

MOSAIC MOR4/MOR4S8 RELAY OUTPUT EXPANSION UNIT

MOR4 and MOR4S8 are Mosaic family safety modules with 4 relay outputs and 4 relative inputs for external feedback contacts (EDM).

The modules communicate with the M1 controller via the proprietary bus MSC and provide the output contacts through their terminal blocks.

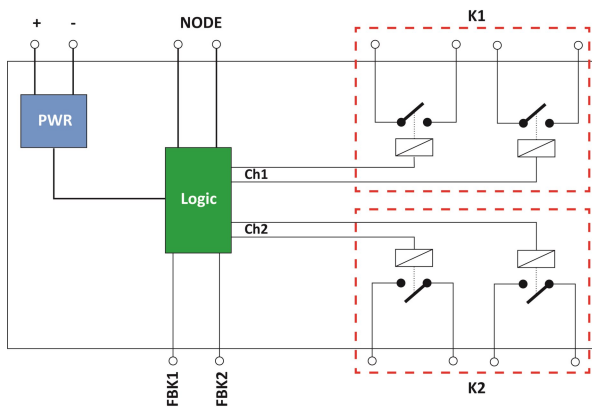
Two different output configurations (configurable with MSD configuration software) can be set :

- * Two double independent contacts (2 NO contacts per output with 2 NC contacts relative to feedback input).
- * Four single independent contacts (1 NO contact for output with 1 NC contact relative to feedback input).

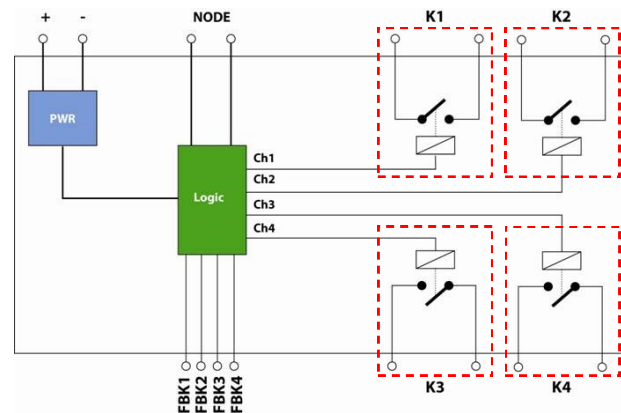
Only MOR4S8 module has 8 programmable signal outputs.



Safety modules MOR4, MOR4S8



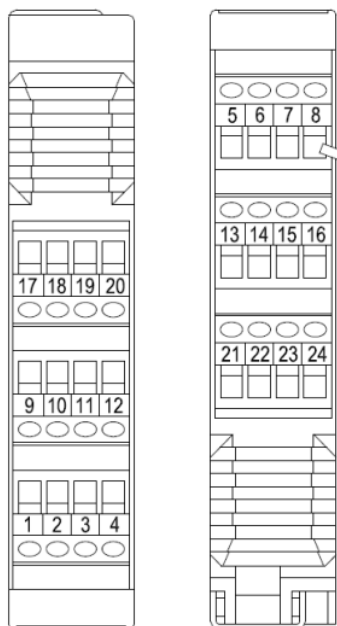
Configuration with 2 independent dual channel outputs (safety category 4)



Configuration with 4 independent outputs (safety category 1-2)

⇒ The relay contacts of the module shall be supplied by the same source.

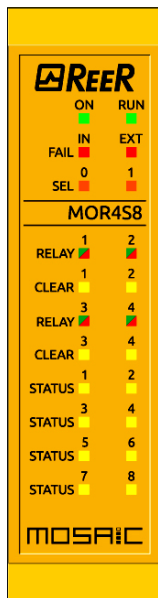
Electrical connections



TERMINAL BLOCK	MOR4	MOR4S8	SIGNIFICATO
1	24VDC	24VDC	24VDC power supply
2	NODE_SELO	NODE_SELO	Node selection
3	NODE_SEL1	NODE_SEL1	
4	0VDC	0VDC	
5	REST_FBK1	REST_FBK1	Feedback/Restart 1
6	REST_FBK2	REST_FBK2	Feedback/Restart 2
7	REST_FBK3	REST_FBK3	Feedback/Restart 3
8	REST_FBK4	REST_FBK4	Feedback/Restart 4
9	A_NO1	A_NO1	N.O. contact Channel 1
10	B_NO1	B_NO1	
11	A_NO2	A_NO2	N.O. contact Channel 2
12	B_NO2	B_NO2	
13	A_NO3	A_NO3	N.O. contact Channel 3
14	B_NO3	B_NO3	
15	A_NO4	A_NO4	N.O. contact Channel 4
16	B_NO4	B_NO4	
17	-	SYS_STATUS1	Programmable output status 1
18	-	SYS_STATUS2	Programmable output status 2
19	-	SYS_STATUS3	Programmable output status 3
20	-	SYS_STATUS4	Programmable output status 4
21	-	SYS_STATUS5	Programmable output status 5
22	-	SYS_STATUS6	Programmable output status 6
23	-	SYS_STATUS7	Programmable output status 7
24	-	SYS_STATUS8	Programmable output status 8



Light signals



LED - NORMAL OPERATION						
RUN	IN FAIL	EXT FAIL	SEL 0/1	RELAY 1/4	CLEAR1/4	STATUS 1/8 (MOR4S8)
GREEN	RED	RED	ORANGE	RED/GREEN	YELLOW	YELLOW
OFF the module waits the first communication from the MASTER	OFF operation OK	OFF operation OK	Shows the NODE_SEL0/1 selection (Ref. MOSAIC technical manual)	RED with contact open	ON waiting for RESTART	ON The associated SYSTEM STATUS output is active
BLINKING configuration does not require the INPUT or OUTPUT from Module				GREEN with contact closed	BLINKING NO feedback	OFF The associated SYSTEM STATUS output is NOT active
ON configuration requires the INPUT or OUTPUT from Module						

Technical Data

Module	MOR4	MOR4S8
PFHd (IEC 61508:1998)	2,72E-09	1,30E-08
Rated voltage	24VDC $\pm$ 20%	
Dissipated power max	3W max	
Switching voltage	240 VAC	
Switching current	6A max	
N.O. contacts	4	
INPUT FBK (EDM)	4	
Digital Status output	-	8
Mechanical life of contacts	$> 40 \times 10^6$	
User connection	Terminal blocks (16)	Terminal blocks (24)
Connection to Master	Via MSC bus	
Operating temperature	$-10 \div 55^{\circ}\text{C}$	
Storage temperature	$-20 \div 85^{\circ}\text{C}$	
Relative humidity	10% $\div$ 95%	
Dimensions (h x l x d)	108 x 22,5 x 114,5 mm	

Safety Technical Data

MOR4	MOR4S8
MTTF _d = 1011,77 *	MTTF _d = 345,56 *
PFH _d = 2,72E-09 **	PFH _d = 1,30E-08 **
DC=99,1%	DC=98,1%
PL e	PL e
SIL 3	SIL 3

* parameter calculated in accordance with standard EN ISO 13849-1: 2015

** parameter calculated in accordance with standard EN 61508-1: 2010

For each Relay output must be added to the previous PFH_d a value that depends on the load of the relay and its switching frequency. In addition, the PL obtained from the Relay outputs changes depending on the configuration chosen by the user. We assume N_{op} defines the number of commutations/year.

Relay Category 1

PL maximum obtainable: c
Maximum achievable SIL: 1

PFH _d	Conditions
$PFH_d = \frac{N_{op}}{2.63E10}$	AC15 Load 3A@230V _{ac}
$PFH_d = \frac{N_{op}}{6.57E10}$	AC15 Load 1A@230V _{ac}
$PFH_d = \frac{N_{op}}{8.77E11}$	DC13 Load 2A@24V _{dc}

Relay Category 2

PL maximum obtainable: d
Maximum achievable SIL: 2

PFH _d	Conditions
$PFH_d = \frac{N_{op}}{2.63E11}$	AC15 Load 3A@230V _{ac}
$PFH_d = \frac{N_{op}}{6.57E11}$	AC15 Load 1A@230V _{ac}
$PFH_d = \frac{N_{op}}{8.77E12}$	DC13 Load 2A@24V _{dc}

Relay Category 4

PL maximum obtainable: e
Maximum achievable SIL: 3

PFH _d	Conditions
$PFH_d = \frac{N_{op}}{6.62E11} + \frac{N_{op}^2}{3.92E19}$	AC15 Load 3A@230V _{ac}
$PFH_d = \frac{N_{op}}{1.65E12} + \frac{N_{op}^2}{2.45E20}$	AC15 Load 1A@230V _{ac}
$PFH_d = \frac{N_{op}}{2.22E13} + \frac{N_{op}^2}{4.36E22}$	DC13 Load 2A@24V _{dc}

For all relay outputs (MTTF_{dTOT})

For each Relay output the previous MTTF_d must be added to a value that depends on the load of the relay and its switching frequency according to the following formula:

$$MTTF_{dTOT} = \frac{1}{(1/MTTF_d) + (1/MTTF_{d1})}$$

MTTF _d (years)	Conditions
$MTTF_d = \frac{3.0E6}{N_{op}}$	AC15 Load 3A@230V _{ac}
$MTTF_d = \frac{7.5E6}{N_{op}}$	AC15 Load 1A@230V _{ac}
$MTTF_d = \frac{1.0E8}{N_{op}}$	DC13 Load 2A@24V _{dc}