speed, however, the louder the action sound because the accelerated mass of slider and magnet anchor cannot be braked as effectively before the end position is reached.

Level 1	Level 2	Level 3 (standard)	Level 4	Level 5	Level 6	Level 7	Level 8

Lowest speed   Highest speed

Attention: Remember that a higher speed also increases the magnets' current consumption. Especially the highest levels 6 to 8 can dramatically increase power consumption, e.g. from 2 A on level 3 to 4 A on level 8.

Feature 7: DIAGNOSTICS

The diagnostics function allows testing of the light barrier, input, button and RS output functions.

LED 1 → end position sensor OFF
LED 2 → track sensor OFF
LED 3 → track sensor ON
LED 4 → end position sensor ON
LED 5 → button
LED 6 → ON (RS) input
LED 7 → OFF input
LED 8 → RS output

Feature 8: ERROR RESET

The S.1 saves error conditions and indicates them with LED 8 or the flashing Error-LED. This feature allows fast and easy detection of even transient problems.
To delete the error messages saved to the system, simply press the RESET button.

The saved errors are also deleted when the TEACH process is started.

Feature 9: ERRORS

When the switch is this position, the LEDs indicate the nature of the problem:

LED 1 → blockage in ON direction
LED 2 → blockage in OFF direction
LED 3 → maximum force moving to ON
LED 4 → maximum force moving to OFF