



Schneider Electric's Twido programmable controllers are a highly flexible automation solution, designed to improve the efficiency of panel builders and machine builders. Twido features both Compact and Modular CPUs, with a single range of Expansion I/O modules (both discrete and analog), option modules, and programming software. Twido CPUs reduce panel space, offering up to 40 I/O points in a footprint the size of a business card. Controllers and I/O modules offer a variety of wiring options to simplify connections: removable terminal blocks, spring-type connectors, and several pre-wired cable modules called Twidofast. With Twido, you can customize your control solution to fit exactly what your application requires:

- Compact controllers, available with 10, 16, or 24 I/O points
- Modular controllers, available with 20 or 40 I/O points
- A single range of Expansion I/O modules for both controllers: 14 digital input/relay output modules, and 4 analog I/O modules
- Available Option Modules offer enhanced RS232 and RS485 communication capability; HMI interfaces; a real-time clock; memory backup of 32K and memory expansion to 64K; input simulators; and an assortment of cables, connectors, and pre-wired units.

TwidoSoft, a Windows 98SE/2000 programming software that simplifies programming, and is compatible and portable across the CPU range. Twido can be used with many other Schneider Electric control products, such as TeSys, Phaseo, Magelis, Altivar, Ultima, and OISConcept.

Twido base controllers

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Applications		Compact bases		
				
Discrete I/O	Basic	10	16	24
	Number of inputs	6 sink/source 24 VDC	9 sink/source 24 VDC	14 sink/source 24 VDC
	Number of outputs	4 relay outputs	7 relay outputs	10 relay outputs
	Connection type	Non-removable screw terminal		
Expansion I/O	Number of possible expansion modules	–		
	Modules E/S TOR	4 discrete I/O or analog		
	Modules E/S analogiques	8, 16 or 32 inputs 24 VDC 2 inputs 12 bits ; 1 output 12 bits		
Maximum number of inputs/outputs per configuration (base with I/O expansions)		10	16	88 with I/O expansions with screw terminal (1) 152 with I/O expansions with HE 10 connector
Integrated counting	5 kHz counters	3 counter channels 16 bits (0...65535 points) : - discrete I/O 24 VDC of controller - up/down counting with preset		
	20 kHz counters	1 counter channel 16 bits (0...65535 points) : - inputs 24 VDC for incremental encoder or proximity sensor - up/down counting, up counter, down counter and frequency meter		
	7 kHz motion			
Communication port types		1 RS 485 port (Mini-DIN connector)	1 RS 485 port (mini-DIN connector) Optional RS 232C (mini-DIN connector) or RS 485 port	
Power supply		100...240 VAC (integrated 24 VDC sensor power supply)		
Programming	Program capacity	700 steps	2000 steps	3000 steps
	Internal bits	128 bits	128 bits	128 bits
	Internal words (2)	256 words (maxi 1024)	512 words (maxi 2048)	1024 words (maxi 2048)
	Function blocks (2)	32 timers (maxi 64), 16 counter (maxi 32)		
	Real-time clock	TWD XCP RTC cartridge in option, 16 user-definable real-time clocks		
	Languages	Ladder language and instruction List language (with Grafcet instructions)		
Software		TwidoSoft software under Windows 98 and Windows 2000		
Model of twido base controllers		TWD LCAA 10DRF	TWD LCAA 16DRF	TWD LCAA 24DRF
Page		8		

(1) With maximum 42 relay outputs (on base and I/O expansions).

(2) The maximum values of internal words and function block are not cumulative.

Modular bases



20

12 --- 24 V sink/source

8 sink or source (depending on model)

Connector HE 10

modules

6 relay output and 2 source

Removable screw terminal

7 discrete I/O or analog modules

40

24 --- 24 V sink/source

16 sink or source (depending on model)

Connector HE 10

8, 16 or 32 outputs 24 VDC or relays; 4 inputs 4 VDC/4 relays outputs or 16 inputs 24 VDC/8 relays outputs
or 2 inputs/1 output 12 bits, connection with screw terminal

84 with I/O expansions with screw terminal
148 with I/O expansions with HE 10 connector

132 with I/O expansions with screw terminal
244 with I/O expansions with HE 10 connector

152 with I/O expansions with screw terminal
264 with I/O expansions with HE 10 connector

2 channels 16 bits (0...65535 points),
- Discrete I/O 24 VDC of controller
- up/down counting with preset

2 channels 16 bits (0...65535 points)
- Discrete I/O 24 VDC of controller for incremental encoder or proximity sensor
- up/down counting, up counter, down counter and frequency meter

2 channels of PWM function (pulse width modulation output) and PLS function (pulse generator output)

(mini-DIN connector or screw terminal)

--- 24 V

3000 steps, 6000 with TWD XCP MFK64 with memory extension cartridge

TWD LMDA 20D●K (1)

TWD LMDA 20DRT

TWD LMDA 40D●K (1)

14

(3) Replace in the reference ● by T: source transistor outputs, U: sink transistor outputs.



TWD LCAA 10DRF



TWD LCAA 16DRF



TWD LCAA 24DRF

Presentation

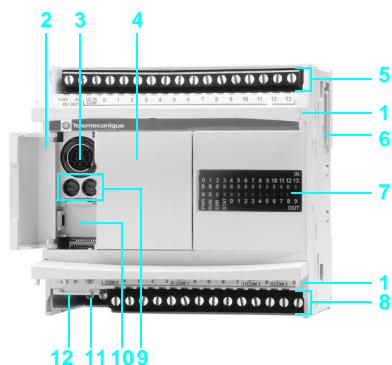
The Twido Compact line of programmable controllers offers an "all-in-one" programmable controller solution in a 3.2 x 3.5 x 2.8 inch footprint. Three Compact base controllers are available, with different combinations of 24 VDC inputs and relay outputs. All Compact controllers utilize a 100...240 VDC power supply. The Compact controller offers significant advantages to the panel and machine builder:

- The Compact controller's small footprint allows a robust accumulation of I/O in a very small area, thus reducing panel size in applications where space is at a premium.
- A variety of expansion possibilities and product options offer the kind of system flexibility usually reserved for larger controller platforms. The Compact controllers can be configured to include expansion I/O modules (with the TWDLCAA24DRF); option modules, such as an HMI plug-in, memory cartridge, and real time clock; and additional RS 485 or RS 232C communication ports.
- Another benefit of the Compact controller solution is its extreme flexibility in wiring. The Compact line offers an array of cabling choices, such as removable screw terminal blocks and spring-type connectors, which allow for quick, easy wiring with increased reliability. The Twidofast pre-wired cabling solution offers a rapid, reliable connection, combining modules with connectors and cables with flying leads for direct connection to sensors/actuators or to Twidofast kits (cables plus a Telefast sub-base).
- The HMI option and the plug-in memory option allow for easy sharing and updating of programs among controllers. The small HMI display can be used as a local adjustment tool that can be transferred from one CPU to another. The EEPROM in the memory option allows for easy transfer of programs among all controllers - Compact and Modular - in the Twido family.
- TwidoSoft software features easy programming, using the same objects and instructions as the current PL7-07 software. Existing PL7-07 programs can be imported using an ASCII file directly into Twidosoft.
- All Compact controllers have at least one analog potentiometer. The potentiometer can be set at a value from 0...1024. The value is stored in system words and is updated every scan.

Controller	Digital inputs	Relay outputs	Analog potentiometers	Serial ports	Expansion I/O modules	HMI option module	Optional cartridge
TWD LCAA 10DRF	6	4	1 point de 0...1023	1 x RS 485	No	Yes	One (RTC or memory)
TWD LCAA 16DRF	9	7	1 point de 0...1023	1 x RS 485, in option 1 x RS 232C/485	No	Yes	One (RTC or memory)
TWD LCAA 24DRF	14	10	1 point de 0...1023	1 x RS 485, in option 1 x RS 232C/485	Yes, max of 4 (1)	Yes	One (RTC or memory)

(1) So maximum 88 I/O with screw terminal expansion module, with maximum 32 relay outputs in I/O expansions.

So maximum 152 I/O with HE 10 connector expansion modules.



Description

Twido TWD LCAA ●● DRF programmable compact base controllers comprise:

- 1 Two hinged connection terminal block covers for access to terminals.
- 2 A hinged access door.
- 3 An RS 485 mini-DIN type serial port connector (enables connection of the programming terminal).
- 4 A slot (protected by a removable cover) for the digital diagnostics/maintenance display TWD XCP ODC.
- 5 A screw terminal block for \sim 24 V sensor supply and for connecting input sensors.
- 6 An input/output extension module connector (for the 24 input/output model).
- 7 A display block showing:
 - the state of the controller (PWR, RUN, ERR and STAT),
 - the inputs and outputs (IN● and OUT●).
- 8 A screw connection terminal block for connecting output actuators.
- 9 Two analog potentiometers (one for 10 and 16 input/output models).
- 10 A extension connector for the addition of a 2nd RS 232C/RS 485 serial port using the TWD NAC ●●● adapter (for 16 and 24 input/output models).
- 11 A screw connection terminal block for the connecting the \sim 100...240 V power supply unit
- 12 A connector for the TWD XCP MFK32 memory cartridge or TWD XCP RTC timer (access via underside of the controller).

The compact bases can be mounted on a symmetric DIN rail, mounting plate or panel (2 holes \varnothing 4.3).

General system specifications of compact base controllers

Temperature	Operating	°C	0...55 (32...131° F)
	Storage	°C	- 25...+ 70 (+ 7...+ 158° F)
Relative humidity			30 to 95 %, non-condensing
Degree of protection			IP 20
Corrosion immunity			Unaffected by corrosive gases
Altitude	Operation	m	0...2000 (0 to 6565 ft)
	Transport	m	0...3000 (0 to 9840 ft)
Vibration resistance	DIN rail	Hz	10...57, amplitude 0.075 mm, 57...150 Hz acceleration
		m/s ²	9.8 (1 G)
	Mounting on panel via TWD XMT5 mounting kit	Hz	2...25, amplitude 1.6 mm, 25...100 Hz acceleration
		m/s ²	39.2 (4 G)
Shock resistance		m/s ²	147 (15 G) 11 msec duration
RAM backup	Data		Internal relay, shift registers, counter, data register...
	Duration		Approx. 30 days (typical) at 25° C (77° F) after battery fully charged
	Battery		Lithium secondary battery
	Battery charging time		Approx. 15 hours to charge from 0% to 90% of full charge
	Battery life		5 years when charging for 9 hours and discharging for 15 hours

Specifications of compact base controllers

CPU type		TWD LCAA 10DRF	TWD LCAA 16DRF	TWD LCAA 24DRF
Number of 24 VDC inputs		6	9	14
Number of AC relay outputs		4	7	10
I/O expansions	Number of modules maxi	—		4
	Number of I/O maxi	—		88/152 (1)
Programm capacity		700 steps	2000 steps	3000 steps
Processing time	Basic instruction	msec	1 for 1000 logical steps)	
	Overhead system	msec	0.5	
Memory data	Internal bytes		128	
	Internal words		256 (1024 maxi) (2)	512 (2048 maxi) (2)
	Timer		32 (64 maxi) (2)	1024 (2048 maxi) (2)
	Counter		16 (32 maxi) (2)	
Power	Rated power voltage	VAC	100...240	
	Allowable voltage range	VAC	85...264	
	Max inrush current	A	35	40
	Max input current at 24 VDC	mA	250	
Max power consumption	~ 100 V	VA	20	22
	~ 264 V	VA	30	31

Communication

Function		Integrated serial link	Serial interface adaptor (optional) (3)
Type of port		RS 485	RS 232C, with TWD NAC 232D adaptor RS 485, with TWD NAC 485● adaptor
Maxi rate		K bits/s	19,2
Isolation between internal circuit and serial port			Non isolated
Connection of programming terminal		Half-duplex terminal port	No
Communication protocol			Modbus Master/Slave RTU, ASCII character mode
I/O "Remote Link"			Yes, see page 41006/3
Integrated functions			
Counter	Number of channels		4
	Frequency		3 channels @ 5 kHz (FCi function), 1 channel @ 20 kHz (VFCi function)
	Capacity		16 bits (0...65535 points)
Analog potentiometer			1 point can be set from 0...1023 points
			1 point can be set from 0...511 points

(1) The first value corresponds to the number of maximum I/O base on expansion with screw or wire-clamp terminal block expansion modules, the second value correspond to the HE 10 connector expansion module.

(2) The maximum values are not cumulative.

(3) With TWD LCAA 16DRF 16 I/O base and TWD LCAA 24DRF 24 I/O base.

DC input specifications				
CPU type		TWD LCAA 10DRF	TWD LCAA 16DRF	TWD LCAA 24DRF
Number of input channels		6	9	14
Rated input voltage		$\overline{\text{---}}$ V	24 sink/source input signal	
Common		1		
Input limit values		$\overline{\text{---}}$ V	20,4...28,8	
Input nominal current		mA	11 mA for I0.0 and I0.1, 7 mA for other inputs I0.i	
Input impedance		kΩ	2,1 kΩ for I0.0 and I0.1, 3,4 kΩ for other inputs I0.i	
Processing time	At status 1	μs	35 μs or programming filter time for I0.0...I0.5, 40 μs or programming filter time for other inputs I0.i	
	At status 0	μs	45 μs or programming filter time for I0.0...I0.5, 150 μs or programming filter time for other inputs I0.i	
Isolation			No isolation between channels, photocoupler on internal circuit	
Relay output specifications				
Number of output channels		4	7	10
Output current		A	2 per channel, 8 per common	
Common	Common 0		3 normally open	4 normally open
	Common 1		1 normally open	2 normally open
	Common 2		–	1 normally open
	Common 3		–	1 normally open
Minimum switching load		mA	0,1/0,1 VDC (reference value)	
Initial contact resistance		mΩ	30 maxi	
Rated load (resistive, inductive)		A	2A/240 VAC or 2A/30 VDC (with maxi 1800 operations /hour) : - electrical life: mini 100 000 operations, - mechanical life: mini 20 x 10 ⁶ operations.	
Isolation		\sim V eff	1 500 for 1 mn	
Consumption for all the outputs	At status 1	$\overline{\text{---}}$ 5 V	mA	24
		$\overline{\text{---}}$ 24 V	mA	26
	At status 0	$\overline{\text{---}}$ 5 V	mA	5
Timer cartridge (optionnal) (1)				
Precision		w/month	\pm 30 @ 25° C	
Autonomy		days	Approx. 30 @ 25° C after full charge of the battery	
Integrated battery			No interchangeable Lithium battery	
Load time		H	about 10 for 0...90 % of the full charge	
Memory cartridge (optional) (1)				
Type of memory			EEPROM	
Memory capacity		Ko	32	
Save/transfer program and internal words			Yes	
Program size increase			No	

(1) The use of the cartridges are exclusive.



TWD LCAA 10DRF/16DRF



TWD LCAA 24DRF



TWD XCP MFK32



TWD XCP RTC



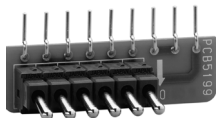
TWD NAC 232D



TWD NAC 485T



TWD XCP ODC



TWD XSM 6

References

These compact base controllers are supplied with \sim 100...240V and in turn supply the voltage Δ 24 V necessary to power the sensors. The digital display can be connected to the controllers via the front panel. They are equipped with:

- a slot for a 32 Kb EPROM memory cartridge or Real Time Clock cartridge.
- a slot for fitting a second RS 232C/RS 485 serial port.

The 24 input/output compact base controller can receive discrete/analog 24 input/output extension modules (4 modules maximum).

Compact controllers

Number of I/O	Inputs sink/source	Outputs	Program memory	Reference	Weight kg (oz)
10 I/O	6 24 VDC inputs	4 O relay	700 steps	TWD LCAA 10DRF	0.230 (8.0)
16 I/O	9 24 VDC inputs	7 O relay	2000 steps	TWD LCAA 16DRF	0.250 (8.8)
24 I/O	14 24 VDC inputs	10 O relay	3000 steps	TWD LCAA 24DRF	0.305 (10.8)

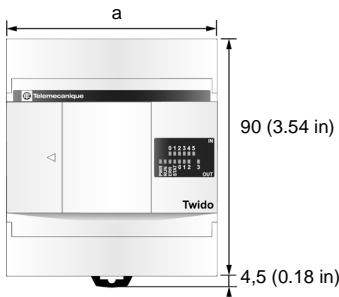
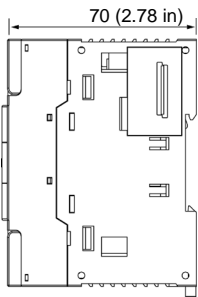
Separate parts (1)

Designation	Use	Type	Wiring	Reference	Weight kg (oz)
32 Kb memory cartridge	Application backup Program transfert	EEPROM	—	TWD XCP MFK32	—
Calendar cartridge	Event time-stamping	—	—	TWD XCP RTC	—
Serial interface adapter	Addition of a second serial port (2)	RS 232C	Mini-DIN	TWD NAC 232D	—
		RS 485	Mini-DIN	TWD NAC 485D	—
		RS 485	Screw terminal block	TWD NAC 485T	—
HMI display	Visualization and modification datas	—	—	TWD XCP ODC	—
Input simulator	Compact controllers 6 I/O	—	—	TWD XSM 6	—
	Compact controllers 9 I/O	—	—	TWD XSM 6	—
	Compact controllers 14 I/O	—	—	TWD XSM 6	—

(1) Other separate parts, see page 41006/5.
(2) With TWD 16DRF/24DRF compact controllers.

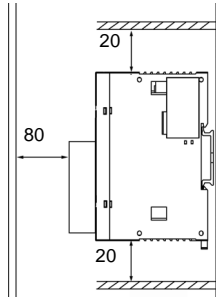
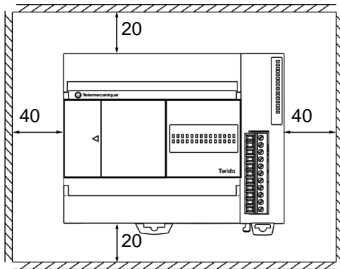
Dimensions

TWD LCAA 10DRF/16DRF/24DRF



	a
TWD LCAA 10 DRF	80 (3.17 in)
TWD LCAA 16 DRF	80 (3.17 in)
TWD LCAA 24 DRF	95 (3.94 in)

Installation rules



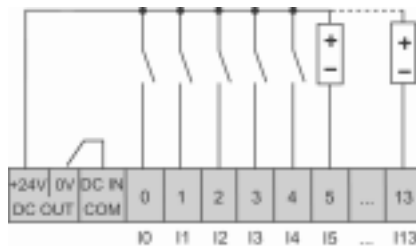
Important :

Vertical mounting: non authorized for temperatures $\geq 40^{\circ}\text{C}$, flat mounting "upside down" non authorized.
Avoid placing heat generating devices (transformers, power supplies, contactors, etc.) beneath the Twido controller.

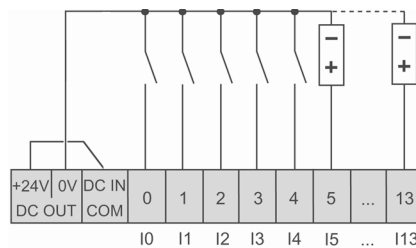
Connections

Connections of 24 VDC inputs

TWD LCAA 10DRF/16DRF/24DRF



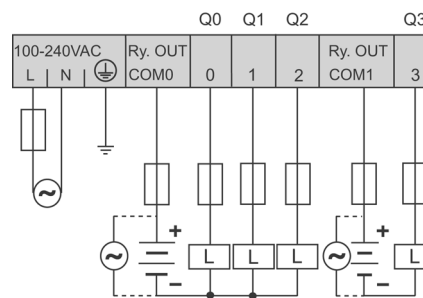
DC source input connection



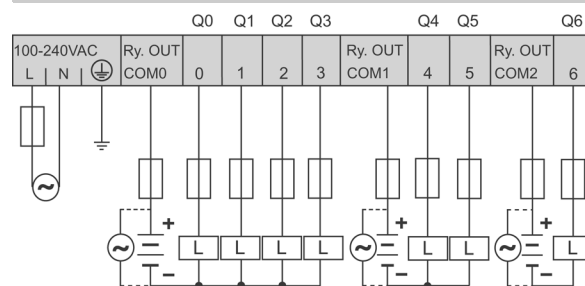
DC sink input connection

Connection of 100...240 VDC power and relay outputs

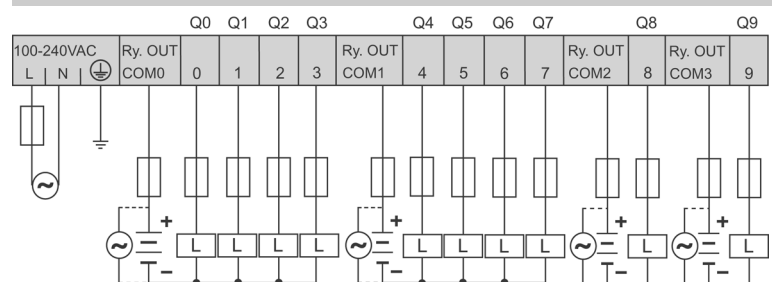
TWD LCAA 10DRF



TWD LCAA 16DRF



TWD LCAA 24DRF





TWD LMDA 20DTK/20DUK



TWD LMDA 20DRT



TWD LMDA 40DTK/40DUK

Presentation

The Twido Modular range of programmable controllers offers a "just enough" programmable controller solution, with a footprint no larger than 1.9 x 3.5 x 2.8 inches. Five Modular base controllers are available, with different combinations of 24 VDC inputs and relay, transistor source, and transistor sink outputs. The function of the Modular controllers can be enhanced by using any of the 18 Expansion I/O modules in the Twido range. All Modular controllers utilize a 24 VDC power supply.

The Modular controller offers significant advantages to the panel builder and small machine supervisor:

- The Modular controller's small footprint allows a robust accumulation of up to 7 expansion I/O modules per controller in a very small area, thus reducing panel size in applications where space is at a premium.

- A variety of expansion possibilities and product options offer the kind of system flexibility usually reserved for larger controller platforms. The Modular controllers can be configured to include an assortment of expansion I/O modules, such as digital and analog input and output, along with mixed digital I/O. The Modular controller options include an HMI base module, memory cartridge, and real time clock; and additional RS485 or RS232C communication ports. The HMI base module offers maximum flexibility, with both a port for an optional communication adapter, as well as a connection method to any of the three communication modules.

- Another benefit of the Modular controller is its extreme flexibility in wiring. The Modular line offers an array of cabling choices, such as removable screw terminal blocks and spring-type connectors, which allow for quick, easy wiring with increased reliability. The Twidofast pre-wired cabling solution offers a rapid, reliable connection, combining modules with :

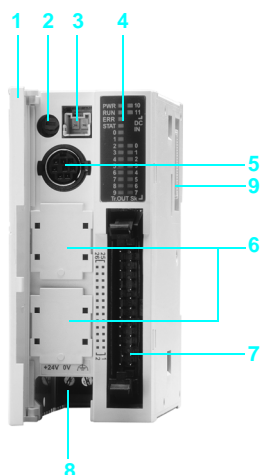
- connectors and cables with flying leads for direct connection to sensors/actuators.
- to Twidofast kits (cables plus a Telefast sub-base).

- The HMI option module and the plug-in memory option allow for easy sharing and updating of programs among controllers. The small HMI display can be used as a local adjustment tool that can be transferred from one CPU to another. The EEPROM in the memory option allows for easy transfer of programs among all controllers - Compact and Modular - in the Twido family. TwidoSoft software features easy programming, using the same objects and instructions as the current PL7-07 software. Existing PL7-07 programs can be imported using an ASCII file directly into TwidoSoft.

- All Modular controllers have :

- one analog potentiometer.
- the potentiometer can be set at a value from 0 ... 1024. The value is stored in system words and is updated every scan.

Controller	Number of 24 VDC inputs	Number and type of outputs	Wiring type	Serial ports	Number of expansion I/O modules possible	Option module	Optional cartridge
TWD LMDA 20DTK	12 sink/source	8 transistor source	Connector HE 10	1 x RS 485, in option 1 x RS 232C/485	4 modules	1 module : HMI display or serial link	2 slots : RTC and memory
TWD LMDA 20DUK	12 sink/source	8 transistor sink	Connector HE 10	1 x RS 485, in option 1 x RS 232C/485	4 modules	1 module : HMI display or serial link	2 slots : RTC and memory
TWD LMDA 20DRT	12 sink/source	6 relay, 2 transistor source	Removable screw terminal	1 x RS 485, in option 1 x RS 232C/485	7 modules	1 module : HMI display or serial link	2 slots : RTC and memory
TWD LMDA 40DTK	24 sink/source	16 transistor source	Connector HE 10	1 x RS 485, in option 1 x RS 232C/485	7 modules	1 module : HMI display or serial link	2 slots : RTC and memory
TWD LMDA 40DUK	24 sink/source	16 transistor sink	Connector HE 10	1 x RS 485, in option 1 x RS 232C/485	7 modules	1 module : HMI display or serial link	2 slots : RTC and memory



Description

Twido modular controller TWD LMDA ●0 D●● il comprised of the following :

On the front panel:

- 1 A hinged door.
- 2 An analog potentiometer.
- 3 A connector for connecting the built-in analog input.
- 4 A display block showing:
 - the state of the controller (PWR, RUN, ERR and STAT),
 - the inputs and outputs (INi and OUTi).
- 5 An RS 485 mini-DIN type serial port connector (enables connection of the programming terminal).
- 6 Two slots (protected by a removable cover) for the TWD XCP MFK●● memory cartridge and the TWD XCP RTC Real Time Clock cartridge.
- 7 One (or more) HE 10 type connector(s) , or screw terminal block, for the connection of the input sensors/output actuators.
- 8 Screw terminals for 24 VDC power supply connection.

On the right-hand panel:

- 9 A connector for the input/output extension modules TWD D●● and TWD AM●/A●M (4 or 7 according to model).

On the left-hand panel:

- 9 A connector for the TWD XCP ODM display module or TWD NOZ ●●● serial interface module.

These modules are mounted on symmetric DIN rail. For modules with a removable screw terminal, the terminal blocks are not supplied with the module. The TWD XMT5 kit (lot of 5) allowed the mounting on panel.



Configuration example

Opposite the configuration exemple including the TWD LMDA 20DRT modular base with:

- On the left, TWD XCP ODM built-in display module,
- On the right, two TWD DDI 8DT and TWD DDO 16TK expansion I/O modules.

The modular base is equipped with TWD XCP RTC real-time clock cartridge and TWD XCP MFK64 increase memory cartridge.

General System Specifications of Modular Base Controllers

Temperature		Operating	°C	0...55 (32...131 °F)			
		Storage	°C	- 25...+ 70 (7...158 °F)			
Relative humidity				30 to 95 %, non- condensing			
Degree of protection				IP 20			
Corrosion immunity				Unaffected by corrosive gases			
Altitude	Operation	m	0...2000				
	Transport	m	0...3000				
Vibration resistance	DIN rail	Hz	10...57, amplitude 0.075 mm, 57...150 Hz acceleration				
		m/s²	9.8 (1 G)				
	Panel	Hz	2...25, amplitude 1.6 mm, 25...100 Hz acceleration				
		m/s²	39.2 (4 G)				
Shock resistance		m/s2	147 (15 G) 11 msec duration				
RAM back up	Elements backed up		Internal RAM: internal bits, shift register, counter, LIFO/FIPO register...				
	Duration		Approx. 30 days (typical) at 25° C (77° F) after battery fully charged				
	Battery		Lithium secondary battery				
	Battery charging time		Approx. 15 hours to charge from 0% to 90% of full charge				
	Battery life		5 years when charging for 9 hours and discharging for 15 hours				
CPU type		TWD	LMDA 20DTK	LMDA 20DUK	LMDA 20DRT	LMDA 40DTK	LMDA 40DUK
Number of inputs ---			12			24	
Number and type of outputs			8 transistor source	8 transistor sink	6 relays 2 transistor source	16 transistor source	16 transistor sink
Wiring I/O			Connector HE 10		Screw terminal block	Connector HE 10	
I/O expansions	Possible expansion modules		4		7		
	Possible expansion points		132/244 (1)		152/264 (1)		
Program capacity		Kb	3000 steps		3000 steps 6000 with TWD XCP MFK64 memory cartridge		
Processing time	Basic instructions	ms	1 for 1000 logical steps				
	Overhead system	ms	0.5				
Memory data	Internal bits		128				
	Internal words		1024 (2048 maxi) (2)				
	Timer		32 (64 maxi) (2)				
	Counter		16 (64 maxi) (2)				
Power	Rated power voltage	VDC	24				
	Allowable voltage range	VDC	20.4...26.4 incuding ripple				
	Max input current at 26.4	mA	560 @ 26.4V		700 @ 26.4 V		
	Max inrush current	A	50				
	Max power consumption	W	15 (base with 4 I/O expansions)		19 (base with 7 I/O expansions)		
Communication							
Function			Integrated serial link		Serial interface adaptor (optional) (3)		
Type of port			RS 485		RS 232C, TWD NAC 232D adaptor or RS 485, TWD NAC 485● adaptor		
Maximum baud rate		K bps	19.2				
Isolation between internal circuit and comm port			No isolation				
Programming		Terminal port	Yes		No		
Communication protocols			Modbus RTU/ASCII Master/slave Character mode ASCII				
Remote link to I/O or controller			Yes, see page 41006/3				
Integrated functions							
High-speed counter	Number of channels		3				
	Frequency	kHz	Single phase, 5 (2 pts); Single/two-phase selectable, 20 (2 pts)				
	Capacity		16 bits (0...65535 points)				
Positioning	Number of channels		2				
	Frequency	kHz	7				
	Functions		PWM, pulse withd modulation output PLS, pulse generator output				
Analog voltage input	Number of channels		1 channel				
	Input voltage range		0...10 VDC				
	Resolution		9 bits (0...511 points)				
	Impedance	kΩ	100				
Analog potentiometer			1 point can be set from 0...1023 points				

(1) The first value corresponds to the number of maximum I/O base on expansion with screw or wire-clamp terminal block expansion modules, the second value correspond to the HE 10 connector expansion module.

(2) The maximum values are not cumulative.

(3) Or with TWD NAC ●●●● serial interface adaptor in TWD XCP ODM built-in display module.

DC input specifications

CPU type		TWD	LMDA 20DTK	LMDA 20DUK	LMDA 20DRT	LMDA 40DTK	LMDA 40DUK
Number of input points			12			24	
Rated input voltage		VDC	24 sink/source input signal				
Common			1			2	
Input voltage range		VDC	20.4...26.4				
Input nominal current		mA	5 mA for I0.0 and I0.1, I0.6 and I0.7, 7 mA for other inputs I0.i				
Input impedance		kΩ	5,7 kΩ for I0.0 and I0.1, I0.6 and I0.7, 4,7 kΩ for other inputs I0.i				
Filter time	At status 1	μs	35 μs for I0.0 and I0.1, I0.6 and I0.7, 40 μs for other inputs I0.i				
	At status 0	μs	45 μs for I0.0 and I0.1, I0.6 and I0.7, 150 μs for other inputs I0.i				
Isolation			No isolation between channels, photocoupler on internal circuit				

Transistor sink and source output specifications

Number of output points			8		2	16	
Output type			Source	Sink	Source		Sink
Common			1			2	
Output nominal values	Voltage	V	24				
	Current	A	0,3				
Output voltage values	Voltage	V	20,4...28,8				
	Current per channel	A	0,36				
	Current per common	A	1				
Response time	At status 1	μs	5 μs for Q 0.0 and Q0.1, 300 μs for other outputs Q 0.i				
	At status 0	μs	5 μs for Q 0.0 and Q0.1, 300 μs for other outputs Q 0.i				
Residual voltage (voltage at status 1)		V	1 maxi				
Maxi inrush current		A	1				
Leakage		mA	0,1				
Clamping voltage		V	39				
Tungsten filament lamp		W	8				
Isolation			No isolation between output terminal; photocoupler between output terminal and internal circuit				

Relay output specifications

Number of outputs			—	6	—
Maximum load current	A		—	2 per point, 8 per common line	—
Nb of points per common	Common 1		—	3 normally open	—
	Common 2		—	2 normally open	—
	Common 3		—	1 normally open	—
Minimum switching load	mA		—	0.1/0.1 --- V (reference value)	—
Initial contact resistance	mΩ		—	30 maxi	—
Rated load (resistive/inductive)	A		—	2/~ 240 V, 2/--- 30 V	—
Isolation	VAV eff		—	1 500 for 1 mn	—
Consumptions for every outputs	At status 1 --- 5 V	mA	—	30	—
	--- 24 V	mA	—	40	—
	At status 0 --- 5 V	mA	—	5	—

Optional clock cartridge

Accuracy	sec/month	± 30 à 25° C
Duration	days	Approx. 30 (typical) at 25° C (77° F) after battery is fully charged
Embedded battery		Lithium secondary battery
Charging time	H	Approx. 10 to charge from 0% to 90% of full charge

Optional memory cartridge

Type of controller		TWD LMDA 20DTK/20DUK	TWD LMDA 20DRT/40DTK/40DUK
Memory type		EEPROM	
Memory capacity	Ko	32	32 64
Application backup		Yes	
Application backup and size increase		No	No Yes

(1) 2A/240 VAC or 2A/30 VDC (with 1800 maximum operations/hour)
 - electrical life: 100 000 operations minimum,
 - mechanical life: 20 x 10⁶ operations minimum.



TWD LMDA 20DTK/20DUK



TWD LMDA 20DRT



TWD LMDA 40DTK/40DUK



TWD XCP MFK



TWD XCP RTC

References

These modular bases have a Δ 24 V supply. These have two slots: one for the 32/64 Kb EEPROM memory cartridge and one for the Real-Time Clock cartridge. They may be extended:

- To the right by discrete/analog input/output modules (4 or 7 modules maximum, according to model).
- To the left by the built-in display module or serial link interface module, these two modules having slots for fitting of a second RS 232C/RS 485 serial port.

The inputs/outputs of these bases are connected by HE 10 connector, except for the model TWD LMDA 20 DTK, which is connected using a removable screw terminal block. These bases are supplied with the built-in analog input connection cable, which is a 1 m long cable featuring a free wire end for connection to sensor.

Modular base 20 I/O

Inputs sink/source	Outputs	Nb of expansion I/O modules	Memory application	References	Weight kg
12 E \rightarrow 24 V	8 S transistor source	4	3000 steps	TWD LMDA 20DTK	0.140
	8 S transistor sink	4	3000 steps	TWD LMDA 20DUK	0.140
	6 S relay	7	3000 steps	TWD LMDA 20DRT	0.185
	2 S transistor source		(1)		

Modular base 40 I/O

Inputs sink/source	Outputs	Nb of expansion I/O modules	Memory application	References	Weight kg
24 E \rightarrow 24 V	16 S transistors source	7	3000 steps (1)	TWD LMDA 40DTK	0.180
	16 S transistors sink	7	3000 steps (1)	TWD LMDA 40DUK	0.180

Separate parts (2)

Description	Utilisation	Type	References	Weight kg
Memory cartridge 32 Ko	Memory extension Application backup Program transfer	EEPROM	TWD XCP MFK32	0.005
Memory cartridge 64 Ko (3)	Memory extension Application backup Program transfer	EEPROM	TWD XCP MFK64	0.005
Calendar cartridge	Event time-stamping	—	TWD XCP RTC	0.005
Serial interface module	Addition of a second serial port	—	see page 34	—
HMI module	Visualization and modification datas	—	see page 34	—
Mounting kit	Mounting on panel	Sold in lot of 5	TWD XMT 5	—

Replacement parts

Screw terminal blocks	TWD LMDA 20DRT base, 13 contacts	Sold in lot of	TWD FTB 2T13	—
	TWD LMDA 20DRT base, 16 contacts	Sold in lot of 2	TWD FTB 2T16	—
Analog input cable		Length 1 m	TWD XCA 2A10M	—

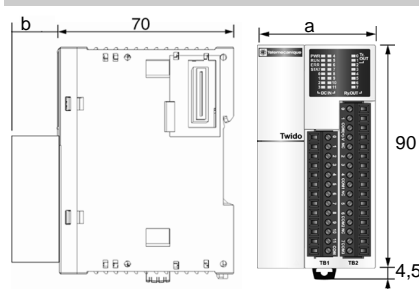
(1) 6000 instructions with TWD XCP MFK64 memory extension cartridge.

(2) Connection by HE 10 connector, see TwidoFast and Telefast 2 pre-wired system, page 35

(3) Extension memory with TWD LMDA 20DRT/40DRT base.

Dimensions

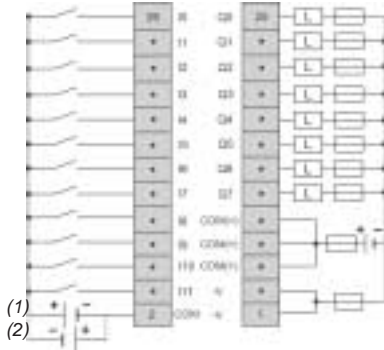
TWD LMDA 20DRT/20DUK/40DRT/40DUK



	a	b
TWD LMDA 20DTK/20DUK	35,4	0 (4)
TWD LMDA 20DRT	47,5	14,6
TWD LMDA 40DTK/40DUK	47,5	0 (4)

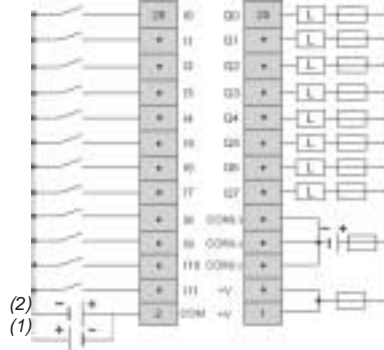
(4) out connector

TWD LMDA 20DTK



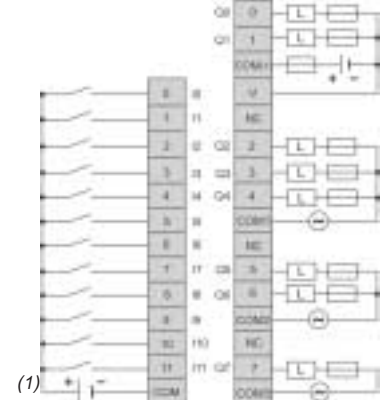
- The COM (+) terminals are connected together internally.
- The COM and COM (+) terminals are not connected together internally.
- The -V terminals are connected together internally.

TWD LMDA 20DUK



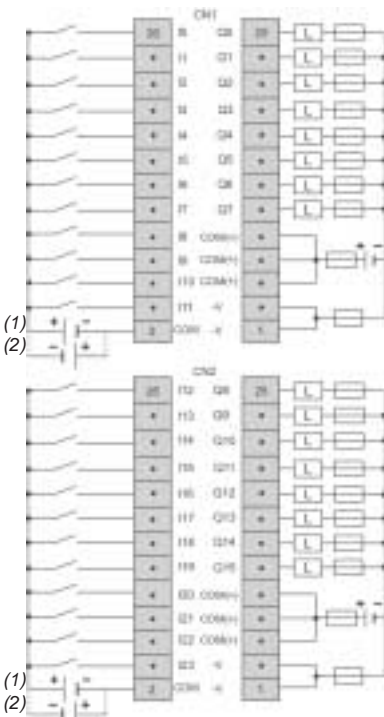
- The COM (-) terminals are connected together internally.
- The COM and COM (-) terminals are not connected together internally.
- The +V terminals are connected together internally.

TWD LMDA 20DRT



- Output points 0 and 1 are transistor source outputs; all other output points are relay.
- The COM terminals are not connected together internally.

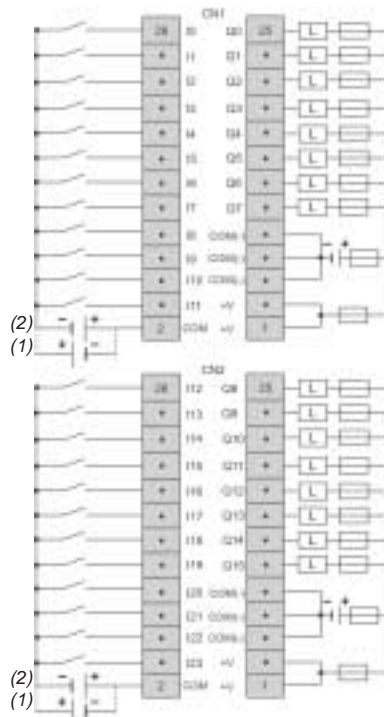
TWD LMDA 40DTK



- The terminals on CN1 and CN2 are not connected together internally.
- The COM (-) terminals are connected together internally.
- The COM and COM (-) terminals are not connected together internally.
- The +V terminals are connected together internally.

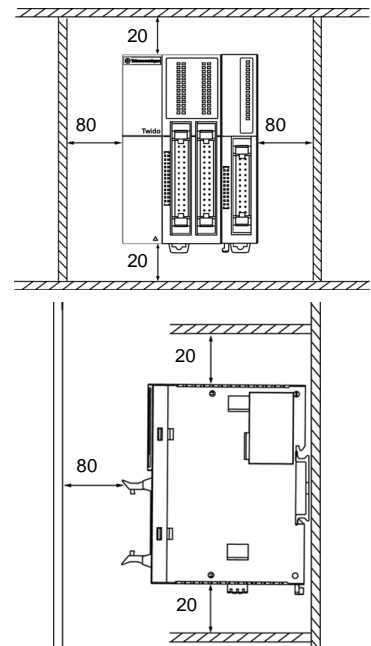
(1) Power supply connection for sink inputs.
(2) Power supply connection for source inputs.

TWD LMDA 40DUK




- The terminals on CN1 and CN2 are not connected together internally.
- The COM (-) terminals are connected together internally.
- The COM and COM (-) terminals are not connected together internally.
- The +V terminals are connected together internally.

Installation rules



Important :

- Horizontal or flat mounting non authorized
- Avoid placing heat generating devices (transformers, power supplies, contactors, etc.) beneath the Twido controller.

Applications		Digital inputs modules		
				
Number of 24 VDC sink/source input points		8 inputs 24 VDC	16 inputs 24 VDC	32 inputs 24 VDC
Connection		Removable screw terminal	HE 10 connector	
Inputs	Input voltage range	20,4...28,8 VDC		
	Rated input current at 24 VDC	7 mA per point	5 mA per point	
	Input logic	Sink/source		
	Commons	1 common point	2 common points	
	Turn ON time at 24 VDC	4 msec		
	Turn OFF time at 24 VDC	4 msec		
Outputs	Type of output			
	Operating load voltage range			
	Commons			
	Output current □□ per point □□ per common line			
Isolation		No isolation between input terminals. Photocoupler between input terminal and internal circuit.		

Type of inputs/outputs module	TWD DDI 8DT	TWD DDI 16DT	TWD DDI 16DK	TWD DDI 32DK
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Page	22
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Discrete mixed inputs/outputs modules



4 inputs 24 VDC/4 relay outputs	16 inputs 24 VDC/8 relay outputs
removable terminal block	Non-removable wire-clamp terminal block
20,4...28,8 VDC	
7 mA per point	
Sink/source	
1 commun point	
4 msec	
4 msec	
1 NO contact	
240 VAC, 30VDC	
1 commun point	2 commun points
2 A (lth)	
7 A (lth)	
No isolation between input terminals. Photocoupler between input terminal and internal circuit.	

TWD DMM 8DRT	TWD DMM 24DRF
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Applications		8/16 outputs modules with screw terminal block			
					
Number of 24 VDC sink/source input points		8 transistors sink outputs 24 VDC		8 sink relay outputs	16 outputs
Type of connector		Removable terminal block			
Inputs	Input voltage range				
	Rated input current at 24 VDC				
	Input logic				
	Commons				
	Turn ON time at 24 VDC				
	Turn OFF time at 24 VDC				
Outputs	Types of output	Transistors		1 NO contact	
	Operating load voltage range	20,4...28,8 VDC		240VAC, 30 VDC	
	Output logic	Sink	Source	–	
	Number of common lines	1 common point		2 common points	
	Output current	0,3 A nominal		2 A max.	
	□ per point	3 A @ 28,8 V		7 A max.	8 A max.
Isolation		No isolation between outputs terminals. Photocoupler between output terminal and internal circuit.		Between channels: common point. Between bus and channels: 1500 VAC during 1mn.	
Type of outputs module		TWD DDO 8UT	TWD DDO 8TT	TWD DRA 8RT	TWD DRA 16RT

16/32 outputs modules with HE 10 connector



16 sink outputs 24 VDC transistor

16 source outputs 24 VDC transistor

32 sink outputs 24 VDC transistor

32 source outputs 24 VDC transistor

HE 10 connector

Transistors

20,4...28,8 VDC

Sink

Source

Sink

Source

1 commun point

2 commun points

0,1 A nominal
1 A @ 28,8 V

No isolation between output terminals.
Photocoupler between output terminal and internal circuit.

TWD DDO 16UK

TWD DDO 16TK

TWD DDO 32UK

TWD DDO 32TK

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Presentation

The Twido platform's discrete I/O modules consist of input modules, output modules, and mixed input/output modules. The Twido platform uses a "just enough" concept of system planning. With 14 different I/O models to choose from, you only need to purchase "just enough" I/O points for your application, thus minimizing expenses and system resources. Twido's wide range of input and output options, combined with ease of configuration and installation, offers maximum flexibility for a variety of applications. The discrete I/O offering is defined as follows:

- 4 digital input modules, one 8-point, two 16-point, and one 32-point, equipped with either terminal blocks or connector-type wiring. These modules can be attached to any Twido controller except the Compact 10- and 16-I/O controllers.
- 8 digital output modules (one of each of the following: 8-point and 16-point relay output module; 8-point, 16-point, and 32-point transistor sink output modules; and 8-point, 16-point, and 32-point transistor source output modules), equipped with either terminal blocks or connector-type wiring. These modules can be attached to any Twido controller except the Compact 10- and 16-I/O controllers.
- 2 digital mixed input and output modules, consisting of one 4-point input/4-point output module with terminal block wiring, and one 16-point input/8-point output module with wire-clamp terminal block wiring. Both of these modules can be attached to any Twido controller except the Compact 10- and 16-I/O controllers.

Twido's small form factor allows installation even in the most limited space. All discrete input and output modules connect to the controller - and to each other - by means of a simple latching mechanism. A clamp on the back of each module allows connection of the controller and I/O rack to a DIN rail.

In order to connect all discrete input/output modules and analog input/output modules to the base controller, they are stacked on DIN rail starting from right-hand side panels of the bases according to the following rules :

- The two 16 and 24 input/output compact bases, TWD LCAA 16DRF/24DRF contain : 4 modules max. (see specifications page 6.
- The 20 input/output modular bases, TWD LMDA 20D●K contain: 4 modules max. (see specifications page 13.
- The 40 input/output modular bases, TWD LMDA 20DRT/40D●K contain : 7 modules max. (see specifications page13

The digital I/O modules are electrically isolated with the use of a photocoupler between the input terminal and the internal circuit.

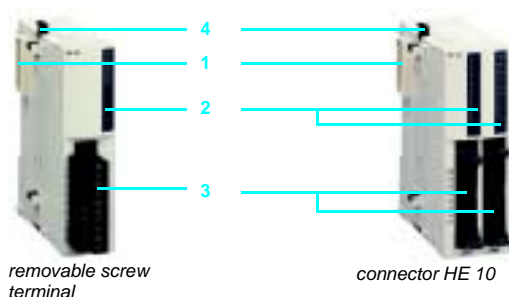
Description

A typical Twido discrete I/O module is comprised of the following :

- 1 An extension connector for the electrical link with the previous module (1).
- 2 One or two blocks for channel display and module diagnostics
- 3 One or two connections, depending the type of model:
 - Removable screw terminal (1 or 2) for modules whose reference ends in T,
 - HE 10 connector (1 or 2) for modules whose reference ends in K,
 - non-removable spring terminal block for module TWD DMM 24DRF.
- 4 One latch mechanism.

These modules are mounted on symmetric DIN rail. For modules with a removable screw terminal, the terminal blocks are supplied with the module.

(1) A connector on the right-hand side base ensures electrical continuity of the electrical link with the following input/output module.



Specifications of 24 VDC input modules

Module type	TWD	DDI 8DT	DDI 16DT	DDI 16DK	DDI 32DK	DMM 8RT	DMM 24DRF
Number of input points		8	16		32	4	16
Rated input voltage	VDC	24 sink/source					
Type of connector		Removable screw terminal		Connector HE 10		Removable screw terminal	Non-remov. wire-clamp terminal block
Number of common lines		1			2	1	
Input voltage range	VDC	20.4...28.8					
Rated input current at 24 VDC	mA	7		5		7	
Input impedance	kΩ	3.4		4.4		3.4	
Response time	Turn ON time at 24	msec					
	Turn OFF time at 24	msecs					
Isolation		No isolation between input terminals; photocoupler between input terminal and internal circuit					
Internal current draw	All inputs ON 5 VDC	mA	25	40	35	65	25
	(1) 24 VDC	mA	0			20	65
	All inputs OFF 5 VDC	mA	5			5	45
	(1)				10		10

Specifications of transistor output modules

Module type		TWD	DDO 8UT	DDO 8TT	DDO 16UK	DDO 16TUK	DDO 32UK	DDO 32UK
Number of output points			8		16		32	
Output logic			Sink	Source	Sink	Source	Sink	Source
Type of connector			Removable screw terminal		Connector HE 10			
Common			1					2
Rated load voltage	Voltage	V	24					
	Current per point	A	0.3			0.1		
Operating load voltage range	Voltage	V	20.4...28.8					
	Current per output point	A	0.36			0.12		
	Current per common line	A	3			1		
Max output delay	Turn ON time	μs	300					
	Turn OFF time	μs	300					
Voltage drop (ON voltage)		V	1 max.					
Max inrush current		A	1					
Max leakage current		mA	0.1					
Clamping voltage		V	39					
Max lamp load		W	8					
Dielectric strength			No isolation between input terminals; photocoupler between input terminal and internal circuit					
Internal current draw	All outputs ON	mA	10		10		20	
		mA	20		40		70	
	All outputs OFF	mA	5		5		10	
		mA	0		0		0	

Specifications of relay outputs

Module type	TWD	DRA 8RT	DRA 16RT	DMM 8RT	DMM 24DRF
Number of outputs		8 contacts NO	16 contacts NO	4 contacts NO	8 contacts NO
Maximum load current	Current per point	2			
	Current per common lines	A	7	8	7
Minimum switching load		mA			
Initial contact resistance		mΩ			
Rated load (resistive/inductive)	A	2A/240 VAC or 2A/30 VDC (with 1800 maximum operations/hour) :			
Dielectric strength		VAC			
		rms			
Internal current draw	All inputs ON 5 VDC	mA	30	45	See values above (input modules)
	24 VDC	mA	40	75	See values above (input modules)
	All inputs OFF 5 VDC	mA	5	0 mA	See values above (input modules)

(1) For all inputs and outputs ON/OFF.

References

These discrete input/output modules are mounted on symmetric DIN rail to the left of the Twido base controller. The maximum number of digital input/output and/or analog modules allowed depends on the type of base :

Type of base TWD	LCAA 10DRF	LCAA 16DRF	LCAA 24DRF	LMDA 20D●K	LMDA 20DRT	LMDA 40D●K
Number of modules	0	4	4	4	7	7



TWD DDI 8T



TWD DDI 32DK



TWD DDO 8●T/DRA ●RT



TWD DDO 16●K



TWD DDO 16●K



TWD DDO 32●K



TWD DDM 8DRT



TWD DDM 24DRF

Digital input modules

Voltage inputs	Number of points	Nb of common lines	Wiring type	References	Weight g(oz)
24 VDC sink/source	8	1	Per removable screw terminal (supplied)	TWD DDI 8DT	85 (3)
	16	1	Per removable screw terminal (supplied)	TWD DDI 16DT	100 (3.5)
			Per HE 10 connector	TWD DDI 16DK	65 (2.3)
	32	2	Per HE 10 connector	TWD DDI 32DK	100 (3.5)

Digital outputs modules

Type of outputs	Number of points	Nb of common lines	Wiring type	References	Weight g(oz)
Transistor 24 VDC/0.3 A	8, sink	1	Per removable screw terminal (supplied)	TWD DDO 8UT	85 (3)
	8, source	1	Per removable screw terminal (supplied)	TWD DDO 8TT	85 (3)
Transistor 24 VDC/0.1 A	16, sink	1	Per HE 10 connector	TWD DDO 16UK	70 (2.5)
	16, source	1	Per HE 10 connector	TWD DDO 16TK	70 (2.5)
	32, sink	2	Per HE 10 connector	TWD DDO 32UK	105 (3.7)
	32, source	2	Per HE 10 connector	TWD DDO 32TK	105 (3.7)
Relay 2 A (lth) 230 VAC/--- 30 V	8 (normally open)	2	Per removable screw terminal (supplied)	TWD DRA 8RT	110 (3.8)
	16 (normally open)	2	Per removable screw terminal (supplied)	TWD DRA 16RT	145 (5.1)

Mixed input/output modules

Number of I/O	Nb and type of inputs	Nb and type of outputs	Nb of common lines	Wiring type	References	Weight g(oz)
8	4 E, 24 VDC sink/source	4 S relays (normally open) 2 A (lth)	inputs : 1 common outputs : 1 common	Via removable screw terminal (fourni)	TWD DMM 8DRT	95 (3.4)
24	16 E, 24 VDC sink/sourc	8 S relays (normally open) 2 A (lth)	inputs : 1 common outputs : 2 commons	Via non remov. wire clamp terminal	TWD DMM 24DRF	140 (4.9)

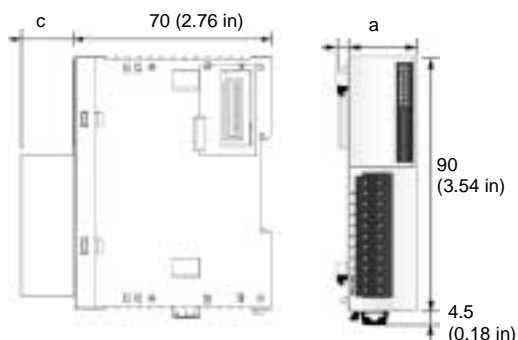
Separate parts

Designation	Description	TWD module compatibility	Sold in	Reference	Weight g(oz)
Pre-wired system	TwidoFast, Telefast	DDI 16/32DK DDO 16●K/32●K	—	Voir page 41006/5	—
Mounting kit	Mounting on panel	All modules	Lot of 5	TWD XMT 5	—

Replacement parts

Designation	Description	TWD module compatibility	Sold in	Reference	Weight g(oz)
Screw terminal blocks	10-way	DDI ●DT/ DRA ●RT DDO 8●T	Lot of 2	TWD FTB 2T10	—
	11-way	DMM 8DRT	Lot of 2	TWD FTB 2T11	—

Dimensions



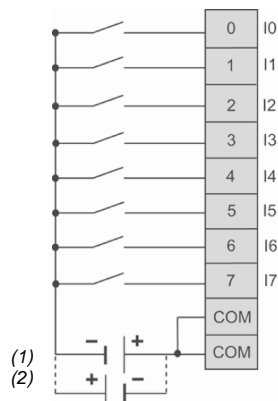
Digital I/O modules

TWD	a	c
DDI 8DT/16DT	23.5 (0.93 in)	14.6 (0.57)
DDI 16DK	17.6 (0.69 in)	11.3 (0.44)
DDI 32DK	29.7 (1.17 in)	11.3 (0.44)
DDO 8UT/8TT	23.5 (0.93 in)	16.6 (0.65)
DDO 16UK/16TK	17.6 (0.69 in)	11.3 (0.44)
DDO 32UK/32TK	29.7 (1.17 in)	11.3 (0.44)
DRA 8RT/16RT	23.5 (0.93 in)	14.6 (0.57)
DDM 8DRT	23.5 (0.93 in)	14.6 (0.57)
DDM 24DRF	39.1 (1.54 in)	1.0 (0.04)

Wiring

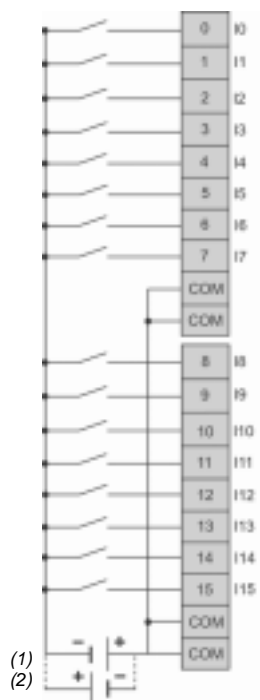
24 VDC inputs modules

TWD DDI 8DT



□ The two COM terminals are connected together internally

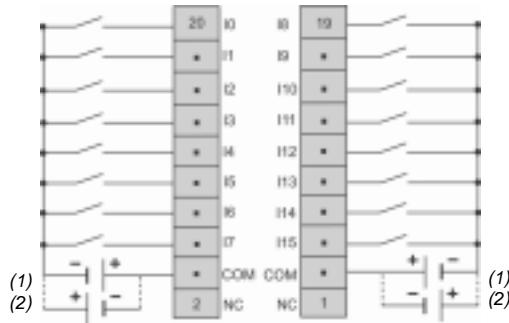
TWD DDI 16DT



□ The four COM terminals are connected together internally

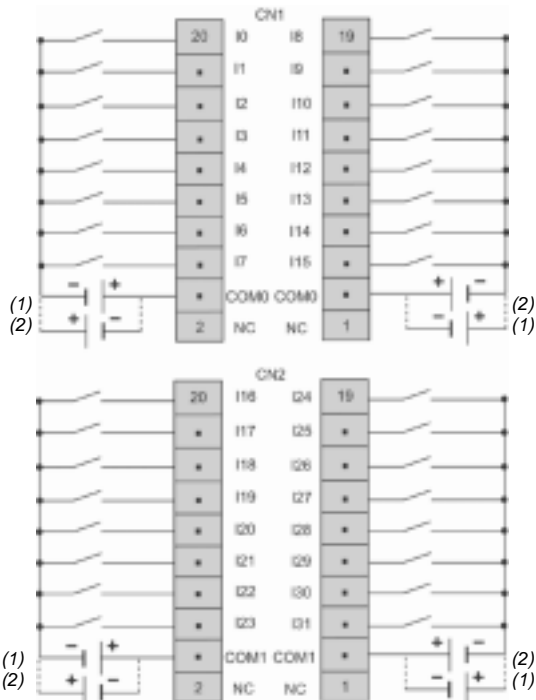
(1) Source input wiring
(2) Sink input wiring

TWD DDI 16DK



□ The two COM terminals are connected together internally

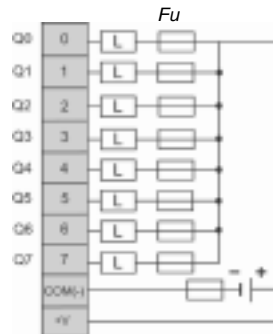
TWD DDI 32DK



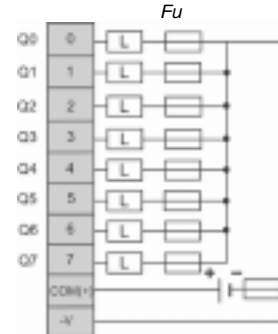
□ The two COM0 terminals are connected together internally
□ The two COM1 terminals are connected together internally

Transistor output modules

TWD DDO 8UT



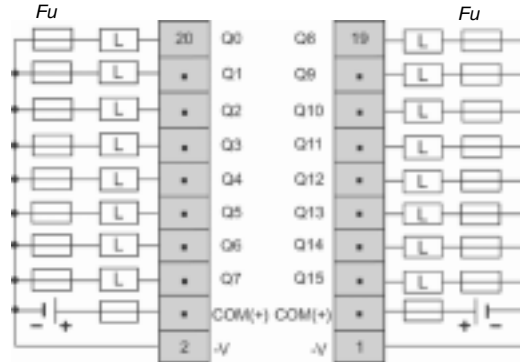
TWD DDO 8TT



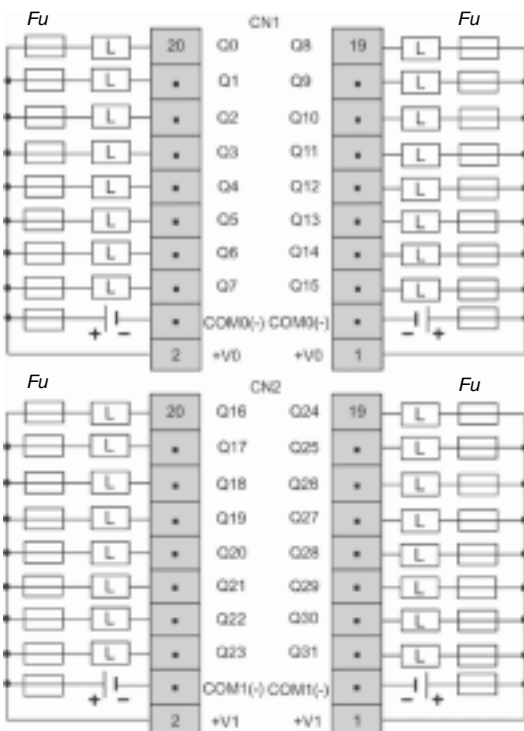
TWD DDO 16UK



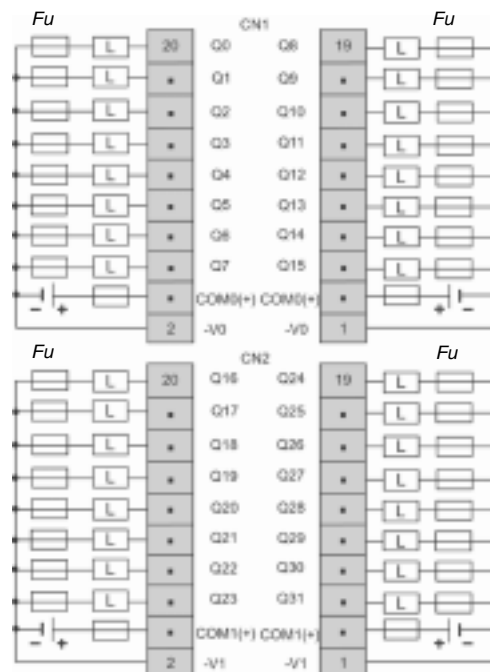
TWD DDO 16TK



TWD DDO 32UK



TWD DDO 32TK

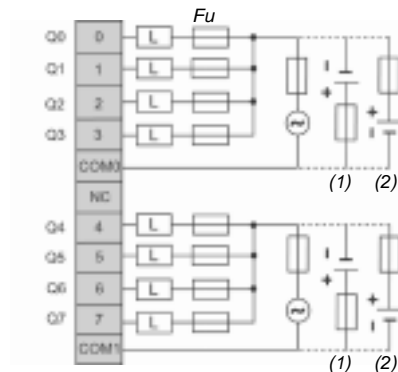


- The COM (-) terminals are connected together internally
- The COM0 (-) terminals are connected together internally
- The COM1 (-) terminals are connected together internally
- The + V terminals are connected together internally
- The + V0 terminals are connected together internally
- The + V1 terminals are connected together internally

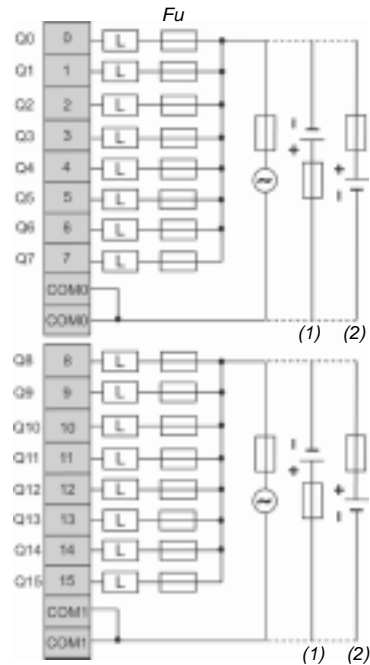
- The COM (+) terminals are connected together internally
- The COM0 (+) terminals are connected together internally
- The COM1 (+) terminals are connected together internally
- The - V terminals are connected together internally
- The - V0 terminals are connected together internally
- The - V1 terminals are connected together internally

Relay output modules

TWD DRA 8RT



TWD DRA 16RT



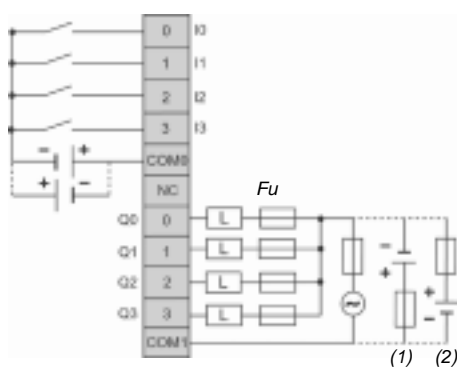
- The COM0 terminals are connected together internally
- The COM1 terminals are connected together internally
- The COM0 and COM1 terminals are not connected together internally

(1) Source input wiring

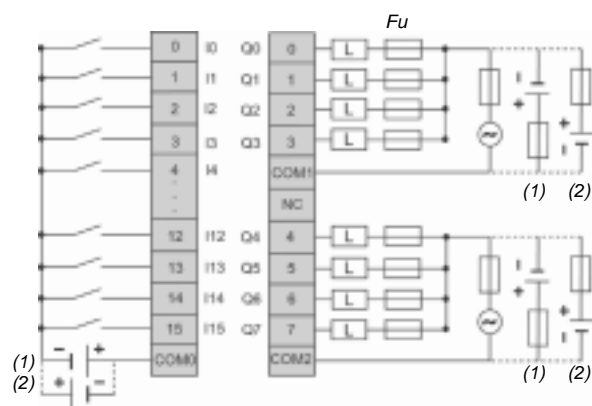
(2) Sink input wiring

Mixed input/output modules

TWD DMM 8DRT



TWD DMM 24DRT



- The COM (+) terminals are connected together internally

- The COM0, COM1 et COM2 terminals are not connected together internally
- The - V terminals are connected together internally

(1) Sink input wiring

(2) Source input wiring

Applications		Analog input module	Analog output module
			
Number of inputs and outputs		2 inputs	1 output
Type of inputs		Voltage/current	
Connection		Removable terminal block	
Inputs	Range	Voltage (0...10 VDC) Current (4...20 mA)	
	Resolution	12 bits (4096 points)	
	Acquisition period	32 ms + 1 scan time	
Outputs	Range	0...10V 4...20 mA	
	Resolution	12 bits (4096 points)	
	Transfer time	20 ms + 1 scan time	
External power		External 24 VDC sensor/output device power supply (limit values 20,4...28,8 V)	
Isolation		No isolation between output terminals. Photocoupler between output terminal and internal circuit.	
Model		TWD AMI 2HT	TWD AMO 1HT
Pages		30	

Analog mixed input/output modules



2 inputs/1 output

Voltage/current

Thermocouple, resistance thermometer

0...10 V DC
4...20 mA

Thermocouple type K, J et T
RTD 3 wire temperature probes (-100...500°)

12 bits (4096 points)

32 ms + 1 scan time

100 ms + 1 scan time

TWD AMM 3HT

TWD ALM 3LT

30

Presentation

The Twido platform's analog input and output modules enable the acquisition of various analog values encountered in industrial applications, including:

- Standard high-level inputs (0 - 10 VDC, 4 - 20 mA)
- Standard high-level outputs (0 - 10 VDC, 4 - 20 mA)
- Thermocouples (Types K, J, and T)
- Resistance thermometer (Pt 100, 3-wire type, -100...500 °C)

The analog output modules are used to control analog field devices such as various speed drives, compressors, conveyors, and applications that require the monitoring of temperature-sensitive processes. The current or the voltage is proportional to the digital value defined by the user program. The outputs can be configured so that when the program stops, the outputs either reset to zero or hold the last value received. This feature is useful during debugging since, if the outputs are set to "Hold", the operation of the analog field devices is not disturbed every time the program stops.

The Twido platform features four analog I/O modules with different characteristics. All Twido analog extensions are 12-bit modules with removable terminal block wiring. The Twido analog I/O offering is defined as follows:

- 1 2-input module, with voltage and current inputs;
- 1 1-output module, with voltage and current outputs;
- 1 2-input and 1-output module, with both voltage and current inputs and outputs;
- 1 2-input and 1-output module with thermocouple and resistance thermometer inputs and voltage and current outputs.

Twido's small form factor allows installation even in the most limited space. All discrete input and output modules connect to the controller - and to each other - by means of a simple latching mechanism. A clamp on the back of each module allows connection of the controller and I/O rack to a DIN rail.

The Twido input and output modules are connected in the same way as the discrete input/output modules, that is, to the base controller by stacking on DIN rail, from the right-hand side panels of the bases according to the following rules:

- The 24 input/output compact base, TWD LCAA 24DRF: 4 modules max. (see characteristics page 6).
- The 20 input/output modular bases, TWD LMDA 20D●K: 4 modules max. (see characteristics page 13).
- The 20/40 input/output modular bases, TWD LMDA 20DRT/40D●K: 7 modules max. (see characteristics page 13).

All Twido input and output modules are designed with photocoupler isolation between the internal electronics and the input/output channels.

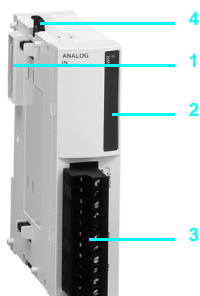
Description

A typical Twido discrete I/O module is comprised of the following:

- 1 An extension connector for the electrical link with the previous module (1).
- 2 A block for displaying the diagnostics of the module and channels.
- 3 A removable screw terminal block for connecting the Δ 24 V external supply, the sensors and the actuators.
- 4 One latch mechanism for locking to the previous module.

These modules are mounted on symmetric DIN rail.

(1) A connector on the right-hand side panel ensures electrical continuity of the electrical link with the following input/output module.



Specifications for analog input and output modules

Module type		TWD AMI 2HT/AMM 3HT		TWD ALM 3LT		
Number and type of inputs		2 inputs				
Input type		Voltage	Current	Thermocouple	Resistance thermometer	
Input type and range		0...10 V	0...20 mA	Type K (0...1300° C) Type J (0...1200° C) Type T (0...400° C)	Sonde Pt, type 3 fils (- 100...500° C)	
Type		Non differential	Differential			
Digital resolution		4096 points (12 bits)				
Input value of least significant byte (LSB)		2.5 mV	4 µA	0.325° C (type K) 0.3° C (type J) 0.1° C (type T)	0.15° C	
Wiring		Removable screw terminal				
Max permanent allowed overload		--- 13 V	40 mA	—		
External power	rated power voltage	VDC	24			
	allowed voltage range	VDC	20.4...28.8			
Input impedance		W	1 MΩ mini	10 Ω	250 Ω maxi	5 Ω maxi
Max sample duration time		msec	16	50		
Max sample repetition time		msec	16	50		
Total input system transfer time		msec	32 + 1 scan time		100 + 1 scan time	
Input error	max error @ 25° C	% PE	± 0.2		± 0.2 + error of internal cold junction compensation (± 4° C maximum)	± 0.2
	temperature coefficient	% PE	± 0.006/° C			
	repeatability after stabilization time	% PE	± 0.5 % of full scale			
	non-linearity	% PE	± 0.2 % of full scale			
	maximum error	% PE	± 1 % of full scale			
Common mode reject ratio		- 50 dB				
Input filter		No				
Cable		twisted pair shielded				
Recommended for noise immunity crosstalk		2 bits maxi				
Dielectric strength		~ V eff	500 between input and power circuit			
Type of protection		Photocoupler between input and internal circuit				
Consumption	internal power	mA	50 @ --- 5 V			
	external power	mA	40 @ --- 24 V			

Analog output specifications

Module type		TWD AMO 1HT/AMM 3HT/ALM 3LT	
Number of outputs		1 output	
Type		Voltage	Current
Output range		0...10 V	4...20 mA
Digital resolution		4096 increments (12 bits)	
Output value of least significant byte (LSB)		2.5 mV	4 µA
Load impedance		Ω 2000 mini	300 maxi
Applicable load type		Resistive	
Settling time		msec 20	
Total output system transfer time		msec 20 + 1 scan time	
External power	rated power voltage	--- VDC 24	
	allowable voltage range	--- VDC 20.4...28.8	
Output error	max error @ 25° C	% PE ± 0.2 % of full scale	
	temperature coefficient	% PE ± 0.015/° of full scale / C	
	repeatability after stabilization time	% PE ± 0.5 % of full scale	
	output voltage drop	% PE ± 1 % of full scale	
	non-linearity	% PE ± 0.2 % of full scale	
	output ripple	1 LSB maxi	
	total error	% PE ± 1 % of full scale	
Cable		twisted pair shielded recommended for noise immunity	
Dielectric strength		~ V eff 500 between output and power circuit	
Type of protection		Photocoupler between input and internal circuit	
Consumption (for TWD AMO 1HT)	internal power	mA 50 @ --- 5 V (for TWD AMO 1HT)	
	external power	mA 40 @ --- 24 V (for TWD AMO 1HT)	

References

The analog input/output expansion modules are mounted on symmetric DIN rail to the right of the Twido base controllers. The sensors/actuators are connected to a removable screw terminal block (supplied with each module). The maximum number of input/output and/or analog modules depends on the type of base:

Types of base	TWDLCAA 10DRF	TWDLCAA 16DRF	TWDLCAA 24DRF	TWDLMDA 20D●K	TWDLMDA 20DRT	TWDLMDA 40D●K
Number of modules	0	0	4	4	7	7

Twido input and output modules

Type of points	Type of inputs	Type of outputs	Resolution	Reference	Weight kg (oz)
2 inputs	0...10 V 4...20 mA	—	12 bits	TWD AMI 2HT	0.085 (3.0)
1 output	—	0...10 V 4...20 mA	12 bits	TWD AMO 1HT	0.085 (3.0)
2 inputs 1 output	0...10 V 4...20 mA	0...10 V 4...20 mA	12 bits	TWD AMM 3HT	0.085 (3.0)
	Thermocouple K, J, T Resistance thermometer Pt 100	0...10 V 4...20 mA	12 bits	TWD ALM 3LT	0.085 (3.0)

Separate part

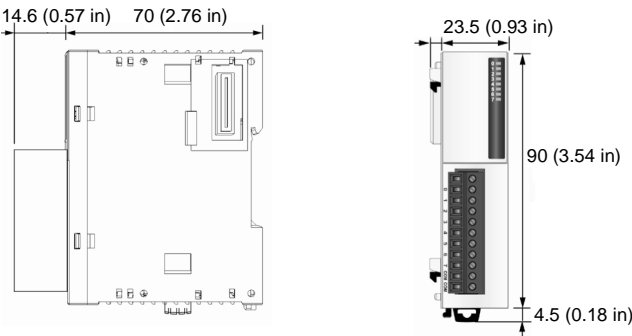
Designation	Utilisation	Sold in	Reference	Weight kg (oz)
Screw terminal block	11-way	Lot of 2	TWD FTB 2T11	—

Replacement part

Designation	Utilisation	Sold in	Reference	Weight kg (oz)
Kit de fixation	Montage sur platine	Lot of 2	TWD XMT 5	—

Dimensions

Twido input and output modules



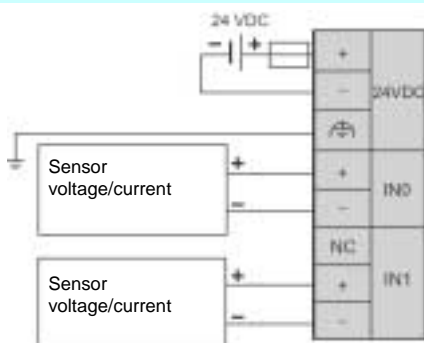
TWD AMI 2HT



TWD ALM 3LT

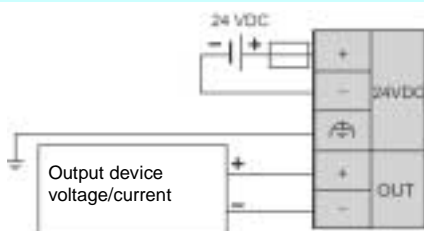
Wiring

Input module TWD AMI 2HT



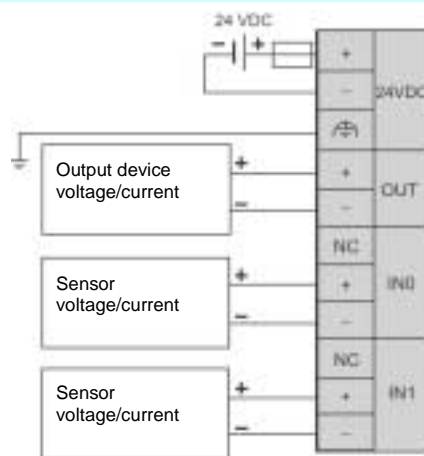
- Connect a fuse appropriate for the applied voltage
- Do not connect any wiring to unused channels.

Output module TWD AMO 1HT



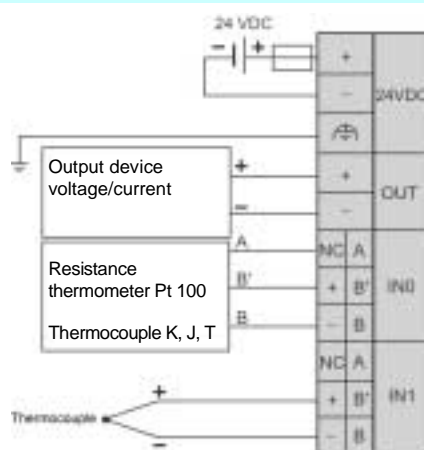
- Connect a fuse appropriate for the applied voltage.
- Do not connect any wiring to unused channels.

Mixed input/output module TWD AMM 3HT



- Connect a fuse appropriate for the applied voltage.
- Do not connect any wiring to unused channels.

Mixed input/output module TWD ALM 3LT



- Connect a fuse appropriate for the applied voltage.
- When connecting a resistance temperature detector (RTD), connect the three wires to RTD terminals A, B', and B of input channel 0 or 1.
- When connecting a thermocouple connect the two wires to terminals + and - of input channel 0 or 1.
- Do not connect any wiring to unused channels.

Presentation

The compact and modular range of programmable Twido controllers offers the following domains as an option:

- Communication, provided with the serial link interface modules and adapters RS 232C/RS 485.
- Operator dialog, provided with the display module and digital display for the adjustment and diagnostics of the Twido applications.
- Programmable controller processing capacity, provided with the memory and real-time clock cartridges.
- TwidoFast and Telefast 2 pre-wiring solutions, provided with the components of the Telefast 2 pre-wiring system.

Communication

The serial interface modules and adapters can be used to add a second RS 485 communication port or RS 232C serial link with the protocols of Modbus/ASCII character mode. Connection to the interface adapters is carried out using a mini-DIN type connector (RS 232C/RS 485) or a screw terminal block (RS 485 only).

A serial interface module TWD NOZ ●●●● can be connected to the left-hand panel of the modular bases (the use of serial interface module TWD NOZ ●●●● is exclusive with that of built-in display module TWD XCP ODM presented below).

The serial interface adapters TWD NAC ●●●● are used to equip:

- Compact bases in the slot provided for this purpose (see page 41001/3).
- Modular bases when the built-in display module TWD XCP ODM is used

Operator display

The built-in display module and digital display are used to provide a digital display at the:

- Compact bases. Here, the TWD XCP ODC digital display fits into the slot provided for this purpose (see page 41001/3).
- Modular bases. Here, the TWD XCP ODM built-in display module connects to the left-hand panel of the modular bases. Moreover, it also has a slot reserved for the serial interface adapters TWD NAC ●●●●.



TWD NOZ ●●●●



TWD NAC ●●●●



TWD XCP ODM

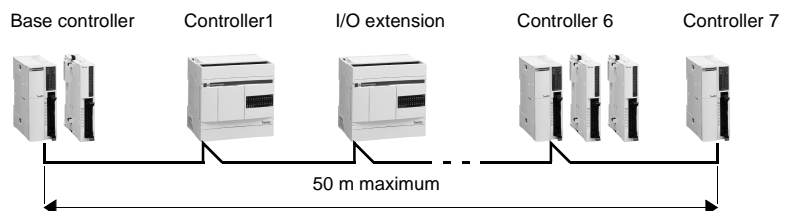


TWD XCP ODC

Decentralized input/output "Remote Link"

Each compact or modular base can be extended by the Twido bases used as:

- Decentralized input/output. In this case, these bases cannot be augmented with an I/O expansion.
- Local "reflex" programmable controller. In this case, these bases can be augmented with the I/O expansions. Each base receives its own application program. Each base has four reserved input (%INW) and four reserved output (%ONW) words for exchanging data between programmable controllers.



Up to 7 base controllers can be connected to the compact or modular base. The link between the base modular and decentralized I/O or local reflex controller is no more 50 m long. The link uses the RS 485 serial integrated or additional port of a base controller.

TwidoFast and Telefast 2 pre-wiring solutions

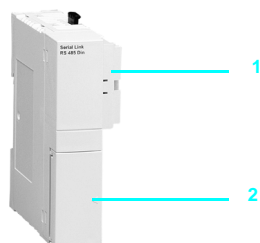
The solutions to be used for the digital input/output connections of the modular bases and extension modules that have a HE 10 connector are:

- TwidoFast pre-formed cables. These pre-formed cables, which can either be 3 or 5 m in length, facilitate the connection of the input/output with one end equipped with a HE 10 connector and the other end free, with marked-out wires.
- Telefast 2 pre-wiring kits, which, under the same reference, provide a Telefast 2 backplane with connection cable (1 or 2 m in length) for the HE 10 connectors of the Twido modules.



TWD FST 16●●●0





Description

Serial interface modules

The serial interface modules TWD NOZ ●●●● used for the Twido modular bases include:

- 1 A connector for linking to the modular base.
- 2 A hinged door providing access to either:
 - a mini-DIN type connector (serial interface module TWD NOZ 232D/485D) or,
 - a screw terminal (serial interface module TWD NOZ 485T).

Each module is mounted on a symmetric DIN rail to the left of the modular base, and is equipped with a mechanical latch for locking to this base.

Built-in display module and digital display

The built-in display module TWD XCP ODM is to be used with Twido modular bases. The digital display TWD XCP ODC is to equip the front panel of the Twido compact bases.

These include:

- 1 A connector for providing an electrical link with the modular base.
- 2 A back-lit LCD screen for displaying the adjustment functions of the programmable controllers.
- 3 Four buttons marked ECHAP, ↑, ↓, MOD/ENTER providing access to the variables in "Edit" mode or "Display" mode.
- 4 A hinged door providing access to the slot that can receive a serial interface adapter RS 232 C (model TWD NAC 232D) or RS 485 (model TWD NAC 485D/485T).

Each module is mounted on a symmetric DIN rail to the left of the modular base, and is equipped with a mechanical device for locking to this base.

N

Specifications of the digital display and built-in display module

Types of modules	TWD XCP ODC	TWD XCP ODM
Description	Digital display	Built-in display module
Twido compatibility base	TWD LCCA compact base controller	TWD LMMA modular base controller
Number by Twido base	1	1 (1)
Screen	2-line, 8-character back-lit LCD	
Slot for option	–	1 for serial interface adaptor TWD NAC

Specifications of modules and serial interface adaptaters

Types of modules	TWD	NOZ 232D	NOZ 485D	NOZ 485T	NAC 232D	NAC 485D	NAC 485T
Description		Serial interface module			Serial interface adapter		
Communication type		RS 232 non isolated	RS 485 non isolated		RS 232 non isolated	RS 485 non isolated	
Connection		Mini-DIN connector		Screw terminal block	Mini-DIN connector		Screw terminal block
Twido base compatibility		TWD LMMA modular base controller			TWD LCCA compact base controller Modular base, via the built-in display module TWD XCP ODM		
No. per Twido base		1 (1)			1		
Maxi data rate	K bps/s	19,2					
Programming		No					
Modbus protocol		ASCII/RTU frame					
Frame		ASCII/RTU frame					
Method of access		Master/Slave					
Character mode protocol		ASCII					
Decentralized input/output "Remote Link"							
Number of Slave stations		–		7 (2)	–		7 (2)
Twido type of base in remote link		–		Compact Modular (3)	–		Compact Modular (3)
Maxi cable lenght for remote link	m	–		50	–		50
Isolation		No isolation between bus and port of communication					

(1) Only one TWD XCP ODM ou TWD NOZ pppp module per modular base.

(2) Each station may be used as a decentralized input/output or as a local "reflex" programmable controller (with application data exchanges between the different stations).

(3) TWD LCCA 16DRF/24DRF compact base controller with 16/24 I/O.



TWD NAC 000



TWD NOZ 000



TWD XCP ODC



TWD XCP ODM

References

Modules and serial link adapters

Description	Compatibility	Physical layer	Wiring	Reference	Weight kg
Serial interface adaptor	TWD LCAA 16/24 DRF compact bases Built-in display module TWD XCP ODM	RS 232 C	mini-DIN connector	TWD NAC 232D	0.010
		RS 485	mini-DIN connector	TWD NAC 485D	0.010
			Screw terminal block	TWD NAC 485T	0.010
Serial interface modules	TWD LMDA 20/40D00	RS 232 C	mini-DIN connector	TWD NOZ 232D	0.010
		RS 485	mini-DIN connector	TWD NOZ 485D	0.010
			Screw terminal block	TWD NOZ 485T	0.010

Digital display and built-in display module

Description	Compatibility	Specifications	Reference	Weight kg
Digital display	TWD LCAA 10/16/25DRF compact bases	Mounted on the front panel of the base. Enables the adjustment and diagnostics of the programmable controller.	TWD XCP ODC	0.020
Built-in display module	TWD LMDA 20/40D00 modular bases	Mounted on the left-hand panel of the base. Enables the adjustment and diagnostics of the programmable controller. Can receive a serial adapter TWD NAC 0000	TWD XCP OPM	0.105

Connection accessories

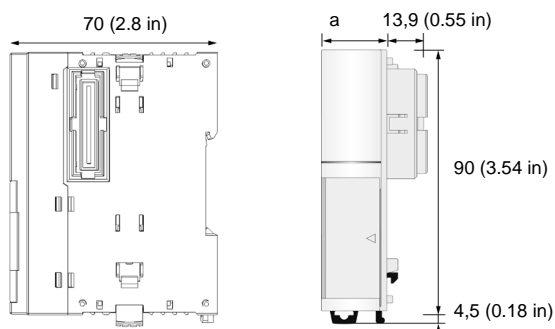
Connection reference			Lenght	Reference	Weight kg
Description	Link from	to			
Serial link connection cable	Serial interface adapter interface or serial interface module (mini-DIN connector)	Modbus device (RJ 45 connector)	3 m	TWD XCA RJ030	0.160

Separate parts

Description	Use	Sold by	Reference	Weight kg
Mounting kit	Mounting on panel	Lot of 5	TWD XMT 5	—

Dimensions

TWD NOZ 000/XCP ODM modules



	b
TWD NOZ 0000	22,50 (0.89)
TWD XCP ODM	38 (1.50 in)

The Telefast 2 connection backplanes provide, as an input/output device for the Twido programmable controllers, the double function of:

- A real screw connection terminal block to which the cables from the external sensors/actuators are connected (case of all Telefast 2 backplanes).
- A signal adaptation functionality. This is the case for the relay backplanes ABE-7R08S111/16S111, which converts Twido transistor outputs (1 relay for 16 channels) into relay outputs (1 relay for 4 channels).

Associations with the modular bases and the input/output modules with HE 10 connectors

Twido modules	Modular base controller with 24 V inputs and transistor outputs		24 V inputs modules		Transistor output modules			
	12 inputs 8 outputs	24 inputs 16 outputs	16 inputs	32 inputs	16 sink outputs	16 source outputs	32 sink outputs	16 source outputs
TWD	LMDA 20DTK	LMDA 40DTK	DDI 16DK	DDI 32DK	DDO 16UK	DDO 16TK	DDO 32UK	DDO 32DK
Number of HE 10 connectors by base or module	1	2	1	2	1	1	2	2

Possible association

TwidoFast cable

16 inputs or 16 outputs	TWD FCW 30 M (3 m)							
	TWD FCW 50 M (3 m)							
	TWD FCW 30 K (3 m)							
	TWD FCW 50 K (3 m)							

Telefast 2 connection kits, with passive sub-base

16 inputs	TWD FST 16D10 (1 m)							
	TWD FST 16D20 (2 m)							

Telefast 2 connection kit, with relay sub-base

16 outputs	TWD FST 16R10 (1 m)							
	TWD FST 16R20 (2 m)							

Mixed Telefast 2 connection kits

12 inputs and 8 outputs	TWD FST 20DR10 (1 m)							
	TWD FST 20DR20 (2 m)							

References

TwidoFast pre-formed cables

Description	Twido associations	Length of Reference cable	Weight kg
Pre-formed cables	1 pre-formed cable: one end with HE 10 connector, one end with free wires	TWD LMDA 20 TK/40 TK 3 m	TWD FCW 30M 0,405
		5m	TWD FCW 50M 0,670
	TWD DDI 16DK/32DK TWD DDO 16●K/32●K inputs and outputs	3m	TWD FCW 30K 0,405
		5 m	TWD FCW 50K 0,670

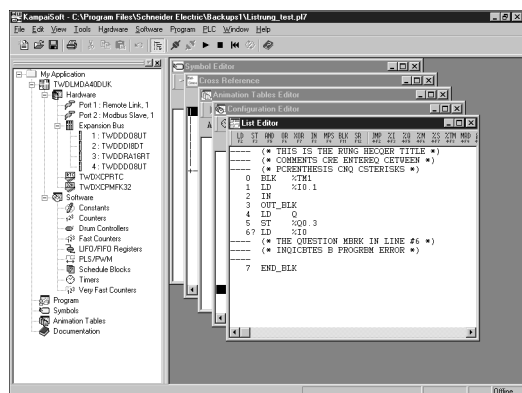
Telefast 2 pre-wired kits (1)

Description	Twido associations	Length of Reference cable	Weight kg
Set for 16 E HE 10 group	1 passive sub-base ABE-7H20E000 1 pre-formed cable	TWD DDI 16DK/32DK inputs 1m	TWD FST 16D10 0,330
		2 m	TWD FST 16D20 0,410
Set for 16 S HE 10 group	1 relay sub-base, ABE-7R16S111 1 pre-formed cable	TWD DDO 16TK/32TK outputs 1m	TWD FST 16R10 0,440
		2 m	TWD FST 16R20 0,520
Set for 12 E/8 S	1 passive sub-base ABE-7H20E000 1 relay sub-base, ABE-7R08S111 1 pre-formed cable	TWD LMDA 20 TK/40TK modular bases 1m	TWD FST 20DR10 0,570
		2 m	TWD FST 20DR20 0,650

(1) For further information on the Telefast 2 range, refer to the specialist catalogue "Telefast 2 pre-wired system"

Twido programmable controllers

TwidoSoft programming software



Presentation

TwidoSoft is a graphical development environment for creating, configuring, and maintaining applications for Twido programmable controllers. TwidoSoft is a 32-bit, Windows-based program for a personal computer running Microsoft Windows 98 (Second Edition) or Microsoft Windows 2000 operating systems. The main software features of TwidoSoft include a standard Windows interface, offering the convenience of the Windows environment most users already know. Included are such familiar features as the keyboard and mouse; dockable windows and toolbars; the standard Windows menu organization; the status bar and shortcut menus; and an online help system, including context-sensitive help.

TwidoSoft provides a comprehensive set of features to simplify programming and configuration, including:

- Reversible ladder and list programming
- Two-step, point-and-click ladder programming
- Off-line and on-line programming
- Program and/or data animation
- An application browser with multiple window views, aiding in easy software configuration
- Individual editors for main programming and configuration features
- Cut, copy, and paste program editing
- Symbolic programming
- Cross-referencing
- Printouts of programs and configuration

As your interface to the Twido hardware, TwidoSoft provides many different types of support for the programmable controllers:

- Connecting and disconnecting a controller
- Operating the controller
- Monitoring application use of memory by the Resource Monitor
- Downloading and uploading controller programs
- Backing up controller programs to the optional EEPROM modules

Connecting a PC to a Twido controller

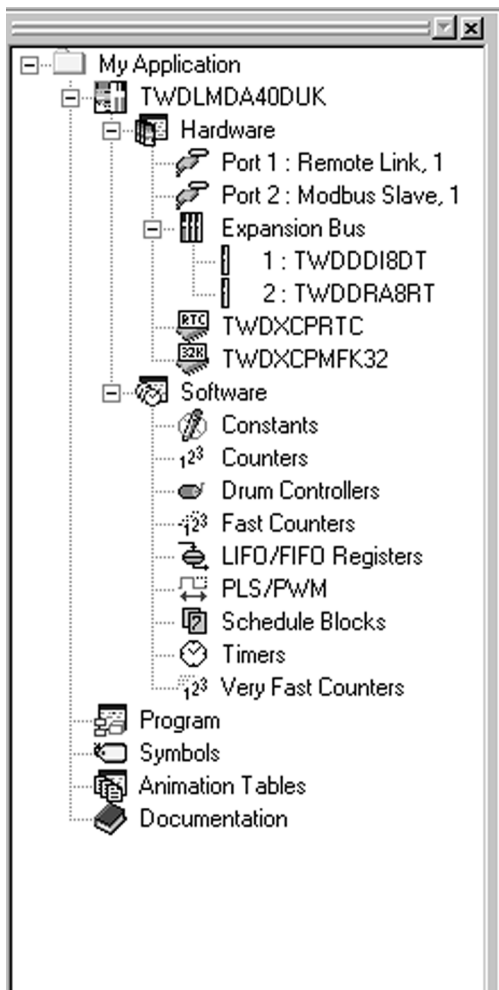
A communications cable connects your PC to a Twido programmable controller. The communications cable is a special, multi-function cable which connects the COM serial port on the PC to Port 1 on the Twido controller. The cable converts signals between RS 485 and RS 232C devices. The programming cable (part number TSX PCX 1031) is 2.4 m (8 ft) in length. The cable is equipped with a four-position rotary switch, which allows the cable to be used in different modes.

Port 1 on all Twido controllers is a built-in RS 485 port, which must be used to communicate to the TwidoSoft software. When the cable is connected to Port 1, protocol is automatically set for TwidoSoft communications.

Twido programmable controllers

TwidoSoft programming software

User Interface



User Interface

TwidoSoft provides an intuitive, Windows-based user interface consisting of standard Windows features, including ToolTips and on-line help. The following is a summary of Twido User Interface features :

- The Application Browser is a dockable window that provides a tree view of an application. Windows and toolbars that are dockable can be moved around and attached to the borders of a parent window. Elements of an application appear in a logical hierarchy based on their relationship in the application. The elements are organized as an indented outline that can be expanded or collapsed. The Application Browser conveniently organizes items in an application so that you do not have to search for these items individually. You can use the Application Browser to view, configure, program, and maintain an application, or to configure hardware using a graphical representation of controllers, expansion inputs/outputs, and options.
- The Status Bar is a panel at the bottom of the main window that displays information about the application, the controller, and TwidoSoft. Included in the Status Bar is a "memory usage indicator", used for obtaining a percentage of the total amount of memory used by a program. A warning is provided when available memory is getting low.
- The Operating Modes for TwidoSoft are either Online or Offline, depending on the connection between the PC and the controller. In Online operation, the PC is connected to the controller, in Offline operation, the PC and the controller are disconnected. Offline operation is used to develop an application. Since the PC is not connected to the controller, changes are made only to the application in PC memory. The application must be transferred from the PC memory to the controller memory (downloaded) to run the application on the controller. Online operation is used to debug and adjust an application. When the PC is connected to the controller, the application in the PC memory is the same as the application in the controller memory, and changes can be made directly to the application in the controller.

Editors and Viewers

TwidoSoft provides specialized windows called editors and viewers for performing important tasks in developing an application. A TwidoSoft application consists of a program, configuration data, symbols, and documentation. These components can be used in any order when creating an application. Developing each part of an application using separate editors makes the application development process more systematic, and results in more clearly defined applications. It also enables the development process to be rationalized. TwidoSoft provides:

- The Instruction List language and Ladder language editors.
- The configuration editor.
- The variable editors (with symbols) and animation table editors.
- The Ladder language, cross reference and program error display viewers.

TwidoSoft also provides security features to protect the integrity of your programs. Controller application protection prevents access to the controller application, but not to the PC application. This option prohibits unauthorized transfers of an application and is selectable when transferring an application to the controller. Password protection controls access to both the PC and the controller application after an application has been transferred from the PC to the controller.

Configuring Hardware and Software

Configuring Twido programmable controllers consists of selecting options for the hardware and software resources of the controller. These resources can be configured at any time while creating a program:

- Hardware resources are considered to be the controller itself, any hardware that connects to the controller, and the connections to the hardware. Examples of hardware resources are base and remote controllers, expansion I/O, and option modules.
- Software resources consist of configurable and non-configurable functions. Function blocks (also called variables) are blocks of addresses that are created in memory to perform special functions that can be used by a program. For example, when a counter function block is configured, memory addresses in the controller are assigned to hold values that represent the associated characteristics of a hardware counter, such as current count, preset count, and so on. Other software resources are called internal memory blocks, such as system bits and words, memory bits and words, and network exchange words.

Methods of configuring these resources within TwidoSoft are through the Main menu, the application browser, and the various editors and viewers.

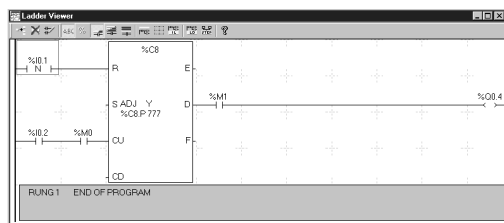
Programming

Using TwidoSoft, you can write a controller program in either Ladder language or List language format. Selecting one method over the other is a matter of preference and does not affect the application:

- Ladder language consists of diagrams that use both graphics and text.
- List language is a text-based instruction set.

In either list or ladder language, you write the program in the logical order required to control a machine or process. In either language, you document your program by using comments in both the List and Ladder editors. Comments consist of text that you insert into instructions to document the meaning and purpose of the program.

You can automatically convert or reverse ladder instructions to list instructions. You can also reverse list to ladder instructions, if the program structure and instructions comply with reversibility rules.



```

0 LD %I0.0 (* THIS IS THE FIRST HEADER COMMENT FOR RUNG 0 *)
1 OR SAMPLE_INPUT (* IT IS IGNORED WHEN REVERSING TO LADDER *)
2 ANDN %I0.1
3 ST M101
4 ST M101
5 LD %I0.0 (* THIS IS A COMMENT ON A LINE *)
6 OR SAMPLE_INPUT (* IT IS IGNORED WHEN REVERSING TO LADDER *)
7 %LS
8 LD %M101
9 [%M20 = %K2 * 16]
10 LD %I0.0 (* THIS IS A COMMENT ON A LINE *)
11 OR SAMPLE_INPUT (* IT IS IGNORED WHEN REVERSING TO LADDER *)
12 LD %Q0.5
13 OR %I1.3
14 OR 10.13
15 ST %Q0.5
16 LDN %I0.4
17 ST %Q0.4

```

Ladder Programming

A program written in Ladder language consists of networks of linked graphical elements organized into rungs that are executed sequentially by the controller. A ladder diagram is a graphical representation of a ladder program similar to a relay logic diagram.

Each rung consists of one network of linked graphical elements organized in a programming grid starting with a potential bar on the left and ending with a potential bar on the right. The graphical elements represent:

- Controller inputs and outputs such as sensors, push buttons, and relays.
- Arithmetic, logical, comparison, and numerical operations.
- Predefined system functions such as timers and counters.
- Controller internal variables, such as bits and words.

List Programming

A program written in List language consists of a series of instructions executed sequentially by the controller. Each List instruction is represented by a single program line, and consists of three components:

- Line number - line numbers are generated automatically when you enter an instruction.
- Instruction code - The instruction code is a symbol for an operator that identifies the operation to be performed using the operand(s). Programmers typically specify Boolean and numerical operations.
- Operand(s) - An operand is a number, address, or symbol representing a value that a program can manipulate in an instruction. For example, in the sample program above, the operand %I0.1 is an address assigned the value of an input to the controller. An instruction can have from zero to three operands, depending on the type of instruction code. Examples of Operands are controller inputs and outputs such as sensors, push buttons, and relays, or predefined system functions, such as timers and counters.

Programmable controller variables

An instruction can have from zero to three operands, depending on the type of instruction code. The operands may be:

- Sensor image inputs (detectors, command buttons, etc.).
- Actuator image outputs (relays, solenoid valves, LCDs, etc.)
- Internal bits (equivalent to the internal relays of the electromagnetic motor equipment)
- Motor equipment function blocks (timers, counters, drum controllers, registers).
- ...

Integrated counter function

The counter functions allow the controller to count many pulse inputs within one scan. Using the built-in, 16-bit high-speed counter, Twido can count up to 65535 high-speed pulses from a rotary encoder or proximity switch without regard to scan time; compares the current value with a pre-set value, and turns on the output when the current value reaches the pre-set value. This function can be used for simple motor control, or to measure the lengths of objects.

The number of Fast Counters there are depends on the type of base:

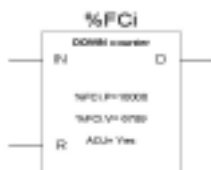
Type of base	TWD	Compact: LCAA 10/12/24DRF	Modular: LMDA 20D●K
Counter VFC (20 kHz)		1	2
Counter FC (5 kHz)		3	2

Very Fast Counter VFC (20 kHz)

The VFC is an up/down counter with auxiliary inputs possible. The counter is accessed by means of a function block (%VFCi), and is programmed using TwidoSoft. The %VFCi function block can be used to perform one of the following 5 sub-functions, all with a maximum frequency of 20kHz:

- Up/Down counter.
- Up/Down 2-phase counter.
- Single Up counter.
- Single Down counter.
- Frequency meter.

The VFC operates in rotary encoder mode, and counts up or down input pulses to input terminals I0 (phase A) and I1 (phase B).



Fast Counter FC (5 kHz)

The FC is a counter available to count up OR to count down pulses (rising edges) on a digital I/O with a maximum frequency of 5 kHz. Both the UP and DOWN counters are accessed by means of a function block (%FCi), and are programmed using TwidoSoft. In configuration mode, the user must choose the mode (UP or DOWN) for each function block, to handle the initial value of the pre-set (%FCi.P between 1 and 65535) and the attribute "adjustable" in order to modify the dynamic pre-set (%FCi.P) and the current value (%FCi.V).

Within the function block, the %FCi.V varies by increment between 0 and %FCi.P for an UP counter, and by decrement between %FCi.P and 0 for a DOWN counter.

Motion

The Twido controllers include two special functions to enable basic control of motion for example, for controlling stepper motors:

- The Pulse Generator Output (PLS), and the Pulse Width Modulation Output (PWM).
- The PLS and PWM functions are available only on the Modular controllers. This section provides a brief introduction to these functions.

The maximum frequency of these 2 functions is 7 kHz.

Function PLS (pulse, 7kHz)

The PLS function block generates pulses of fixed ratio. In some cases the frequency can be fixed, in others variable (such as in control of slopes when driving a step motor). It is possible to program the %PLS block to generate a specific number of pulses.

PLS can be assigned to output %Q0.0.0 or %Q0.0.1 on a base or peer controller. This signal has a variable period, but has a constant duty cycle, an ON to OFF ratio of 50% of the period. This relationship is shown in the opposite diagram.



Function PWM (7 kHz)

The PWM function can be used to manage analog output modules. The PWM function block generates pulses of a fixed frequency, with a variable ratio between high state and low state of the output signal. The ratio, "high state duration/low state duration" is a dynamic variable called %PWM.R, with a range from 0% to 100%. PWM can be assigned to output %Q0.0.0 or %Q0.0.1 on a base or peer controller. The PWM function can be used to control analog module outputs.

A user-defined function block (%PWM) generates a signal on output %Q0.0.0 or %Q0.0.1. This signal has a constant period, with the option of varying the duty cycle or ON to OFF ratio. Compare the PLS relationship above with the opposite PWM diagram.



Specifications

Instructions

Combined List instructions

- **LD, LDN, LDR, LDF** : read the state of a bit (direct, inverse, rising and falling edge)
- **ST, STN, S, R** : write an output (direct, inverse, set, reset)
- **AND, ANDN, ANDR, ANDF** : logic AND with a bit (direct, inverse, rising and falling edge)
- **OR, ORN, ORR, ORF** : logic OR with a bit (direct, inverse, rising and falling edge)
- **LD (, AND (, OR (,)** : open and close brackets (8 possible levels)
- **XOR, XORN, XORR, XORF** : exclusive OR with a bit
- **MPS, MRD, MPP** : buffer memory management for divergence towards output bits
- **N** : negation

List comments and title with PL7-07 software

- **Title** : 122 characters before each instruction
- **LD, LDN, LDR, LDF**
- **Comments** : 4 lines of 122 characters before each instruction **LD, LDN, LDR, LDF**
- Possibility of associating a comment of 122 characters with each instruction

Ladder rungs

- 10 contacts of 7 lines with 1 output per line
- **Title** : 122 characters per rung
- **Comments** : 4 lines of 122 characters

Standard function blocks (1)

- **Timers** : %Tmi (0 ≤ i ≤ 31) 0 to 9999 (word)
- **Up/down counters** : %Cci (0 ≤ i ≤ 15) 0 to 9999 (word)
- 4 16-bit LIFO or FIFO registers : %Ri (0 ≤ i ≤ 3)
- 4 drum controllers : %DRi (0 ≤ i ≤ 3) 8 steps
- **Real-time clock** : %RTCi (0 ≤ i ≤ 15) month, day, hour, minute, with TSX Nano 16 and 24 I/O

Numerical instructions

- Assignment in word, indexed word, bit strings
- word tables : :=
- Arithmetic : +, -, x, /, REM, SQRT
- Logic : AND, OR, XOR, NOT, INC, DEC
- Shift operation : SHL, SHR, ROL, ROR (logic and rotate)
- Conversion : BTI, ITB (BCD <=> Binary)
- Comparison : >, <, <=, >=, =, <>

Specific functions

- 1 input for PLC RUN/STOP command
- 1 PLC status (security) output : PLC error

Grafcet List instructions

- **-*i** : step (1 ≤ i ≤ 62)
- **=*i** : initial step (1 ≤ i ≤ 62)
- **#i** : activate step i, after deactivation of current step
- **#** : deactivate current step
- **#Di** : deactivate step i after another step
- **=*POST** : start post-processing
- **%Xi** : bit associated with step i

Instructions on program

- **MCS, MCR** : master relay
- **END, ENDC, ENDCN** : end of program (conditional or unconditional)
- **JMP, JMPc, JMPcN** : jump to a label %L (conditional or unconditional)
- **SRn** : call subroutine n (0 ≤ n ≤ 15)
- **RET** : end of subroutine
- **NOP** : non-operative instruction

Ladder language graphic symbols

- Normally open, normally closed and on edge contacts
- Direct, inverse, SET and RESET coils
- Program jump, subroutine call

Specific function blocks

- Transmission/reception of message of 64 words maximum (internal or constant) : EXCH
- Exchange control : %MSG available output, fault -output
- 8 shift bit registers : %SBri (0 ≤ i ≤ 7), shift one step to the left or right (max. 16 steps).
- 8 step counter blocks : %SCi (0 ≤ i ≤ 7), move forward or back one step (max. 256 steps)
- Fast counter 5 KHz, up/down counter: %FC
- Fast counter 20 KHz up/down counter, frequency meter, %VFC
- Pulse width modulated output : %PWM
- Pulse output : %PLS
- Real-time display of Grafcet steps used
- Symbol table management
- Porting of Nano applications to Micro (List or Ladder)

- Real-time display of Grafcet steps used
- Symbol table management

Addressable objects

Bit objects (1)

- **%I/Qx.y** : inputs/outputs bits
- **%Mi** : internal bits
- **%Si** : system bits
- **%Xi** : 62 Grafcet steps
- **%●●i.j** : function block bits
- **%●●i:Xk** : bits extracted from internal words, system words, constant words, input and output words

Bit string and word table objects

- **%●i:L** : bit strings (I/O, internal, system and Grafcet bits)

Word objects (1)

- **%MWi** : internal words
- **%KWi** : 64 constant words
- **%SWi** : 128 system words
- **%INWi.j** : 4 input words per controller (exchange words for inter-controller communication)
- **%QNWi.j** : 4 output words per controller (exchange words for inter-controller communication)

- **%●Wi:L** : word tables (internal, constant and system words)

(1) When the object numbers are not indicated, see specifications pages 6 and 12

Twido programmable controllers

TwidoSoft programming software

References

The multi-language software packages (French, English, German, Spanish and Italian) are to be used with compatible PCs (1) equipped with Windows 98 or Windows 2000 operating systems.

These software packages include:

- A CD-ROM containing TwidoSoft multilanguage software and multilanguage hardware and software installation documentation.
- Depending on the model, the PC terminal/Twido base connection cable, reference TSX PCX 1031 compatible with Twido, Micro, and Premium controllers, (length 2.5 m).

TwidoSoft software packages

Description	Languages	PC connection cable	Reference (1)	Weight kg
Multilanguage programming TwidoSoft	Ladder	TSX PCX 1031	TWD SPU 1001 V10M	—
	Instruction List	—	TWD SPU 1002 V10M	—

TwidoPack kits

Schneider Electric offers two TwidoPack kits to help you discover and become familiar with the new range of Twido programmable controllers. TwidoPack is inexpensive and easy to use, and is available in two versions that include:

- A Twido base controller.
- A range of options.
- The TwidoSoft software package TWD SPU 1001 V10M (cable included).
- A teach-yourself E-Learning CD-ROM.

Description	Twido controller	Options	Reference (2)	Weight kg
TwidoPack compact	10 I/O Compact TWD LCAA 10DRF	<input type="checkbox"/> TWD XCP RTC Real Time Clock cartridge <input type="checkbox"/> 6-input TWD XSM 6 simulator	TWD XDP PAK1●	—
TwidoPack modular	20 I/O Modular TWD LMDA 20DTK	<input type="checkbox"/> TWD XCP RTC Real Time Clock cartridge <input type="checkbox"/> Built-in display module <input type="checkbox"/> TWD XCP ODM, <input type="checkbox"/> TWD NAC 485T serial interface adapter <input type="checkbox"/> 3-meter pre-formed cable TWD FCW 30M	TWD XDP PAK2●	—

Documentation utilisateur

Description	Format	Language	Reference	Weight kg
Twido installation and setup manual Hardware and software	Paper layout (216 x 181 mm)	English	TWD USE 10AE	—
		French	TWD USE 10AF	—
		German	TWD USE 10AD	—
		Spanish	TWD USE 10AS	—
		Italian	TWD USE 10AI	—

(1) Typical recommended configuration processor 300 MHz, 128 Mb of RAM memory, with 40 Mb available on harddisk.

(2) At the end of the reference, replace ● by E: english, F: french.