

9.2 DM476

9.2.1 General Information

The DM476 is a standard digital mixed module.

9.2.2 Order Data


Model Number	Short Description	Image
3DM476.6	2005 digital mixed module, 16 inputs, 24 VDC / 24 VAC, 1 ms, DC: Sink/Source, 4 electrically isolated input groups, 16 transistor outputs, 24 VDC, 0.4 A	
Connection made using DSUB connector.		

Table 171: DM476 order data

9.2.3 Technical Data

Product ID	DM476
C-UL-US Listed	Yes
B&R ID Code	\$62
Inputs	25-pin DSUB socket (upper)
Number of Inputs Total	16
in 4 Groups of	4
Input Connections	Sink or source

Table 172: DM476 technical data

Product ID	DM476
Electrical Isolation Input - PLC Group - Group Input - Input (same group)	Yes (optocoupler) Yes (optocoupler) No
Input Voltage Nominal Maximum	24 VDC / 24 VAC 30 VDC / 30 VAC
Input Resistance	4.8 k Ω
Switching Threshold LOW Range Switching range HIGH Range	< 5 V 5 to 15 V > 15 V
Input Delay Log. 0 - Log. 1 Log. 1 - Log. 0	Max. 1 ms Max. 1 ms
Input Current at Nominal Voltage	Approx. 5 mA
Maximum Peak Voltage	500 V for 50 μ s max. every 100 ms
Outputs	25-pin DSUB plug (lower)
Number of Outputs	16
Design	Transistor
Electrical Isolation Output - PLC Output - Output	Yes No
Switching Voltage Minimum Nominal Maximum	18 VDC 24 VDC 30 VDC
Continuous Current per Output Module	Max. 0.4 A Max. 4.8 A ¹⁾
Leakage Current when Switched Off	0.3 mA
Switching Delay Log. 0 - Log. 1 Log. 1 - Log. 0	Max. 100 μ s Max. 100 μ s
Switching Frequency (resistive load)	Max. 500 Hz
Overload Protection	Yes
Switching On after Overload Cutoff	Automatically within seconds (depends on the module temperature)
Short Circuit Current	0.75 to 1.5 A
Protective Circuit Internal External	Yes Only if necessary (surge)
Braking Voltage when Switching Off Inductive Loads	45 to 55 V

Table 172: DM476 technical data (cont.)

Product ID	DM476
Power Consumption	
Internal	
5 V	Max. 2.5 W
24 V	---
Total	Max. 2.5 W
Terminal Side at 24 V	Max. 2 W
Dimensions	B&R 2005 single-width

Table 172: DM476 technical data (cont.)

1) Simultaneousness factor = 75%: A maximum 12 of 16 outputs are allowed to be fully loaded at the same time.

9.2.4 Status LEDs

Image	LED	Description															
<p>Status LEDs for Inputs 1 - 16</p> <p>Status LEDs for Outputs 1 - 16</p> <p>DM476</p>	1 - 16, green	The 16 green status LEDs indicate the logical status of the corresponding inputs. Regardless of the type connection (sink or source connection) the LED is lit if the input is logical 1, i.e. when the current flows through the optocoupler.															
	1 - 16, yellow	The 16 yellow status LEDs indicate the logical status of the corresponding outputs.															
	A, B	LEDs A and B indicate the operating status.															
		<table border="1"> <thead> <tr> <th>B</th> <th>A</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>Outputs work normally.</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>A short circuit or over temperature has occurred with at least one of the outputs (see also Section 9.2.10 "Overload Protection", on page 298).</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>An output is switched on, even though no load is connected.</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>The supply voltage for the output driver has sunk to <12 V.</td> </tr> </tbody> </table>	B	A	Description	OFF	OFF	Outputs work normally.	OFF	ON	A short circuit or over temperature has occurred with at least one of the outputs (see also Section 9.2.10 "Overload Protection", on page 298).	ON	OFF	An output is switched on, even though no load is connected.	ON	ON	The supply voltage for the output driver has sunk to <12 V.
B	A	Description															
OFF	OFF	Outputs work normally.															
OFF	ON	A short circuit or over temperature has occurred with at least one of the outputs (see also Section 9.2.10 "Overload Protection", on page 298).															
ON	OFF	An output is switched on, even though no load is connected.															
ON	ON	The supply voltage for the output driver has sunk to <12 V.															

Table 173: DM476 Status LEDs

9.2.5 Connection Elements

The DM476 module is supplied with 16 digital inputs and 16 digital outputs. However, the terminal block for B&R 2005 controllers is only 20-pin. The connection elements are made up of a 25-pin DSUB sockets and a 25-pin DSUB plug.

Due to space restrictions, it is necessary to use press connectors and rolled ribbon cable for the connection.

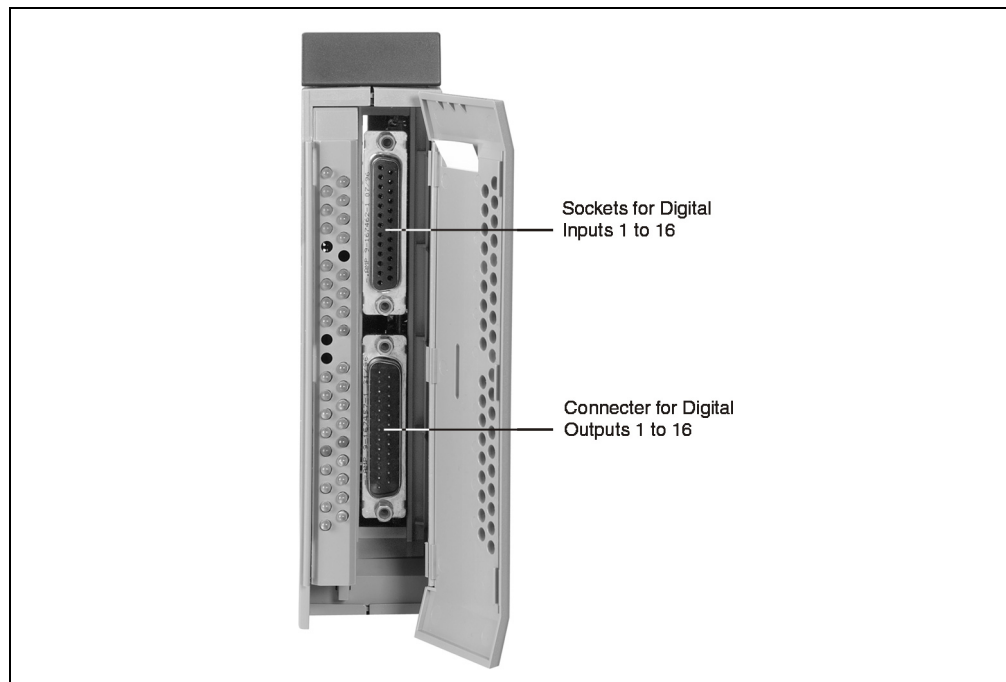


Figure 112: DM476 connection elements

Lower 25-pin DSUB plug	Pin	Assignment
	1	+24 V
	2	Output 1
	3	Output 3
	4	+24 V
	5	Output 5
	6	Output 7
	7	+24 V
	8	Output 9
	9	Output 11
	10	+24 V
	11	Output 13
	12	Output 15
	13	+24 V
	14	Output 2
	15	Output 4
	16	GND
	17	Output 6
	18	Output 8
	19	GND
	20	Output 10
	21	Output 12
	22	---
	23	Output 14
	24	Output 16
	25	---

The diagram shows a 25-pin DSUB plug with pins numbered 1 to 25. The labels for each pin are as follows:

- Pin 1: +24 V
- Pin 2: Output 1
- Pin 3: Output 3
- Pin 4: +24 V
- Pin 5: Output 5
- Pin 6: Output 7
- Pin 7: +24 V
- Pin 8: Output 9
- Pin 9: Output 11
- Pin 10: +24 V
- Pin 11: Output 13
- Pin 12: Output 15
- Pin 13: +24 V
- Pin 14: Output 2
- Pin 15: Output 4
- Pin 16: GND
- Pin 17: Output 6
- Pin 18: Output 8
- Pin 19: GND
- Pin 20: Output 10
- Pin 21: Output 12
- Pin 22: ---
- Pin 23: Output 14
- Pin 24: Output 16
- Pin 25: ---

Table 175: DM476 pin assignments for the lower 25-pin DSUB plug

9.2.7 Connection Example for Digital Outputs

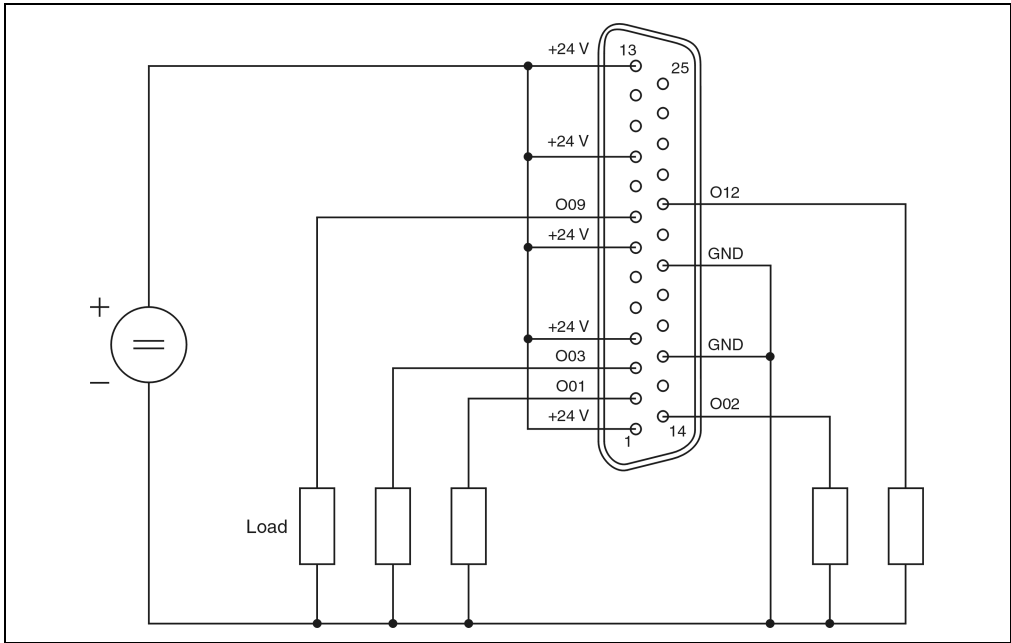


Figure 113: DM476 connection example for digital outputs

9.2.8 Input Circuit Diagram

The inputs can be connected with a 24 VDC or a nominal 24 VAC. For DC input voltages, sink or source circuits are allowed within a group of four. The logical status of each input is indicated by a green LED.

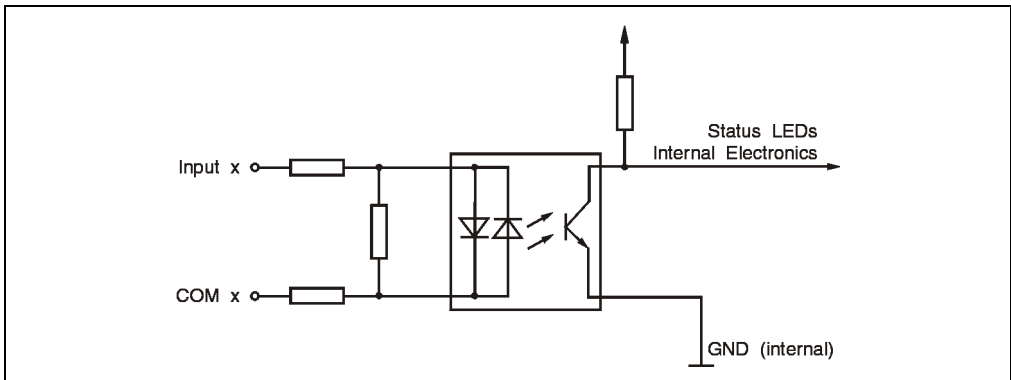


Figure 114: DM476 input circuit diagram

9.2.9 Output Circuit Diagram

The output driver requires an external supply, which is divided into five socket contacts because of the high current requirement (approximately 410 mA/channel).

The logical status of each output is indicated by a yellow LED. The operational status is indicated with LEDs A and B (see also Section 9.2.4 "Status LEDs", on page 293).

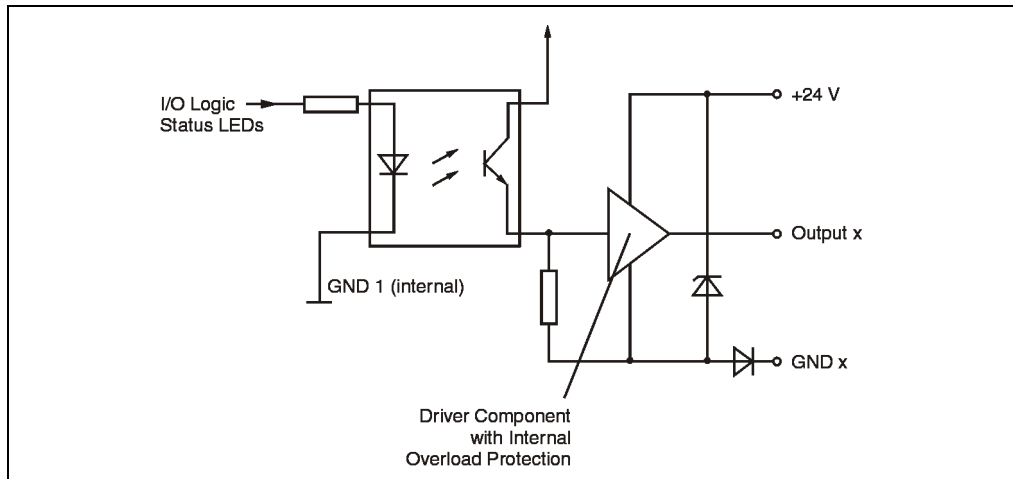


Figure 115: DM476 output circuit diagram

9.2.10 Overload Protection

The overload protection is activated in the following cases:

- Junction temperature for transistors exceeds the limit value (typ. 150° C, min. 135° C, max. 175° C). Causes: Short circuit, overload or environmental temperature is too high
- The 24 V supply voltage (terminal side) is smaller than typ. 12 V (min. 10 V, max. 14.5 V).

The affected output remains switched off until ...

... the junction temperature is again within the limit value (hysteresis typ. 20° C). The time until it is switched on again is within seconds.

... the voltage supply is again within the valid range (typ. >14.5 V).

9.2.11 Variable Declarations

The variable declaration is made in B&R Automation Studio™:

Function	Variable Declarations				
	Scope	Data Type	Length	Module Type	Chan.
Read single digital input (channel x)	tc_global	BOOL	1	Digit. In	1 ... 16
Read digital inputs I01 - I08 Bit 0 ... I01 Bit 7 ... I08	tc_global	USINT	1	Transp. In	0
Read digital inputs I09 - I16 Bit 0 ... I09 Bit 7 ... I16	tc_global	USINT	1	Transp. In	1
Single digital output (channel x)	tc_global	BOOL	1	Digit. Out	1 ... 16
Digital Outputs O01 - O08 Bit 0 ... O01 Bit 7 ... O08	tc_global	USINT	1	Transp. Out	0
Digital Outputs O09 - O16 Bit 0 ... O09 Bit 7 ... A16	tc_global	USINT	1	Transp. Out	1
Read Status Register	tc_global	USINT	1	Status In	0

Table 176: DM476 variable declaration

Status Register

Status Register	Bit	Description
	7	x
	6	x
	5	x
	4	x
	3	x
	2	Status - 24 V on the output
	1	Diag1 - Diagnostics bit 1
	0	Diag2 - Diagnostics bit 2
x x x x x		
7		0

Output	Status	Diag1	Diag2	Information
0	0	1	1	Outputs work normally.
1	1	1	1	
0	0	1	1	An output is switched on even though no load is connected.
1	1	0	1	
0	0	1	0	A short circuit or over temperature has occurred with at least one of the outputs.
1	0	1	0	
0	0	0	0	The supply voltage for the output driver has sunk to <12 V.
1	0	0	0	

Table 177: DM476 status register states