6.2 DM455

6.2.1 General Information

The DM455 is equipped with a powerful processor. The functionality (DM455 operating system) is transferred via a coupling memory from the CPU into the DM455. Therefore, it is possible to provide functions such as stepper motor control, PWM positioning, connection of an asymmetrical incremental encoder, gear measuring, etc.

6.2.2 Order Data

Model Number	Short Description	Image
3DM455.60-2	2005 digital mixed module, 8 inputs, 24 VDC, 2.5 µs, sink, 8 transistor outputs, 0 to 50 VDC, 1 A. Order terminal blocks 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 86: DM455 order data

6.2.3 Technical Data

Product ID	DM455
C-UL-US Listed	Yes
B&R ID Code	$20
Status LEDs Inputs Outputs ERROR RUN	 8 (green) 8 (yellow) Red Green
Inputs	
Number of Inputs	8
Input Connections	Sink
Electrical Isolation Input - PLC Input - Output	 Yes (optocoupler) Yes (optocoupler)
Input Voltage Minimum Nominal Maximum	 18 VDC 24 VDC 30 VDC
Input Voltage to Ground	Max. ±70 VDC
Input Current at Nominal Voltage	Approx. 5 mA
Input Resistance	4.4 kΩ
Switching Threshold LOW Range Switching range HIGH Range	 < 5 V 5 to 15 V > 15 V
Applications	Encoder evaluation, signal measurement, high-speed signal processing
Input Frequency	Max. 100 kHz, decisively limited by the software
Input Delay Log. 0 - Log. 1 Log. 1 - Log. 0	 Max. 2.5 µs Max. 2.5 µs
Outputs	
Number of Outputs	8
Design	Transistor
Electrical Isolation Output - PLC Output - Input	 Yes (optocoupler) Yes (optocoupler)
Supply Voltage	0 -50 VDC
Supply Voltage Range + to ground - to ground	 Max. +70 VDC Max. -70 VDC
Continuous Current per Output Push, Pull or Push/Pull Operation Motor Operation	 Max. 1 A See Section 6.2.11 "Maximum Permitted Load on the Motor Windings", on page 198

Table 87: DM455 technical data

Product ID	DM455
Current Threshold Offset Error Amplification Error Digital Value -> Analog Value Minimum Permitted Setting Maximum Setting	 Max. ±40 mA Max. 8% 1 LSB = 1 mA 0.1 A 2.55 A
Switching Delay Log. 0 - Log. 1 Log. 1 - Log. 0	 Max. 7 µs Max. 7 µs
Switching Frequency (resistive load)	Max. 100 kHz, decisively limited by the software
Short Circuit Protection	Yes
Switching On after Short Circuit Cutoff	Using software
Short Circuit Current	2.55 A ±15%
Protective Circuit Internal External	 Yes Generally required (fuse)
Power Consumption 5 V 24 V Total	 Max. 3.5 W --- Max. 3.5 W
Dimensions	B&R 2005 single-width

Table 87: DM455 technical data (cont.)

6.2.4 Status LEDs

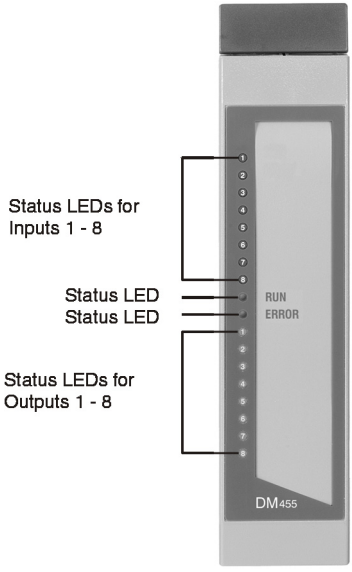
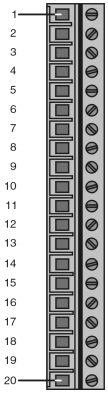
Image	LED	Description
	1 -8, green	The 8 green status LEDs indicate the relevant logical status of the corresponding inputs. The LED is lit if the operating system sets the corresponding LED because of the input information.
	RUN	LED blinks .....the DM455 is not initialized LED not lit .....the DM455 is initialized
	ERROR	LED blinks .....LED blinks during the boot phase LED lit .....module error
	1 -8, yellow	The 8 yellow status LEDs indicate the relevant logical status of the corresponding outputs.

Table 88: DM455 Status LEDs

6.2.5 Pin Assignments



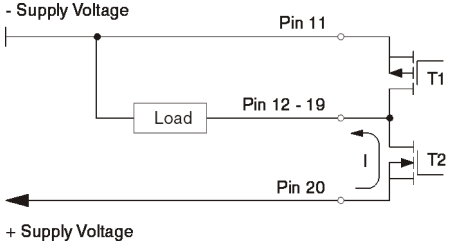
TB170

Connection	Assignment
1	COM (Inputs 1 - 8)
2	Input 1
3	Input 2
4	Input 3
5	Input 4
6	Input 5
7	Input 6
8	Input 7
9	Input 8
10	Shield
11	COM (Outputs 1 - 8)
12	Output 1
13	Output 2
14	Output 3
15	Output 4
16	Output 5
17	Output 6
18	Output 7
19	Output 8
20	Supply of Outputs

Table 89: DM455 pin assignments

6.2.6 Connection Example

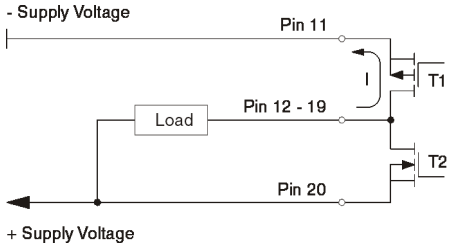
1) Push Operation



Output	IN	OUT
T1	Off	Off
T2	On	Off

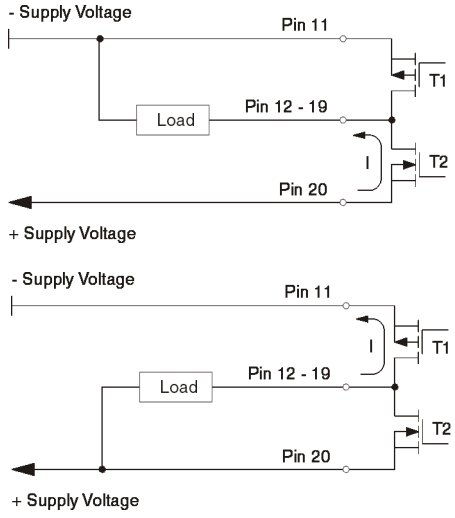
Table 90: DM455 connection examples

2) Pull Operation



Output	IN	OUT
T1	On	Off
T2	Off	Off

3) Push/Pull Operation



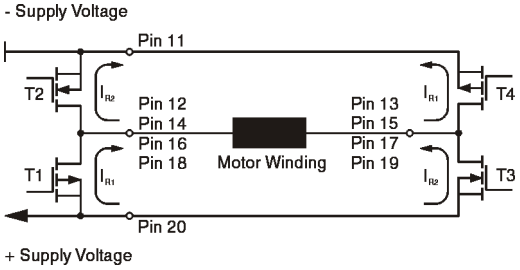
Current flow, if output = IN

Output	IN	OUT
T1	Off	On
T2	On	Off

Current flow, if output = OUT

Table 90: DM455 connection examples (cont.)

4) Motor Operation



Output	Direction 1	Direction 2
T1	On	Off
T2	Off	On
T3	Off	On
T4	On	Off

Table 90: DM455 connection examples (cont.)

6.2.7 Installation Notes

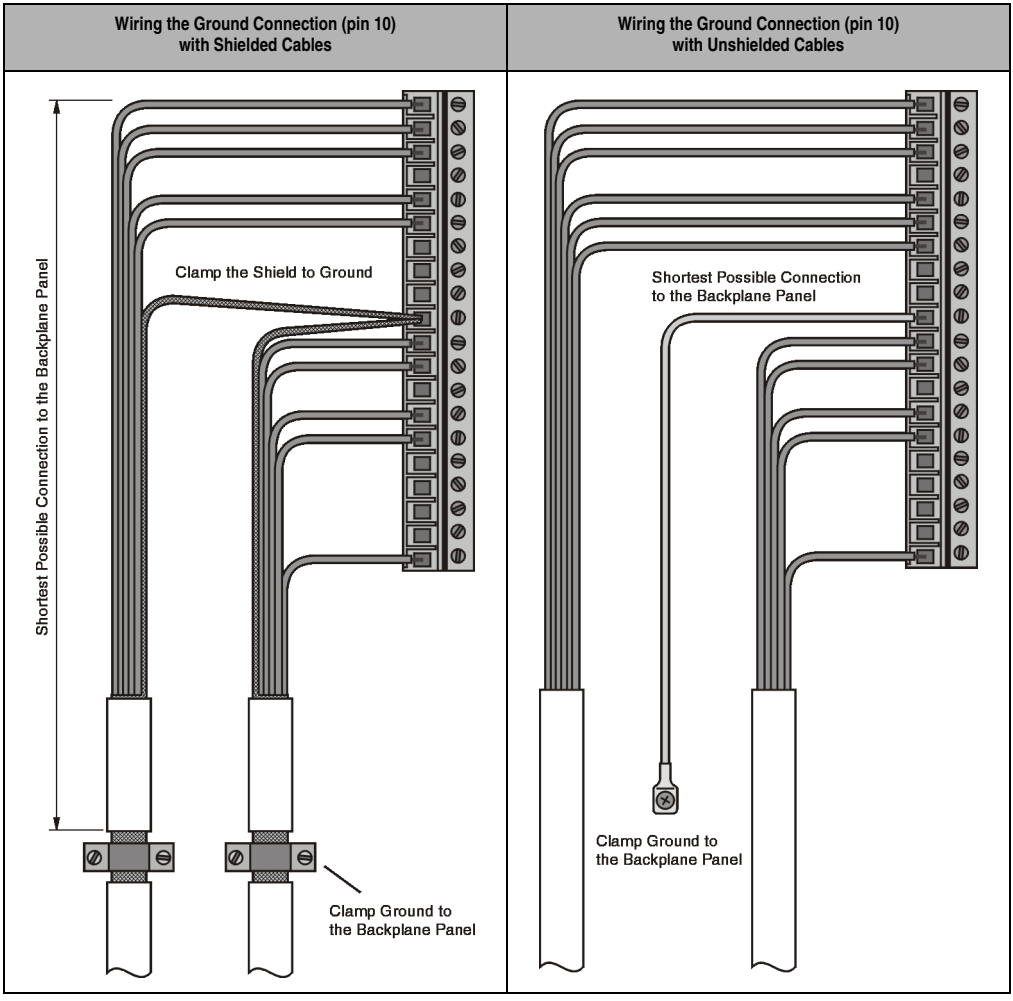


Figure 75: DM455 installation guidelines

6.2.8 Input Circuit Diagram

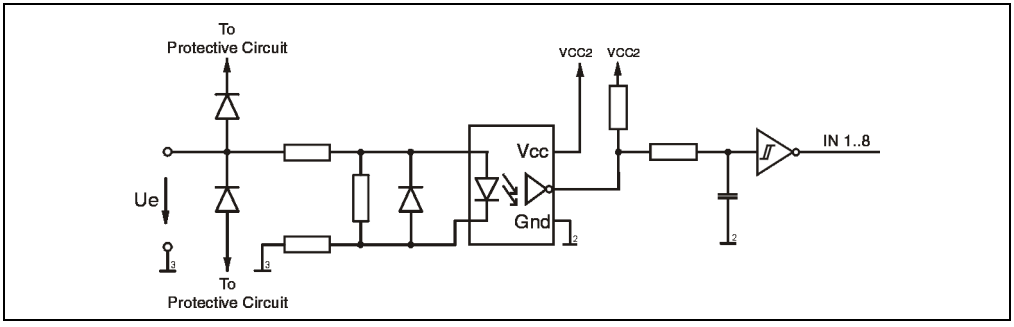


Figure 76: DM455 input circuit diagram

6.2.9 Output Circuit Diagram

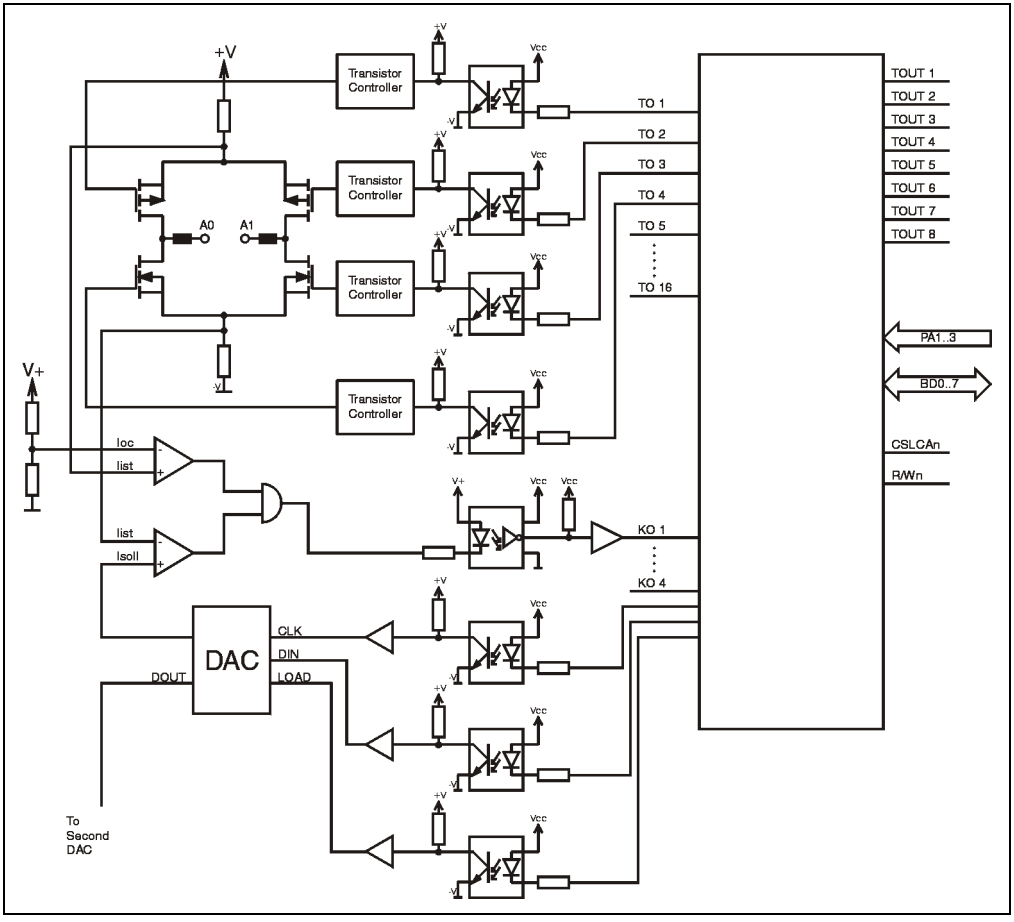


Figure 77: DM455 output circuit diagram

6.2.10 Detailed Description of Outputs

The DM455 is equipped with eight outputs. Two outputs are grouped together into one pair:

Pair	Outputs
1	1 + 2
2	3 + 4
3	5 + 6
4	7 + 8

Table 91: DM455 outputs

Operating Modes

The DM455 provides four operating modes which can be configured by the user using software.

Operating Mode	Description
Push	Switched to plus
Pull	Switched to GND
Push/Pull	Switched to plus and GND
Motor	Full-bridge

Table 92: DM455 operating modes

The first three operating modes are defined in pairs.

Example:

Pair	Outputs	Operating Mode
1	1 + 2	Push
2	3 + 4	Push
3	5 + 6	Pull
4	7 + 8	Push/Pull

Motor Operation

Up to two motors can be controlled using the DM455.

Motor	Outputs
1	1 - 4
2	5 - 8

Two outputs are required per motor windings.

Motor	Motor Windings	Outputs
1	1	1 + 2
	2	3 + 4
2	1	5 + 6
	2	7 + 8

A set current value can be given by the software for each motor.

Motor	Set Value
1	1
2	2

Configuration examples for motor operation.

Example 1:

Operating Mode	Outputs
Motor	1 - 4
Push	5 + 6
Pull	7 + 8

Example 2:

Operating Mode	Outputs
Push	1 + 2
Push/Pull	3 + 4
Motor	5 - 8

Example 3:

Operating Mode	Outputs
Motor 1	1 - 4
Motor 2	5 - 8

6.2.11 Maximum Permitted Load on the Motor Windings

The following diagram displays the maximum load on the motor windings depending on the power supply voltage and the switch off time.

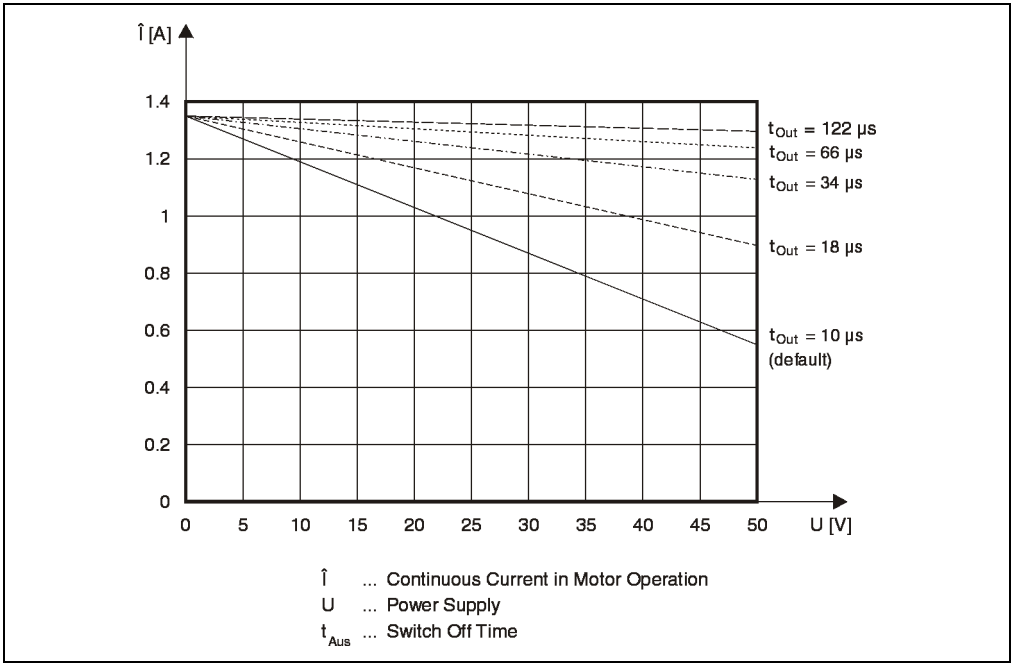


Figure 78: DM455 maximum permitted load on the motor windings

6.2.12 Current Surge Cutoffs

Push, Pull or Push/Pull Operation

Current surge cutoff occurs at 2.55 A (±15%).

Operation as a Motor Bridge Circuit

Each of the four motor bridge circuits monitors the current for the plus and minus supply. A short circuit message is given if the current exceeds 2.55 A (±15%).

6.2.13 Communication Memory

The communication memory can be freely defined by the user.

Division

USINT
USINT
USINT
USINT
UINT
UINT
UDINT
UDINT