8.3 DO480

8.3.1 General Information

The DO480 is a standard digital output module.

8.3.2 Order Data

Model Number	Short Description	Image
3DO480.6	2005 digital output module, 16 transistor outputs 24 VDC, 2 A, 2 electrically isolated output groups. Order TB170 terminal block separately.	
3TB170.9	2005 terminal block, 20-pin, screw clamps	
3TB170.91	2005 terminal block, 20-pin, cage clamps	
3TB170:90-02	2005 terminal block, 20-pin, 20 pcs., screw clamps	
3TB170:91-02	2005 terminal block, 20-pin, 20 pcs., cage clamps	
Terminal blocks not included in the delivery (see "Accessories").		

Table 139: DO480 order data

8.3.3 Technical Data

Product ID	DO480
C-UL-US Listed	Yes
B&R ID Code	$41
Number of Outputs Total in 2 Groups of	 16 8
Design	Transistor
Electrical Isolation Output - PLC Group - Group Output - Output	 Yes Yes No

Table 140: DO480 technical data

Product ID	DO480
Switching Voltage Minimum Nominal Maximum	 0 VDC 24 VDC 48 VDC
Continuous Current per Output Group Module	 Max. 2 A Max. 12 A[1)] Max. 24 A
Switching Capacity of Filament Lamps	15 W / 24 V
Leakage Current when Switched Off	0.1 mA
Switching Delay Log. 0 - Log. 1 Log. 1 - Log. 0	 Typ. 4 µs / max. 120 µs Typ. 100 µs / max. 120 µs
Switching Frequency (resistive load)	Max. 500 Hz
Overload Protection	Yes
Switching On after Overload Cutoff	Automatically after approx. 1 s
Short Circuit Current	Max. 90 A
Protective Circuit Internal External	 Yes Only if necessary (surge)
Residual Voltage of Transistors	Max. 0.3 V (at 2 A)
Braking Voltage when Switching Off Inductive Loads	Typ. 56 V
Power Consumption 5 V 24 V Total	 Max. 1.5 W Max. 1 W Max. 2.5 W
Dimensions	B&R 2005 single-width

Table 140: DO480 technical data (cont.)

1) Simultaneousness factor = 75%, maximum 12 of the 16 outputs can be fully loaded at the same time.

8.3.4 Status LEDs

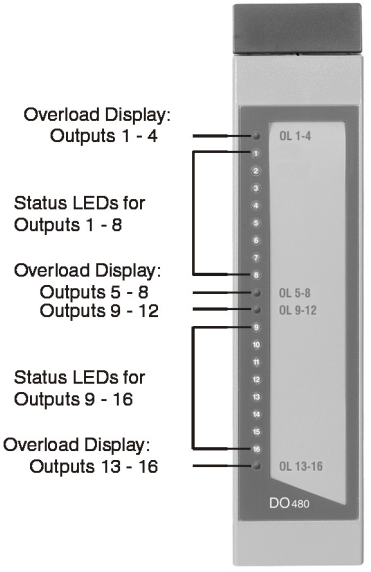
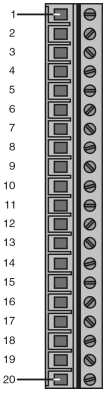
Image	LED	Description
	1 - 16	The status LEDs indicate the logical status of the corresponding outputs.
	OL x-y	The LEDs OL x-y (overload) indicate that the overload or short circuit cutoff has been activated for the respective LED group. If e.g. the OL 1-4 LED is lit, it means that a transistor pair (output 1/2 or 3/4) has been switched off (for more information see Section 8.3.7 "Overload Protection", on page 261).

Table 141: DO480 status LEDs

8.3.5 Pin Assignments



TB170

Connection	Assignment	
1	+24 V supply for inputs 1 - 8	Group 1
2	Output 1	
3	Output 2	
4	Output 3	
5	Output 4	
6	Output 5	
7	Output 6	
8	Output 7	
9	Output 8	
10	--- 1)	
11	--- 1)	Group 2
12	Output 9	
13	Output 10	
14	Output 11	
15	Output 12	
16	Output 13	
17	Output 14	
18	Output 15	
19	Output 16	
20	+24 V supply for inputs 9 -16	

Table 142: DO480 pin assignment

1) For technical reasons it is recommended to connect these pins to ground to enable the DO480 to be replaced by the DO479 at a future point in time. This step also avoids any rewiring.

When connecting the terminal block, it is important to ensure that any potential difference does not exceed 50 V. This is valid for:

Potential Difference <50 V
Group ↔ Group
+24 V connection ↔ PLC ground
+24 V connection ↔ ground

Table 143: DO480 the potential difference must be smaller than 50 V

Both electrically isolated groups can also be supplied by 2 separate 24 V sources.

Connection Example

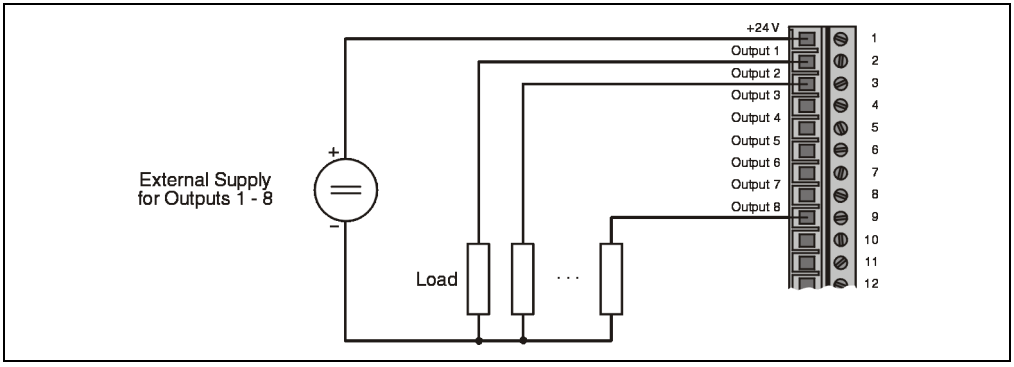


Table 144: DO480 connection example

8.3.6 Output Circuit Diagram

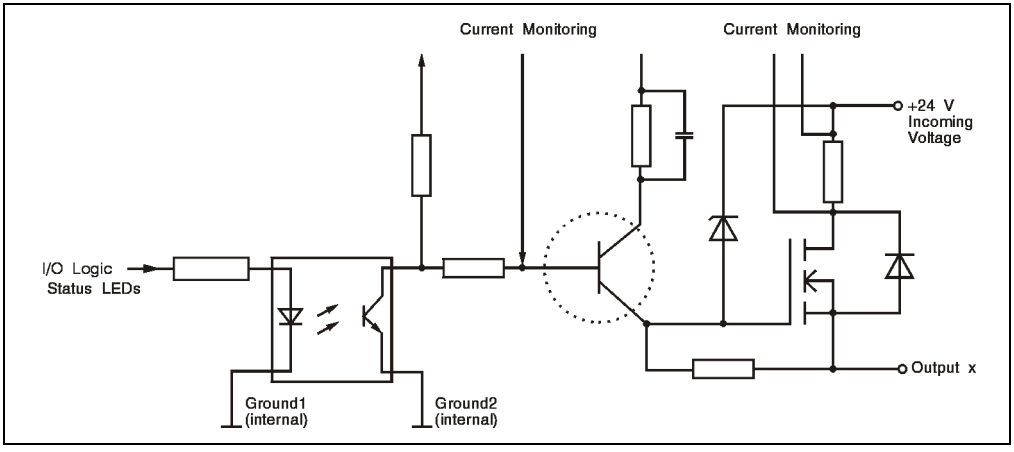


Figure 102: DO480 output circuit diagram

8.3.7 Overload Protection

The overload protection is activated in the following cases:

- The sum of all currents from output pairs (1/2, 3/4, 5/6, etc.) is greater than 4.4 A (at 60° C environmental temperature). The cutoff delay is typically 5 ms. The more the 4.4 A limit is exceeded, the faster the cutoff.
  When switching loads with high starting current (e.g. lamps) this switch-off functionality must be taken into consideration.
- If the total current (output pair) reaches approximately 15 A the cutoff takes place without delay.

When an output pair is turned off because of an overload (overload LED lit), an attempt to restart is made after approximately 1 s. If the overload still exists, this causes a continual switching on and off until the respective output is turned off by the application program or the overload no longer exists.

8.3.8 Switching Inductive Loads

The transistors are suited for fast and secure switching of inductive loads using Zener diodes. The transistors are switched on at a voltage of >56 V (⇒ braking voltage) and provide protection from large voltage spikes. For this reason, inverse diodes are not necessary on inductive loads.

Braking Voltage: is a negative voltage on the switching element (e.g. valve). If the switching element is **unable** to operate with a negative voltage, an external inverse diode must be installed to limit the voltage to approx. -0.6 V.

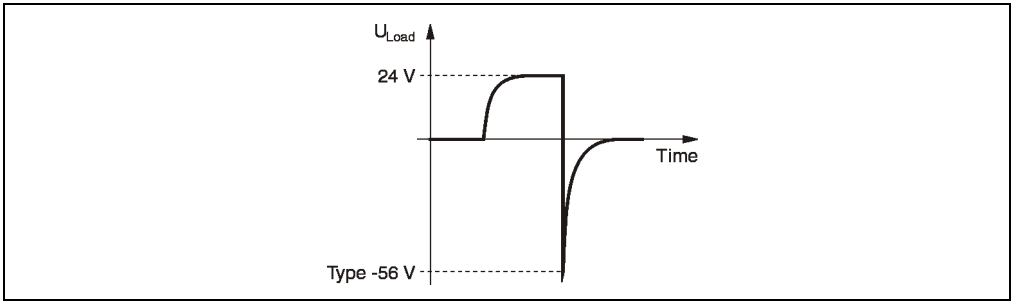


Figure 103: DO480 schematic representation for braking voltage

The protective switch reduces the maximum switching frequency as inductivity increases. A coil with an inductivity of 1 H can be easily switched with 5 Hz at 48 V / 0.5 A and 60° C environmental temperature.

The maximum switching frequency in relation to a given inductance can be seen from the following diagram.

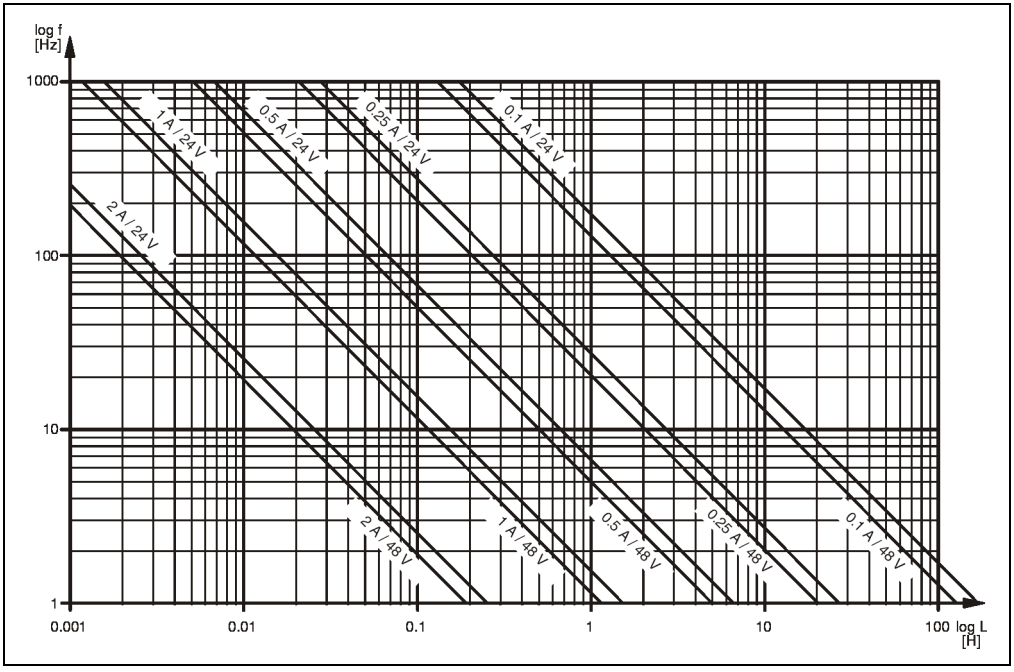


Figure 104: DO480 switching frequency in relation to a given inductance

8.3.9 Variable Declarations

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

Function	Variable Declarations				
	Scope	Data Type	Length	Module Type	Chan.
Single digital output (channel x)	tc_global	BOOL	1	Digit. Out	1 ... 16

Table 145: DO480 variable declaration