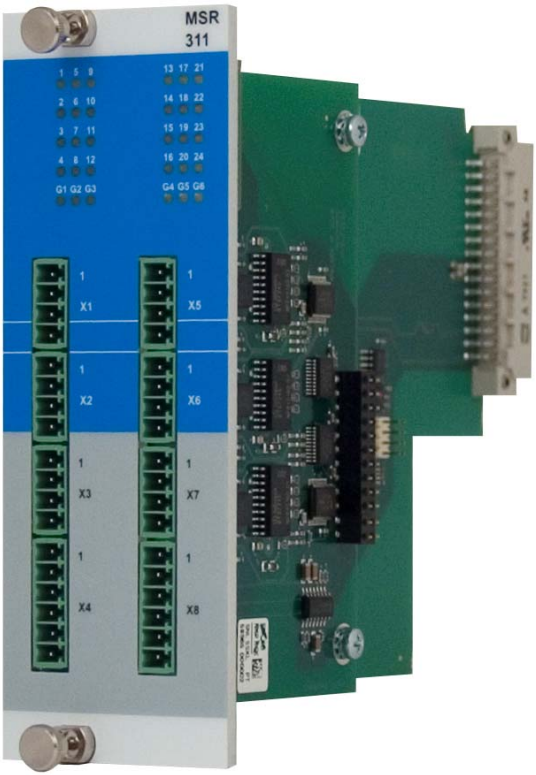
I/O Module MSR 311



This module has 24 short-circuit proof +24 V / 2 A (positive switching) digital outputs, which are back-readable and therefore can also be used as inputs with a +24 V level for reading the signal conditions 0 and 1.

The power supply for each channel group is monitored for over voltage.

Technical Data

Digital Outputs

Number of outputs	24 (back-readable)
Short-circuit proof	Yes
Maximum continuous current load allowed per channel	2 A
Maximum total current (per 4 outputs)	6 A (100 % of on-time)
Maximum total current (entire module)	36 A (100 % of on-time)
Voltage drop over power supply (output active)	≤1 V
Residual current (inactive)	≤12 µA
Turn-on delay	Typically 100 µs
Turn-off delay	Typically 100 µs
Status display	(LEDs: outputs YELLOW, voltage monitor RED)

Status of the back-readable outputs

Number of outputs	24	
Input voltage	Typically +24 V	Maximum +30 V
Signal level	Low: <+4.5 V	High: >+12 V
Switching threshold	Typically +8 V	
Input current	Typically 5 mA (at + 24 V)	
Input delay	Typically 5 ms	

If only the inputs are used with X1 – X3 and X5 – X7, the external supply over X4 and X8 are not required due to the internal circuitry!

Electrical requirements

Supply voltage for Outputs +24 V /1 - 6	18 – 30 V DC
Current consumption of supply voltage for the outputs +24 V /1 - 6	Corresponds to the load on the digital outputs (maximum of 6 A per group of 4)

Voltage monitor

Supply voltage +24 V /1-6	Power supply < 18 V (error LED lights red)

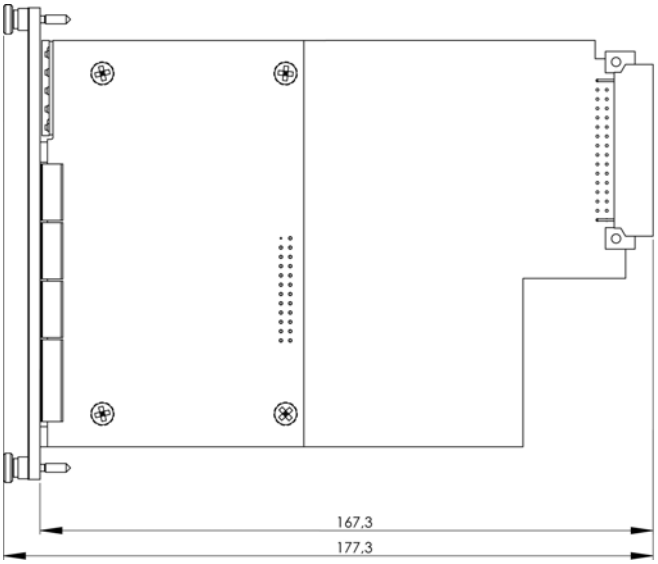
Miscellaneous

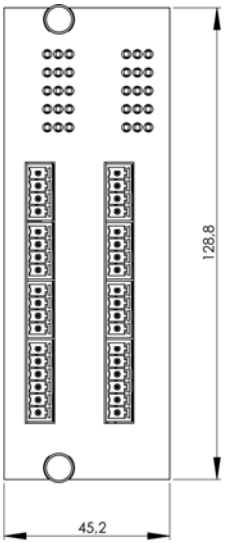
Article number	18-001-311
Hardware version	1.x

Environmental conditions

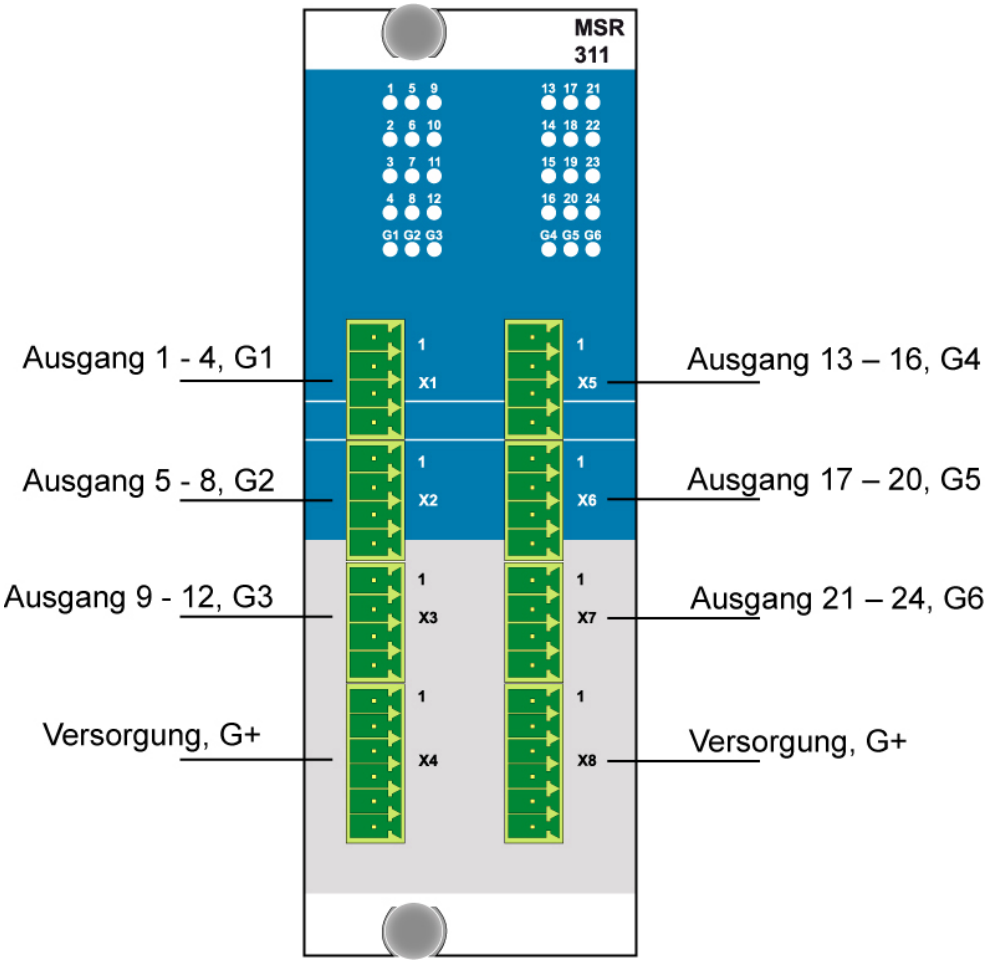
Storage temperature	-30 – +85 °C	
Operating temperature	0 – +60 °C	
Humidity	0 - 95 %, uncondensed	
EMV stability	According to EN 61000-6-2:2001 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s²
Protection Type	EN 60529	IP 20

Mechanical Dimensions

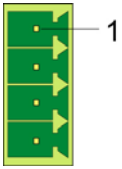




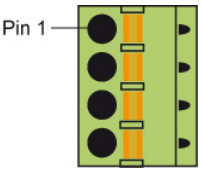
Connector Layout



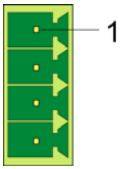
X1: output 1 – 4, G1
Phoenix 4-pin (Phoenix MC1.5/4-G-3.5)



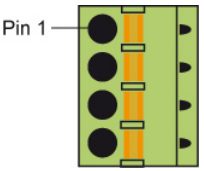
Pin	Function
1	Output 1
2	Output 2
3	Output 3
4	Output 4



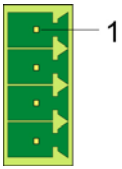
X2: output 5 – 8, G2
Phoenix 4-pin (Phoenix MC1.5/4-G-3.5)



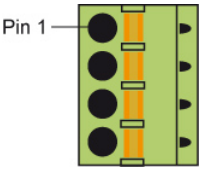
Pin	Function
1	Output 5
2	Output 6
3	Output 7
4	Output 8



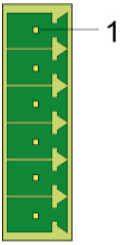
X3: output 9 – 12, G3
Phoenix 4-pin (Phoenix MC1.5/4-G-3.5)



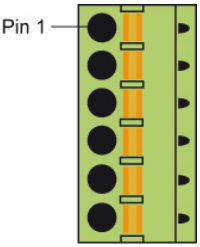
Pin	Function
1	Output 9
2	Output 10
3	Output 11
4	Output 12



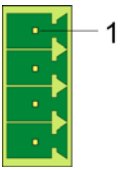
X4: power supply, G+
Phoenix 6-pin (MC1.5/6-G-3.5)



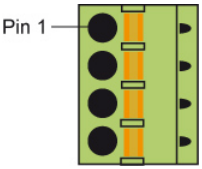
Pin	Function
1	+24 V /1 (output 1 - 4)
2	+24 V /1 (output 1 - 4)
3	+24 V /2 (output 5 - 8)
4	+24 V /2 (output 5 - 8)
5	+24 V /3 (output 9 - 12)
6	+24 V /3 (output 9 - 12)



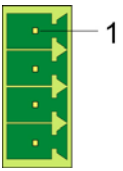
X5: output 13 – 16, G4
Phoenix 4-pin (Phoenix MC1.5/4-G-3.5)



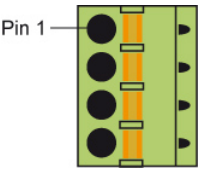
Pin	Function
1	Output 13
2	Output 14
3	Output 15
4	Output 16



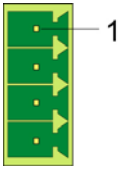
X6: output 17 – 20, G5
Phoenix 4-pin (Phoenix MC1.5/4-G-3.5)



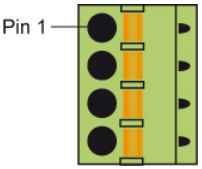
Pin	Function
1	Output 17
2	Output 18
3	Output 19
4	Output 20



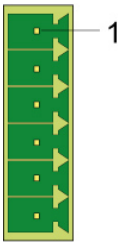
X7: output 21 – 24, G6
Phoenix 4-pin (Phoenix MC1.5/4-G-3.5)



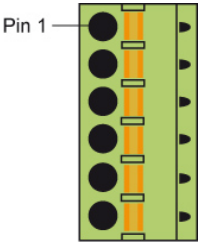
Pin	Function
1	Output 21
2	Output 22
3	Output 23
4	Output 24



X8: power supply, G+
Phoenix 6-pin (MC1.5/6-G-3.5)



Pin	Function
1	+24 V /4 (output 13 - 16)
2	+24 V /4 (output 13 - 16)
3	+24 V /5 (output 17 - 20)
4	+24 V /5 (output 17 - 20)
5	+24 V /6 (output 21 - 24)
6	+24 V /6 (output 21 - 24)



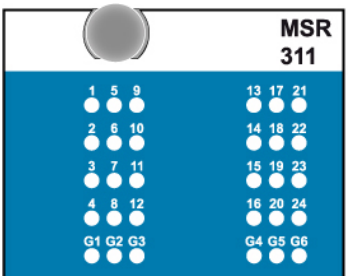
The insertion force of the Phoenix plug is sufficient enough to hold the weight of 4 stranded wires (2 m 0.75 mm²), 90° in the mating direction

Applicable connectors

X1 – X3 and X5 – X7: Phoenix FK-MCP1,5/4-ST-3,5
X4 and X8: Phoenix FK-MCP1,5/6-ST-3,5

The complete connector set for the MSR 311 is available at Sigmatek under the article number 18-001-311-Z1.

Status display



LED number	LED color	Definition
1 - 12 13 - 24	Yellow	Output 1 - 12 Output 13 - 24
G1 – G3 G4 – G6	RED	Error, voltage monitor

General Information on the Digital Outputs

Up to 4 outputs are powered by a common +24 V supply.

The cross section of the +24 V line and the 0 V input must be designed for the maximum output current of a group.

CAUTION!
When inductive loads are not fitted with a protective circuit, the high surge current flows over the 0 V line when the load is deactivated since the internal protective circuit is wired against 0 V. An excessively long or too thin 0 V conductor can lead to undesired responses from the outputs or the affected module.

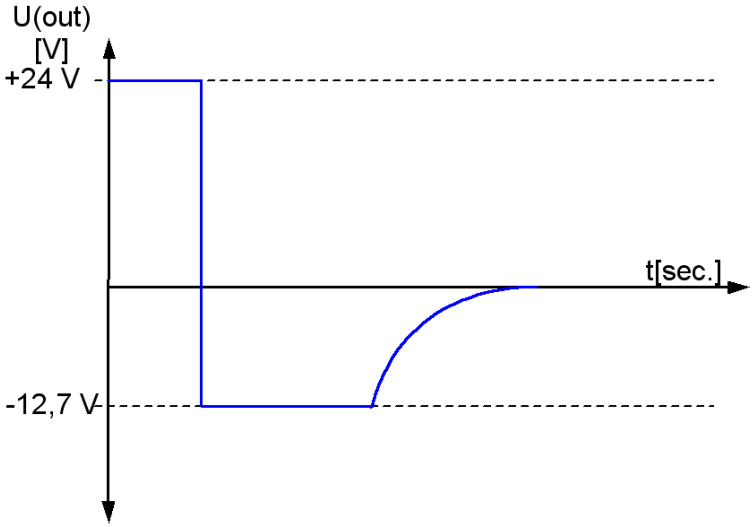
The outputs can be turned off by disconnecting the +24 V supply voltage.

Applying power to an output whose supply voltage exceeds 0.7 V is not allowed.

All outputs are electrically protected against +24V. Braking of inductive loads is limited to –12.7 V as shown in the graph below. However, an additional protection circuit directly on inductive loads is recommended (freewheeling diode) to avoid a system failure caused by voltage spikes (cross talk on analog lines). However, this results in the internal voltage limit being effective only up to -0.6 V.

Protective circuit (Breaking of Inductive Loads)

Each group of 4 outputs are also protected internally against 24V / 1 to 24V / 8. Braking of inductive loads is limited to – 12.7 V as shown in the graph below. However, an additional protection circuit directly on inductive loads is recommended (freewheeling diode) to avoid a system failure caused by voltage spikes (cross talk on analog lines).



Wiring Guidelines for the Digital Outputs

The following guidelines should be observed:

- Avoid parallel wiring between input lines and load-bearing circuits.
- Protective circuits for all relays (RC networks or free-wheeling diodes)
- Correct wiring to mass

Connecting inductive loads: