

# Modicon TSX Nano PLCs

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## Nano PLCs

### Presentation

#### New features on Nano PLCs

The range of Nano PLCs includes new functions with :

- Non-extendable Nano PLC bases for small configurations.
- Nano PLC extensions which can be used to augment extendable Nano PLC bases at minimum cost.
- Analogue I/O extension modules (with  $\sim 100\dots 240$  V or  $\text{---} 24$  V power supply) incorporating 3 inputs and 1 output.

### Presentation

Nano PLCs are very compact and offer a cost-effective replacement for traditional solutions while increasing application flexibility and ease of wiring.

Nano PLCs are available in 3 formats :

- Nano PLC bases with 10, 14, 16, 20 or 24 non-extendable I/O.
- Nano PLC bases with 10, 16 or 24 extendable I/O, which can be augmented with an I/O extension and up to 3 PLC extensions.
- Nano PLC extensions with 16 or 24 I/O which can be used to augment extendable Nano PLC bases (1 extension per base).

#### Non-extendable Nano PLC bases



Nano PLCs with 10 I/O



Nano PLCs with 14/16 I/O



Nano PLCs with 20/24 I/O

Non-extendable Nano PLC bases will not accept any extension. They all have a  $\sim 100\dots 240$  V power supply, depending on the model :

- 10 I/O : 6 inputs + 4 outputs and 1 analogue input.
- 14 I/O : 8 inputs + 6 outputs.
- 16 I/O : 9 inputs + 7 outputs and 1 analogue input.
- 20 I/O : 12 inputs + 8 outputs.
- 24 I/O : 14 inputs + 10 outputs and 1 analogue input.

The following types of inputs and outputs are used :

- Inputs :  $\text{---} 24$  V (sensor supply is not protected).
- Outputs : relay.

These PLCs incorporate extended communication : Uni-Telway master/slave link or ASCII link for transmission/reception.

Models with 10, 14 and 20 I/O do not have a real-time clock.

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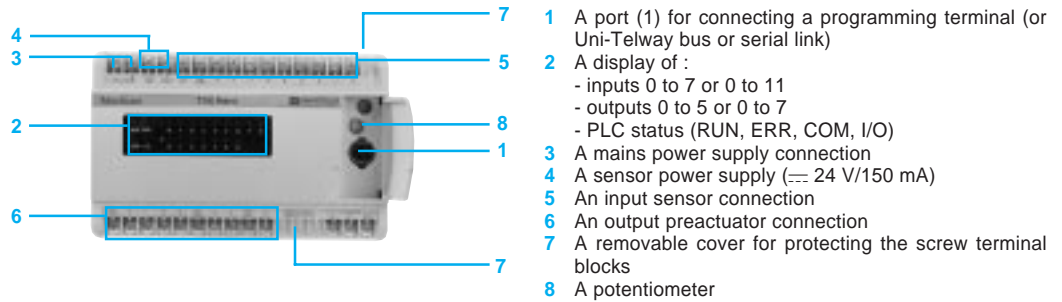
## Nano PLCs

### Description

### Description

#### Non-extendable Nano PLCs

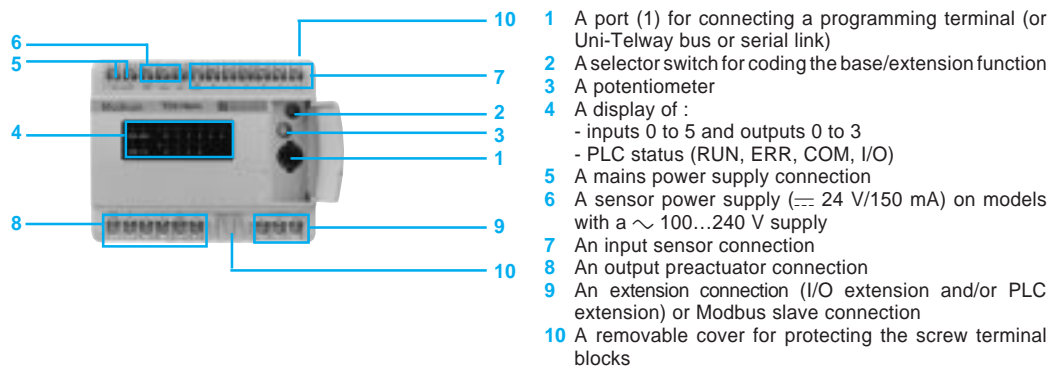
The front panels of **TSX 07 3L ●●28** non-extendable Nano PLCs comprise :



- 1 A port (1) for connecting a programming terminal (or Uni-Telway bus or serial link)
- 2 A display of :
  - inputs 0 to 7 or 0 to 11
  - outputs 0 to 5 or 0 to 7
  - PLC status (RUN, ERR, COM, I/O)
- 3 A mains power supply connection
- 4 A sensor power supply ( $\approx$  24 V/150 mA)
- 5 An input sensor connection
- 6 An output preactuator connection
- 7 A removable cover for protecting the screw terminal blocks
- 8 A potentiometer

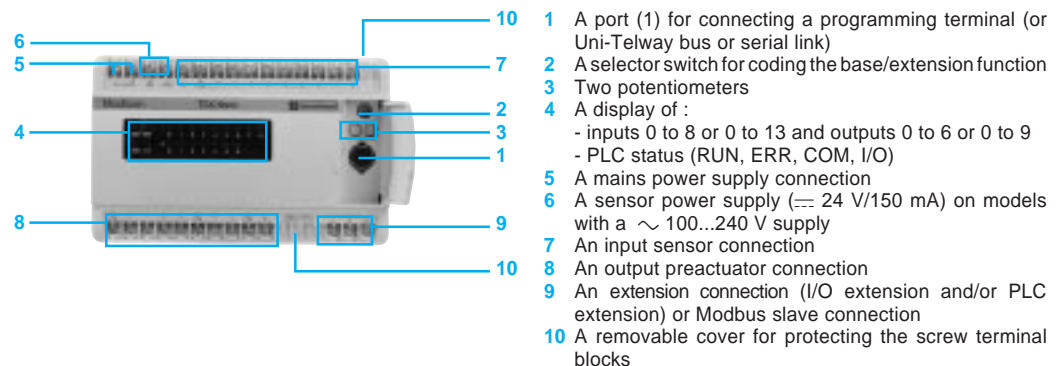
#### Extendable Nano PLCs

The front panels of **TSX 07 30 10●●** extendable Nano PLCs with 10 I/O comprise :



- 1 A port (1) for connecting a programming terminal (or Uni-Telway bus or serial link)
- 2 A selector switch for coding the base/extension function
- 3 A potentiometer
- 4 A display of :
  - inputs 0 to 5 and outputs 0 to 3
  - PLC status (RUN, ERR, COM, I/O)
- 5 A mains power supply connection
- 6 A sensor power supply ( $\approx$  24 V/150 mA) on models with a  $\sim$  100...240 V supply
- 7 An input sensor connection
- 8 An output preactuator connection
- 9 An extension connection (I/O extension and/or PLC extension) or Modbus slave connection
- 10 A removable cover for protecting the screw terminal blocks

The front panels of **TSX 07 31 16/24●●** extendable Nano PLCs with 16/24 I/O comprise :



- 1 A port (1) for connecting a programming terminal (or Uni-Telway bus or serial link)
- 2 A selector switch for coding the base/extension function
- 3 Two potentiometers
- 4 A display of :
  - inputs 0 to 8 or 0 to 13 and outputs 0 to 6 or 0 to 9
  - PLC status (RUN, ERR, COM, I/O)
- 5 A mains power supply connection
- 6 A sensor power supply ( $\approx$  24 V/150 mA) on models with a  $\sim$  100...240 V supply
- 7 An input sensor connection
- 8 An output preactuator connection
- 9 An extension connection (I/O extension and/or PLC extension) or Modbus slave connection
- 10 A removable cover for protecting the screw terminal blocks

(1) Female 8-way mini-DIN type connector.

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## Nano PLCs

### Presentation (continued)

#### Extendable Nano PLC bases



Nano PLCs with 10 I/O



Nano PLCs with 16 I/O



Nano PLCs with 24 I/O  
 Nano PLCs with 16 I/O (~ inputs)

Nano PLCs, with  $\sim 24$  V or  $\sim 100...240$  V power supply, are available with three different I/O combinations :

- 10 I/O : 6 inputs + 4 outputs.
- 16 I/O : 9 inputs + 7 outputs.
- 24 I/O : 14 inputs + 10 outputs.

There are many types of I/O :

- Inputs :  $\sim 24$  V,  $\sim 115$  V, analogue 0/10 V.
- Outputs : relay outputs, transistor outputs  $\sim 24$  V/0.5 A (positive logic : load common at "-"), transistor outputs  $\sim 24$  V/0.5 A (negative logic : load common at "+").

Nano PLCs are programmed in lists of instructions using the FTX 117 programming terminal, in Ladder or Instruction list language using software on an FT 2000, FTX 517 terminal or PC compatible. Instruction list and Ladder programs are reversible on FTX terminals or PC compatibles.

Nano PLCs are easy to set up and have numerous built-in functions (EEPROM memory for storing programs, battery-backed RAM, real-time clocks for models with 16 and 24 I/O). They can be installed easily on a mounting rail or base plate, in a vertical or horizontal position.

#### Nano PLC extensions



Nano PLC extensions with 16 I/O



Nano PLC extensions with 24 I/O

Nano PLC extensions can be used to augment extendable Nano PLCs using a single extension per base.

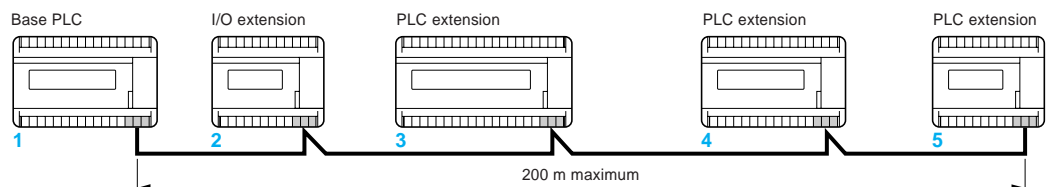
They all have a  $\sim 100...240$  V or  $\sim 24$  V power supply and, depending on the model :

- 16 I/O : 9 inputs + 7 outputs.
- 24 I/O : 14 inputs + 10 outputs.

The following types of inputs and outputs are used :

- Inputs :  $\sim 24$  V.
- Outputs : relay outputs for models with  $\sim 100...240$  V power supply, transistor outputs with positive logic for models with  $\sim 24$  V power supply.

Each extendable Nano base PLC **1** can be augmented using an I/O extension **2**, made up of one of the extendable Nano PLCs or a Nano extension. In addition, up to three PLC extensions **3**, **4** and **5** communicating via exchange words can be connected to the base PLC. Only the base PLC can receive an I/O extension.



This extension link can be used exclusively as a Modbus slave link.

# Modicon TSX Nano PLCs

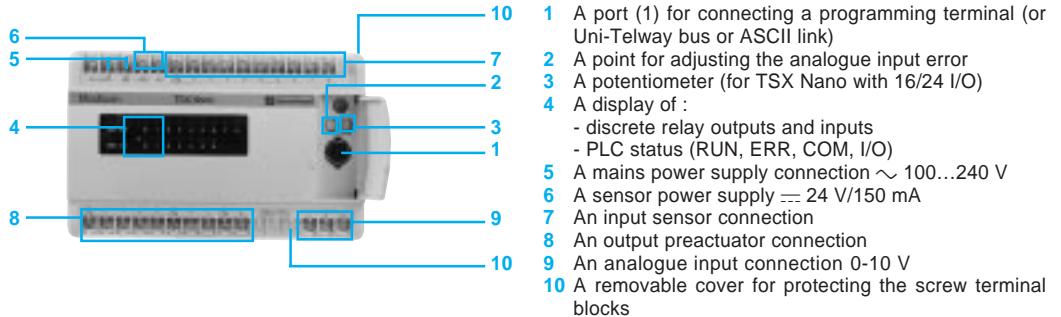
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## Nano PLCs

### Description (continued)

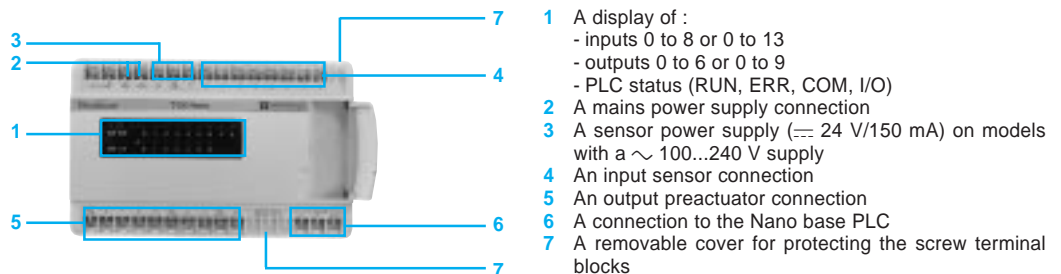
#### Nano PLCs (with integrated analogue input)

The front panels of **TSX 07 32/33 ●●28** Nano PLCs with 10/16/24 I/O and 1 integrated analogue input comprise :



#### Nano PLC extensions

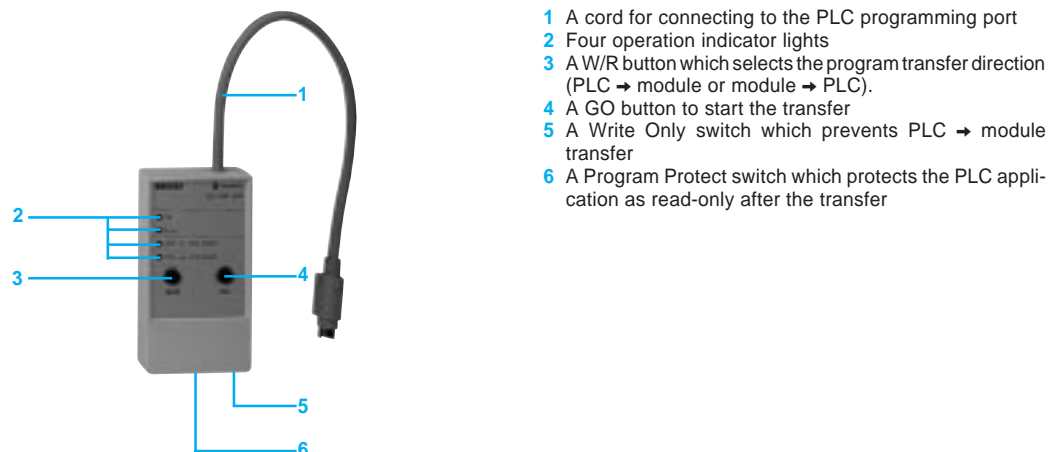
The front panels of **TSX 07 EX ●●●●** Nano PLC extensions comprise :



#### Program loader

The TSX PGR LDR module is designed to simplify duplicating or updating applications on Nano and Micro PLCs without the need for a programming terminal. An application (in internal RAM) can be transferred from a PLC to the TSX PGR LDR module (and saved within it), then transferred from the TSX PGR LDR module to a PLC.

The front panel of the **TSX PGR LDR** module comprises :



(1) Female 8-way mini-DIN type connector.

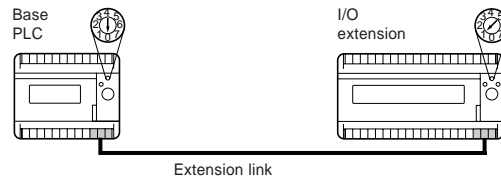
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## Nano PLCs

### Functions

#### I/O extension (1)

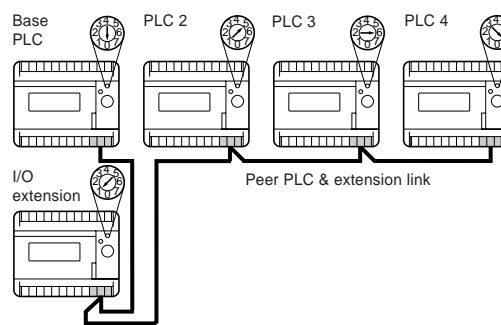


Each Nano base PLC can be extended using an I/O extension. This extension is created by one of the PLCs with 10, 16 or 24 I/O. The function of each PLC is defined by the position of the coding selector switch :

- Position 0 : base PLC
- Position 1 : I/O extension

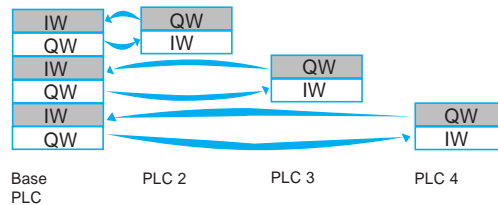
The extension link cable between the base PLC and the I/O extension is a shielded, twisted pair and is no more than 200 metres long.

#### Peer PLCs (1)



Up to 3 peer PLCs, communicating via common words, can be connected to the base PLC. In this case, only the base PLC can receive an I/O extension. The function of each PLC is defined by the position of the coding selector switch. I/O addressing of peer PLCs is identical to that of the base PLC.

The extension link cable between the base PLC and PLC extensions is a shielded, twisted pair and is no more than 200 metres long.

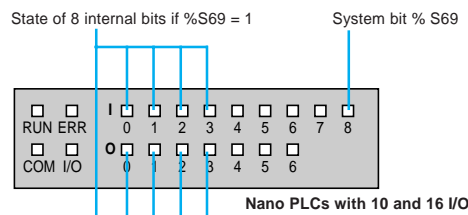


#### Inter-PLC communication

Each PLC has 2 reserved (IW) and 2 reserved (QW) words for exchanging data between PLCs. These exchange words are updated automatically. For each PLC, the user program is only able to :

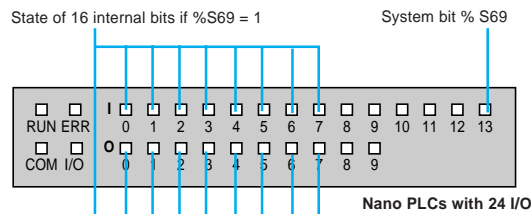
- Write to the 2 %QW output words
- Read the 2 %IW input words

#### Displaying the I/O, internal bits and PLC status



The results of the self-tests performed continuously by the base PLC, peer PLCs and I/O extensions are displayed on the front panel by 4 indicator lamps :

- RUN : PLC status
- ERR : internal fault
- COM : data exchange on the extension link
- I/O : I/O fault



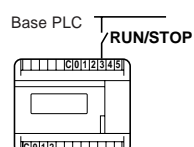
#### I/O display

The state of each I/O is displayed on the front panel of the PLC by an indicator lamp : when the lamp is on, the I/O is active, when the lamp is off, the I/O is inactive.

#### Internal bits display

When the PLC system bit %S69 is set to 1, the first indicator lamps show the state of 8 or 16 defined internal bits (%M120...%M127 or %M112...%M127).

#### Dedicated I/O



The RUN/STOP input will launch or stop program execution from an external order. After configuration, one of the first 6 inputs (%I0.0 to %I0.5) can be assigned to this function. One of the first 4 outputs (%Q0.0 to %Q0.3) can be configured to indicate to the user that the PLC program is not running (STOP or fault).

(1) TSX 07 30/31 PLCs can no longer receive an I/O extension or peer PLC when the integrated Modbus link is in use. TSX 07 32/33 ●●28 and TSX 07 3L ●●28 PLCs cannot take an I/O extension or peer PLC.

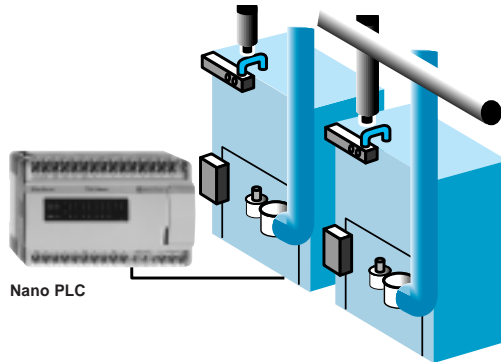
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## Nano PLCs

### Functions (continued)

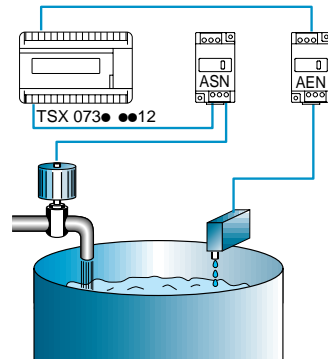
#### Real-time based programming



Nano PLCs with 16 or 24 I/O integrate 16 user-definable real-time clocks which can be used to :

- Control the outputs directly (opening and closing electrical circuits) or act on the user program according to the time (month, day, hour and minute).
- Program time setpoints which can be modified via an operator panel or calculated by the program.
- Program event time-stamping or perform time calculations.

#### Analogue I/O

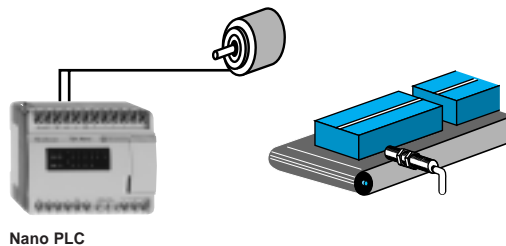


The Nano PLC is designed for simple process control applications (level, temperature, flow rate control, etc) with speed controller or servo-valve control.

TSX AEN/ASN modules are used with Nano PLCs to process 1 analogue input and 1 analogue output respectively :

- The input module, 0/10 V - 10/+ 10 V or 4/20 mA is connected to the  $\bar{\text{---}}$  24 V input %I0.0 of the PLC and is configured in frequency meter mode.
  - The output module, 0/10 V - 10/+ 10 V or 4/20 mA uses the pulse width modulation transistor output %Q0.0.
- Analogue processing is also possible using three TSX 07 32/33 ●●28 bases which consist of 1 analogue input 0-10 V.

#### High-speed processing applications



On a base PLC or peer PLC, each of the first 6 inputs (%I0.0 to %I0.5) can be assigned to the latching function after configuration. This function is used to take account of input pulses with short durations, 100  $\mu$ s minimum.

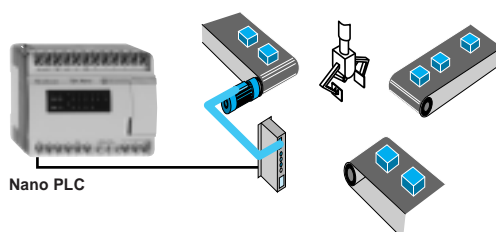
Nano PLCs include standard functions which are easy to set up and can be used for adaptation to control systems requiring counting capacity or short response times :

- Fast counter (maximum frequency 10 kHz)
- Fast up/down counter (maximum frequency 1 kHz)
- Frequency meter (maximum frequency 10 kHz)

Sensors which are used on the up/down counter inputs (%I0.0 and %I0.3) must have solid state outputs.

2 reflex outputs (%Q0.1 and %Q0.2) are controlled directly by the fast counter (without waiting for outputs to be updated at the end of the scan) according to a matrix predefined during configuration.

#### Pulse outputs



After configuration, the first output %Q0.0 (if it is a transistor output) of the Nano PLC can be used with :

- The **PWM** software function, as a pulse width modulation output at a predefined frequency of up to 4.9 kHz designed for use in applications with light or sound intensity control (dimmer function).
- The **PULSE** software function, as a pulse generator output of up to 4.9 kHz designed for use for controlling stepper motors.

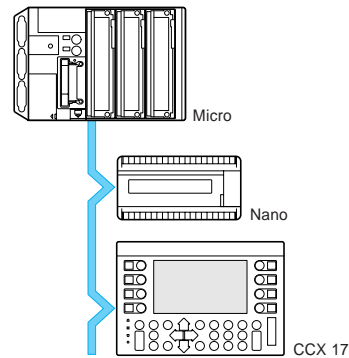
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## Nano PLCs

### Functions (continued)

#### Uni-Telway communication



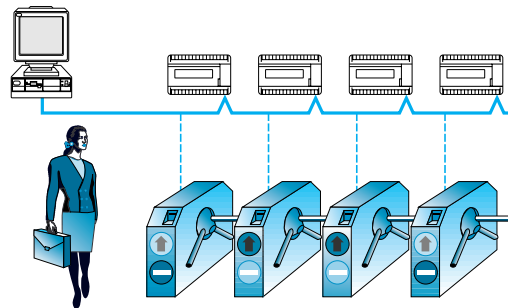
The Nano PLC can communicate with other Uni-Telway devices via the terminal port : speed controllers, operator terminals, compact or modular PLCs.

The ability to send and receive messages means that Nano PLCs can be integrated in distributed architectures.

In slave mode, for example, the Nano PLC can initiate communication and send updated variables to the bus master (local reflex processing).

28 Nano slave PLCs can be connected to the Uni-Telway bus over a distance of 1 km (isolated for speeds of 1.2 to 9.6 K bits/s).

#### Modbus slave communication

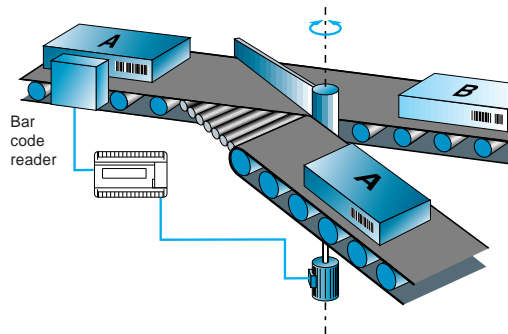


Nano PLCs have an RS 485 serial link extension port, supporting the Modbus protocol (depending on the model). It is used to perform the following requests :

- Read/write bits and words
- Read PLC status (via Uni-TE request)
- Set to RUN or STOP mode (via Uni-TE request)
- Initialise the PLC (via Uni-TE request)

Up to 28 Nano PLCs can be connected over a distance of 200 m for user-definable speeds of 1.2 to 19.2 K bits/s.

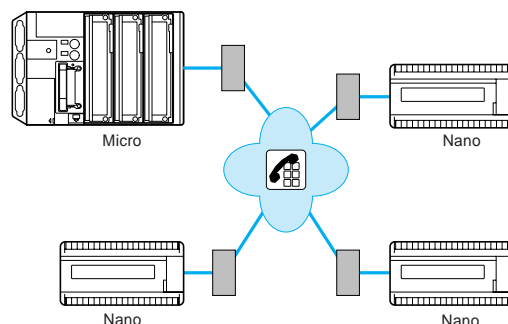
#### ASCII communication



The ability to send and receive characters enables the Nano PLC to communicate in point-to-point mode with a large number of ASCII devices, such as PCs (directly or via modem), printers, bar code readers, etc.

Frame speed and format can be configured. Connection to the Nano PLC terminal port is via an RS 232/485 converter cable powered by the PLC.

#### Modem application (Modbus or Uni-Telway protocol)



A PLC fitted with a Modbus or Uni-Telway master module interrogates Nano PLCs via the switched telephone network.

When connected to a Modem in RS 485 mode, the master can use the link to generate dialling sequences for remote sites.

Each Nano PLC responds to requests from the master, but is also able to trigger a call by activation of a discrete input on the Modem.

Target applications (with Modbus or Uni-Telway) :

- System teleprocessing
- Telemetry of remote sites
- Water, energy, environment control

The Uni-Telway slave link of Nano PLCs can also be used for :

- Up/down loading programs
- Programming and remote diagnostics



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## Characteristics

### Environment

<b>Conforming to standards</b>		IEC 1131-2, IEC 664, UL 508, UL 746 C, UL 94, CSA 22-2 no. 142, EN 50081/class B
<b>Temperature</b>	Operation	°C 0...+ 60
	Storage	°C - 25...+ 70
<b>Humidity</b>	Without condensation	% 5...95
<b>Altitude</b>		m 0...2000
<b>Vibration resistance</b>		Conforming to IEC 68-2-6 FC tests
<b>Mechanical shock resistance</b>		Conforming to IEC 68-2-27 EA tests

### Power supply characteristics

Type of PLC		TSX 07 30/31/32/33 ●●●8, TSX 07 3L ●●28, TSX 07 EX ●●28	TSX 07 30/31 ●●●2, TSX 07 EX ●●12
<b>Supply voltage</b>	Nominal	V $\sim$ 100...240	$\equiv$ 24
	Limit	V 85...264	19.2...30
<b>Frequency</b>	Nominal	Hz 50/60	–
	Limit	Hz 47...63	–
<b>Power required</b>		$\leq$ 30 VA	$\leq$ 14 W
<b>Sensor protected power supply</b>		V 24/150 mA	–
<b>Primary/earth isolation</b>		Vrms 2000/50-60 Hz	2000/50-60 Hz
<b>Microbreaks</b>	Duration	ms $\leq$ 10	$\leq$ 1

### Discrete input characteristics

Type of input	V	$\equiv$ 24 (resistive)	$\sim$ 115 (capacitive)	
<b>Nominal input values</b>	Voltage	V $\equiv$ 24	$\sim$ 110/120	
	Current	mA 7	10	
	Sensor supply	V $\equiv$ 19.2...30 (including ripple)	–	
<b>Limit input values</b>	At state 1	Voltage	V $\geq$ 11	$\geq$ 79
		Current	mA $\geq$ 2.5 for 11 V	$\geq$ 4 for 79 V
	At state 0	Voltage	V $\leq$ 5	$\leq$ 20
		Current	mA $\leq$ 1.2	$\leq$ 2
<b>Logic</b>		Positive or negative depending on wiring	–	
<b>Filter time</b>		12 ms, 3 ms or 100 $\mu$ s (on I0.0 to I0.7)/375 $\mu$ s (on I0.8 to I0.13)	12 ms	
<b>Isolation</b>	Betw. grps of I/O points	Vrms 1500/50-60 Hz	1500/50-60 Hz	
	Type	Optoelectronic module	–	



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### Characteristics (continued)

#### Discrete output characteristics

Type of output			Relay	Transistor, positive logic	Transistor, negative logic
Output description			1 normally open contact	Protected	Non-protected
Loads (nominal values)	Voltage	V	~ 24...220	--- 24	--- 24
	Nominal current	A	–	0.5	0.5
	Tungsten lamp	W	–	≤ 10	≤ 10
--- loads	Voltage	V	24	19.2...30	19.2...30
	Current	A	DC-12 : 1-24 V (0.3 x 10 <sup>6</sup> op. cycles) DC-13 : 0.4-24 V (1 x 10 <sup>6</sup> op. cycles)	0.625 (at 30 V) common to “-” loads	0.625 (at 30 V) common to “+” loads
~ loads	AC-12 resistive duty	A	1-110/220 V (0.5 x 10 <sup>6</sup> op. cycles) 0.5-110/220 V (2 x 10 <sup>6</sup> op. cycles) 1-48 V (0.5 x 10 <sup>6</sup> op. cycles) 2-24 V (0.3 x 10 <sup>6</sup> op. cycles) 1-24 V (0.5 x 10 <sup>6</sup> op. cycles)	–	–
	AC-15 inductive duty	A	0.22-220 V (1 x 10 <sup>6</sup> op. cycles) 0.5-24/48/110 V (1 x 10 <sup>6</sup> op. cycles) 1-24 V (0.2 x 10 <sup>6</sup> op. cycles)	–	–
Response time	State 0 to 1	ms	≤ 5	≤ 1	≤ 1
	State 1 to 0	ms	≤ 10	≤ 1	≤ 1
Leakage current	At state 0	mA	–	≤ 1	≤ 1
Voltage drop	At state 1	V	–	≤ 2 (for I = 0.5 A)	≤ 1.5 (for I = 0.5 A)
Built-in protection	Overloads and short-circuits		None (fit one fuse per I/O point or group of I/O points)	Yes	None (fit a fuse on the preactuator common)
	Overvoltages		None (fit RC or GMOV peak limiter circ. for ~ and a freewheel diode for ---)	Yes	Yes
	Polarity inversions		–	Yes	Yes

#### Integrated analogue input characteristics

Type of PLC			TSX 07 32/33 ●●28
Analogue input	Number of points		1
	Input range	V	0...10
	Input impedance	kΩ	16...18
	Max. voltage without destruction	V	± 16
	Type of protection		Against short-circuits
Conversion	Method		Successive approximations
	Resolution		8 bits
	Conversion time		PLC scan time
	Precision at 25 °C	% FS	± 0.8
	Precision at 60 °C	% FS	± 2
	Drift		0.34 % per 10 °C
Repeatability	V	± 0.8 % of 0 to 60 °C (at full scale)	
Isolation	Analogue input and processor	V	None
Wiring distance with shielded cable	Isolated sensor	m	30 max.
	Non-isolated sensor	m	10 max.

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### Modbus characteristics

<b>Type of PLC</b>	<b>TSX 07 30/31 ●●●●</b>			
<b>Structure</b>	Description	Heterogeneous industrial bus		
	Physical interface	RS 485 non-isolated		
	Method of access	Master/slave type		
<b>Transmission</b>	Mode	Asynchronous in base band, RTU/ASCII frame		
	Bit rate	1.2 K bits/s to 19.2 K bits/s		
	Medium	Double shielded twisted pair		
<b>Configuration</b>	Number of devices	28 devices maximum, 98 link addresses maximum		
	Bus length	200 m maximum		
	Drop cable	15 m maximum		
<b>Available Modbus/Jbus slave functions</b>	Code	Description	Code	Description
	01	Reading of n consecutive output bits	05	Writing of 1 output bit
	02	Reading of n consecutive input bits	06	Writing of 1 output word
	03	Reading of n consecutive output words	15	Writing of n output bits
	04	Reading of n consecutive input words	16	Writing of n output words
<b>Services</b>	Sending requests	Bits : 120 bits maximum per request Words : 120 words maximum per request		
	Safety	One CRC 16 check parameter on each frame		
	Monitoring	Diagnostics counters, event counters		

### ASCII asynchronous serial link characteristics

<b>Type of PLC</b>	<b>TSX 07 30/31/32/33 ●●●●, TSX 07 3L ●●●●</b>	
<b>Physical layer</b>	Terminal port	RS 485 non-isolated Half-duplex (10 m max)
	Flow rate	1.2 K bits/s to 9.6 K bits/s
<b>Transmission</b>	Type	Point-to-point, without flux control (Xon-Xoff, RTS/CTS)
	Data	7 or 8 bits
	Stop bit	1 or 2 bits
	Parity bit	Even, odd or no parity
<b>Services</b>	120 character messages	Transmission/reception

### Uni-Telway integrated link characteristics (general characteristics, see page 43594/2)

<b>Type of PLC</b>	<b>TSX 07 30/31/32/33 ●●●●, TSX 07 3L ●●●●</b>	
<b>Structure</b>	Physical interface	RS 485 terminal port Half-duplex non-isolated
	Bit rate	1.2 to 9.6 K bits/s
	Functions	Master/slave
<b>Configuration</b>	Number of devices	Master : 3 devices maximum (5 link addresses maximum) Slave : 28 devices maximum (96 link addresses max.)
	Bus length	10 m max, 1000 m when using the <b>TSX P ACC 01</b> terminal port cable connector
<b>Services</b>	Uni-TE server	Writing or reading Nano master data after a request is sent by a connected client device Reception of messages from all devices on the bus (master or slave) 128 bytes maximum
	Uni-TE client (master function)	Sending requests (128 bytes maximum) to : - all slave devices on the bus
	Uni-TE client (slave function)	Sending messages to every device on the bus (master or slave), 128 bytes maximum

# Modicon TSX Nano PLCs

## Nano PLCs

Characteristics :  
 pages 40050/9 to 40050/11  
 Dimensions :  
 page 40050/15  
 Connections :  
 pages 40050/16 to 40050/19

## References

### Non-extendable Nano PLC bases



TSX 07 3L 1428

These bases will not accept any extension. They incorporate extended communication : Uni-Telway master/slave link or ASCII link for transmission/reception.  
 ≡ 24 V/150 mA sensor power supply is not protected.

Number of I/O	Inputs	Relay outputs	Transistor outputs 24 V/0.5 A	Reference (1)	Weight kg
---------------	--------	---------------	-------------------------------	---------------	-----------

#### ~ 100...240 V power supply

14	8 ≡ 24 V	6	–	<b>TSX 07 3L 1428</b>	0.320
20	12 ≡ 24 V	8	–	<b>TSX 07 3L 2028</b>	0.340



TSX 07 3L 2028

### Extendable Nano PLC bases

These Nano PLC bases are used as base PLCs (1 per configuration), as I/O extensions (maximum 1 per configuration) or as peer PLCs (maximum 3 per configuration). They integrate an extended communication function : Uni-Telway master/slave link or ASCII link in transmission/reception and Modbus slave link.

Number of I/O	Inputs	Relay outputs	Transistor outputs 24 V/0.5 A	Reference (1)	Weight kg
---------------	--------	---------------	-------------------------------	---------------	-----------

#### ≡ 24 V power supply

10	6 ≡ 24 V	4	–	<b>TSX 07 30 1022</b>	0.290
		–	4 protected, positive logic	<b>TSX 07 30 1012</b>	0.270
			4 unprotected, negative logic	<b>TSX 07 30 1002</b>	0.270
16	9 ≡ 24 V	7	–	<b>TSX 07 31 1622</b>	0.350
		–	7 protected, positive logic	<b>TSX 07 31 1612</b>	0.325
			7 unprotected, negative logic	<b>TSX 07 31 1602</b>	0.325
24	14 ≡ 24 V	10	–	<b>TSX 07 31 2422</b>	0.400
		–	10 protected, positive logic	<b>TSX 07 31 2412</b>	0.370
			10 unprotected, negative logic	<b>TSX 07 31 2402</b>	0.370



TSX 07 30 1022



TSX 07 31 1622



TSX 07 31 2422

(1) Multilingual quick reference guide included as standard (English, French, German, Italian and Spanish).

# Modicon TSX Nano PLCs

## Nano PLCs

Characteristics :  
pages 40050/9 to 40050/11  
Dimensions :  
page 40050/15  
Connections :  
pages 40050/16 to 40050/19

## References (continued)

### Extendable Nano PLC bases (continued)



TSX 07 01 16

Number of I/O	Inputs	Relay outputs	Transistor outputs 24 V/0.5 A	Reference (1)	Weight kg
<b>~ 100...240 V power supply</b>					
10	6 $\equiv$ 24 V	4	–	<b>TSX 07 30 1028</b>	0.300
		–	4 unprotected, negative logic	<b>TSX 07 30 1008</b>	0.280
16	9 $\sim$ 115 V	7	–	<b>TSX 07 31 1648</b>	0.390
	9 $\equiv$ 24 V	7	–	<b>TSX 07 31 1628</b>	0.360
		–	7 unprotected, negative logic	<b>TSX 07 31 1608</b>	0.335
24	14 $\equiv$ 24 V	10	–	<b>TSX 07 31 2428</b>	0.410
		–	10 unprotected, negative logic	<b>TSX 07 31 2408</b>	0.380



TSX 07 01 24/TSX 07 21 1648

### Nano PLC bases (with an integrated analogue input) (2)



TSX 07 33 1628

<b>~ 100...240 V power supply</b>					
Number of I/O	Inputs	Relay outputs	Integrated analogue input	Reference (1)	Weight kg
10	6 $\equiv$ 24 V	4	1 x 0...10 V	<b>TSX 07 32 1028</b>	0.290
16	9 $\equiv$ 24 V	7	1 x 0...10 V	<b>TSX 07 33 1628</b>	0.290
24	14 $\equiv$ 24 V	10	1 x 0...10 V	<b>TSX 07 33 2428</b>	0.290



TSX 07 EX 16

### Nano PLC extensions

These extensions can be used to augment extendable Nano PLC bases at minimum cost (maximum 1 extension per base).

Number of I/O	Inputs	Relay outputs	Transistor outputs 24 V/0.5 A	Reference (1)	Weight kg
<b><math>\equiv</math> 24 V power supply</b>					
16	9 $\equiv$ 24 V	–	7 protected, positive logic	<b>TSX 07 EX 1612</b>	0.325
24	14 $\equiv$ 24 V	–	10 protected, positive logic	<b>TSX 07 EX 2412</b>	0.370
<b>~ 100...240 V power supply</b>					
16	9 $\equiv$ 24 V	7	–	<b>TSX 07 EX 1628</b>	0.360
24	14 $\equiv$ 24 V	10	–	<b>TSX 07 EX 2428</b>	0.410



TSX 07 EX 24

(1) Multilingual quick reference guide included as standard (English, French, German, Italian and Spanish).

(2) TSX 07 32/33 0028 PLCs do not have I/O extension and/or PLC extension links or the Modbus slave link.

# Modicon TSX Nano PLCs

## Nano PLCs

Characteristics :  
pages 40050/9 to 40050/11  
Dimensions :  
page 40050/15  
Connections :  
pages 40050/16 to 40050/19

## References (continued)

### Separate parts



TSX PRG LDR

Description	Use with	Length	Reference	Weight kg
<b>Program loader</b> with programming port connecting cable	Simplifies duplicating or updating applications (program and constants in internal RAM)	0.3 m	<b>TSX PRG LDR</b>	0.150
<b>Input simulator</b> = 24/~ 115 V	Nano PLC with 10 I/O	–	<b>TSX 07 SIM 06</b>	0.050
	Nano PLC with 16 I/O	–	<b>TSX 07 SIM 09</b>	0.070
	Nano PLC with 24 I/O	–	<b>TSX 07 SIM 14</b>	0.080
<b>Connecting cables</b> between Nano PLC bases	I/O extension	0.3 m	<b>TSX CA0 003</b>	0.015
	PLC extension	50 m	<b>TSX STC 050</b>	1.710
		200 m	<b>TSX STC 200</b>	6.790
<b>Connecting cable for Modem (DCE)</b>	Nano PLC terminal port connection to the Modem device (with 25-way male SUB-D connector)	2,5 m	<b>TSX PCX 1130</b>	0.240
<b>Terminal port cable connector</b>	Isolation of Uni-Telway signals for distances > 10 m and < 1 km, line termination, bus drop cable	1 m	<b>TSX P ACC 01</b>	0.690
Description	Composition		Reference	Weight kg
<b>Self-instruction cases (1)</b>	1 Nano PLC (16 I/O), 1 input simulator and 1 FTX 117		<b>TSX SDC 07 30 117</b>	0.950
	1 Nano PLC (16 I/O), 1 input simulator and software under DOS for FT 2000/FTX 517		<b>TSX SDC 07 30 DSF</b>	0.600
	1 Nano PLC (16 I/O), 1 input simulator and software under DOS for PC compatible		<b>TSX SDC 07 30 DSP</b>	0.600



TSX P ACC 01

(1) Multilingual quick reference guide included as standard (English, French, German, Italian and Spanish).

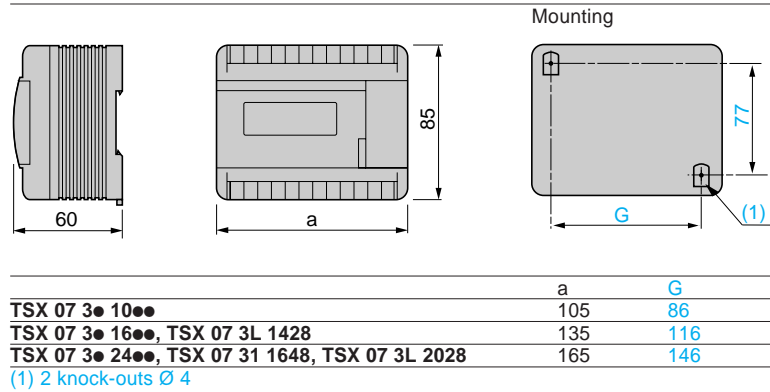
# Modicon TSX Nano PLCs

## Nano PLCs

Characteristics :  
 pages 40050/9 to 40050/11  
 References :  
 pages 40050/12 to 40050/14  
 Connections :  
 pages 40050/16 to 40050/19

## Dimensions, mounting

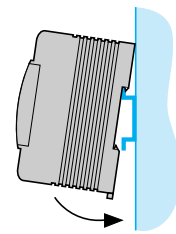
### Dimensions



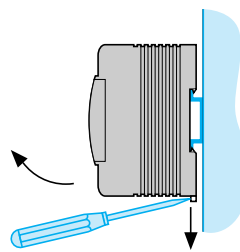
### Mounting

By clicking onto 35 mm DIN rail, or by screwing onto panel using Ø M3 screws

#### Mounting

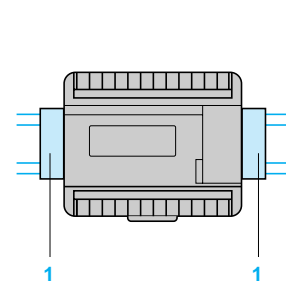


#### Removal

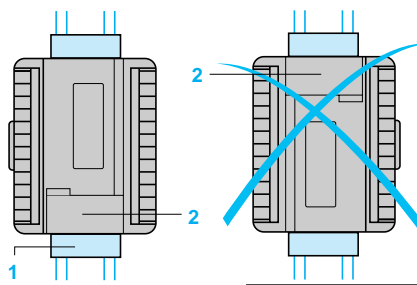


### Mounting positions on vertical plane

Possible mounting positions

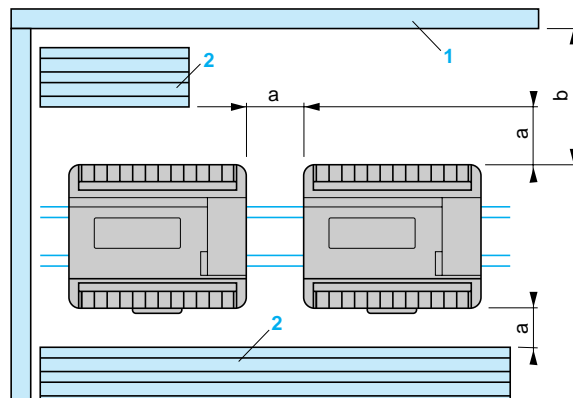


### Incorrect mounting position



- 1 End stop AB1-AB8P35
- 2 Access cover

### Installation rules



- 1 Switchgear, enclosure or machine frame
- 2 Cable ducting or clips
- $a \geq 20$  mm
- $b \geq 40$  mm

**Warning :** Avoid placing heat generating devices (transformers, power supplies, contactors, etc) beneath the Nano PLC.

# Modicon TSX Nano PLCs

## Nano PLCs

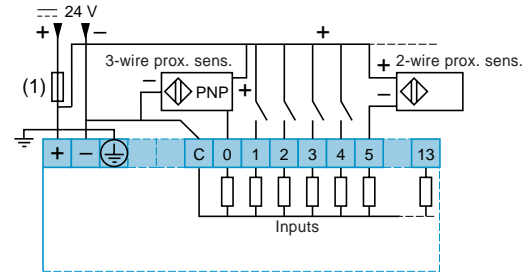
### Connection of inputs

Characteristics :  
pages 40050/9 to 40050/11  
References :  
pages 40050/12 to 40050/14

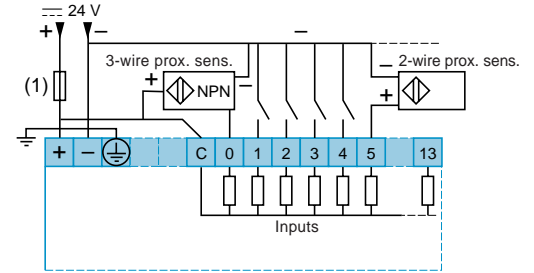
Power supply = 24 V, 6, 9 or 14 inputs = 24 V

TSX 07 30/31 ●●●2, TSX 07 EX ●●●12

Positive logic



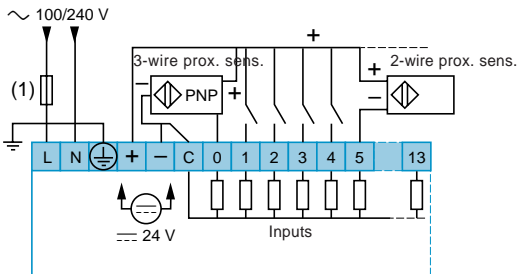
Negative logic



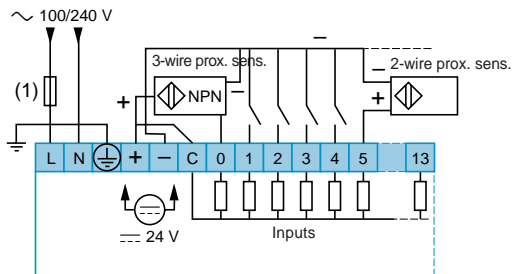
Power supply ~ 100/240 V, 6, 8, 9, 12 or 14 inputs = 24 V

TSX 07 30/31 ●●●8, TSX 07 32/33 ●●●8, TSX 07 EX ●●●28, TSX 07 3L●●28

Positive logic

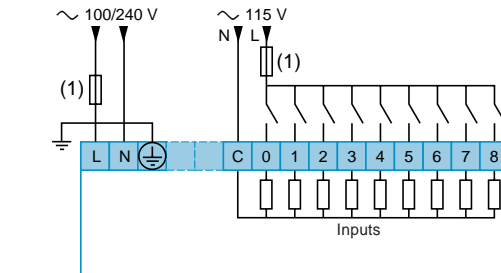


Negative logic



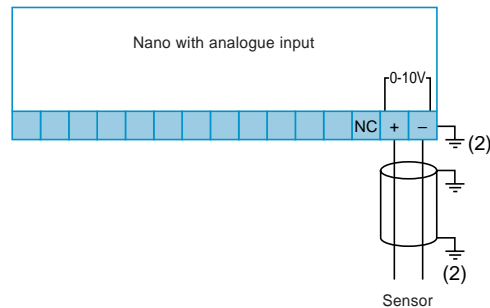
Power supply ~ 100/240 V, 9 inputs ~ 115 V

TSX 07 31 1648



Analogue input

TSX 07 32 1028/33 ●●28



(1) 3 A fuse.

(2) Earth connection required for non-isolated sensor.



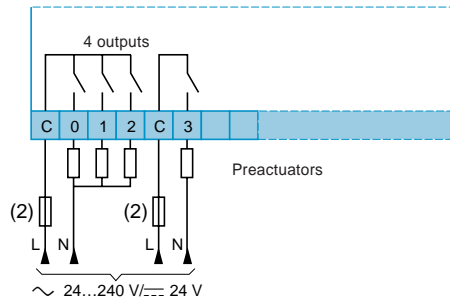
# Modicon TSX Nano PLCs

## Nano PLCs

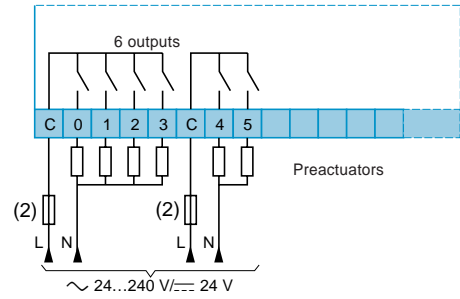
### Connection of relay outputs

Characteristics :  
pages 40050/9 to 40050/11  
References :  
pages 40050/12 to 40050/14

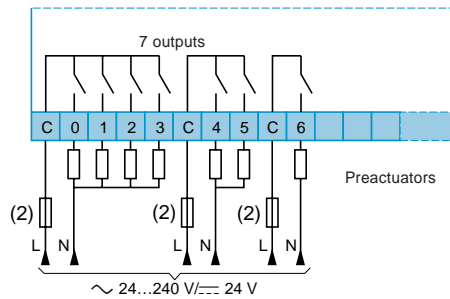
**Power supply  $\approx 24\text{ V}$  or  $\sim 110\text{...}220\text{ V}$  (1)**  
**TSX 07 30 1022/1028, TSX 07 32 1028**



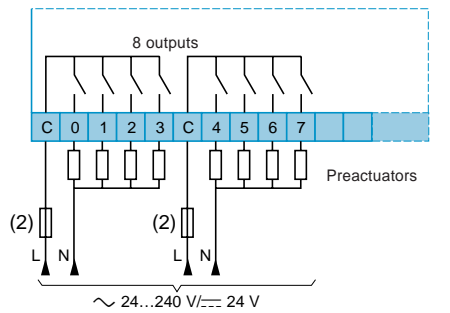
**TSX 07 3L 1428**



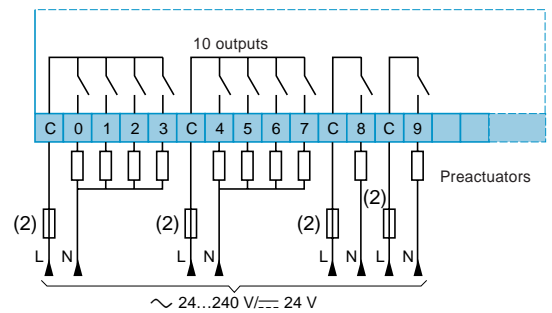
**TSX 07 31 1622/1628, TSX 07 33 1628, TSX 07 EX 1628**



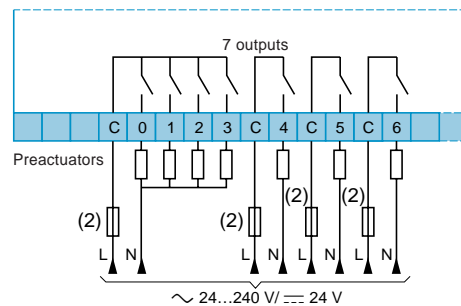
**TSX 07 3L 2028**



**TSX 07 31 2422/2428, TSX 07 33 2428, TSX 07 EX 2428**



**Power supply  $\sim 110\text{...}220\text{ V}$  (1)**  
**TSX 07 31 1648**



(1) Provide an inductive overload protection device at the load terminals and for each output : an RC or GMOV type peak limiter circuit for  $\sim$ , a flywheel diode for  $\approx$ .  
(2) Fuse rated for load.

# Modicon TSX Nano PLCs

## Nano PLCs

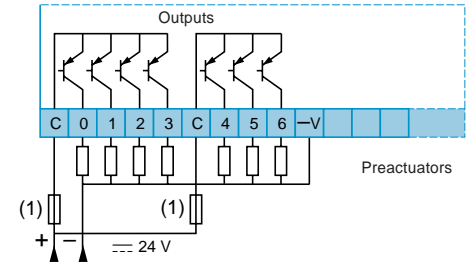
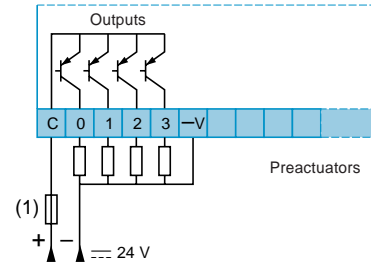
### Connection of $\approx 24\text{ V}$ transistor outputs

Characteristics :  
pages 40050/9 to 40050/11  
References :  
pages 40050/12 to 40050/14

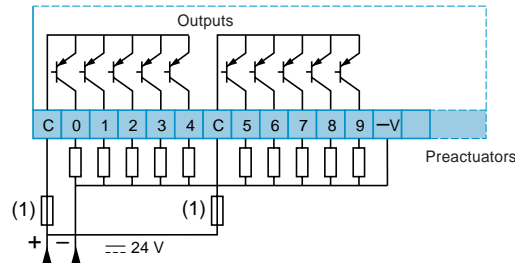
#### Power supply $\approx 24\text{ V}$ , positive logic transistor outputs

TSX 07 30 1012

TSX 07 31 1612, TSX 07 EX 1612



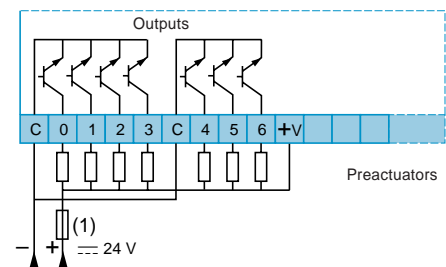
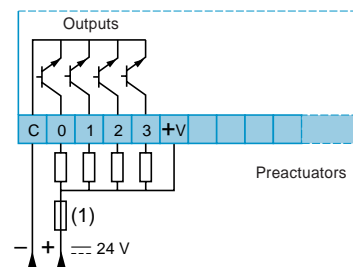
#### TSX 07 31 2412, TSX 07 EX 2412



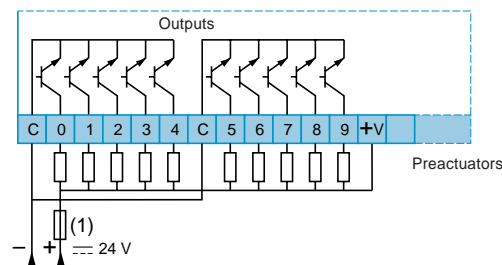
#### Power supply $\approx 24\text{ V}$ , negative logic transistor outputs

TSX 07 30 1002/1008

TSX 07 31 1602/1608



#### TSX 07 31 2402/2408, TSX 07 31 2408



(1) Fuse rated for load.

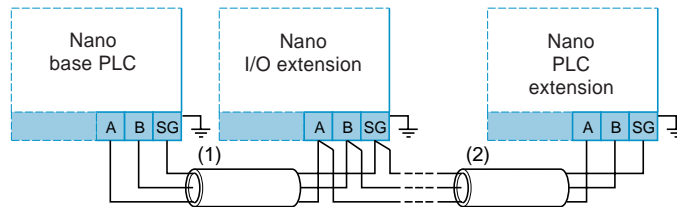
# Modicon TSX Nano PLCs

## Nano PLCs

### Connection of extensions Connection to Modbus and Uni-Telway buses

Characteristics :  
pages 40050/9 to 40050/11  
References :  
pages 40050/12 to 40050/14

#### Connection of extensions

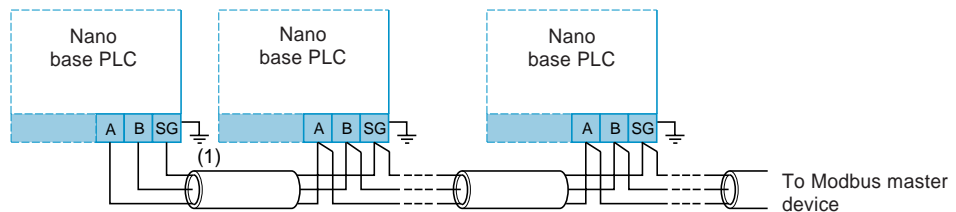


(1) TSX CA0 003 cable (0.3 m long) or shielded twisted pair cable.

(2) Remote location (200 m max) of Nano PLC extensions requires either :

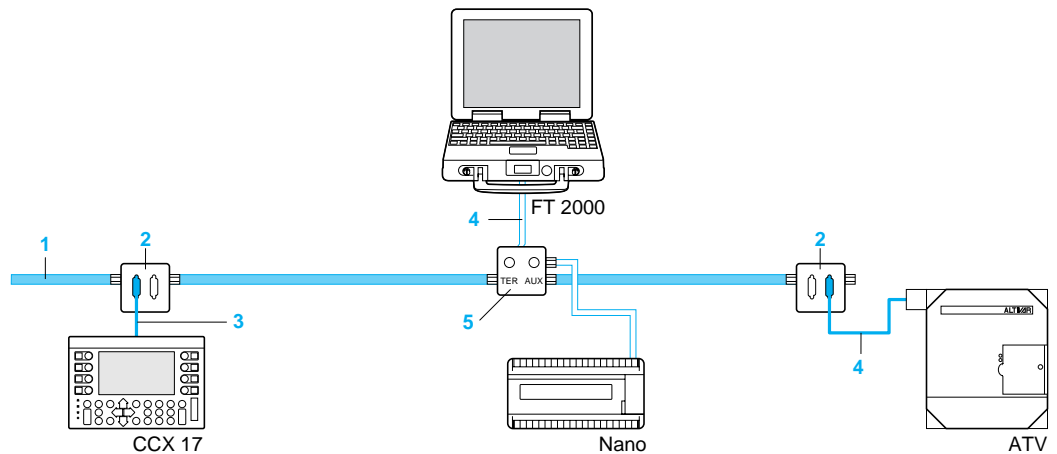
- TSX STC 050 cable (50 m long) or TSX STC 200 (200 m long), or
- Shielded twisted pair cable with the following main characteristics :
  - Mechanical characteristics : tinned copper core, 18 to 24 gauge with tinned copper shielding
  - Electrical characteristics : load resistance per unit length of one wire :  $\leq 85 \Omega/\text{km}$ , load resistance per unit length of shielding :  $\leq 12 \Omega/\text{Km}$

#### Connection of Modbus bus



(1) Shielded twisted pair cable

#### Connection of Uni-Telway bus



- 1 **TSX CSA ●●●** : bus cable, double twisted shielded pair. The shielding must be taken to earth at each device.
- 2 **TSX SCA 62** : passive 2-channel subscriber socket (see page 43594/5).
- 3 **XBT-Z908** : connecting cable between the CCX 17 operator panel and the TSX SCA 62 subscriber socket (see page 43594/5).
- 4 **TSX PCU 1030** : Uni-Telway connecting cable between the PC compatible FT 2000 terminal and the TER port of Nano PLCs or TSX P ACC 01 connectors.  
**FTX CBF 020** : Uni-Telway connecting cable between the FTX 517 terminal and the TER port of Nano PLCs or TSX P ACC 01 connectors.
- 5 **TSX P ACC 01** : cable connector from a Nano PLC to the Uni-Telway bus via the PLC terminal port. The connecting cable (1 m long) is integrated in the cable connector. It isolates signals (over a distance > 10 m) and adapts line termination impedance. It is also used to select the terminal port (Uni-Telway master/slave or character mode).