Overview of Modular Controllers

Introduction

The information in this section describes the main features of the Modular bases.

Modular Bases Features Overview

The following table gives information about the main features of the different types of Modular bases:

Features	**20 I/O bases: TWDLMDA20DTK TWDLMDA20DUK**	**20 I/O bases: TWDLMDA20DRT**	**40 I/O bases: TWDLMDA40DTK TWDLMDA40DUK**
Inputs	12 discrete inputs	12 discrete inputs	24 discrete inputs
Outputs	8 transistor source outputs: TWDLMDA20DTK 8 transistor sink outputs: TWDLMDA20DUK	6 relay outputs + 2 transistor source outputs	16 transistor source outputs: TWDLMDA40DTK 16 transistor sink outputs: TWDLMDA40DUK
Analog Voltage Input Connector	1	1	1
Analog Potentiometers	1	1	1
Integrated Serial Port	√	√	√
Wiring	Connector	Terminal Block	Connector
RTC cartridge (optional)	√	√	√
Memory cartridge (optional)	32 KB / 64 KB	32 KB / 64 KB	32 KB / 64 KB
Expansion I/O Modules	up to 4 modules	up to 7 modules	up to 7 modules
AS-I V2 bus Modules	up to 2 modules	up to 2 modules	up to 2 modules
CANopen fieldbus Module	√	√	√
Operator Display Expansion Module (optional)	√	√	√
Communication Expansion Module (optional)	√	√	√
Ethernet interface	1 ConneXium TwidoPort module	1 ConneXium TwidoPort module	1 ConneXium TwidoPort module

General Specifications for the Modular Bases

Introduction

This section provides general specifications for the Modular bases.

Normal Operating Specifications

Modular base	**TWDLMDA20DTK TWDLMDA20DUK**	**TWDLMDA20DRT**	**TWDLMDA40DTK TWDLMDA40DUK**
Operating temperature	0 to 55° C (32° F to 131° F) operating ambient temperature		
Storage temperature	-25° C to +70° C (-13° F to 158° F)		
Relative humidity	from 30 to 95% Rh (non-condensing)		
Pollution degree	2 (IEC60664)		
Degree of protection	IP20		
Corrosion immunity	Free from corrosive gases		
Altitude	Operation: from 0 to 2000 m (0 to 6,560 ft) Transport: 0 to 3,000 m (0 to 9,840 ft)		
Resistance to Vibration	When mounted on a DIN rail: from 10 to 57 Hz amplitude 0.075 mm, from 57 to 150 Hz acceleration 9.8 ms^2 (1G), 2 hours per axis on each of three mutually perpendicular axes. When mounted on a panel surface: from 2 to 25 Hz amplitude 1.6 mm, from 25 to 100 Hz acceleration 39.2 ms^2 (4G) Lloyd's 90 min per axis on each of three mutually perpendicular axes.		
Impact strength	147 ms^2 (15G), 11 ms duration, 3 shocks per axis, on three mutually perpendicular axes (IEC 61131).		
Weight	140 g (4.93 oz)	185 g (6.52 oz)	180 g (6.35 oz)

Specifications for the Backup Battery

Modular backed up elements	**Internal RAM: internal variables, internal bits and words, timers, counters, shift registers, etc.**
Time	Approximately 30 days at 25° C (77° F) after battery fully charged.
Battery type	Non-interchangeable lithium accumulator
Charging time	Approximately 15 hours for 0% to 90 % of total load
Service life	10 years

Electrical Specifications for the Modular Bases

Introduction

This section provides electrical specifications for the Modular bases.

Electrical Specifications

Modular base	**TWDLMDA20DTK TWDLMDA20DUK**	**TWDLMDA20DRT**	**TWDLMDA40DTK TWDLMDA40DUK**
Rated power voltage	24 VDC		
Allowable voltage range	from 20.4 to 26.4 VDC (including ripple)		
Maximum input power	Base plus 4 I/O Modules	Base plus 7 I/O Modules	
	15 W (26.4 VDC)	19 W (26.4 VDC)	19 W (26.4 VDC)
Allowable momentary power interruption	10 ms, 100% drop out (at the rated inputs and outputs) (IEC61131 and IEC61000-4-11)		
Dielectric strength	Between power and ground terminals: 500 VAC, 1 min Between I/O and ground terminals: 1500 VAC, 1 min		
Insulation resistance	Between power and ground terminals: 10 MΩ minimum (500 VDC) Between I/O and ground terminals: 10 MΩ minimum (500 VDC)		
Electromagnetic resistance	AC power terminals: 2kV, Level 3 DC power terminals: 2kV, Level 3 I/O terminals: - DC: 1kV, Level 3 - AC: 2kV, Level 4 According to IEC61131-2 (Zone B) and IEC61000-4-4		
Inrush current	50 A maximum (24 VDC)		
Ground wiring	UL1015 22 AWG (0.33 mm^2), UL1007 18 AWG (0.82 mm^2)		
Power supply wiring	UL1015 22 AWG (0.33 mm^2), UL1007 18 AWG (0.82 mm^2)		
Effect of improper power supply connection	Reverse polarity: no operation, no damage Improper voltage or frequency: internal fuse protection		

Input Specifications for the Modular Bases

Introduction

This section provides Input specifications for the Modular bases.

DC Input Specifications

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

If any input exceeding the rated value is applied, permanent damage may be caused.

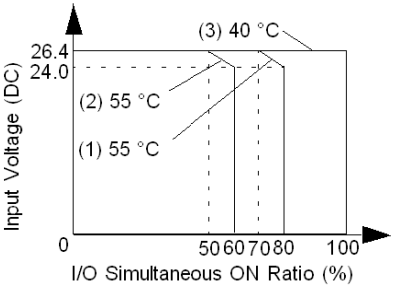
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Modular base	**TWDLMDA20DUK TWDLMDA20DTK**	**TWDLMDA20DRT**	**TWDLMDA40DUK TWDLMDA40DTK**
Input points	12 points in 1 common line	12 points in 1 common line	24 points in 1 common line
Rated input voltage	24 VDC source/sink input signal		
Input voltage range	from 20.4 to 26.4 VDC		
Rated input current	I0, I1, I6, I7: 5 mA/input (24 VDC) I2 to I5, I8 to I23: 7 mA/input (24 VDC)		
Input impedance	I0, I1, I6, I7: 5.7 kΩ I2 to I5, I8 to I23: 3.4 kΩ		
Turn on time (ON Time)	I0 to I7: 35 µs + filter value I8 to I23: 40 µs + filter value		
Turn off time (OFF Time)	I0, I1, I6, I7: 45 µs + filter value I2 to I5, I8 to I23: 150 µs + filter value		
Isolation	Between input terminals and internal circuit: photocoupler isolated (isolation protection up to 500 V) Between input terminals: not isolated		
Filtering (3 possibilities: none, 3 ms or 12 ms.)	I0 to I11	I0 to I11	I0 to I7
Input type	Type 1 (IEC 61131)		
External load for I/O interconnection	Not needed		
Signal determination method	Static		
Input signals type	The input signals can be both sink and source.		

Modular base	TWDLMDA20DUK TWDLMDA20DTK	TWDLMDA20DRT	TWDLMDA40DUK TWDLMDA40DTK
Cable length	3m (9.84 ft) for compliance with electromagnetic immunity		
Connector insertion/removal durability	100 times minimum		

I/O Usage Limits

When using TWDLMDA20DUK and TWDLMDA20DTK at an ambient temperature of 55° C (131° F) in the normal mounting direction, limit the inputs and outputs, respectively, which turn on simultaneously along line (1).



When using TWDLMDA40DUK and TWDLMDA40DTK limit the inputs and outputs, respectively, which turn on simultaneously along line (2).

At 40° C (104° F), all inputs and outputs can be turned on simultaneously at 26.4 VDC as indicated with line (3).

When using the TWDLMDA20DRT controller, all inputs and outputs can be turned on simultaneously at 55° C (131° F), input voltage 26.4 VDC.

Transistor Sink and Source Output Specifications

Modular controller TWDLMDA...	20DUK	40DUK	20DRT	20DTK	40DTK
Output type	Sink	Sink	Source	Source	Source
Output points per common Line	8	2	2	8	16
Rated load voltage	24 VDC				
Maximum load current	1 A per common line				
Operating load voltage range	from 20.4 to 28.8 VDC				

Modular controller TWDLMDA...	20DUK	40DUK	20DRT	20DTK	40DTK
Voltage drop (on voltage)	1 V maximum (voltage between COM and output terminals when output is on)				
Rated load current	0.3 A per output				
Inrush current	1 A maximum				
Leakage current	0.1 mA maximum				
Clamping voltage	39 V +/-1 V				
Maximum lamp load	8 W				
Inductive load	L/R = 10 ms (28.8 VDC, 1 Hz)				
External current draw	100 mA maximum, 24 VDC (power voltage at the +V terminal)		100 mA maximum, 24 VDC (power voltage at the -V terminal)		
Isolation	Between output terminal and internal circuit: photocoupler isolated (isolation protection up to 500 V) Between output terminals: not isolated				
Average number of connector insertions/removals	100 times minimum				
Output delay - turn on/off time	Q0, Q1: 5 µs maximum Q2 to Q15: 300 µs maximum				

Relay Output Specifications

Modular controller	TWDLMDA20DRT
Number of outputs	8 discrete inputs consisting of 6 relay outputs and 2 transistor source outputs
Output points per common line - COM0	2 outputs
Output points per common line - COM1	3 NO contacts
Output points per common line - COM2	2 NO contacts
Output points per common line - COM3	1 NO contact
Maximum load current	2 A per output 8 A per common line
Minimum switching load	0.1 mA/0.1 VDC (reference value)
Initial contact resistance	30 mΩ maximum
Mechanical life	20,000,000 operations minimum (no load 18,000 operations/h)

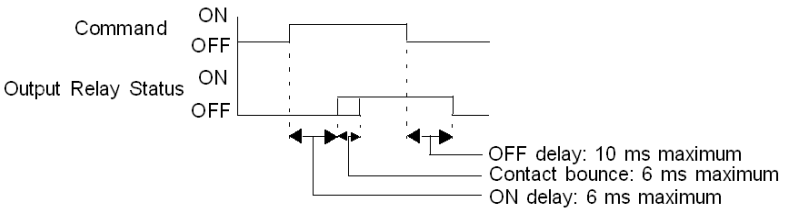
Modular controller	TWDLMDA20DRT
Dielectric strength	Between output to internal circuit: 1500 VAC, 1 min Between output groups: 1500 VAC, 1 min
Connector insertion/removal durability	100 times minimum

Usage category	Rated load	Electrical life (number of operations)
AC1 Resistive load command	500 VA(*)	10^5
AC14 Weak solenoid load	250 VA	10^5
AC15 Solenoid	200 VA	10^5
DC1 Resistive load command	60 W(*)	10^5
DC13 Solenoid L/R=150ms	30 W	10^5

(*) for AC1 & DC1 the outputs indicated here take the maximum per point on Twido (2A) into account.

Output delay

The output delay is shown below.



Relay Output Specifications for the Modular Bases

Introduction

This section provides Relay output specifications for the Modular bases.

Relay Output Specifications

Modular base	**TWDLMDA20DRT**
Number of outputs	8 discrete inputs consisting of 6 relay outputs and 2 transistor source outputs
Output points per common line - COM0	2 outputs
Output points per common line - COM1	3 NO contacts
Output points per common line - COM2	2 NO contacts
Output points per common line - COM3	1 NO contact
Maximum load current	2 A per output 8 A per common line
Minimum switching load	0.1 mA/0.1 VDC (reference value)
Initial contact resistance	30 mΩ maximum
Mechanical life	20,000,000 operations minimum (no load 18,000 operations/h)
Dielectric strength	Between output to internal circuit: 1500 VAC, 1 min Between output groups: 1500 VAC, 1 min
Connector insertion/removal durability	100 times minimum

Usage category	**Rated load**	**Electrical life (number of operations)**
AC1 Resistive load command	500 VA(*)	10^5
AC14 Weak solenoid load	250 VA	10^5
AC15 Solenoid	200 VA	10^5
DC1 Resistive load command	60 W(*)	10^5
DC13 Solenoid L/R=150ms	30 W	10^5

(*) for AC1 & DC1 the outputs indicated here take the maximum per point on TwidoSuite (2A) into account.

Description of Analog Potentiometers

Introduction

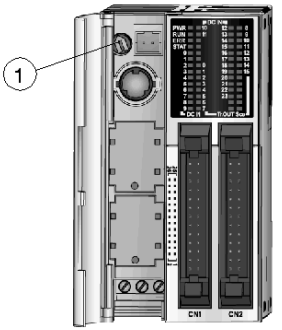
The following section describes the analog potentiometer on the Modular bases.

Description

The TWDLMDA20DUK, TWDLMADA20DTK, TWDLMDA20DRT, TWDLMDA40DUK, and TWDLMADA40DTK bases have one analog potentiometer. The analog potentiometer can be set to a value between 0 and 1023. The value is stored in a system words and is updated in every scan. For more information on setting the analog potentiometer, see the TwidoSuite Software Reference Manual.

Analog Potentiometer on a Modular Base

The following figure shows the analog potentiometer on a Modular base, the TWDLMDA40DUK.

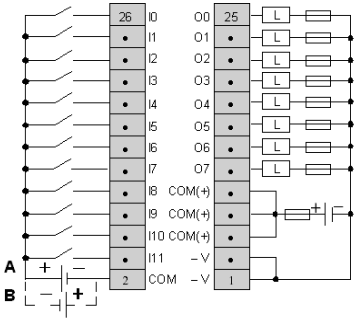


Caption

Label	Description
1	Analog potentiometer 1

TWDLMDA20-DTK Wiring Diagram

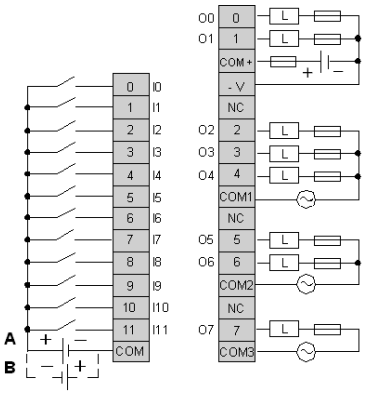
This diagram is for the TWDLMDA20DTK base with connector.



- The COM(+) terminals are connected together internally.
- The COM and COM(+) terminals are **not** connected together internally.
- The -V terminals are connected together internally.
- Connect an appropriate fuse for the load.
- A is the positive logic.
- B is the negative logic.

TWDLMDA20-DRT Wiring Diagram

This diagram is for the TWDLMDA20DRT base with terminal block.



- Output points 0 and 1 are transistor source outputs, all other output points are relay.
- The COM terminals are **not** connected together internally.
- Connect an appropriate fuse for the load.
- A is the positive logic.
- B is the negative logic.