techsystem

automatyka klimatyzacja wentylacja

▸ zapoznaj się z naszą ofertą

Tech-System
40-600 Katowice, ul. Kościuszki 229

tel./fax (32) 202 62 25
tel.kom. 601 241 355

www.techsystem-automatyka.pl
e-mail: info@techsystem-automatyka.pl

METASYS®

XTM-905 Extension Module, XPx-xxx Expansion Modules

*Indicates changes made since the last release.

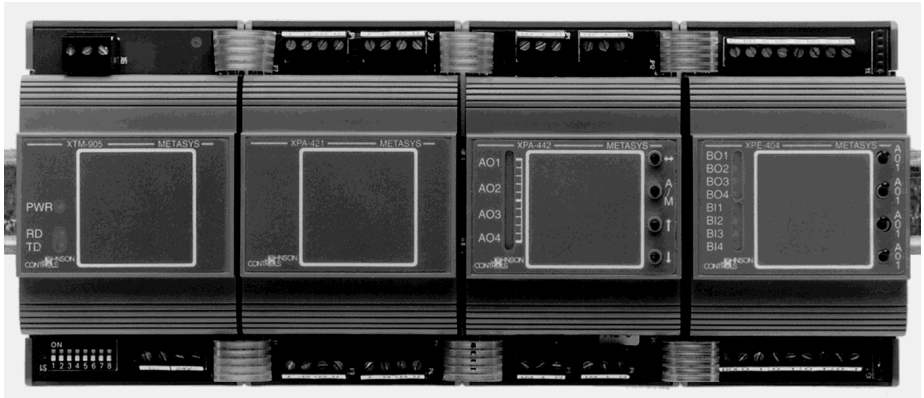
Introduction

The XTM-905 Extension Module and XPx-xxx Expansion Modules provide additional physical inputs and outputs for DX-9100 and DX-912x (LONWORKS®) controllers. The XTM module provides the processing power and communications interface, and the XPx modules provide the analog and binary inputs and outputs.

The DX controller communicates with the XTM-905 via the XT-Bus. By connecting XPx modules to each XTM-905, sets can be built with up to eight binary inputs/outputs and up to eight analog inputs/outputs, or up to 16 binary inputs/outputs with eight counter functions. XPx modules provide triac outputs or relay outputs.

The status of all binary inputs and outputs, and the value of analog outputs, are indicated by LEDs built into the front panels of the modules. On XPx output modules with the manual override function, switches are provided to set outputs to manual mode for maintenance or emergency override purposes, if required.

The modules have been designed for installation on standard "DIN" rails within a control cabinet. The outer dimensions of the modules also conform to a "DIN" standard for small, wall-mounting enclosures, which allow access to the indicator lamps and controls on the face of the module, yet protect the user from the internal wiring.

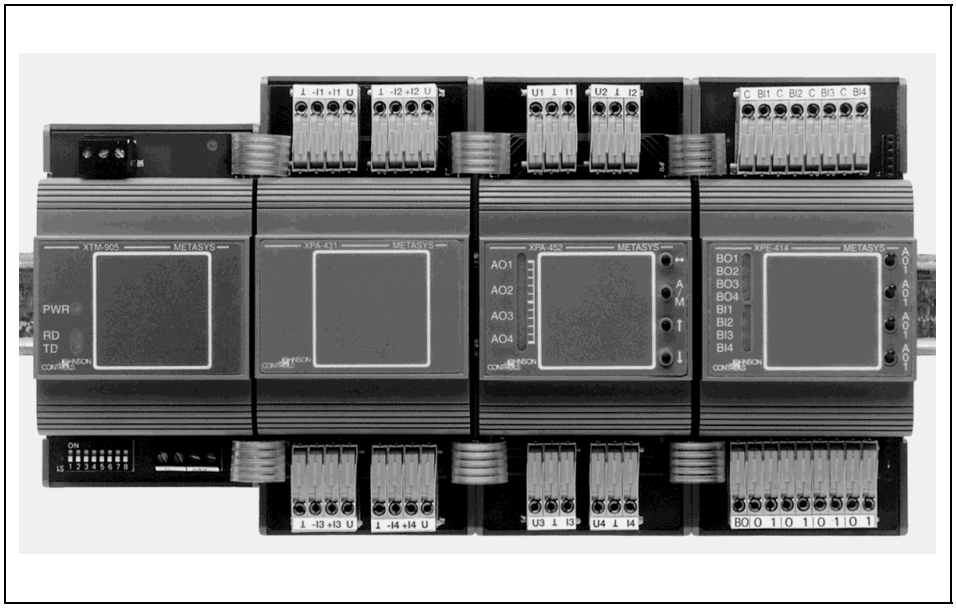


2644

Figure 1: XTM-905 Extension Module and XPx-xxx Expansion Modules

2295

Figure 2: Extension Modules in Wall-Mounting Enclosure



2345

Figure 3: Extension Modules with Disconnect Terminals

Features

- Range of modules for flexible configuration of from 4 to 16 input/output points.
- Analog inputs 0-10 V, 0/4-20 mA, RTD (Pt1000, Ni1000, A99, Pt100, and Ni100), or 5 Kohm potentiometer.
- Analog outputs 0-10 V or 0/4-20 mA, with LED indicators (and option for manual override on the XPA-4x2 module).
- Binary inputs with LED indicators.
- Binary triac outputs for switching 24 VAC with LED indicators and option for manual override.
- Binary relay outputs (for up to 250 VAC) with LED indicators and option for manual override.
- Standard screw terminals or screw terminals with quick disconnect feature.
- Communications serial port (RS-485) for the XT-Bus from the DX controller.
- Enclosure to DIN dimensions in self-extinguishing ABS.
- DIN rail mounting.
- Parameter entry by PC and GX-9100 Graphic Configuration Software (GX Tool).
- Self-checking diagnostics for correct hardware configuration.

Application

The modularity of the design makes the Extension Modules ideal for distributed monitoring and control in conjunction with the DX-9100 or DX-912x (LONWORKS) controller, and reduces wiring costs to a minimum.

However, for large, centralized plant monitoring and control, the design enables high density installation in large control cabinets and requires no extra terminal blocks for field wiring. The modules are also available with disconnect terminals where required for conformance with local termination codes for supervisory systems.

The XTM-905 configuration and operating parameters are entered using a personal computer, and configuration software is available from Johnson Controls. Configuration data is downloaded via the DX controller and is stored in EEPROM memory, which requires no battery support.

For details of the configuration requirements for the DX controller, refer to the *DX-9100 Configuration Guide (MN-9100-4103)*.

Note: XTM-905 modules are designed to be connected to the XT-Bus of a DX-9100 or DX-912x (LONWORKS) controller. For connection to the N2 Bus, use XTM-105 modules. Refer to the *XTM-105 Extension Module, XPx-xxx Expansion Modules Technical Bulletin (ETN-4-004).*

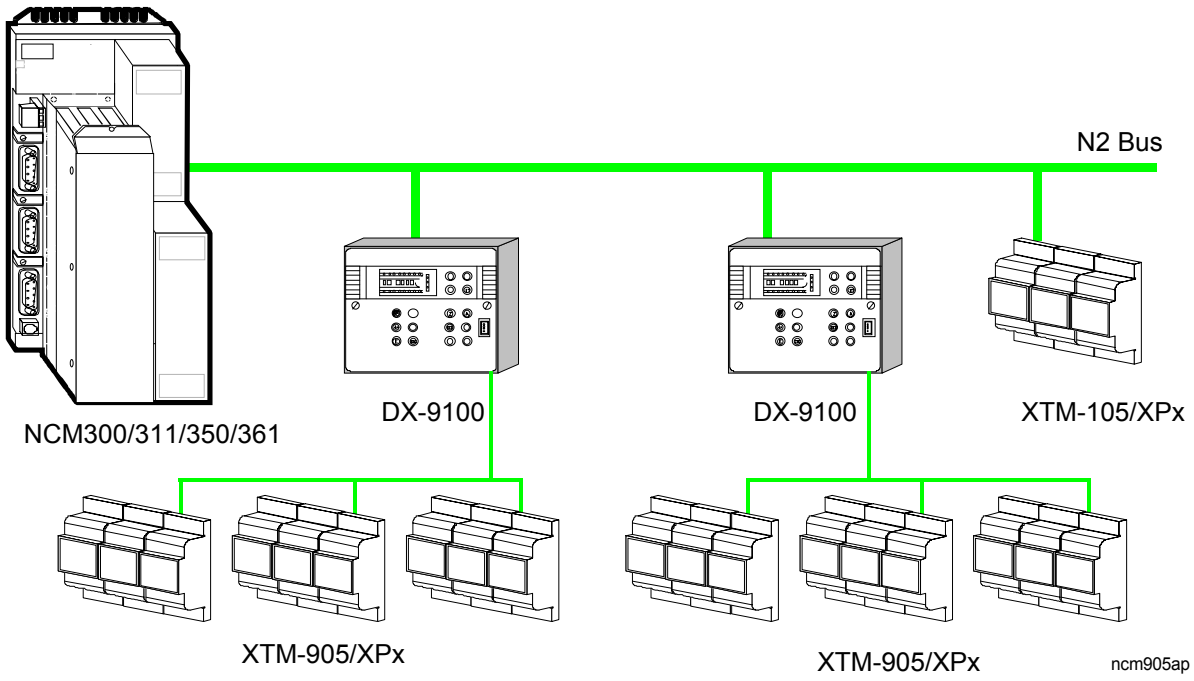


Figure 4: Metasys-NCM Application

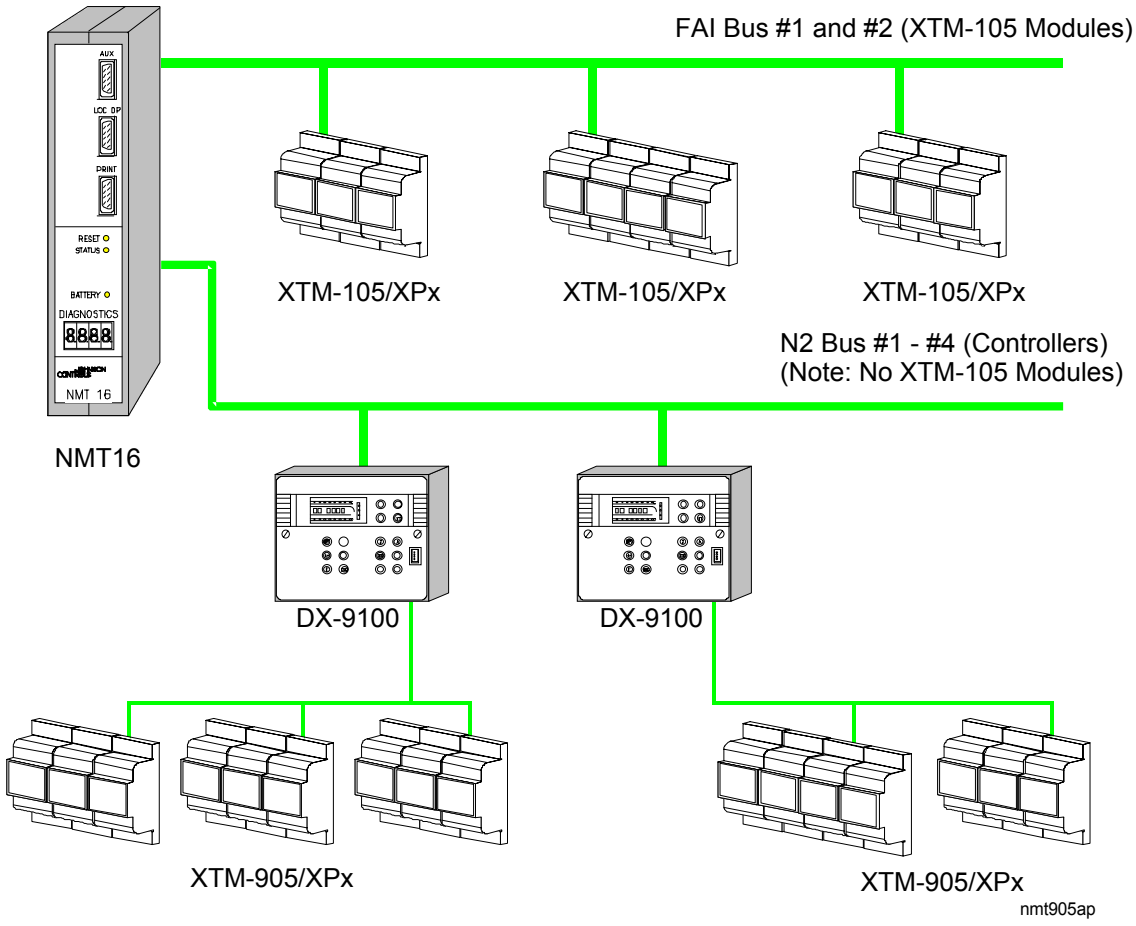


Figure 5: Metasys-NMT16 Application Model Codes

Model Codes

Table 1: Model Codes

Model/Ordering Code	Module Type	Description
XTM-905-5	Extension Module	Communications interface and 24 VAC supply
XPA-421-5 XPA-431-5	Expansion Module Analog	4 analog inputs (including PT100, Ni100 and 0-5 kΩ)
XPA-442-5 XPA-452-5	Expansion Module Analog	4 analog outputs with manual override
XPA-462-5 XPA-472-5	Expansion Module Analog	4 analog outputs without manual override
XPA-821-5 XPA-831-5	Expansion Module Analog	6 analog inputs 2 analog outputs without manual override
XPB-821-5 XPB-831-5	Expansion Module Binary	8 binary inputs
XPM-401-5 XPM-411-5	Expansion Module Binary	4 binary inputs 2 binary outputs (momentary relays with manual override)
XPM-421-5 XPM-431-5	Expansion Module Binary	4 binary inputs 2 binary outputs (momentary relays without manual override)
XPL-401-5 XPL-411-5	Expansion Module Binary	4 binary inputs 3 binary outputs (latching relays with manual override)
XPL-421-5 XPL-431-5	Expansion Module Binary	4 binary inputs 3 binary outputs (latching relays without manual override)
XPE-401-5 XPE-411-5	Expansion Module Binary	4 binary inputs 3 binary outputs (electrically maintained relays with manual override)
XPE-421-5 XPE-431-5	Expansion Module Binary	4 binary inputs 3 binary outputs (electrically maintained relays without manual override)
XPE-404-5 XPE-414-5	Expansion Module Binary	4 binary inputs 4 binary outputs (common supply) (ON/OFF or pulse relays with manual override)
XPE-424-5 XPE-434-5	Expansion Module Binary	4 binary inputs 4 binary outputs (common supply) (ON/OFF or pulse relays without manual override)
XPE-444-5 XPE-454-5	Expansion Module Binary	4 binary outputs (common supply) (ON/OFF or pulse relays with manual override)
XPE-464-5 XPE-474-5	Expansion Module Binary	4 binary outputs (common supply) (ON/OFF or pulse relays without manual override)
Continued on the next page...		

Model/Ordering Code (Cont.)	Module Type	Description
XPT-401-5 XPT-411-5	Expansion Module Binary	4 binary inputs 4 binary outputs (24 VAC triacs with manual override)
XPT-421-5 XPT-431-5	Expansion Module Binary	4 binary inputs 4 binary outputs (24 VAC triacs without manual override)
XPT-861-5 XPT-871-5	Expansion Module Binary	8 binary outputs (24 VAC triacs without manual override)
XST-101-0	Blank Stickers for Module Front Panels: Pack of 50 sheets, DIN A4, 12 stickers per sheet, laser printable	
Note: The model numbers with a 0, 2, 4, or 6 as the second digit are for modules with normal terminals; the model numbers with a 1, 3, 5, or 7 as the second digit are for modules with disconnect terminals.		

Note: The modules with disconnect terminals differ from the modules with normal terminals only in the extra height of the body needed to accommodate the larger disconnect terminal blocks. The characteristics and specifications of the two types of modules are otherwise identical. **Where the technical descriptions or diagrams in this document name or show the normal terminal model codes, the discussion applies equally to the module with disconnect terminals.**

Design Considerations

Power is supplied to the XTM-905 by a standard 24 VAC power transformer (not supplied). Interconnecting ribbon cables supply 24 VAC power from the XTM to all of the expansion modules connected to the XTM. Additional ribbon cables connect the XTM's communications bus from module to module. For environmental requirements, see *Specifications and Technical Data* further in this document.

XTM-905 Hardware Configurations

An Extension Module assembled unit consists of one XTM-905 processor and communications module, and one or two Expansion Module positions known as "XP1" and "XP2".

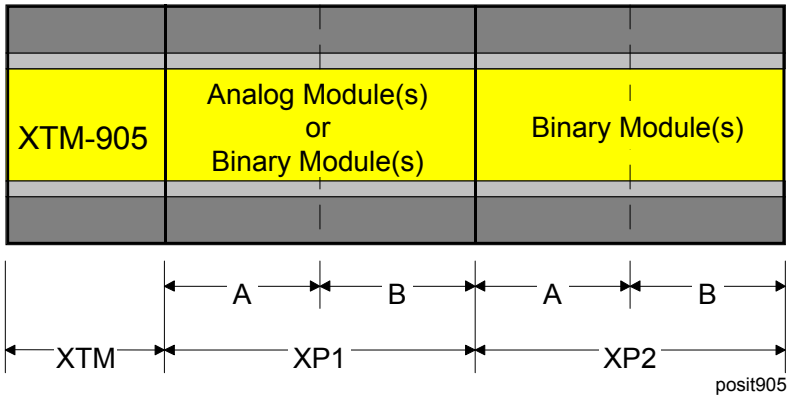


Figure 6: Extension Module Configuration Positions

Each position may contain either one 8-point module, or two 4-point modules. If 4-point modules are installed in either position, then the half positions will be referred to as XPxA and XPxB (e.g., the two 4-point module positions in XP1 are called XP1A and XP1B).

Analog modules XPA-8x1-5 are 8-point modules and modules XPA-4xx-5 are 4-point modules. All binary modules with input and outputs are considered to be 8-point modules by the XTM-905. Only the binary modules XPE-444-5, XPE-454-5, XPE-464-5 and XPE-474-5, which have only four outputs, are considered as 4-point binary modules by the XTM-905.

The following rules apply to the choice and placement of the various modules connected to one XTM:

- The position XP1 may contain analog type modules or binary type modules (but not both) and any binary inputs will have the counter function.
- The position XP2 is optional and may contain only binary type modules without the counter function.

- One 4-point binary module may be installed in the XP1 position (XP1A) if there is an 8-point binary module or no module in the XP2 position, and one 4-point binary module may be installed in the XP2 position (XP2A) when the XP1 position is filled. A 4-point binary module placed after XP1A will be configured as XP1B and not as XP2A, and three 4-point binary modules will be configured as XP1A, XP1B and XP2A.
- An 8-point binary module placed after XP1A will be configured as XP2.
- The XP1 and XP2 positions can each be filled with two 4-point binary modules, or filled with an 8-point binary module.

Correct configurations can be built up from the currently available modules using the table below:

Table 2: Configuration Positions

Position	Possible Modules		Notes
XTM	XTM-905		An XTM-905 module is always required.
	Analog	**Binary**	
XP1	XPA-8x1	XPB-8x1 XPT-8x1 XPM/L/E-4x1 XPT-4x1 XPE-4x4 (x = 0...3)	The “B” position cannot be used if an 8-point module already exists in XP1. Binary inputs have the counter function.
XP1A	XPA-4x1 XPA-4x2	XPE-4x4 (x = 4...7)	If one XPA-4x1 and one XPA-402 are installed, the XPA-4x1 must be placed in XP1A.
XP1B	XPA-4x1 XPA-4x2	XPE-4x4 (x = 4...7)	
XP2	–	XPB-8x1 XPT-8x1 XPM/L/E-4x1 XPT-4x1 XPE-4x4 (x = 0...3)	The “B” position cannot be used if an 8-point module already exists in XP2. The counter function is not available in this position.
XP2A	–	XPE-4x4 (x = 4...7)	
XP2B	–	XPE-4x4 (x = 4...7)	

Front Panel Point Labels

Each point in an Expansion Module has a label for user identification of LED indicators and manual override switches, as shown in the table below. Note that the point labels are always the same on any one type of module and therefore, the same point label may appear more than once in a given configuration. These labels can also be seen on the module diagrams shown later in this document under *Specifications and Technical Data*.

Table 3: Front Panel Point Labels

Module	Point Configuration	Front Panel Labels for:	
		LEDs All Modules	**Switches Modules with Manual Override Feature Only**
XPA-8x1	6 analog inputs 2 analog outputs	– AO7-AO8	–
XPA-4x1	4 analog inputs	–	–
XPA-4x2	4 analog outputs	AO1-AO4	⇔, A/M, ⇧, ⇩
XPB-8x1	8 binary inputs	BI1-BI8	–
XPM-4x1	4 binary inputs 2 binary outputs	BI1-BI4 BO1 & BO3	2 x (A/M, 0/1)
XPL/E-4x1	4 binary inputs 3 binary outputs	BI1-BI4 BO1-BO3	3 x A/0/1
XPE-4x4 (x = 0...3)	4 binary inputs 4 binary outputs	BI1-BI4 BO1-BO4	4 x A/0/1
XPE-4x4 (x = 4...7)	4 binary outputs	BO1-BO4	4 x A/0/1
XPT-4x1	4 binary inputs 4 binary outputs	BI1-BI4 BO1-BO4	4 x A/0/1
XPT-8x1	8 binary outputs	BO1-BO8	–

Item Tag Names

For configuration and monitoring purposes, each point in an Expansion Module is given a unique Item tag name based upon the XP position, as shown in the table below:

Table 4: Point Tag Names

Module	Point Configuration	Item Tag Names for Each Position			
8-Point Analog Module in position:		XP1 (XT_n...)		XP2 (XT_{n+1}...)	
XPA-8x1	6 analog inputs 2 analog outputs	AI1-AI6 AO7-AO8		– –	
4-Point Analog Modules in position:		XP1A	XP1B	XP2A	XP2B
XPA-4x1	4 analog inputs	AI1-AI4	AI5-AI8	–	–
XPA-4x2	4 analog outputs	AO1-AO4	AO5-AO8	–	–
8-Point Binary Module in position:		XP1 (XT_n...)		XP2 (XT_{n+1}...)	
XPB-8x1	8 binary inputs	DI1-DI8		DI1-DI8	
XPT-8x1	8 binary outputs	DO1-DO8		DO1-DO8	
XPM-4x1	4 binary inputs 2 binary outputs	DI1-DI4 DO5, DO7		DI1-DI4 DO5, DO7	
XPL/E-4x1	4 binary inputs 3 binary outputs	DI1-DI4 DO5-DO7		DI1-DI4 DO5-DO7	
XPE-4x4 (x = 0...3)	4 binary inputs 4 binary outputs	DI1-DI4 DO5-DO8		DI1-DI4 DO5-DO8	
XPT-4x4	4 binary inputs 4 binary outputs	DI1-DI4 DO5-DO8		DI1-DI4 DO5-DO8	
4-Point Binary Modules in position:		XP1A	XP1B	XP2A	XP2B
XPE-4x4 (x = 4...7)	4 binary outputs	DO1-DO4	DO5-DO8	DO1-DO4	DO5-DO8

Note: The full Item tag name in the the DX controller is made up of the XT number and the point tag, XT1AI4, for example. The XT number for points in position XP2 is one greater than the XT number for points in XP1.

Analog Modules

The eight analog expansion modules currently available are listed in the table below:

Table 5: Analog Expansion Modules

Model	Analog Inputs	Types	Analog Outputs	Types
XPA-821-5 XPA-831-5	6 analog inputs (AI1-AI6)	0-10 VDC 0/4-20 mA Ni1000 (JCI) Pt1000 (DIN) A99	2 analog outputs (without manual override) (AO7-AO8)	0-10 VDC 0/4-20 mA
XPA-421-5 XPA-431-5	4 analog inputs (AI1-AI4 or AI5-AI8)	0-10 VDC 0/4-20 mA Ni1000 (JCI, DIN, L&G) Pt1000 (DIN) A99 Pt100 (DIN) Ni100 (DIN) 5 Kohms potentiometer	–	
XPA-442-5 XPA-452-5	–		4 analog outputs (with manual override) (AO1-AO4 or AO5-AO8)	0-10 VDC 0/4-20 mA
XPA-462-5 XPA-472-5	–		4 analog outputs (without manual override) (AO1-AO4 or AO5-AO8)	0-10 VDC 0/4-20 mA

Input Characteristics

Expansion modules with analog inputs accept 0-10 V, 0-20 mA, or passive RTD sensors by jumper configuration (XPA-8x1) or software configuration (XPA-4x1). For 0-20 mA DC inputs, a zero offset of 4 mA may be set by software configuration. The measurement unit of each RTD input can be configured for degrees Celsius or degrees Fahrenheit.

Voltage and current inputs, and 5 Kohm potentiometer inputs of the XPA-4x1 module can be ranged using the programmable range parameters as follows:

Lower end of range (LR) for 0 V/ 0 mA/ 4 mA/ 0 ohm.

Higher end of range (HR) for 10 V/ 20 mA/ 5 Kohms.

The analog input value is calculated as follows:

$$AI = \frac{\%PR}{100} * (HR - LR) + LR$$

where *%PR* = the analog value in percent of the physical range (0-10 V, 0-20 mA, 4-20 mA, 0-5 Kohms).

Note: For a potentiometer input, the value of %PR is always related to a maximum resistance of 5 Kohms. For potentiometers with another resistance value, the maximum value of %PR is as follows:

$$\text{Maximum } \%PR = r * \frac{100}{5}$$

where *r* is the potentiometer resistance in Kohms.

The value of HR must correspond with a %PR value of 100 or an equivalent input of 5 Kohms. For example, for a 2 Kohm potentiometer representing a physical quantity of 0-250 units, the value of HR must be set to:

$$250 * \frac{5}{2} = 625$$

Voltage and current inputs, from a differential pressure sensor, for example, can be linearized by a square root function which operates over the complete range of the input according to the following equation:

$$AI = \sqrt{\frac{\%PR}{100}} * (HR - LR) + LR$$

where *%PR* = the analog value in percent of the physical range (0-10 V, 0-20 mA, 4-20 mA).

For all analog input types, a configurable filter is incorporated for the reduction of signal instability. The filter function is:

$$FV_t = FV_{t-1} + \frac{1}{1 + T_s}\left(AI_t - FV_{t-1}\right)$$

where: FV_t = Filtered Analog Value at Current Time

FV_{t-1} = Filtered Analog Value at previous poll

AI_t = Actual Analog Value at current time

T_S = Filter Time Constant (seconds)

A Ts value of “0” disables the filter.

Expansion modules with analog inputs will accept Ni1000, Pt1000, A99, and on the XPA-4x1 only, Pt100 and Ni100 passive RTD sensors. The measurement ranges for these sensors are fixed, as shown in the table below:

Table 6: RTD Sensor Measurement Ranges

RTD Sensor	Range
XPA-8x1 and XPA-4x1:	
Ni 1000 Regular Sensor (JCI)	-45 to +121 °C/-50 to +250 °F
Ni 1000 High Temperature Sensor (JCI)	+21 to +288 °C/+70 to +550 °F
Platinum 1000 (DIN) Sensor	-50 to +200 °C/-58 to +392 °F
A99 Sensor (JCI)	-50 to +100 °C/-58 to +212 °F
XPA-4x1 only:	
Platinum 1000 and Pt 100 (DIN) Sensor	-200 to +850 °C/-328 to +1562 °F
Ni 1000 and Ni 100 (DIN) Sensor	-60 to +180 °C/-76 to +356 °F
Ni 1000 (L&G) Sensor	-50 to +160 °C/-58 to +320 °F

An offset parameter (OFS) is available which is added to the analog input value to compensate for wiring resistance.

A high and low alarm limit setting with alarm limit differential can be assigned to each analog input.

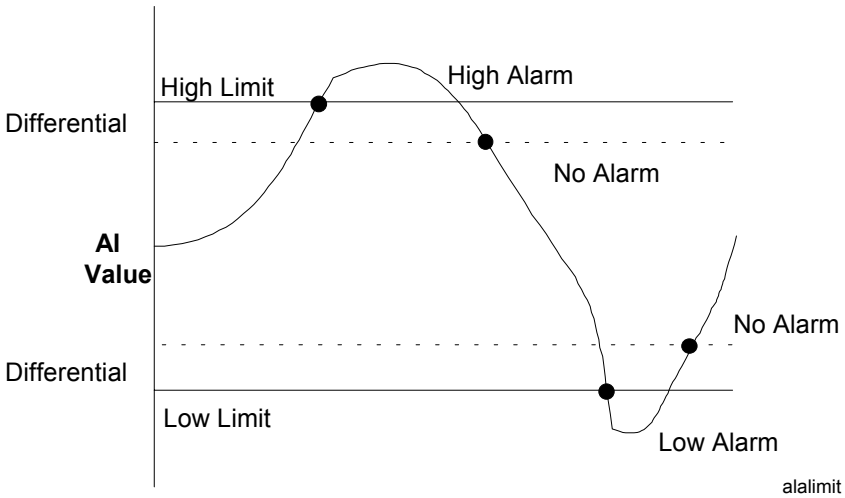


Figure 7: How Alarm Limits Function

Note: Expansion modules with analog inputs provide a 15 VDC supply for analog input sensors. The maximum current supplied from this power supply must not exceed 30 mA for the XPA-8x1 and 20 mA for the XPA-4x1.

XPA-4x1 only: When configured for a 0-20 mA input, the module will only allow currrent to flow in the external input circuit when 24 VAC power is present, because the input type is software configured. If the 0-20 mA signal is used for other controller devices in a series circuit, you must ensure that the 24 VAC supply to the module is connected to the same secure source as all other devices to avoid control failure.

Output Characteristics

Expansion modules with analog outputs provide 0-10 VDC, 0-20 mA or 4-20 mA outputs by software configuration. The type of output (voltage or current) is selected on the XPA-8x1 by a jumper, and on the XPA-4x2 by the output terminals used.

The output signal is proportional to the requested analog output value from 0 to 100%.

Manual Override Operation of the Analog Outputs (XPA-442 and XPA-452 Only)

The XPA-4x2 Analog Output module with manual override has four pushbutton switches on the right of its front panel and a vertical column of 11 LEDs on the left. The LEDs display either the current status of all four outputs, or the current value of a selected output. The buttons are used to change the display mode and to manually override the output value of the currently selected output.

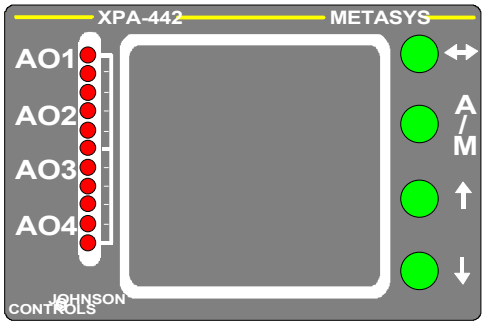


Figure 8: Front Panel of XPA-442

- The top button labeled ⇔ is used to toggle the display mode between status display for all four outputs and actual value display of the selected output.
- The button labeled ***A/M*** is used to toggle the selected output between Automatic (DX-91x0) and Manual (local) operation. The button is only active in the status display mode and for the selected output.
- The two buttons labeled ⇧ and ⇩ are used, depending on the display mode, to either select an output, or change the value of the currently selected output when it is in Manual mode. When selecting an output, either button, when repeatedly pressed or held down, will cycle in the indicated direction through the four outputs AO1 to AO4.

In the status display mode, two LEDs for each output are used. The upper LED of the pair flashes when the output is selected, otherwise it is off. The lower LED of the pair is constantly lit when the output is in Manual mode, and is off when the output is in Automatic mode. Only one output may be selected at one time, but any number of outputs, or none, may be in Manual mode.

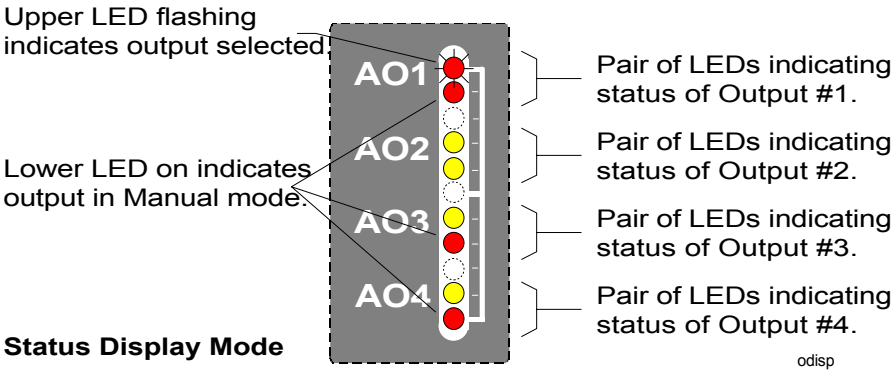


Figure 9: Output Status Display

By pressing the ⇔ button, you can change the display mode to show the actual value of the selected output, which uses all 11 LEDs. The lowest LED represents an output of 0% and a full column of 11 lit LEDs represents 100%. Each LED in the column represents a 10% step in the value of the output.

Note: When setting the value of an output in Manual mode, each press of the ⇧ or ⇩ button will change the value by 5%. Therefore, you may have to press a button twice to see a change in the displayed value.

If no button is pressed within a period of one minute, the display automatically returns to a quiescent state where only the lowest LED is on. Pressing any button will restore the display to operational mode.

Binary Input Modules

The two 8-point binary input expansion modules currently available are listed in the table below:

Table 7: Eight-Point Binary Input Expansion Modules

Model	Binary Inputs	Counters (XP1 only)
XPB-821 XPB-831	8 binary inputs (DI1-DI8)	8 counters (CNT1-CNT8)

Input Characteristics

Binary inputs are powered by the 24 VAC power to the XTM module. By software configuration, the input is either active when connected to the binary input common by the closing of an external potential-free contact (normally open), or when disconnected from the common by the opening of an external, normally-closed contact. The red LED is lit when the corresponding input is active. Eight LEDs indicate the status of each input on the binary expansion module.

A binary input may be defined as maintained or pulse type by software configuration. With maintained type contacts, the status reported by the XTM follows the status of the contact. With pulse type contacts, the XTM sets and resets the status at each pulse of the input contact. This type is only recommended for manual override functions, such as in lighting control, where the user gets confirmation of the override request by a verifiable response.

Counter Function

The counter function is provided for the binary expansion module if installed in position XP1. The number of input contact transitions required to increment the counter can be set in the XTM module. The counter values are stored in 4-byte memory locations in RAM (Items CNT1-CNT8), and on power failure, the values are automatically saved in EEPROM and then restored to RAM when power returns. The pulse frequency at the input should not exceed 25 Hz and the pulses must have a minimum ON time of 20 ms, and a minimum OFF time of 20 ms.

For consistency with the DX controller display, the counters will roll over at the decimal value of [9,999,999].

Binary Output Modules

The 26 currently available binary relay expansion modules are listed in the table below:

Table 8: Binary Relay Expansion Modules

Model with Manual Override	Model without Manual Override	Binary Inputs	Binary Outputs	Output Type
XPM-401 XPM-411	XPM-421 XPM-431	4	2	Momentary Relay
XPL-401 XPL-411	XPL-421 XPL-431	4	3	Magnetically Latching Relay
XPE-401 XPE-411	XPE-421 XPE-431	4	3	Electrically Latching Relay
XPE-404 XPE-414	XPE-424 XPE-434	4	4	Electrically Latching (ON/OFF) or Momentary (Pulse) Relays (Configurable)
XPE-444 XPE-454	XPE-464 XPE-474	–	4	
XPT-401 XPT-411	XPT-421 XPT-431	4	4	24 VAC Triac
–	XPT-861 XPT-871	–	8	24 VAC Triac

Input Characteristics

Binary inputs are powered by the XTM module. By software configuration, the input is either active (set) when connected to the binary input common via an external potential-free contact (normally open), or when disconnected from the common via an external potential-free contact (normally closed). The green LED is lit when the corresponding input is active (set). Normally open contacts are recommended for all status feedback indicators.

Binary inputs may be defined as maintained or pulse type by configuration. With maintained type contacts, the binary input status follows the status of the contact, and this type is recommended for all status feedback indicators and alarm signals.

With pulse type contacts, the binary input status is set and reset at each pulse of the input contact.

Counter Function

The counter function is available for the four inputs of a binary expansion module in position XP1. The number of input contact transitions required to increment the counter on each input can be set in the XTM module. The counter values are stored in 4-byte memory locations in RAM (Items CNT1-CNT4), and on power failure, the values are automatically saved in EEPROM and then restored to RAM when power returns. The pulse frequency at the input should not exceed 25 Hz and the pulses must have a minimum ON time of 20 ms, and a minimum OFF time of 20 ms. The counters will roll over at the decimal value of [9,999,999].

Binary Output Characteristics (XPM/L/E-4x1)

The binary outputs associated with binary output modules XPM/L/E-4x1 do not have to be configured as the module will always drive the output relays as momentary (XPM), magnetically latched (XPL), or electrically latched (XPE), according to the type of module. The only exceptions are the XPE-4x4 modules (see below).

Momentary Relays (XPM)

Two contacts are provided for each binary output, one for the ON command (1) and one for the OFF command (0), and will change over momentarily on command. The contacts are interlocked such that only one output can be active at one time, and the length of the active pulse is determined by configuration (default is 20 ms). Activating the OFF command removes power from the holding circuit output terminal.

Magnetically Latched Relays (XPL)

The change-over contacts for the binary output will change state on command and remain in the commanded state (0 or 1) by a magnetic latch on the relay. The magnetically latched contacts do not change state on 24 VAC power loss.

Electrically Latched Relays (XPE, Except XPE-4x4 Modules)

The change-over contacts for the binary output will change state on command and remain in the commanded ON state (1) by electrical holding of the contacts. An electrically held closed contact will go to the OFF state if the module loses 24 VAC power.

Relays (XPE-4x4 Modules) and Triac Outputs (XPT-4x1 and XPT-8x1)

The binary outputs of XPE-4x4, XPT-4x1 and XPT-8x1 modules are configurable as ON/OFF or pulse outputs. Relay outputs have change-over contacts with a single supply terminal for all four outputs. Triac outputs are electrically separated. The contacts or triac of an output configured as an ON/OFF binary output will close or open on command and will remain in the commanded state. If the module loses 24 VAC power, the triac will open, and the relay will go to the OFF state.

The contacts or triac of an output configured as a pulse binary output will change state momentarily on each command (ON or OFF). The length of the pulse is determined by configuration (default is 20 ms).

Manual Override Operation of the Binary Output Modules

The binary output modules with manual override have 3 to 4 switches (depending on the number and type of outputs) on the right side of their front panels. The switches on the XPL/E modules have 3 positions and latch in each position (up, middle, down). The switches on the XPM modules have 2 or 3 positions (up, middle, down) but since the outputs are momentary, some of the switches do not latch but are instead spring loaded to return to the middle position after they have been pushed either up or down.

By software configuration, the manual override operation may be disabled when the module is connected to an active DX controller. In this case, the manual override operation is only enabled when XT-Bus communication fails and the module is in a “standalone” mode.

The LEDs on the left side of the front panel show the last commanded state from the DX controller.

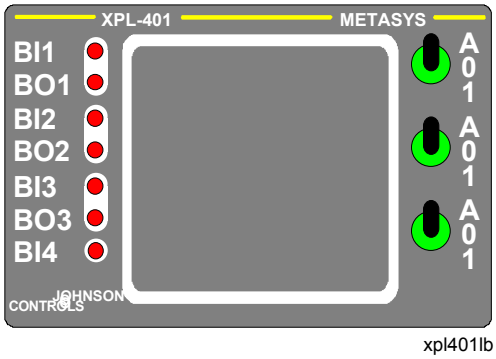
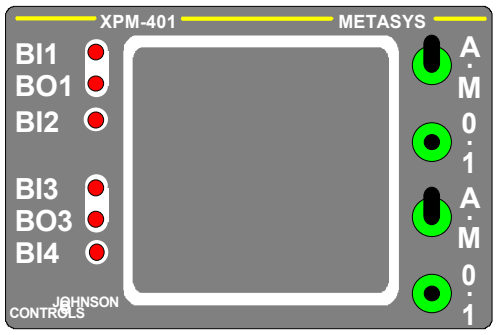


Figure 10: Front Panel of XPL/E-401 (3 Binary Outputs)

Each binary output on an XPL/E/T module has one switch with positions labeled A, 0, and 1 . The A position sets the output to Automatic mode, i.e., the output is controlled by the DX controller. Setting the switch to either 0 or 1 sets the output both to Manual mode and to the selected output state.



xpm401lb

Figure 11: Front Panel of XPM-401 (2 Binary Outputs)

Each binary output on an XPM module has two switches, where the first switch has positions labeled ***A*** and ***M***, and latches in each position. The second switch has positions ***0*** and ***1***, and is spring loaded to return to the middle position after having been pushed either up or down. The ***A*** position on the first switch sets the output to Automatic mode for control by the DX controller. The ***M*** position sets the output to Manual mode. Once in Manual mode, the second switch can be used to pulse the output to either state ***0*** or ***1***.

Installation

The XTM-905 must be supplied with a 24 VAC power source. All models are suitable for 50 Hz or 60 Hz through software configuration. The extension modules are then supplied with 24 VAC power from the XTM via the expansion module supply bus, which is connected with the ribbon cables provided.

Two modules (XTM-905 and XPA-8x1) require that hardware settings (jumpers and DIP switches) be made before power is supplied to the modules. See *Commissioning and Troubleshooting Procedures* further in this document for instructions.

> ⚠ CAUTION: Connections to the terminals of XPM, XPL and XPE expansion modules may carry up to 250 VAC. Isolate before servicing.

General Guidelines

While every reasonable precaution has been taken to prevent electrical disturbances from adversely affecting the operation of the modules, lack of attention to generally accepted control wiring installation practices can lead to module problems in high electromagnetic field environments. In general, follow the guidelines below:

- Do not mount the modules in heavy-duty switch gear cabinets or in cabinets with frequency converting or phase-cutting equipment.
- Low voltage wiring in electrical cabinets must be physically separated from line voltage and power wiring, and a distinctive color (e.g. white or pink) is recommended.
- To avoid electrical interference in field cables:
  - Keep input and output point cable runs as short as possible (< 50 m/165 feet).
  - Use twisted pair cables.
  - Run low voltage cables separately from line voltage/power cables (min. 30 cm/12-inch separation from 230 V, 30 A circuits).
  - Do not run low voltage cables parallel to power cables for long distances (> 3 m/10 feet).
  - Do not run cables close to transformers or high frequency generating equipment.
  - In high electromagnetic field environments, use shielded cable, grounding the shield at one end, preferably at cabinet housing the modules.

- For the communications bus (XT-Bus) use a cable recommended for RS-485 transmission. The cable must be shielded and the shield grounded at one end only.
- Do not connect switched inductive loads to the 24 VAC transformer which supplies the modules, and cable each connected load from the transformer separately, as shown in the figure below:

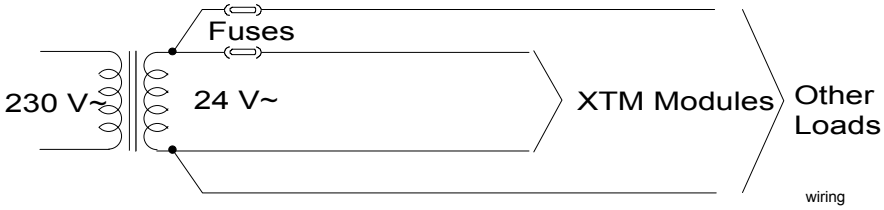


Figure 12: Wiring of Modules to a 24 VAC Transformer

Mounting and Wiring Instructions

The figure below shows the dimensions of the XTM-905 module. All other modules have the same dimensions except for those with disconnect terminals, which have the height indicated by dotted lines in the figure. When mounted on a DIN rail, the modules of a XTM device set must be placed side by side such that the overall width of the unit is the sum of the widths of the individual modules.

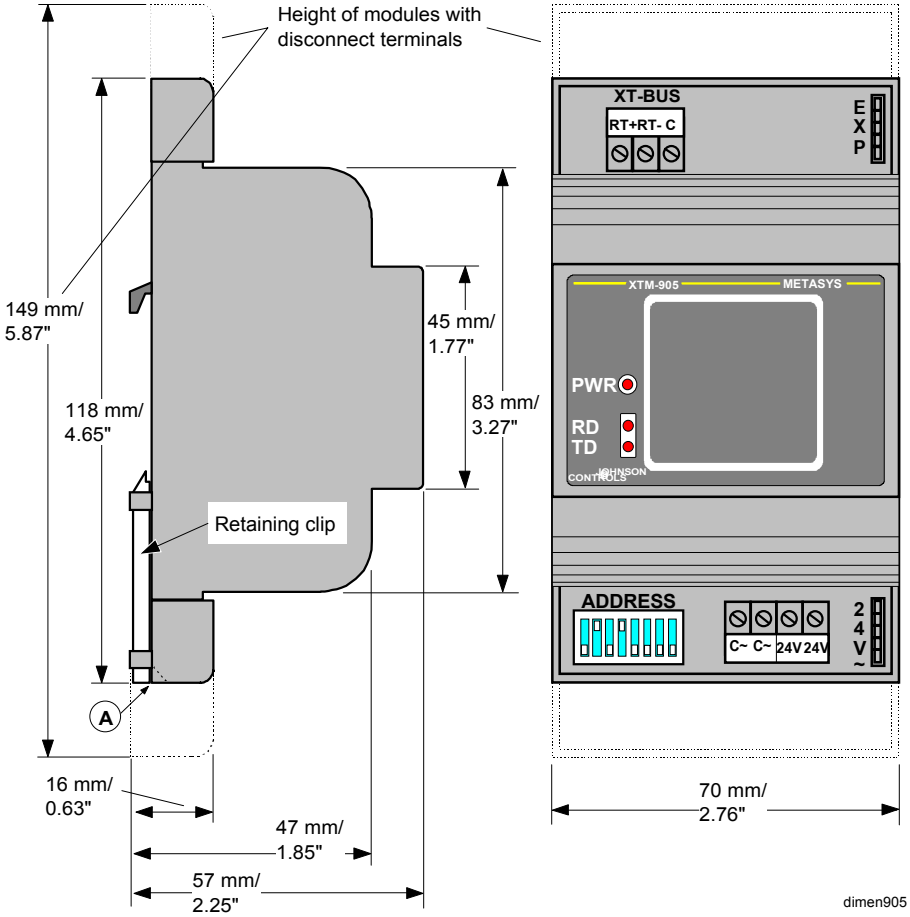


Figure 13: Module Dimensions

Mounting

Snap the module onto the 35-mm DIN rail. To release the module insert a screwdriver at the base of the module (point A), pull down to release the retaining clip, and tilt the bottom of the module forward and up. Since the retaining clip is spring-loaded, you can also remove the module without a screwdriver by carefully pushing the module up against the clip and then tilting the top forward to release the top lug from the DIN rail.

Labels for Module Front Panels

DIN A4 sheets of 12 blank stickers per sheet are available for making up module labels. The stickers fit in the white-framed area in the middle of the module front panel, and the lines of text can be printed such that they line up with the LED indicators in order to show the function of each input and output. The sheets can be printed with a laser printer.

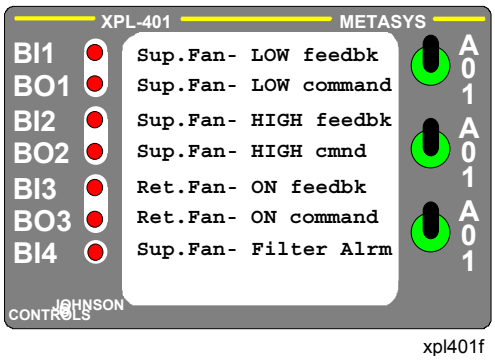


Figure 14: Module Label Showing Functions of Inputs/Outputs

Wiring

Terminations are made via the terminal blocks on the upper and lower parts of the modules, which accept a maximum of 1.5 mm²/16 AWG cable. See the figures in the *Wiring Diagrams* section for field wiring examples.

Connect the XT-Bus (serial link) cable to the terminals provided on the XTM-905 module. Ground the shield of the cable at one end only. The maximum bus length is 1200 meters/3900 feet, and a maximum of eight XTM-905 modules may be connected. When the bus length is greater than 100 meters/328 feet, both ends of the XT-Bus must be terminated with end-of-line resistors. When the bus length is less than 100 meters/328 feet, only the DX controller end of the bus must be terminated.

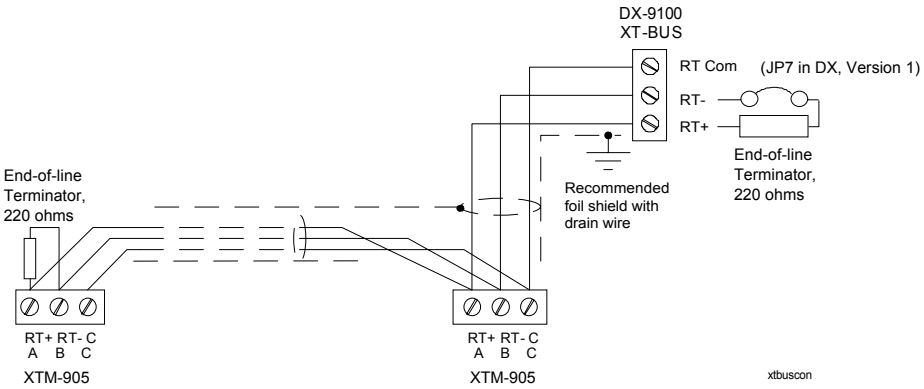


Figure 15: Connection Details for the XT-Bus

The end-of-line-resistor is provided in the Version 1 DX controller and is connected by jumper JP7. For Version 2 and LONWORKS DX controllers, the end-of-line resistor is provided in the mounting base or frame. Refer to the *DX-9100 Technical Bulletin (MN-9100-2110)* for details.

Expansion modules are connected to the XTM and to each other with two 5-pin ribbon cables, which are supplied with the expansion modules. One ribbon cable is plugged into the connector at the top of the neighboring module to provide the expansion module communications bus from the XTM to each module. The second ribbon cable is plugged into the connector at the bottom of the neighboring module to provide 24 VAC power from the XTM to the expansion modules.

Note: A power watchdog circuit checks that power is getting to all modules; the XTM will not respond if there is a problem. In order for the power watchdog circuit to operate properly, you must make sure that the last expansion module connected to the XTM has the loopback (end-of-bus) jumper installed in the correct position on its connector for the 24 VAC module supply bus, as shown in the figure below. One jumper is supplied with each module although only the last module will use the jumper.

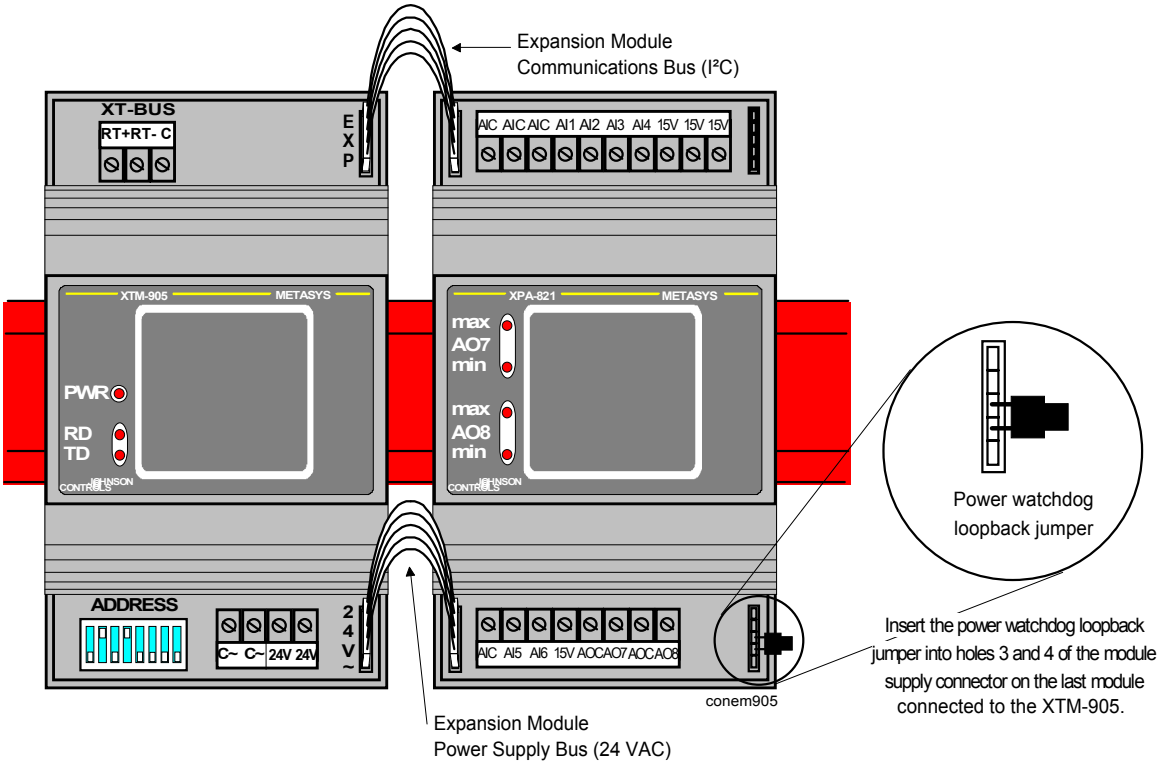


Figure 16: Connecting Expansion Modules to the XTM-905

Complete all field wiring and connections to the XTM and XPx modules before applying power. The XTM processor will then automatically configure itself for the connected XPx expansion modules.

CAUTION: The CMOS integrated circuits used in the modules are sensitive to static electricity. Take suitable precautions.

Wiring Diagrams

The following wiring diagrams illustrate typical field wiring to the inputs and outputs of the various expansion modules. Table 9, at the end of this section, describes the terminal labels.

Notes: 1. Loads connected to binary outputs should be supplied from a separate, properly sized transformer.

2. The following commons are electrically independent:
   Analog Input Common,
   Analog Output Common,
   24 V Common/Binary Input Common,
   XT-Bus (RS-485)

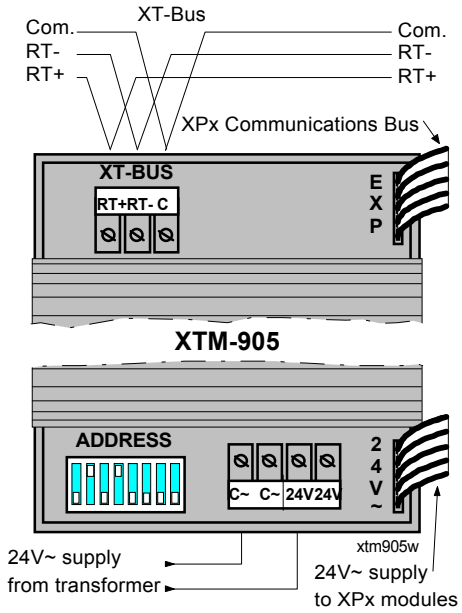
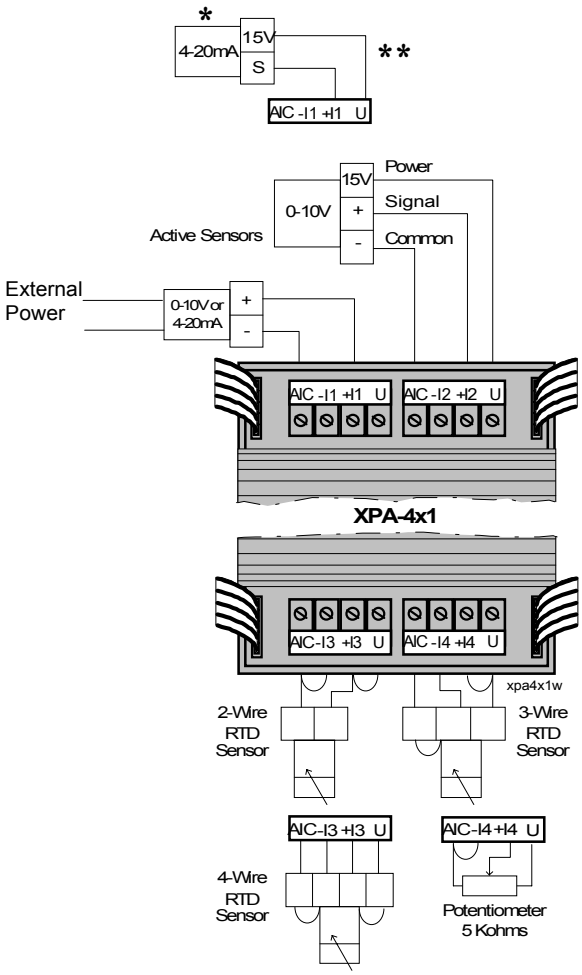


Figure 17: XTM-905



* Only one 4-20 mA active sensor may be powered by the module.

** Configure inputs for 20 mA before applying power. Current will only flow through the module when 24 VAC power is applied to the module.

Figure 18: XPA-4x1

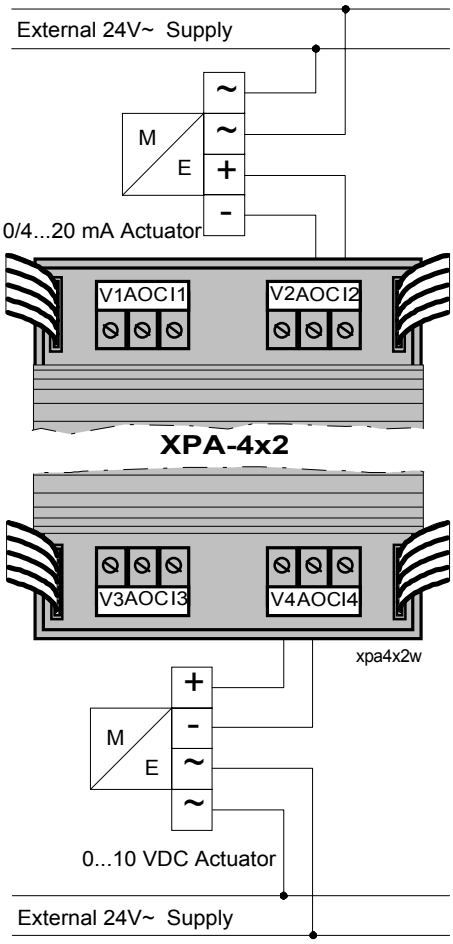
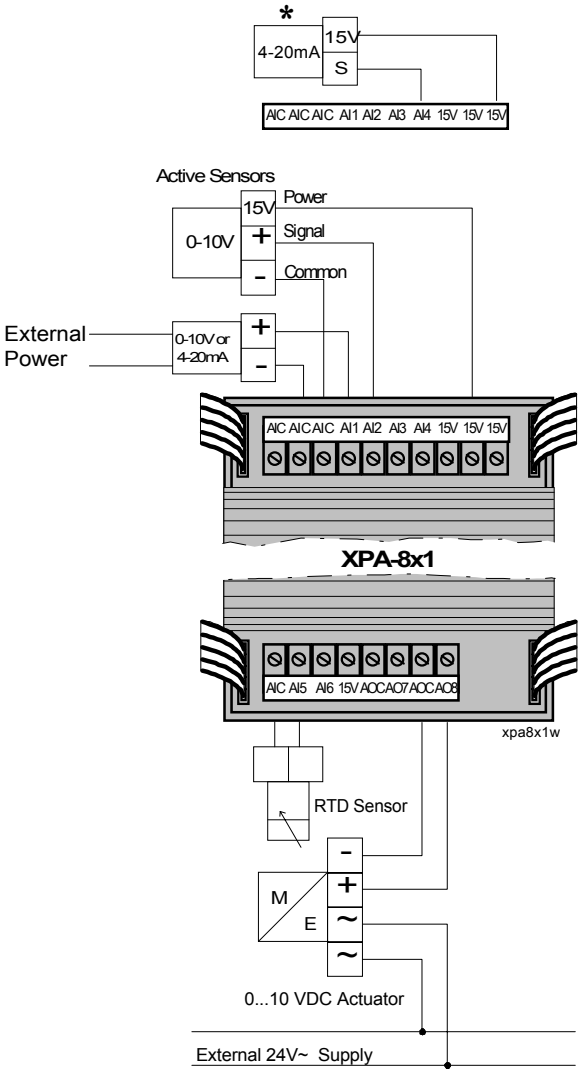


Figure 19: XPA-4x2



* Only one 4-20 mA active sensor may be powered by the module.

Figure 20: XPA-8x1

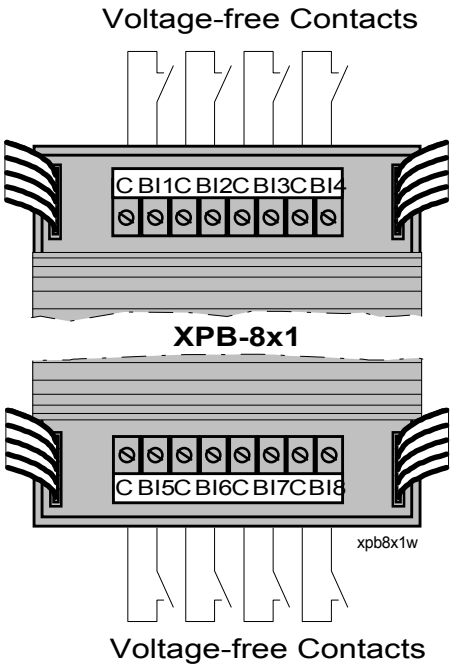


Figure 21: XPB-8x1

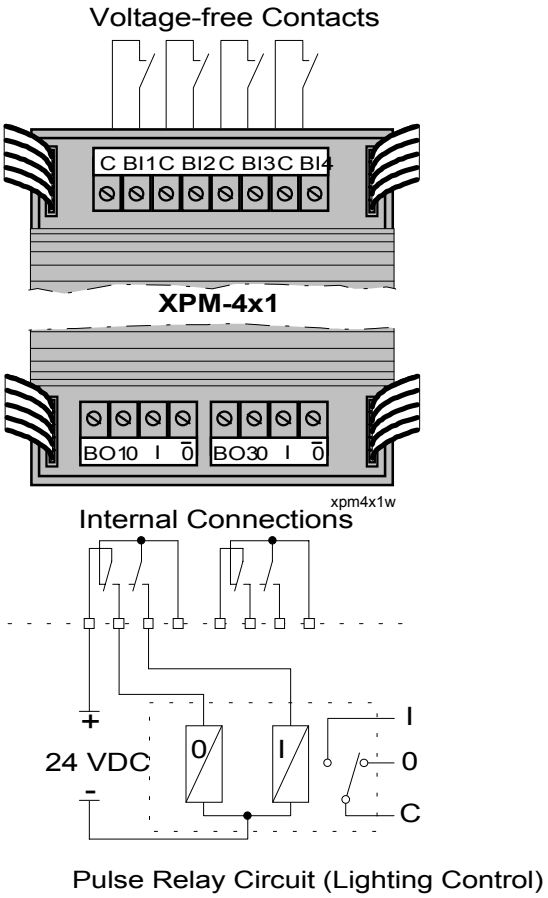


Figure 22: XPM-4x1

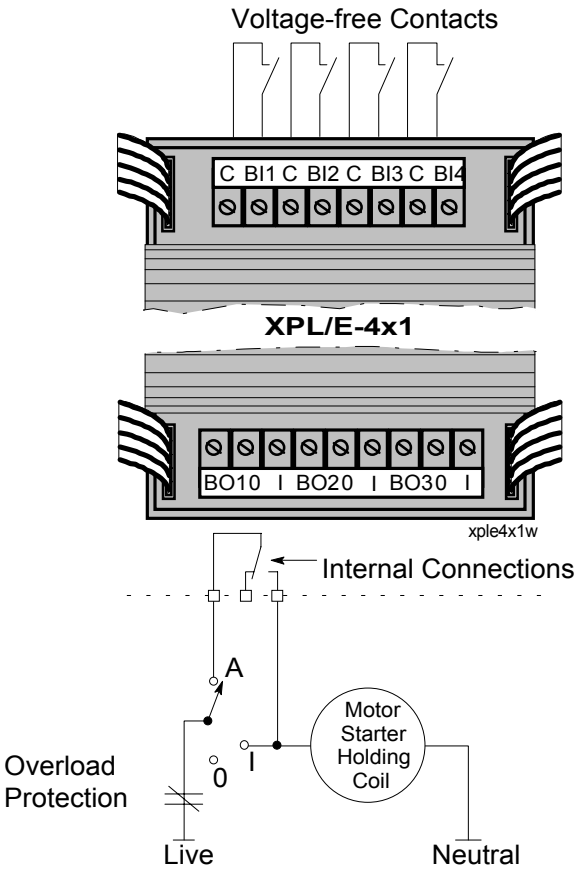


Figure 23: XPL/E-4x1

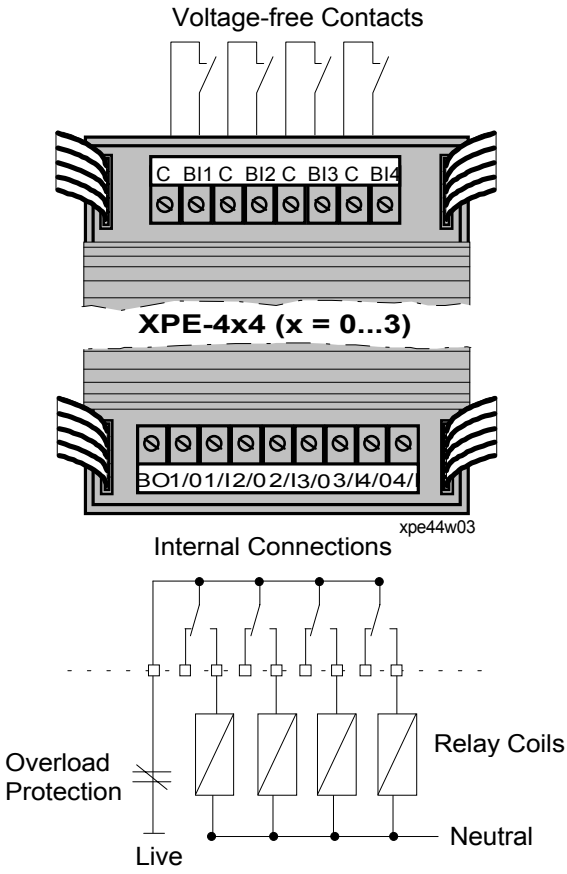


Figure 24: XPE-4x4 (x = 0...3)

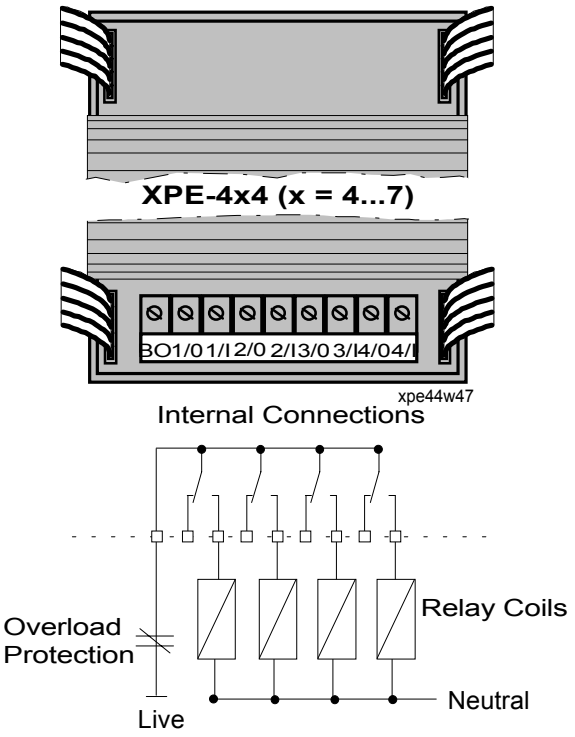


Figure 25: XPE-4x4 (x = 4...7)

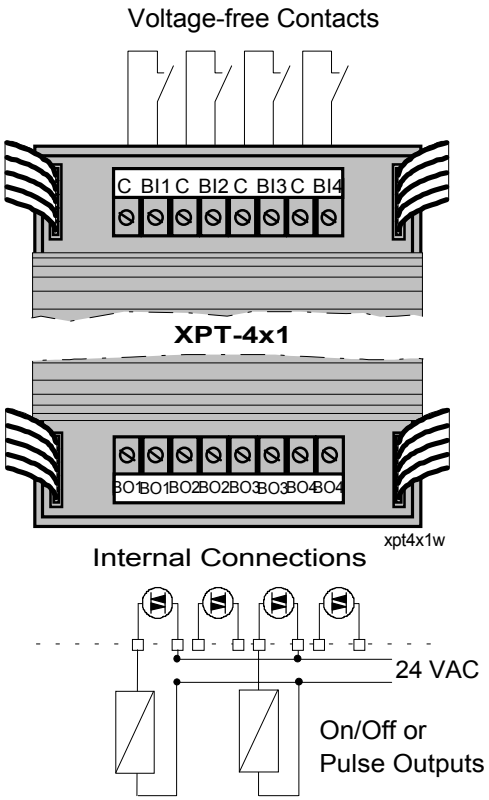


Figure 26: XPT-4x1

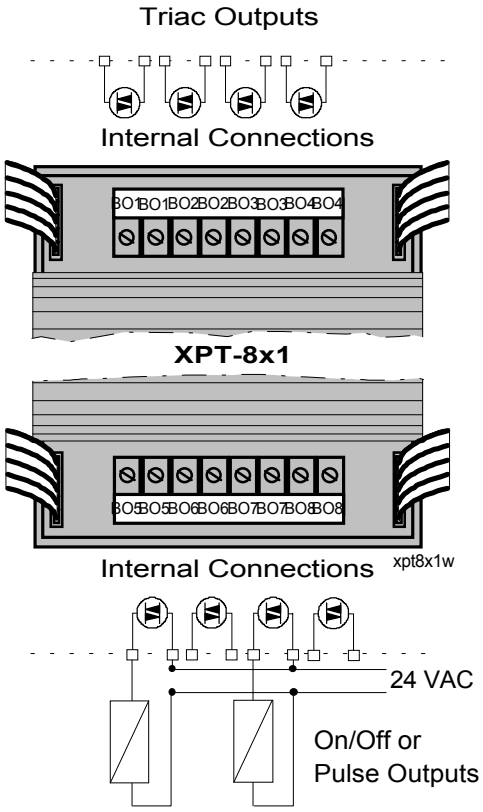


Figure 27: XPT-8x1

Table 9: Terminal Labels

XPA-8x1	15V	Analog input +15 V voltage supply
	AIn	Analog input signal
	⊥ or AIC	Analog input common
	AOn	Analog output signal
	⏚ or AOC	Analog output common
XPA-4x1	-In	Analog input signal negative
	+In	Analog input signal positive
	U	Software programmable analog input source, +15 V for active sensors OR current source for RTD sensors.
	⊥ or AIC	Analog input common
XPA-4x2	Un or Vn	Analog voltage output signal
	In	Analog current output signal
	⏚ or AOC	Analog output common
XPB/E/L/M	BIn	Binary input
	C	Binary input common
	BOn	Binary/multistate output relay supply
	0, I	Relay output states
	$\overline{0}$	Momentary relay output NOT 0 (0 NC holding circuit supply)
XPE4x4	BIn	Binary input
	C	Binary input common
	BO	Binary output relay supply
	n/0	N.C. contact, BOn
	n/I	N.O. contact, BOn
XPT	BIn	Binary input
	C	Binary input common
	BOn	Binary Output (isolated triac)

Software Configuration

Software configuration of the XTM-905 Extension Module is done as part of the DX controller configuration process, using the GX-9100 Graphic Configuration Software (GX Tool). Refer to the *GX-9100 Software Configuration Tools for Windows User's Guide (MET-CTW-05)* in the *Configuration Tools for Windows Manual (MET-CTW*) for full technical and operating details. This section explains the configuration process for users wanting to understand the XTM data base structure in more detail, and also gives information on how to verify and change the configuration using the SX Tool.

Description of Items

A configuration consists of a set of parameters which are stored in specific memory locations in the XTM-905. These memory locations are addressed and referenced using mnemonic names called Items. Each Item represents a specific memory location (address) and is of a specific type corresponding to its usage and the number of bytes of memory it represents.

Dynamic (changing) data, such as analog values, are stored in RAM. Configuration parameters are stored in EEPROM. Data stored in EEPROM is retained when the power is switched off.

The **Item Table** in **Appendix A** of this document gives a brief description of all of the Items available within the module.

Item Address

The address of each Item is shown in the **ADDRESS** column of the Item Table in both decimal and hexadecimal representation in the **Dec.** and **Hex.** subcolumns, respectively. In order to make it easier to find the Items in the table, the decimal Item Address is shown in parentheses throughout the rest of the configuration section, e.g., Item *XTS (dec. 69)*.

Item Type

The information stored in the Items can have one of several formats:

a) **Floating Point Numerical Items** are real numbers, with a ± sign and decimal point. They refer to input or output values, limit values, etc. They are displayed and entered as numbers, with a sign and decimal point. These Items are shown in the Item Table with "*Float*" in the **TYPE** column.

b) **Integer Items** are positive whole numbers used as scale factors. These Items are shown in the Item Table with "*1 Byte*" in the **TYPE** column. Some integer values may be 2 bytes long, which is indicated in the Item Table with "*2 Bytes*" in the **TYPE** column.

c) **Totalized Numerical Items** are positive whole numbers. They refer to totalized values of pulse counters. They are displayed and entered as whole numbers without a sign or decimal point. These Items are shown in the Item Table with "*4 Bytes*" in the **TYPE** column.

d) **Status Items** are either 8- or 16-bit (1- or 2-byte) Items giving information on the current status or configuration of the inputs, outputs, and modules. Each bit of the Item has a specific meaning as described in the Item Table. These Items are shown in the Item Table with "*8-bits*" or "*16-bits*" in the **TYPE** column. In the table, the bit positions will be referenced using X8-X1 or X16-X1, and a line depicting the bit positions will be shown, as follows:

```
1 Byte   =    X8 X7 X6 X5 X4 X3 X2 X1
2 Bytes =     X16 X15 X14 X13 X12 X11 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1
```

Item Tag

Each Item in the Item Table has a unique, 3- or 4-character name or "Tag," which is a mnemonic for the type and usage of the data stored at that memory location in the XTM-905.

The Items are shown in the Item Table with their mnemonic names in the **TAG** column.

Read/Write Data

The Items shown in the Item Table fall into three basic categories:

a) Input values and status Items of the XTM-905 which can be read but not changed by a supervisory system. These Items are shown in the Item Table with an "*R*" in the **R/W** (read/write) column.

b) Variables in the XTM-905 which can be read and modified by Configuration Software or supervisory systems. These Items are shown in the Item Table with an "*R/W*" in the **R/W** (read/write) column. The "*R/W*" may be followed by "*(E)*", which indicates that the Item is stored in EEPROM and can only be written approximately 10,000 times.

c) All other Items in the XTM-905 refer to configuration parameters of the module and contain information such as analog ranges, output type, etc. These Items should only be changed with the GX-9100 Graphic Configuration Software (GX Tool) or SX Tool, and are indicated in the Item Table with "*CNF*" in the **R/W** (read/write) column. All configuration parameters are stored in EEPROM and the restriction of approximately 10,000 write operations applies here also.

XTM-905 Type Settings

Power Line Frequency (50 or 60 Hz)

Via the GX Tool

Select Edit and then Global Data. Enter the frequency as 50 or 60. The XTM frequency and the DX frequency are both defined here.

Via the SX Tool

Set Bit X1 of Item XTS (dec.69).

X1 = 0	50 Hz power line
X1 = 1	60 Hz power line

User Name and Description (GX Tool Only)

Via the GX Tool

First configure an XTM module. Select PM, XTMn, and an analog or digital configuration.

Then select the just configured XTMn and Data. Enter as appropriate:

User Name (maximum 8 characters)

Description (maximum 24 characters)

XTM Address

Via the GX Tool

In order to download the XTM-905 devices it is necessary to enter the XTM addresses. When performing a download through a DX controller, these addresses will also be loaded into the DX, and the controller will retransmit XTM data to its own XTM set. The XTM address is not stored in the XTM-905, but must be set on the address switches on the module.

First configure an XTM Module. Select PM, XTMn, then an analog or digital configuration. Then select the just configured XTMn and Data. At the “Hardware Address” field, enter the address (1-255) of the XTM-905 module.

Via SX Tool

Refer to *Extension Module Configuration* in the *DX-9100 Configuration Guide*.

Maximum Time Between Communications

When communication fails for the period set in this Item, the XTM-905 goes into "communication failure" state, indicated by a blinking Power LED on the front of the module. The default value is 60 seconds.

Via the GX Tool

First configure an XTM module. Select PM, XTMn, and an analog or digital configuration. Then select the just configured XTMn and Data. At the "Comm. timeout (sec)" field, enter the value in seconds.

Via the SX Tool

The **Maximum Time Between Communications** (in seconds) is entered at Item MTBC (dec.86).

Operational Mode (SX Only)

The operational mode of the XTM-905 can be seen at Item OPMO (dec.01) with following status bits:

X8 = 1 PWR Power Failure. This bit is set when an XTM is powered up or when there is a serial interface communication failure.

The setting in Item XTS (dec.69) Bit X2 ("Output Hold/Reset on Communication Failure" flag) is repeated in Item OPMO (dec.01) Bit X7 (FAIL) so that it can be read by the DX controller. Both of these operational mode status bits are available in the DX configuration data base.

XTM-905 Configuration Settings

Via the GX Tool

The I/O type and map details are automatically generated by the GX-9100 Graphic Configuration Software when all I/O data for extension modules has been entered. It is then downloaded into the XTM-905 via the DX controller and XT-Bus. (Refer to the *Download/Upload* section, further in this document.)

When in the GX Tool, select PM, XTMn, and an analog or digital configuration. If digital, define the module as 4DI4DO, 8DI, 8DO, XPM, XPL or XPE. If analog, define it as 4AI, 4AO, 4AI4AO, 8AI, 8AO or 6AI2AO. This defines Module XP1. If an XTM has 16 points (XP2 is connected), select the XTM box with the next highest index number to the configured module, select EXP and define it as 4DI4DO, 8DI, 8DO, XPM, XPL or XPE. EXPn will appear in the XTM box on screen, and the configured points will appear to the left and right of the screen. Refer to Table 10 below for the appropriate selections for the available XPx modules. Then define each point in the selected configuration in the same way as when defining the points in the DX controller. The following pages describe how to define each of the points individually.

Table 10: GX Tool Selection for Module Configuration

XTM Module Configuration	GX Tool Selection
XPA-4x1	4AI
XPA-4x2	4AO
XPA-4x1 + XPA-4x2	4AI4AO
XPA-4x1 + XPA-4x1	8AI
XPA-4x2 + XPA-4x2	8AO
XPA-8x1	6AI2AO
XTM/EXP Module Configuration	**GX Tool Selection**
XPM-4x1	XPM
XPL-4x1	XPL
XPE-4x1	XPE
XPE-4x4 (x = 0...3)	4DIDO
XPE-4x4 (x = 4...7)	8DO (Configure DO1-DO4 only.)
XPE-4x4 + XPE-4x4 (x = 4...7)	8DO
XPT-4x1	4DIDO
XPT-8x1	8DO
XPB-8x1	8DI

Via the SX Tool

Each extension module configuration is defined by the I/O types and map which are configured in Extension Module Items **IOMAP** (dec.77). **IOTYP** (dec.78) and **IOMOD** (dec.79).

a) The **I/O map** (IOMAP) defines which inputs/outputs (in pairs) on the extension module are used. Each extension module can be defined with eight used points which normally reside in the XP1 (first) Expansion Module (points I/O1-I/O8), defined in bits X1-X4.

   When an extension module has an XP2 (second) Expansion Module with a further eight points, these points must be defined in bits X5-X8.

b) The **I/O type** (IOTYP) defines which inputs/outputs (in pairs) are analog and which are digital. As the points on XP2 (if used) must be digital, only bits X1-X4 can be configured.

c) The **I/O mode** (IOMOD) defines points as "input" or "output" (in pairs). Only those points declared as "used" in Item IOMAP will be monitored or controlled.

   The combination of data in the Items IOMAP, IOTYP and IOMOD completely defines the configuration of an extension module. When connected to a DX controller, an identical set of data must be entered into the Item data base in the DX controller, so that, when the DX and XTM-905 are connected and started up, the DX will compare data bases and only send commands to the extension module if the data is identical, thus avoiding incorrect control actions.

Note: The data base in the XTM-905 has been designed to accept most configuration of inputs and outputs. **All inputs and outputs which are physically connected through expansion modules must be configured, and only those points.** If there is a difference between the physical configuration and the software configuration the XTM-905 will signal an error condition to the DX controller:

XTnERR = Wrong hardware configuration.

XTnHARD = Hardware not connected or not responding.

Analog Input Configuration

Each analog input is defined and configured by the following parameters:

- User name and description (GX Tool only)
- Input signal and range
- Measurement units (for RTD inputs)
- Enable square root
- Alarm on unfiltered value
- Alarm limits
- Filter time constant

The GX Tool determines the input signal range with a two-step process: you must first decide if the input is active or passive; the remaining options depend on this choice. With the SX Tool, this information is entered into a number of Items.

Via the GX Tool

Select XTnAIn, then Active or Passive.

Note: All AI points must be configured even if not connected to a sensor to enable the generation of a complete IO Map and to ensure correct operation with the DX controller.

AI User Name and Description (GX Tool Only)

Via the GX Tool

Select XTnAIn and then Data. Enter as appropriate:

User Name (maximum 8 characters)

Description (maximum 24 characters)

AI: Input Signal and Range

Via the GX Tool

(You must first have selected whether the input is active or passive. See the beginning of *Analog Input Configuration*.)

For **active** inputs, select XTnAIn and Data. At the "Type of Active Input" field, enter:

0 = 0-10 VDC

1 = 4-20 mA

2 = 0-20 mA

Each analog input module channel performs the conversion of the input signal to a numeric value using the high range and low range.

Select XTnAIn and Data.

High Range = enter the equivalent number for reading at high input (10 V, 20 mA).

Low Range = enter the reading at low input (0 V, 0 mA, 4 mA).

For **passive** inputs, select XTnAIn, then Data. At the "Type of Passive Input" field, enter:

1 = Ni1000 (JCI Type)	6 = Ni1000 (DIN)
2 = Ni1000 Extended Range	7 = Unused
3 = A99 (JCI Type)	8 = 5 K Potentiometer
4 = Pt 1000 (DIN)	9 = Pt100 (DIN)
5 = Ni1000 (L&G)	10 = Ni100 (DIN)

Note: Selections 5 to 10 on the screen are not available in an XTM-905 with a XPA-8x1 connected.

For Pt100 RTD inputs at the "3-Wire Pt100" field, enter:

0 = 4-wire or 2-wire connection

1 = 3-wire connection

See *Installation - Wiring Diagrams* for details.

For all RTD inputs, the range of the displayed value is fixed according to the type of sensor.

For Potentiometer inputs, the range is determined as follows:

High Range (Pot.) = enter the equivalent number for reading at 5 Kohms input.

Low Range (Pot.) = enter the reading at 0 Kohms input.

Via the SX Tool

Input type:

X7 = 0	0-10 Volts or potentiometer
X7 = 1	0-20 mA or RTD
X8 = 1	**20 % Suppression** (2-10 V or 4-20 mA)

Linearization and Sensor Type:

X12 X11 X10 X9 = 0000	Linear (Active Sensor)
X12 X11 X10 X9 = 0001	Ni 1000 RTD Regular Sensor (JCI)
X12 X11 X10 X9 = 0010	Ni 1000 RTD High Temperature Sensor
X12 X11 X10 X9 = 0011	RTD Sensor A99 (JCI)
X12 X11 X10 X9 = 0100	RTD Sensor Platinum 1000 (DIN)
X12 X11 X10 X9 = 0101	Ni 1000 RTD Sensor (L&G)*
X12 X11 X10 X9 = 0110	Ni 1000 RTD Sensor (DIN)*
X12 X11 X10 X9 = 1000	Linear - Potentiometer 5 Kohms*
X12 X11 X10 X9 = 1001	RTD Sensor Platinum 100 (DIN)*
X12 X11 X10 X9 = 1010	Ni 100 RTD Sensor (DIN)*
X15 = 0	RTD 2- or 4-wire connection* (Default for linear sensors)
X15 = 1	RTD 3-wire connection*
	*For XPA-4x1 only

Note: For RTD Sensor Measurement Ranges, refer to *Table 6*.

Each analog input channel performs conversion of the input signal to a raw value as a function of factory set calibration constants.

For active inputs and potentiometer inputs, a numeric value expressed in engineering units is then obtained using the input's **high range** at Items HRn (n = 1-8 at dec. addresses 89, 97, 105, 113, 121, 129, 137 and 145) and the input's **low range** at Items LRn (n = 1-8 at dec. addresses 90, 98, 106, 114, 122, 130, 138 and 146).

For RTD inputs, the range of the temperature value is fixed according to the type of sensor and the units of measurement.

AI: Measurement Units

Via the GX Tool

The selection of Celsius or Fahrenheit, is set in the Global Data of the DX controller (select Edit, then Global Data. At the "Temperature Units" field, select Celsius or Fahrenheit).

To set the measurement units of active inputs, select XTnAIn, Data, and then enter in the "Measurement Units" field:

0 = None

1 = Temperature ("C" or "F" as entered in Global Data)

2 = Percent (%)

Note: The units of an active input are not only used by the Version 1 DX-9100 Controller for the front panel display, but may also be entered for informational purposes.

Via the SX Tool

The **measurement units** for the eight possible inputs (n = 1 to 8) can be configured in Item AITn (dec. addresses 88, 96, 104, 112, 120, 128, 136 and 144).

The unit of each analog input can be selected with the following bits: (For RTD inputs Celsius or Fahrenheit must be selected.)

X4 X3 X2 X1 = 0000	No Units
X4 X3 X2 X1 = 0001	Celsius
X4 X3 X2 X1 = 0010	Fahrenheit
X4 X3 X2 X1 = 0011	Percent or potentiometer

Changing individual temperature units for each AI can only be done using the SX tool.

AI: Enable Square Root

This function allows the linearization of a differential pressure signal from a 0-10 VDC or 0/4-20 mA active sensor.

Via the GX Tool (Option Only Available with Active Sensor)

Select XTnAIn and Data. At the "Square Root" field, enter "0" for No, or "1" for Yes (to enable the square root calculation).

Via the SX Tool (Operative Only with Active Sensor)

Select Item AITn.

X5 = 1 Enable Square Root of Input

X5 = 0 Disable Square Root of Input

AI: Alarm on Unfiltered Value

An alarm from the High Limit (HIAn) and Low Limit Alarm (LOAn) values may be generated from the unfiltered or filtered input. (See *Filter Time Constant* further in this document.)

Via the GX Tool

Select XTnAIn and Data. At the "Alarm Unfiltered" field, enter "0" for No (Alarm on Filtered Value), or "1" for Yes (Alarm on Unfiltered Value).

Via the SX Tool

Select Item AITn.

X6 = 0 Alarm on Filtered Value

X6 = 1 Alarm on Unfiltered Value

AI: Alarm Limits

The **high limit** and the **low limit** define at which levels the analog input reading will generate an alarm, either for remote monitoring or for internal use within the control sequences in the DX controller.

Note: The limits cannot be deleted. If you do not want alarms, enter limits beyond the range.

Via the GX Tool

Select XTnAIn, then Data. At the respective field, enter the limit:

High Limit = enter value at which input should go to high alarm.

Low Limit = enter value at which input should go to low alarm.

Limit Differential = enter value by which the input must change below the high limit or above the low limit to reach the normal state.

Via the SX Tool

The **high limits** at Items HIAn (n = 1-8 at dec. addresses 91, 99, 107, 115, 123, 131, 139 and 147) and the **low limits** at Items LOAn (n = 1-8 at dec. addresses 92, 100, 108, 116, 124, 132, 140 and 148) define at which levels the analog input reading will generate an alarm for remote monitoring purposes. These Items may also be set via the DX controller by a supervisory system, with the restriction that they are stored in EEPROM and can only be written approximately 10,000 times.

By setting bit X6 of Items AITn (dec. addresses 88, 96, 104, 112, 120, 128, 136 and 144) to "1", the alarm will be generated from the unfiltered input.

The **differentials** on alarm limits are adjustable with Items ADFn (n = 1-8 at dec. addresses 93, 101, 109, 117, 125, 133, 141 and 149).

AI: Filter Time Constant

The **Filter Time Constant** Ts (seconds) is used to filter out any cyclic instability in the analog input signals.

Via the GX Tool

Select XTnAIn, and Data. At the "Filter Constant (sec)" field, enter a number within the recommended range of 0 to 10.

Via the SX Tool

The **Filter Time Constant** is entered at Item **FTCn** (dec. addresses 94, 102, 110, 118, 126, 134, 142 and 150).

AI: Offset Value

An offset value, in the units of the analog input, is used to compensate for analog transmitters which do not have a true zero output, or for wiring resistance to RTD sensors. The offset value is added to the analog value calculated from the range parameters.

Via the GX Tool

Select XTnAIn and Data. At the "Offset Value" field, enter a number in the units of the analog input.

Via the SX Tool

The **offset value** is defined in Items OFSn (n=1-8, at dec. addresses 95, 103, 111, 119, 127, 135, 143, 151). Enter a value in the units of the analog input.

AI Notes

1. When the XTM-905 is connected to the DX controller, you can view the AI value and alarm limits from the DX front panel. See *Display Panel and Keypads* in the *DX-9100 Technical Bulletin.*
2. Analog input values can be read via the SX Tool at Item AIn (dec.12 to dec.19).
3. Analog input alarm status can be seen via the SX Tool at Item AIS (dec.11), Bit X1, X3...X15 for high alarm condition and X2, X4...X16 for low alarm condition.
4. Configure all AIs as Active or Passive, whether they are used or not. A configured AI is shown by an inner border around its function box on the screen of the GX Tool.

Binary (Digital) Input Configuration

An XTM-905 can accept up to 16 digital inputs, depending on the hardware configuration. The first eight digital inputs are connected to XP1, and the next eight digital inputs to XP2.

Each digital input is defined and configured by the following parameters:

- User name and description (GX Tool only)
- Input type
- Counter prescaler

Inputs may be defined as maintained or pulse type. With maintained type contacts the extension module status follows the status of the contact. With pulse type contacts the extension module sets and resets the status at each pulse of the input contact. The inputs may also be configured for normally open or normally closed contacts, normal being defined as the inactive or "0" state.

DI User Name and Description (GX Tool Only)

Via the GX Tool

Select XTnDIn, then Data. Enter as appropriate:

User Name (maximum 8 characters)

Description (maximum 24 characters)

DI: Input Type

Via the GX Tool

Select XTnDIn, then Data. At the "Digital Input Type" field, enter 0 for maintained contact or 1 for pulse contact. At the "Normally Closed Contact" field, enter 0 for normally open and 1 for normally closed.

Via the SX Tool

The **input type** for the 2 x 8 possible inputs can be configured in Item DIT1 for XP1 (dec.64) and in Item DIT2 (dec.65) for XP2, bits X1-X8 for D11-DI8, as follows:

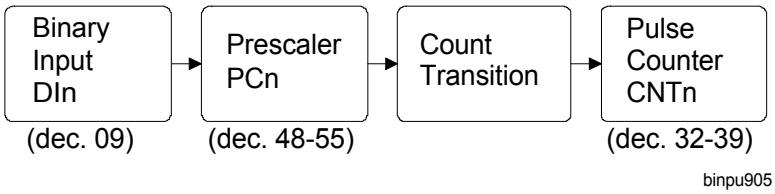
0 = Maintained Contact
1 = Pulse Contact

The **normally open/normally closed** contact type for each binary input can be configured in Item NOC1 (dec. address 46) for XP1 and in Item NOC2 (dec. address 47) for XP2, bits X1-X8 for xDI1-xDI8, as follows:

0 = Normally Open Contact
1 = Normally Closed Contact

DI: Counter Prescaler

The digital input transitions of XP1 are counted as follows:



A count transition occurs when the number of positive transitions of the digital input (DIn) equals the value of the prescaler (PCn). The pulse counter (CNTn) (n = 1-8) counts the count transitions up to a maximum of 9,999,999, after which the count will automatically reset to 0.

Note: Counters are only available in the XP1 location.

Via the GX Tool

Select XTnDIn, then Data. At the "Prescaler (counts)" field, enter from 1 to 255.

Via the SX Tool

Enter the **prescaler** at Item PCn (dec. 48-55) within the range 1-255.

DI Notes

1. When the XTM-905 is connected to the DX controller you can view the DI status and counter values from the DX front panel. See "Display Panel and Keypads" in the *DX-9100 Technical Bulletin.*
2. The status of the digital inputs can be seen at Item DIS1 (dec.09), bits X1-X8, and Item DIS2 (dec.10), bits X1-X8.

Analog Output Configuration

Each analog output is defined and configured by the following parameters:

- User name and description (GX Tool only)
- Output type
- Output Ramp Time (XPA-4x2 only)

The following parameters are defined in the DX controller for the analog output:

- Source
- Range

AO User Name and Description (GX Tool Only)

Via the GX Tool

Select XTnAOn and then Data. Enter as appropriate:

User Name (maximum 8 characters)

Description (maximum 24 characters)

AO: Output Type

Via the GX Tool

Select XTnAOn and Data, then enter at the “Type of Output” field:

0 = disabled

1 = 0-10 VDC

2 = 0-20 mA

3 = 4-20 mA

Via the SX Tool

The **output type** is configured in Item AOT (dec. 87) in bit pairs X2-X1, X4-X3, up to X16-X15 for outputs 1-8, respectively. To define the output signal type, set the bits as follows (for Output #1):

X2 X1 = 00	Output Disabled
X2 X1 = 01	Output 0-10 V
X2 X1 = 10	Output 0-20 mA
X2 X1 = 11	Output 4-20 mA

The other outputs are set in a similar way.

AO: Source

The source of the analog output signal is defined in the DX controller.

Via the GX Tool

Select XTnAOn, Data and the "Source Point" field. Enter * and select the required source variable.

Via the SX Tool

Refer to *Extension Module Configuration* in the *DX-9100 Configuration Guide*.

AO: Range

The AO range of the analog output is defined in the DX controller. The High Range defines the level of control source signal that corresponds to an output of 100%.

The Low Range defines the level of control source signal that corresponds to an output of 0%.

When the source point is equal to the high range, then the output will be at the maximum signal (10 V/ 20 mA). When the source point is equal to low range, then the output will be at the minimum signal (0 V, 0/4 mA).

Via the GX Tool

Select XTnAOn and Data, then enter the desired values in the "High Range" and "Low Range" fields.

Via the SX Tool

Refer to *Extension Module Configuration* in the *DX-9100 Configuration Guide.*

AO: Output Ramp Time (XPA-4x2 Only)

The analog output ramp time defines the maximum rate of change of the output in units of 5 msec for a 1% change. A value of 10 defines a rate of 50 msec for a 1% change or 5 sec for a 100% (full scale) change.

Via the GX Tool

Select XTnAOn and Data, then enter the desired rate at the “Output Ramp Time” field.

Via the SX Tool

The **Analog Output Ramp Time** is entered in Item AORn (n = 1-8 at dec. addresses 152-159). The value entered determines the time required, in increments of 5 ms, for a 1% change in the analog output value in both manual and automatic modes. For example, when a value of 20 is entered, each 1% change in analog output value will require 100 ms and a change from 0 to 100 will take 10 seconds.

AO Notes

1. When the XTM-905 is connected to the DX controller you can view and override the AO value from the DX front panel. See *Display Panel and Keypads* in the *DX-9100 Technical Bulletin.*
2. The analog output values can be read in percent at Item AO1-8 (dec.20-27) with the SX Tool.
3. The manual override status of analog outputs is not available in the DX controller.

Binary (Digital) Output Configuration

Each digital output is defined and configured by the following parameters:

- User name and description (GX Tool only)
- Output type
- Pulse time
- Status on Communication Failure
- Status after Power Failure
- Disable Manual Override in supervisory mode
- Manual Override status

The following parameter is defined in the DX controller for the digital output:

- Source

DO User Name and Description (GX Tool Only)

Via the GX Tool

Select XTnDOn and then Data. Enter as appropriate:

User Name (maximum 8 characters)

Description (maximum 24 characters)

DO: Output Type

Via the GX Tool

Select XTnDOn, then select On/Off or Pulse. For the Pulse type, the output switches for a configurable pulse time for each state transition of the command output. For XPM-4x1, XPL-4x1 and XPE-4x1 modules the type of output is determined by the hardware, and Pulse should be selected as a default.

Via the SX Tool

The **output type** can be set in Item DOT1 (dec. 66) for XP1 and Item DOT2 (dec. 67) for XP2 as follows (n = 1-8):

Xn = 0	On/Off Type
Xn = 1	Pulse Type

Note: This setting is only required for binary outputs on XPE 4x4, XPT 4x1 and XPT 8x1 modules. For XPM, XPL, and other XPE modules, the type of output is determined by the module.

DO: Pulse Time

This parameter is set once for all pulse type outputs in the XTM-905.

Via the GX Tool

Select XTn and Data, then enter a value in the “Digital Output Pulse Time” field. The valid range is 1 to 250 (5 msec to 1.25 sec pulse time).

Via the SX Tool

The **digital output pulse time** is used by XPM-4xx modules, and by XPE-4x4, XPT-4x1 and XPT-8x1 modules configured with pulse type outputs, to determine the output pulse width. It is defined in Item DOPT (dec. 68) in units of 5 msec. The default value is 4, which represents a pulse time of 20 msec.

Note: All connected DO points must be configured to ensure correct operation with the DX controller. When a single XPE-4x4 (x = 4...7) (4DO) relay module is connected, select 8DO on the GX Tool and define outputs DO1-DO4 only.

DO: Status on Comm. Failure

Via the GX Tool

First configure an XTM module. Select PM, XTMn, and an analog or digital configuration. Then select the just configured XTMn and Data.

To set this flag, at the "DO status on comm. fail" (communication failure) field, enter 0 or 1.

When this field is set to "0," the digital outputs are switched off upon a XT Bus failure, and the corresponding Item values are reset to zero.

When set to "1," the digital outputs hold their current state upon a XT Bus failure.

Via the SX Tool

The **Output Hold/Reset on Communication Failure** flag is set at Bit X2 of Item XTS (dec.69).

X2 = 0	Output reset upon communication failure.
X2 = 1	Output hold upon communication failure.

DO: Status After Power Failure

Via the GX Tool

Select XTMn and Data. At the "DO status after power fail" field, enter 0 or 1.

When this field is set to 0, all digital outputs on the XTM are switched off on a power failure and remain off when power is retained.

When set to 1, all digital outputs on this XTM are restored to their previous state when power returns.

Via the SX Tool

The **power fail/restore mode** for each output is defined in Item DOR1 (dec. 70) for XP1 and Item DOR2 (dec. 71) for XP2, as follows (n = 1-8):

Xn = 0	Reset output #n to 0 at power-up.
Xn = 1	Restore previous condition (at power-down) to output #n when power returns.

The restore mode does not apply to pulse outputs on XPE-4x4, XPT-4x1, and XPT-8x1 modules, nor to XPL-xxx modules which remain latched through power failure and restoration.

DO: Disable Manual Override in Supervisory Mode

Via the GX Tool

Select XTMn and Data. At the "Disable Man. Ovr. in Sup." field, enter 0 or 1. When the field is set to 0, Manual Override is enabled in all connected modules at all times.

When set to 1 (disable), Manual Override is disabled in all connected modules when the XTM is communicating with the DX controller. Manual Override is still active when the XTM module is not communicating with the DX controller.

Via the SX Tool

The **Manual Override Enable** mode for each output on a module with the manual override feature is defined in Item MOE1 (dec. 40) for XP1 and Item MOE2 (dec. 41) for XP2, as follows (n = 1-8):

Xn = 0	Manual Override Enabled in Supervisory and Standalone Mode
Xn = 1	Manual Override Enabled in Standalone Mode only

DO: Manual Override Status

There are two options for reading and displaying the manual override status of the connected XPx modules at the DX controller. The XPx modules must have binary inputs DI1-DI4 for this feature. Options 1 and 2 may be selected for to XP1 and XP2 independently.

Option 1: The manual override status of outputs DO5-DO8 can be read as binary inputs DI1-DI4. In this case the physical binary inputs cannot be used.

Option 2: The manual override of one or more outputs DO5-DO8 can be read in binary input DI4. In this case the individual manual override status is not indicated, but only one physical binary input (DI4) cannot be used.

Via GX Tool

Select XTMn and Data for XP1, and EXPn and Data for XP2. Enter a 1 in the field “Man. Ovr. status in DI1-4” or “Any Ovr. status in DI4”, as required.

Via SX Tool

The following items must be set for the two options:

- **Manual Override Status** of DO5-DO8 in DI1-DI4: Items DMI1 (dec. 42), DMI2 (dec. 43), DML1 (dec. 83) and DML2 (dec.84) - set all bits.
- Any **Manual Override Status** of DO5-DO8 in DI4: Items DCM1 (dec.81), DCM2 (dec. 82), DML1 (dec. 83) and DML2 (dec. 84) - set each item to “00001000” (Bit 4 set, all other bits at 0).

DO: Source

The source of the digital output signal is defined in the DX controller.

Via the GX Tool

Select XTnDOn, Data and then the "Source Point" field. Enter * and select the required source variable.

Via the SX Tool

Refer to *Extension Module Configuration* in the *DX-9100 Configuration Guide.*

DO Notes

1. When the XTM-905 is connected to the DX controller you can view and override the DO value from the DX front panel. See *Display Panel and Keypads* in the *DX-9100 Technical Bulletin.*
2. If so configured, the manual override status of digital outputs can be viewed as digital inputs from the DX front panel. See *DO: Manual Override Status* above.
3. The digital output status can be seen at Item DOS1 (dec.07) for XP1 and Item DOS2 (dec.08) for XP2, bits X1-X8 for outputs DO 1-8 with the SX Tool.
4. A configured DO is shown by an inner border around its function box.

   Configure all DOs as On/Off or Pulse, whether they are used or not. The only exception is for the 4-output relay module (XPE-4x4) (x=4...7). When only one module is installed, select 8DO, but only configure DO1-DO4. When two modules are installed, configure both as one 8DO module, and configure DO1-DO8.

   XPM-4x1, XPL-4x1 and XPE-4x1 modules should be configured as On/Off. The type of output on these modules is determined by the hardware.

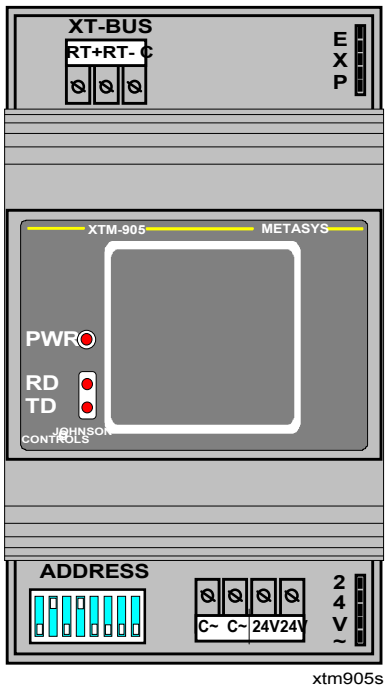
Specifications and Technical Data

The specifications and technical data for all available modules are listed in this section. The following environment specifications apply to all modules:

Operating Environment	XTM-905 and XPx-xxx-x:	0 to +50 °C/+32 to +122 °F 10 to 90% RH, noncondensing
	XPA-4xx-x:	+5 to +40 °C/+41 to +104 °F 10 to 90% RH, noncondensing
Storage Environment		-40 to +70 °C/-40 to +158 °F
Weight	XTM-905:	150 gr./5.3 oz.
	XPA-xxx-x without disconnect terminals:	237 gr./8.4 oz.
	XPA-xxx-x with disconnect terminals:	322 gr./11.4 oz.
	Other expansion modules (XPx-xxx-x) without disconnect terminals:	163 gr./5.8 oz.
	Other expansion modules (XPx-xxx-x) with disconnect terminals:	248 gr./8.8 oz.
Agency Compliance	All Modules: CE Directive 89/336/EEC EN 50081-1, EN 50082-1 XPM, XPL and XPE only: CE Directive 73/23/EEC EN 60730 XTM-905 and XPx-xxx-x, except XPA-4xx-x: UL Listed, CSA Certified, FCC Compliant	

XTM-905-5

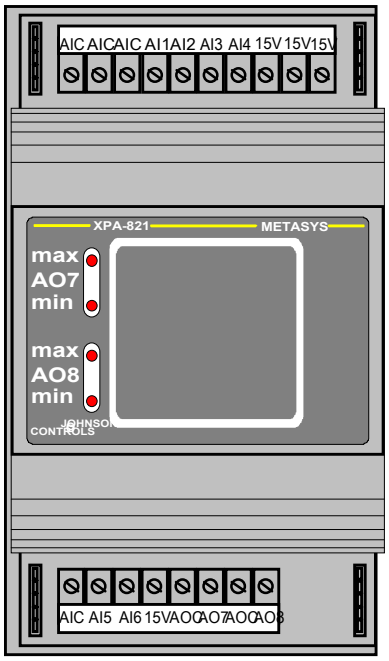
Electrical Requirements	24 VAC ±15%, 50/60 Hz
Power Consumption	5 VA
Terminations	
Power Supply	1.0...1.5 mm²/16 AWG stranded cable 1.0...2.5 mm²/16...14 AWG solid cable
XT-Bus	0.5...1.5 mm²/20...16 AWG RS-485 cable 2 twisted pair cables, 120 ohms impedance
XPx-Bus	5-pin ribbon cable provided with XPx modules
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with XPx modules
XT-Bus	RS-485; 9600 baud; opto-isolated
LED Indicators (red)	Power On (flashing = no communication or configuration error) Receive Data Transmit Data



xtm905s

XPA-821-5, XPA-831-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	6 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPA-831 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Analog Inputs	6 inputs, 10-bit resolution, jumper selectable: • 0-10V, > 300 Kohm impedance, Accuracy: 100mV • 0/4-20 mA, 100 ohm impedance, Accuracy: 300µA • RTD (Ni1000, Pt1000, A99), Accuracy: 1°C at 25°C
Analog Outputs	2 outputs, jumper selectable: • 0-10 VDC, (10 mA), Accuracy: 100mV • 0/4-20 mA, maximum 500 ohms, Accuracy: 200µA
LED Indicators (red)	Each output level indicated by 2 LEDs, one for 0% and one for 100%. The LEDs are equally bright at 50% output. **Note: There are no Manual Override switches on this module.**
Active Sensor Supply	15 VDC, 30 mA

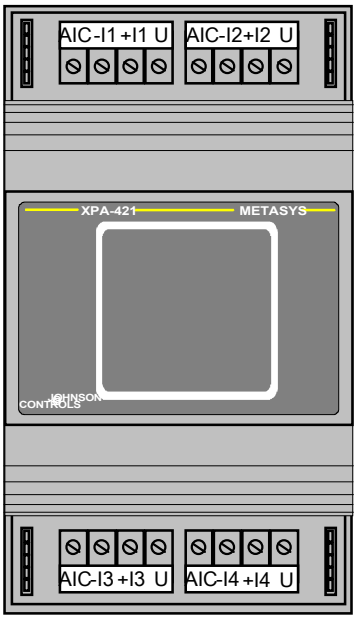


xpa821s

Note: On older models the "AIC" terminals may be marked "⊥" and the "AOC" terminals may be marked "⏚".

XPA-421-5, XPA-431-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	6 VA
Terminations	
Inputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPA-431 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Analog Inputs	4 inputs, 10-bit resolution, selectable by terminals used: • 0-10V, > 300 Kohm impedance, Accuracy: 5mV • 0/4-20 mA, 100 ohm impedance, Accuracy: 20µA • RTD (Ni1000, Pt1000, A99, Pt100, Ni100), Accuracy: 0.3°C • Potentiometer 5 Kohms, Accuracy: 20 ohms
Active Sensor Supply	15 VDC, 20 mA

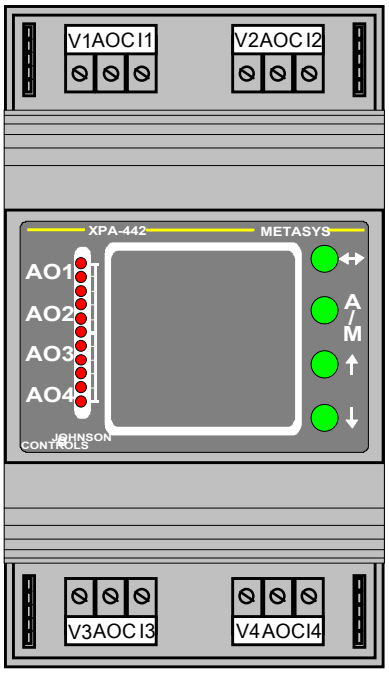


xpa421s

Note: On older models the "AIC" terminals may be marked "⊥".

XPA-442-5, XPA-452-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	10 VA
Terminations	
Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPA-452 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Analog Outputs	4 outputs, selectable by terminals used: • 0-10VDC (10 mA), Accuracy: 100mV • 0/4-20 mA, maximum 500 ohms, Accuracy: 200µA
LED Indicators (red)	Output level indicated by 11 LEDs, 0-100%. LEDs also show selected output and Auto/Manual mode.
Manual Override	4 pushbuttons for Manual Override operation: ⇔ Toggles between Status and Value display modes A/M Toggles selected output between Auto and Manual modes ⇧/⇩ Select previous/next output, or increase/decrease value

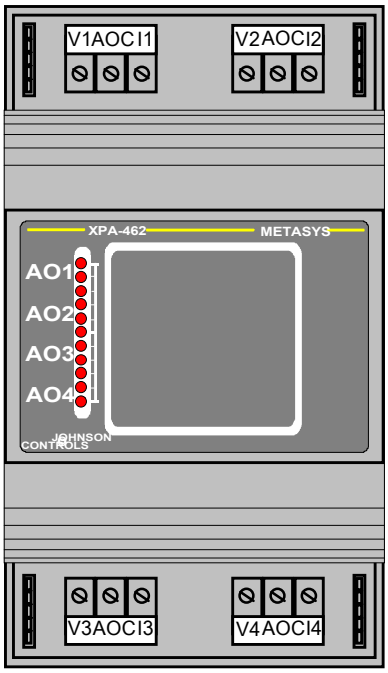


xpa442s

Note: On older models the "Vn" terminals may be marked "Un" and the "AOC" terminals may be marked "⏚".

XPA-462-5, XPA-472-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	10 VA
Terminations	
Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPA-472 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Analog Outputs	4 outputs, selectable by terminals used: • 0-10VDC (10 mA), Accuracy: 100mV • 0/4-20 mA, maximum 500 ohms, Accuracy: 200µA
LED Indicators (red)	Output level indicated by 11 LEDs, 0-100%. LEDs show output number (AO1-AO4), followed by level of output in a continuous cycle. **Note: There are no Manual Override switches on this module.**

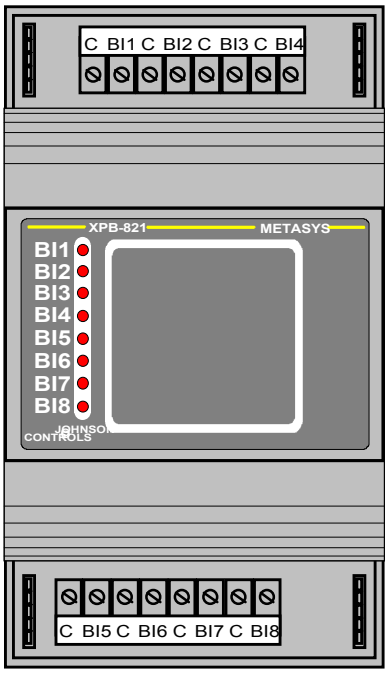


xpa462s

Note: On older models the "Vn" terminals may be marked "Un" and the "AOC" terminals may be marked "⏚".

XPB-821-5, XPB-831-5

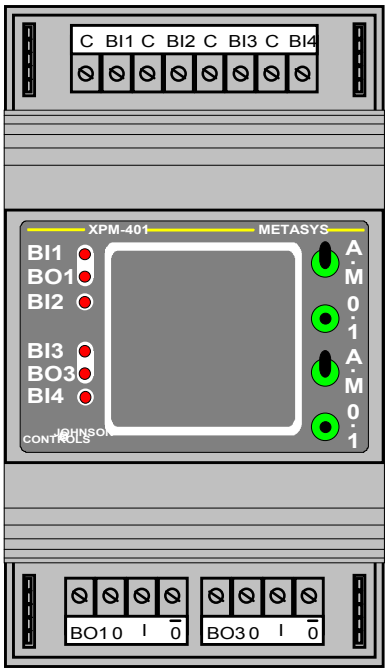
Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	3 VA
Terminations	
Inputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPB-831 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	8 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
LED Indicators (red)	Each input indicated by an LED. **Note: There are no Manual Override switches on this module.**

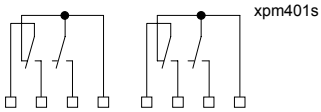


xpb821s

XPM-401-5, XPM-411-5

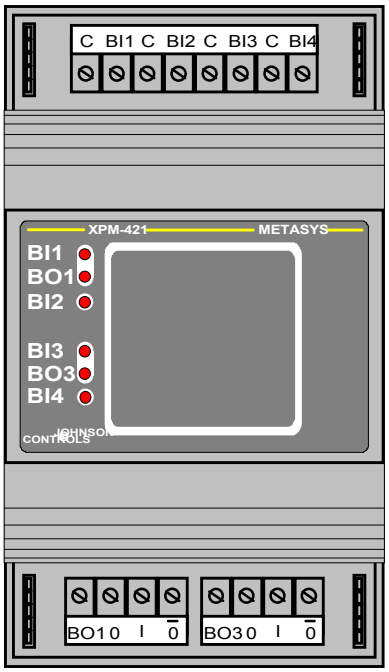
Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	4 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPM-411 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	2 binary outputs, momentary relays. Software configurable pulse time (5…1275 ms), 20 ms default Contact voltage ratings: • 250 VAC, 750 VA, or • 250 VDC, 30 W, or • 24 V(AC/DC), 70 W
LED Indicators (green)	Each input and output indicated by an LED.
Manual Override	4 switches for Manual Override operation: A/M Toggles output between Auto and Manual modes 0/1 Momentarily sets output to indicated state

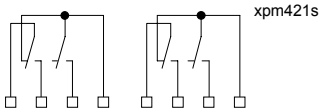




XPM-421-5, XPM-431-5

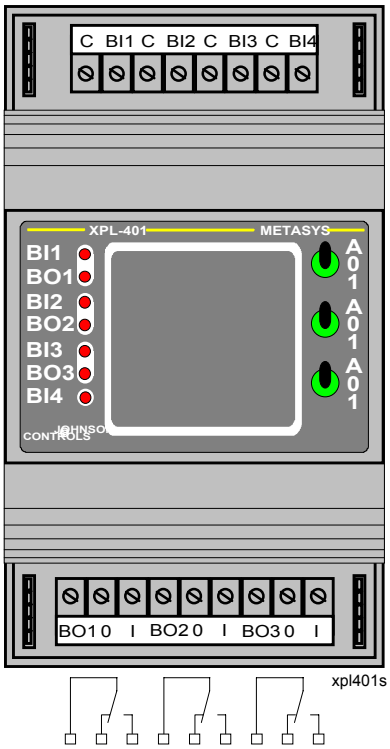
Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	4 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPM-431 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	2 binary outputs, momentary relays. Software configurable pulse time (5…1275 ms), 20 ms default Contact voltage ratings: • 250 VAC, 750 VA, or • 250 VDC, 30 W, or • 24 V(AC/DC), 70 W
LED Indicators (green)	Each input and output indicated by an LED. **Note: There are no Manual Override switches on this module.**





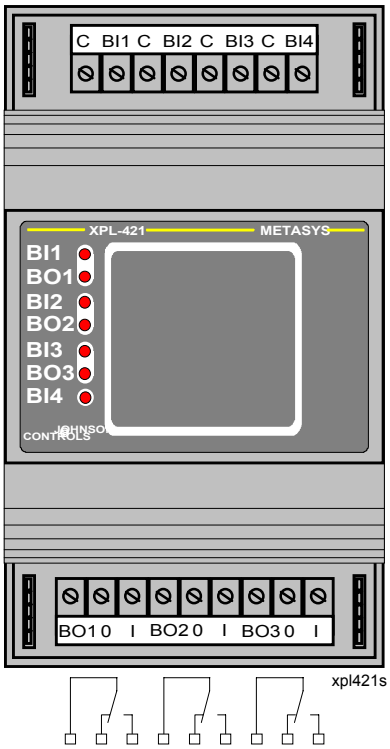
XPL-401-5, XPL-411-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	5 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPL-411 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	3 binary outputs, magnetically latching relays Contact voltage ratings: • 250 VAC, 750 VA, or • 250 VDC, 30 W, or • 24 V(AC/DC), 70 W
LED Indicators (green)	Each input and output indicated by an LED.
Manual Override	3 switches for Manual Override operation: A/0/1 Sets output to Auto or indicated state in Manual mode



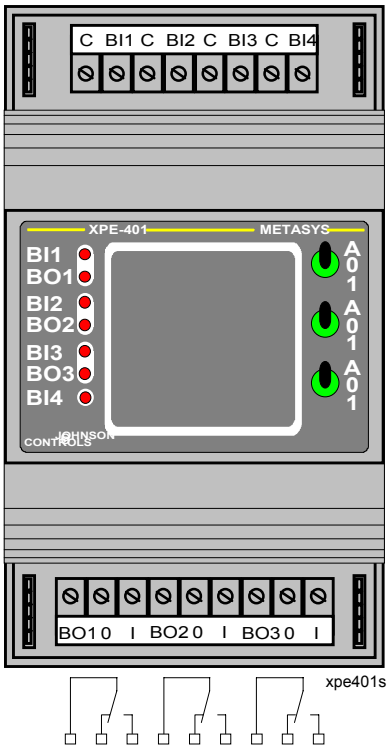
XPL-421-5, XPL-431-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	5 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPL-431 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	3 binary outputs, magnetically latching relays Contact voltage ratings: • 250 VAC, 750 VA, or • 250 VDC, 30 W, or • 24 V(AC/DC), 70 W
LED Indicators (green)	Each input and output indicated by an LED. **Note: There are no Manual Override switches on this module.**



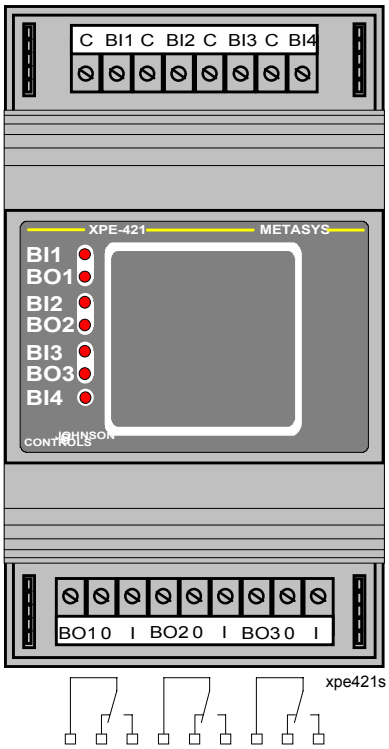
XPE-401-5, XPE-411-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	5 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPE-411 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	3 binary outputs, electrically latching relays. Contact voltage ratings: • 250 VAC, 750 VA, or • 250 VDC, 30 W, or • 24 V(AC/DC), 70 W
LED Indicators (green)	Each input and output indicated by an LED.
Manual Override	3 switches for Manual Override operation: A/0/1 Sets output to Auto or indicated state in Manual mode.



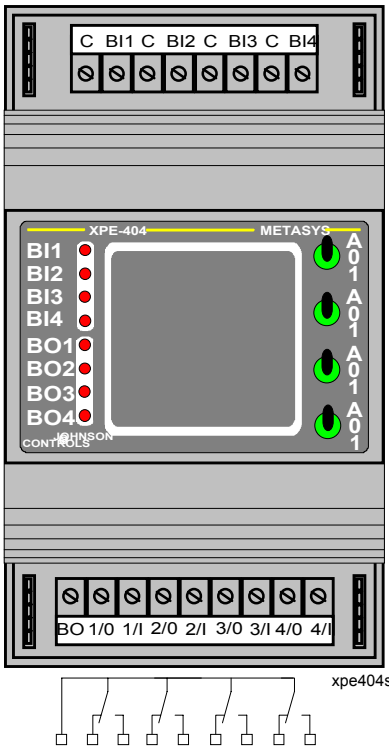
XPE-421-5, XPE-431-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	5 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPE-431 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	3 binary outputs, electrically latching relays. Contact voltage ratings: • 250 VAC, 750 VA, or • 250 VDC, 30 W, or • 24 V(AC/DC), 70 W
LED Indicators (green)	Each input and output indicated by an LED. **Note: There are no Manual Override switches on this module.**



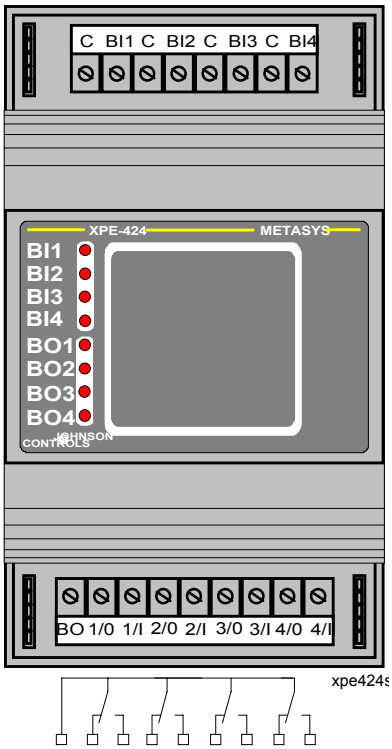
XPE-404-5, XPE-414-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	6 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPE-414 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	4 binary outputs, electrically driven relays. Software configurable as ON/OFF or Pulse Type (5…1275 ms). Contact voltage ratings: • 250 VAC, 250 VA, or • 250 VDC, 10 W, or • 24 V(AC/DC), 20 W
LED Indicators (green)	Each input and output indicated by an LED.
Manual Override	4 switches for Manual Override operation: A/0/1 Sets output to Auto or indicated state in Manual mode.



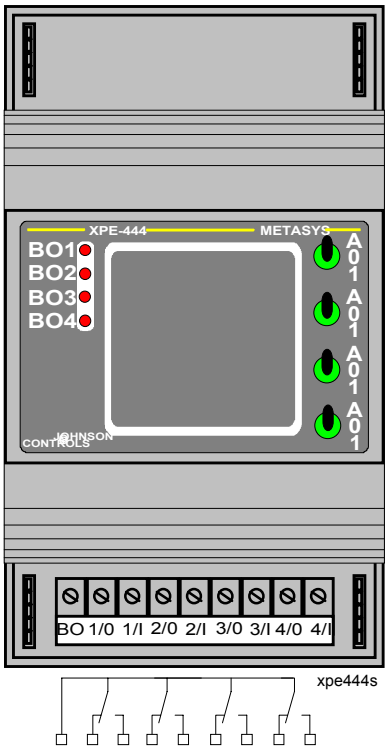
XPE-424-5, XPE-434-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	6 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPE-434 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Relay Outputs	4 binary outputs, electrically driven relays. Software configurable as ON/OFF or Pulse Type (5…1275 ms). Contact voltage ratings: • 250 VAC, 250 VA, or • 250 VDC, 10 W, or • 24 V(AC/DC), 20 W
LED Indicators (green)	Each input and output indicated by an LED. **Note: There are no Manual Override switches on this module.**



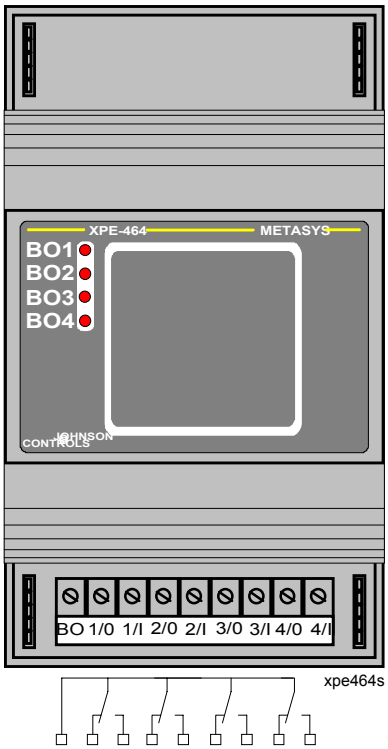
XPE-444-5, XPE-454-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	4 VA
Terminations	
Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPE-454 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Relay Outputs	4 binary outputs, electrically driven relays. Software configurable as ON/OFF or Pulse Type (5…1275 ms). Contact voltage ratings: • 250 VAC, 250 VA, or • 250 VDC, 10 W, or • 24 V(AC/DC), 20 W
LED Indicators (green)	Each output indicated by an LED.
Manual Override	4 switches for Manual Override operation: A/0/1 Sets output to Auto or indicated state in Manual mode.



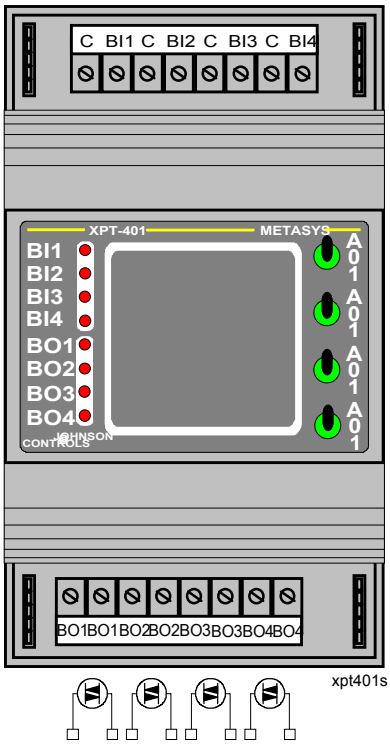
XPE-464-5, XPE-474-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	4 VA
Terminations	
Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPE-474 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Relay Outputs	4 binary outputs, electrically driven relays. Software configurable as ON/OFF or Pulse Type (5…1275 ms). Contact voltage ratings: • 250 VAC, 250 VA, or • 250 VDC, 10 W, or • 24 V(AC/DC), 20 W
LED Indicators (green)	Each output indicated by an LED. **Note: There are no Manual Override switches on this module.**



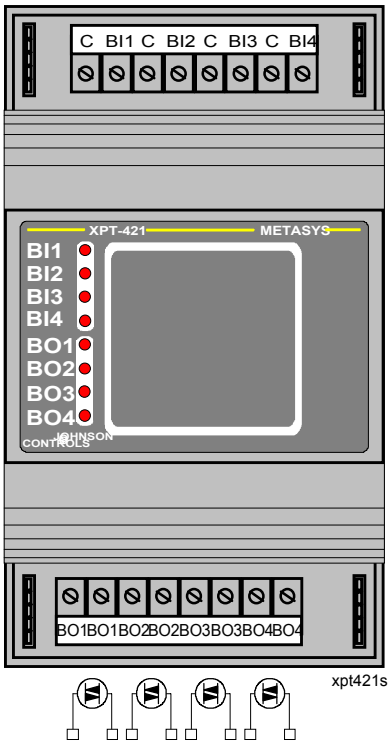
XPT-401-5, XPT-411-5

Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	2 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPT-411 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Triac Outputs	4 binary outputs, triacs 24 VAC RMS +15%/500 mA RMS Software configurable as ON/OFF or Pulse Type (5…1275 ms).
LED Indicators (green)	Each input and output indicated by an LED.
Manual Override	3 switches for Manual Override operation: A/0/1 Sets output to Auto or indicated state in Manual mode.



XPT-421-5, XPT-431-5

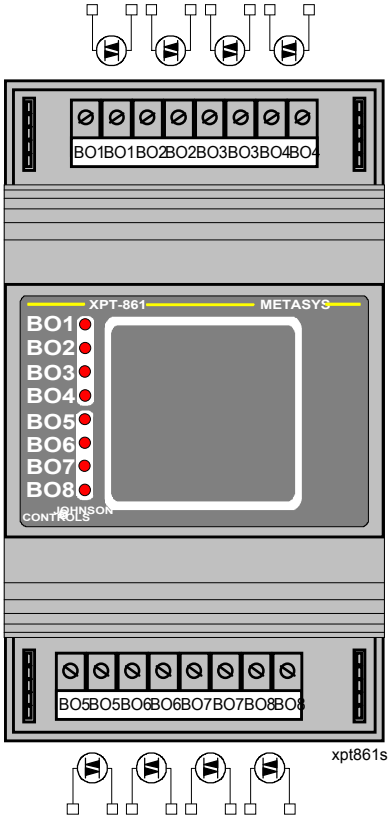
Electrical Requirements	24 VAC ±15%, 50/60 Hz (via Module Supply Bus)
Power Consumption	2 VA
Terminations	
Inputs/Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPT-431 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module
XPx-Bus	5-pin ribbon cable provided with module
Binary Inputs	4 binary inputs from potential-free contacts, input resistance 7 Kohms. Software configurable as Maintained or Pulse Type. Software configurable as NO or NC for each input. Transition counter function: min. 20 ms on, 20 ms off.
Triac Outputs	4 binary outputs, triacs 24 VAC RMS +15%/500 mA RMS Software configurable as ON/OFF or Pulse Type (5…1275 ms).
LED Indicators (green)	Each input and output indicated by an LED. **Note: There are no Manual Override switches on this module.**



xpt421s

XPT-861-5, XPT-871-5

Electrical Requirements	Power from XTM-905
Terminations	
Outputs	0.5...1.5 mm²/20...16 AWG stranded cable 0.5...2.5 mm²/20...14 AWG solid cable (XPT-871 with disconnect terminals)
Module Supply Bus (24 VAC)	5-pin ribbon cable provided with module, end-of-bus jumper provided with module Note: 24 VAC is NOT used, but must be connected.
XPx-Bus	5-pin ribbon cable provided with module
Triac Outputs	8 binary outputs, triacs 24 VAC RMS +15%/500 mA RMS Software configurable as ON/OFF or Pulse Type (5…1275 ms).
LED Indicators (green)	Each output indicated by an LED. **Note: There are no Manual Override switches on this module.**



Commissioning and Troubleshooting

Switch and Jumper Settings

The sections below describe the following switch and jumper settings which must be made on two of the modules before power is applied.

- On the **XTM-905**, the extension module address must be set with the address switches at the bottom of the module.
- On the **XPA-8x1** module, the types of analog inputs and outputs must be set with jumpers on the circuit board of the module.

All of these settings must comply with the software configuration settings. For all other modules, no hardware settings are necessary because all configuration is handled in software.

XTM-905 Address Switch Settings

Set the **XTM Module Address** using the block of 8 DIP switches next to the lower terminals on the XTM-905 module. ***The address must be unique on the network to which the XTM-905 is connected.*** This network includes the N2 Bus to which the DX controller is connected and the XT-Bus of all other DX controllers on the N2 Bus.

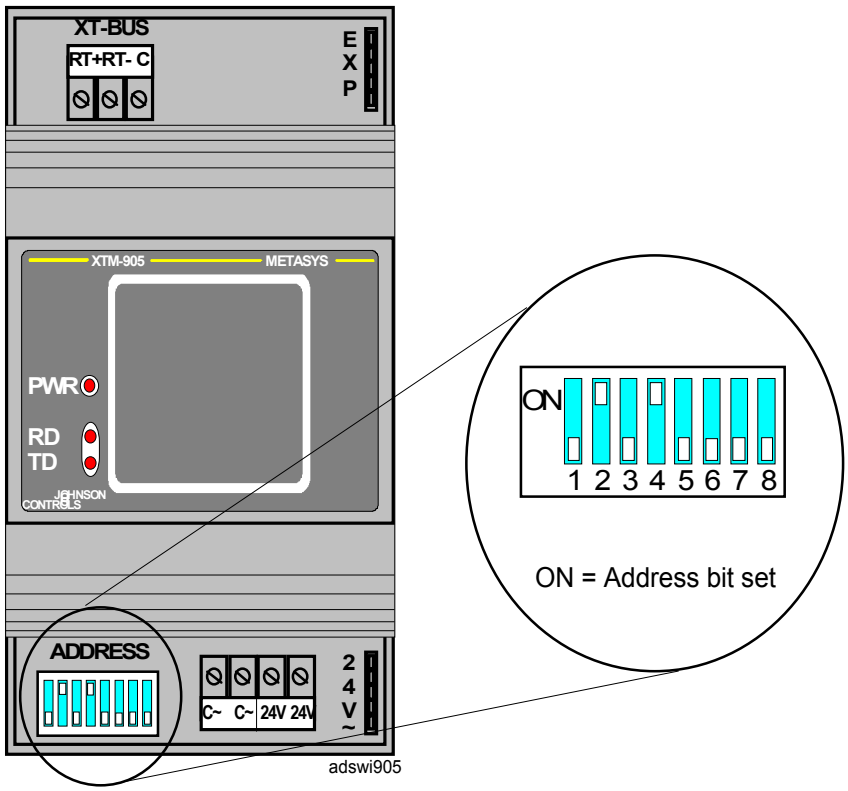
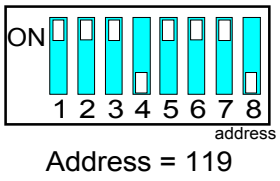


Figure 28: Address Switch on the XTM-905 (address = 10 in the figure)

The switches are numbered 1 to 8, and each switch represents one bit in an 8-bit binary representation of the address, giving an address range of 0 - 255. Binary representation means that setting a switch to ON adds to the address a specific decimal amount corresponding to the position of the switch. The table below shows the switch numbers and the decimal amount each switch represents.

Switch Number	1	2	3	4	5	6	7	8
Decimal Amount	1	2	4	8	16	32	64	128

For example, to set a decimal address of 119, you would set switches 1, 2, 3, 5, 6, and 7 to ON (1+2+4+16+32+64 = 119), as shown in the figure below:



Address = 119

Figure 29: Address Switch Set to Address 119

XPA-8x1 Jumper Settings

Set the analog input and output types of the XPA-8x1 module by setting jumpers on the circuit board of the module. All jumper settings must be made before installing the module and before power is applied to the module. Remove the cover of the module by carefully prying it loose from the four retaining lugs located on the sides of the cover.

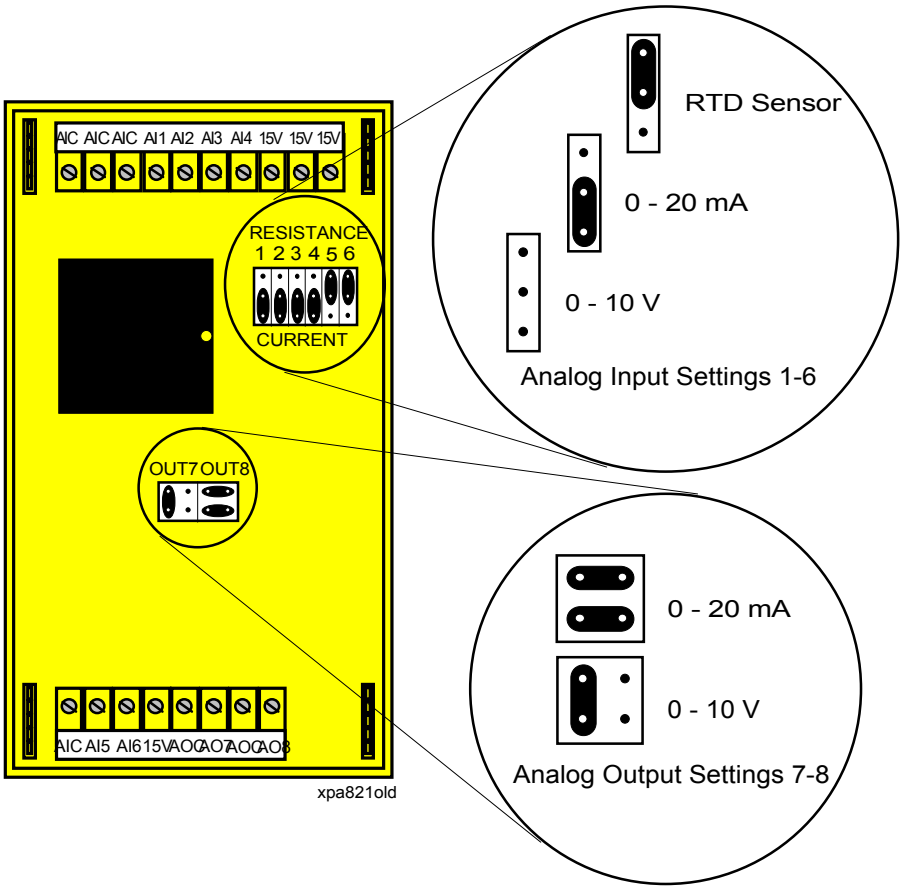


Figure 30: Jumper Details for the Older Version of XPA-8x1

Note: On older models the "AIC" terminals may be marked "⊥" and the "AOC" terminals may be marked "⏚".

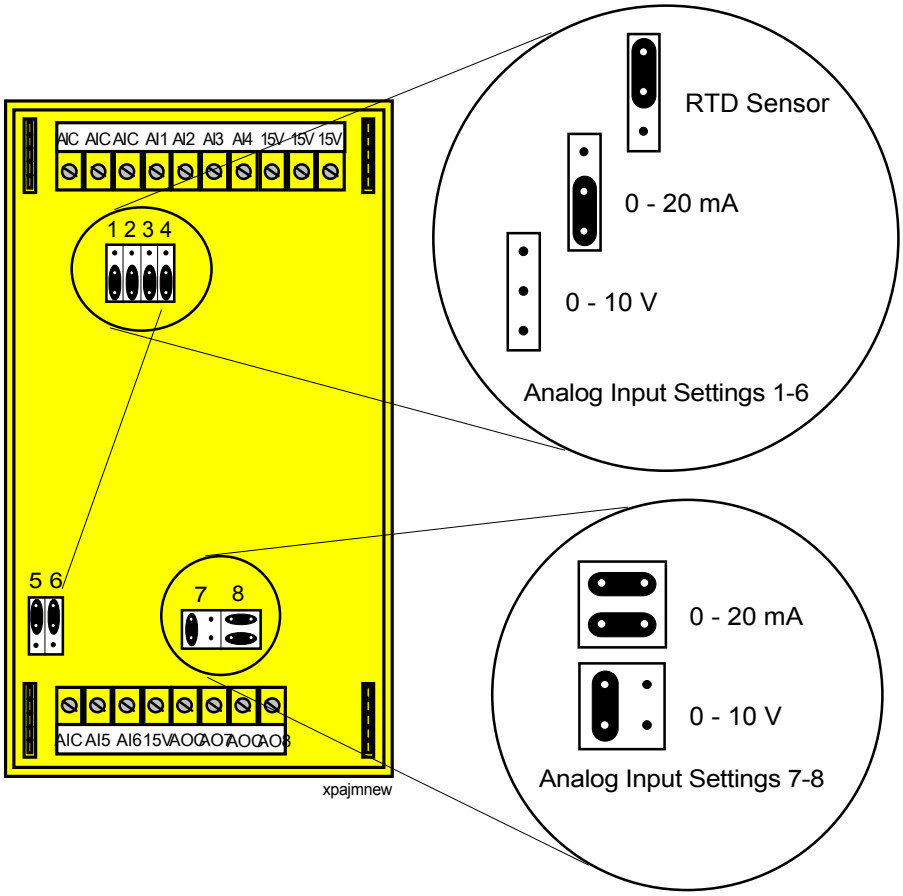


Figure 31: Jumper Details for the New Version of XPA-8x1

- Set the **Analog Input Type** for each of AI1 to AI6 using one jumper per input in each respective position marked 1 to 6 on the corresponding jumper block. Place a jumper on the upper two pins to set an RTD resistive sensor input. Place a jumper on the lower two pins to set a 0-20 mA current input. Remove the jumper completely to set a 0-10 V input.

  A maximum of 30 mA is available from the 15 V supply of the module.

- Set the Analog Output Type for each of AO7 and AO8 using jumpers marked 7 and 8 on the corresponding jumper block. Place the jumpers as shown in the figure above for the required output type. Two jumpers are required for a 0-20 mA output and one jumper for a 0-10 V output.

Power Up

After inspecting the field wiring, switch and jumper settings, and the XT-Bus cabling, power may be applied to the XTM-905. If the software configuration has not yet been downloaded to the XTM (stored in non-volatile EEPROM), take the necessary steps using the GX-9100 Graphic Configuration Software (GX Tool).

At power up, the XTM performs a configuration check, comparing the software defined configuration with the number and types of expansion modules actually connected to the XTM. If the configurations do not match, a configuration error will be indicated by the power LED of the XTM (see *LEDs* below). The LED indicators on the front of the XTM-905 module can be used to determine that the XTM is functioning properly.

LEDs

There are three LEDs on the front of the XTM-905 module: Power (*PWR*), Receive Data (*RD*), and Transmit Data (*TD*).

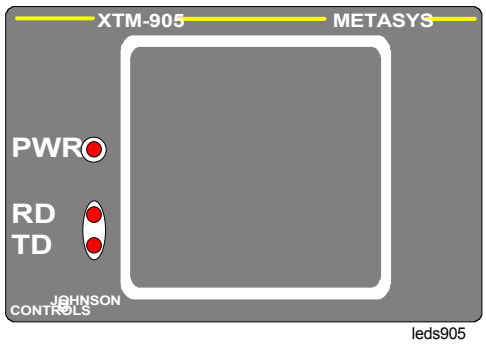


Figure 32: LEDs on the Front of the XTM-905

When power is applied to the XTM-905, the power LED will indicate the following conditions:

- The power LED will light up continuously if the XTM has established good communications with the DX controller over the serial link (XT-Bus) and there are no configuration errors,
- The power LED will flash at a frequency of about once per second if there is no communication with the the DX controller,
- The power LED will flash at a frequency of about twice per second if communications with the the DX controller are good but there is a configuration error.

The Receive Data LED lights to indicate that data is on the XT-Bus. The Transmit Data LED lights to indicate that the XTM is responding on the XT-Bus.

If there is a communications fault, you should check the XT-Bus cabling, and also make sure that the address setting on the XTM agrees with the XTM address configured in the DX controller.

If there is a configuration error, you should make sure that the software configuration being downloaded to the XTM agrees with the actual types and number of expansion modules connected to the XTM. Any error in the configuration will also be indicated in Items OPMO (dec. 01) and I2CE (dec. 02). (See *XTM-905 Configuration Settings* and *Appendix A—Item Table* for details). Another possible cause of this error could be an improperly seated ribbon cable connecting the expansion module communications bus.

Power Watchdog Loopback Jumper

The power watchdog circuit checks that power is getting to all modules; the XTM will not respond if there is a problem. In order for the power watchdog circuit to operate properly, you must make sure that the last expansion module connected to the XTM has the loopback (end-of-bus) jumper installed in the correct position on its connector for the 24 VAC module supply bus:

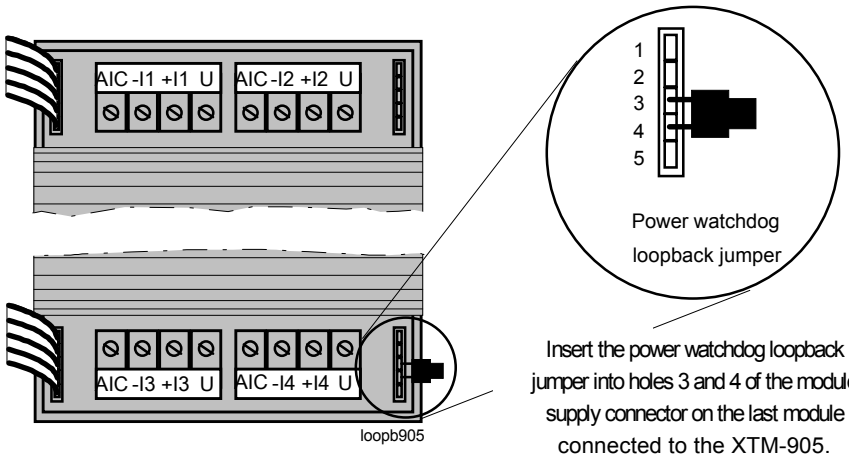


Figure 33: Power Watchdog Loopback Jumper on Last Module Connected to XTM-905

Supply Protection

All modules are equipped with a protective device to limit the current drawn from the 24 VAC supply to approximately 500 mA in the event of an internal failure or an external short circuit due to incorrect wiring to the binary input terminals which have the same “common” as the 24 VAC supply. If a module is not working (no LEDs show when the input or output is active), check the wiring. If the wiring is correct, replace the module.

Download/ Upload

Via the GX Tool

Download via DX Controller and N2 Bus

Connect an RS-232C/RS-485 converter (type MM-CVT101-x in North America and type IU-9100-810x in Europe) to one of the serial communication ports (COM1 or COM2) of the personal computer on which the GX Tool is running. Connect the N2 Bus of the DX to the converter unit connected to the PC.

Set the address switches and jumpers on the DX controller and XT/XTM devices as required, and connect the XT/XTM devices to the XT Bus of the DX. (See the *DX-9100 Technical Bulletin* for details.)

If the DX and XT/XTM devices are installed and wired, verify all field wiring and sensor voltage/current signals. It is recommended that controlled devices be isolated during download and initial startup.

Note: Do not download an untested configuration into an installed device. Test the configuration on a simulator panel before downloading.

Apply 24 VAC power to the DX controller and XT/XTM devices.

On the GX Tool select Action, Download, and DX. Enter the DX address (0-255) in the "Address" field and select the PC serial communication port (COM1 or COM2). Click on OK.

Checks are made before the data is downloaded to the controller, and a message is displayed on the screen if a value is outside the normal range for that parameter. The user may abort the download process and change the value in the configuration or press <ENTER> to ignore the message and download the entered value.

When the download is complete, select Action, Download, and XT/XTM. Verify that the correct "Port" is selected and click on OK.

For subsequent downloads, where the XT/XTM addresses have not been changed, the loading can be done in one process by selecting Action, Download, and DX and XT/XTM.

Download via DX Controller (RS-232-C Port)

Connect the serial communication port of the PC directly to the RS-232-C port of the DX controller. See the *DX-9100 Technical Bulletin* for details. Proceed as for *Download via DX-9100 Controller and N2 Bus*.

Upload via a DX Controller

Only complete DX /XT/XTM configurations should be uploaded from the DX controller. Save the current configuration on the PC screen and select File, New, then Action, Upload and DX and XT/XTM. Enter the DX controller address (0-255) and PC port (COM1 or COM2). Click on OK.

Note: When uploading a configuration from an XTM, modules defined as XPM, XPL or XPE-4x1 will be shown with four outputs, although only two or three outputs are physically available.

Via the SX Tool

XT-905 configuration data can only be changed item by item with the SX Tool. It is not possible to download or upload a complete configuration.

Appendix A—Item Table

Items

Each constant, variable or parameter in an XTM-905 Extension Module can be addressed via an Item code. All Items are listed in the Item Table which follows.

Note: It is important to note that EEPROM Items can only be written approximately 10,000 times, so that write commands from cyclical processes in supervisory systems must be avoided. The DX controller does not write to EEPROM items except during a configuration download.

Item Types

The format of any XTM-905 Item is described by the following types:

Float: Floating point number (2 bytes).

1 Byte: Unsigned integer number from 0 to 255.

8 Bits: 8 bits (1-byte) used to store logic states.

2 Bytes: Unsigned integer number from 0 to 65,535.

16 Bits: 16 bits (2-byte) used to store logic states.

4 Bytes: Unsigned integer number from 0 to 4,294,967,295.

Floating Point Numbers

An XTM-905 floating point number consists of two bytes which are bit-encoded using the following format:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
E3	E2	E1	E0	S	M10	M9	M8	M7	M6	M5	M4	M3	M2	M1	M0

where:

E3 - E0	=	4-bit exponent
S	=	sign bit (1 = negative)
M10 - M0	=	11-bit mantissa

- A number is normalized when the most significant bit of the mantissa is set (M10 = 1).
- A number is zero when all bits of the mantissa are 0.
- The value of a number is:

<NUMBER> = *<SIGN>* * .*<MANTISSA>* * 2 exp *<EXPONENT>*

Examples:

1	=	1400H	or	B001H
-1	=	1C00H	or	B801H
100	=	7640H	or	B064H

Item Table

Abbreviations used in the Item Table:

ADDRESS

Dec. Decimal Item Address

Hex. Hexadecimal Item Address

TYPE Item Type as described previously under **Item Type**.

R/W Read/Write conditions:

R	Read only Item
R/W	Read/Write Item
R/W (E)	Read/Write Item (in EEPROM)
CNF	Configuration Item (in EEPROM)

TAG Name for Item or bit position within an Item. Note that in bit-addressed Items, not all bits have an explicit Tag.

ADDRESS Dec.	ADDRESS Hex.	TYPE	R/W	TAG	DESCRIPTION
00	00	1 Byte	R	MODL	Device Model: 18 hex. for XTM-905
01	01	8 Bits	R/W	OPMO	Operation Mode (status)
		X8 X7 X6 X5 X4 X3 X2 X1			
		X1 = 1			Watchdog test
		X2 = 1			DO Error
		X3 = 1			DI Error
		X4 = 1			AI Error
		X5 = 1			AO Error
		X6			Unused (set to 0)
		X7	R	FAIL	XT Fail Mode (= XTS, Bit X2)
		X8 = 1		PWR	Power Fail or Comm. Failure
02	02	8 Bits	R	I2CE	Bus Error
		X8 X7 X6 X5 X4 X3 X2 X1			
		X1 = 1			XP1: DO Error
		X2 = 1			XP2: DO Error
		X3 = 1			XP1: DI Error
		X4 = 1			XP2: DI Error
		X5 = 1			XP1: AI or Counter 1-4 Error
		X6 = 1			XP1: AO or Counter 5-8 Error
		X7 = 1			EEPROM Error
		X8 = 1		HARD	XPx Hardware not available
03	03	1 Byte			Unused

ADDRESS		TYPE	R/W	TAG	DESCRIPTION
Dec.	Hex.				
04	04				Unused
to					
06	06				Unused
07	07	8 Bits	R/W	DOS1	Binary Output Status XP1 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 1	(n = 1-4)	DOn	XP1A: Output #n is On
		Xn = 1	(n = 5-8)	DOn	XP1B: Output #n is On
08	08	8 Bits	R/W	DOS2	Binary Output Status XP2 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 1	(n = 1-4)	DOn	XP2A: Output #n is On
		Xn = 1	(n = 5-8)	DOn	XP2B: Output #n is On
09	09	8 Bits	R	DIS1	Binary Input Status XP1
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 1	(n = 1-8)	DIn	XP1: Binary Input #n is On
10	0A	8 Bits	R	DIS2	Binary Input Status XP2
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 1	(n = 1-8)	DIn	XP2: Binary Input #n is On
11	0B	16 Bits	R	AIS	Analog Input Status
		X16 X15 X14 X13 X12 X11 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1			
		X1 = 1		AIH1	High Alarm Condition
		X2 = 1		AIL1	Low Alarm Condition
		X3 = 1		AIH2	High Alarm Condition
		X4 = 1		AIL2	Low Alarm Condition
		X5 = 1		AIH3	High Alarm Condition
		X6 = 1		AIL3	Low Alarm Condition
		X7 = 1		AIH4	High Alarm Condition
		X8 = 1		AIL4	Low Alarm Condition
		X9 = 1		AIH5	High Alarm Condition
		X10 = 1		AIL5	Low Alarm Condition
		X11 = 1		AIH6	High Alarm Condition
		X12 = 1		AIL6	Low Alarm Condition
		X13 = 1		AIH7	High Alarm Condition
		X14 = 1		AIL7	Low Alarm Condition
		X15 = 1		AIH8	High Alarm Condition
		X16 = 1		AIL8	Low Alarm Condition

ADDRESS Dec.	ADDRESS Hex.	TYPE	R/W	TAG	DESCRIPTION
12	0C	Float	R	AI1	Analog Input Value #1
13	0D	Float	R	AI2	Analog Input Value #2
14	0E	Float	R	AI3	Analog Input Value #3
15	0F	Float	R	AI4	Analog Input Value #4
16	10	Float	R	AI5	Analog Input Value #5
17	11	Float	R	AI6	Analog Input Value #6
18	12	Float	R	AI7	Analog Input Value #7
19	13	Float	R	AI8	Analog Input Value #8
20	14	Float	R/W	AO1	Analog Output Value #1
21	15	Float	R/W	AO2	Analog Output Value #2
22	16	Float	R/W	AO3	Analog Output Value #3
23	17	Float	R/W	AO4	Analog Output Value #4
24	18	Float	R/W	AO5	Analog Output Value #5
25	19	Float	R/W	AO6	Analog Output Value #6
26	1A	Float	R/W	AO7	Analog Output Value #7
27	1B	Float	R/W	AO8	Analog Output Value #8
28 to 31	1C to 1F				Unused Unused
32	20	4 Bytes	R/W	CNT1	DI1 Pulse Count - XP1
33	21	4 Bytes	R/W	CNT2	DI2 Pulse Count - XP1
34	22	4 Bytes	R/W	CNT3	DI3 Pulse Count - XP1
35	23	4 Bytes	R/W	CNT4	DI4 Pulse Count - XP1
36	24	4 Bytes	R/W	CNT5	DI5 Pulse Count - XP1
37	25	4 Bytes	R/W	CNT6	DI6 Pulse Count - XP1
38	26	4 Bytes	R/W	CNT7	DI7 Pulse Count - XP1
39	27	4 Bytes	R/W	CNT8	DI8 Pulse Count - XP1
40	28	8 Bits X8 X7 X6 X5 X4 X3 X2 X1 Xn = 0 (n = 1-8) Xn = 1	CNF	MOE1	Manual Override Enable XP1 DOn = Supervisory and Standalone DOn = Standalone Only (Note: All bits set to 0 or 1 by GX Tool)
41	29	8 Bits X8 X7 X6 X5 X4 X3 X2 X1 Xn = 0 (n = 1-8) Xn = 1	CNF	MOE2	Manual Override Enable XP2 DOn = Supervisory and Standalone DOn = Standalone Only (Note: All bits set to 0 or 1 by GX Tool)

ADDRESS Dec.	Hex.	TYPE	R/W	TAG	DESCRIPTION
42	2A	8 Bits	CNF	DMI1	Display Manual Override Status in DIS1
		0 0 0 0 X4 X3 X2 X1			
		Xn = 0	(n = 1-4)		DIn = Digital Input Status
		Xn = 1			DIn = Manual Override Status DOn+4
		Xn	(n = 5-8)		Unused
					(Note: All bits set to 0 or 1 by GX Tool)
43	2B	8 Bits	CNF	DMI2	Display Manual Override Status in DIS2
		0 0 0 0 X4 X3 X2 X1			
		Xn = 0	(n = 1-4)		DIn = Digital Input Status
		Xn = 1			DIn = Manual Override Status DOn+4
		Xn	(n = 5-8)		Unused
					(Note: All bits set to 0 or 1 by GX Tool)
44	2C				Unused (set to 0)
45	2D				Unused (set to 0)
46	2E	8 Bits	CNF	NOC1	Normally Open/Normally Closed Contact XP1
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 0	(n = 1-8)		XP1: DIn = Normally Open
		Xn = 1			XP1: DIn = Normally Closed
47	2F	8 Bits	CNF	NOC2	Normally Open/Normally Closed Contact XP2
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 0	(n = 1-8)		XP2: DIn = Normally Open
		Xn = 1			XP2: DIn = Normally Closed
48	30	1 Byte Int	CNF	PC1	Prescaler DI1 Counter (default = 1)
49	31	1 Byte Int	CNF	PC2	Prescaler DI2 Counter (default = 1)
50	32	1 Byte Int	CNF	PC3	Prescaler DI3 Counter (default = 1)
51	33	1 Byte Int	CNF	PC4	Prescaler DI4 Counter (default = 1)
52	34	1 Byte Int	CNF	PC5	Prescaler DI5 Counter (default = 1)
53	35	1 Byte Int	CNF	PC6	Prescaler DI6 Counter (default = 1)
54	36	1 Byte Int	CNF	PC7	Prescaler DI7 Counter (default = 1)
55	37	1 Byte Int	CNF	PC8	Prescaler DI8 Counter (default = 1)
56	38	1 Byte	CNF	DIL1	Internal use only
57	39	1 Byte	CNF	DIL5	Internal use only
58	3A	1 Byte	CNF	DIL9	Internal use only
59	3B	1 Byte	CNF	DILD	Internal use only
60	3C	1 Byte	CNF	DOL1	Internal use only
61	3D	1 Byte	CNF	DOL5	Internal use only
62	3E	1 Byte	CNF	DOL9	Internal use only
63	3F	1 Byte	CNF	DOLD	Internal use only

ADDRESS Dec.	Hex.	TYPE	R/W	TAG	DESCRIPTION
64	40	8 Bits	CNF	DIT1	Binary Input Type XP1 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 0	(n = 1-8)		XP1: DIn = Maintained Contact (default)
		Xn = 1			XP1: DIn = Pulse Contact
65	41	8 Bits	CNF	DIT2	Binary Input Type XP2 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 0	(n = 1-8)		XP2: DIn = Maintained Contact (default)
		Xn = 1			XP2: DIn = Pulse Contact
66	42	8 Bits	CNF	DOT1	Binary Output Type XP1 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			(XPE-4x4 and XPT only)
		Xn = 0	(n = 1-8)		XP1: DOn = ON/OFF Type (default)
		Xn = 1			XP1 : DOn = Pulse Type
67	43	8 Bits	CNF	DOT2	Binary Output Type XP2 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			(XPE-4x4 and XPT only)
		Xn = 0	(n = 1-8)		XP2: DOn = ON/OFF Type (default)
		Xn = 1			XP2: DOn = Pulse Type
68	44	1 Byte	CNF	DOPT	Binary Output Pulse Time (* 5 ms.)
					(default value of 4 = 20 ms)
69	45	8 Bits	CNF	XTS	XTM-905 Type Settings
		X8 X7 X6 0 0 0 X2 X1			
		X1 = 0			50 Hz Power Line (default)
		X1 = 1			60 Hz Power Line
		X2 = 0			Output Reset on communication failure
		X2 = 1			Output Hold on communication failure (default)
		X5, X4, X3			Internal use only (must be set to 0)
		X8 X7 X6 = 000			Counters on XP1 or XP1A (default - set by GX Tool)
70	46	8 Bits	CNF	DOR1	Binary Output Restore XP1 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 0	(n = 1-8)		Reset DOn to 0 at power-up
		Xn = 1			Restore DOn at power-up (default)
					(Note: All bits set to 0 or 1 by GX Tool)
71	47	8 Bits	CNF	DOR2	Binary Output Restore XP2 (A/B)
		X8 X7 X6 X5 X4 X3 X2 X1			
		Xn = 0	(n = 1-8)		Reset DOn to 0 at power-up
		Xn = 1			Restore DOn at power-up (default)
					(Note: All bits set to 0 or 1 by GX Tool)

ADDRESS		TYPE	R/W	TAG	DESCRIPTION
Dec.	Hex.				
72	48	8 Bits	CNF	COL1	Counter Limit CNT1-CNT4
		X8 X7 X6 X5 X4 X3 X2 X1			
		X2 X1			Counter Limit CNT1
					11 = 9999999 (default - set by GX Tool)
		X4 X3			Counter Limit CNT2 (as X2 X1)
		X6 X5			Counter Limit CNT3 (as X2 X1)
		X8 X7			Counter Limit CNT4 (as X2 X1)
73	49	8 Bits	CNF	COL2	Counter Limit CNT5-CNT8
		X8 X7 X6 X5 X4 X3 X2 X1			
		X2 X1			Counter Limit CNT5
					11 = 9999999 (default - set by GX Tool)
		X4 X3			Counter Limit CNT6 (as X2 X1)
		X6 X5			Counter Limit CNT7 (as X2 X1)
		X8 X7			Counter Limit CNT8 (as X2 X1)
74	4A	1 Byte	CNF		Internal use only
75	4B	1 Byte	CNF	AI2C	Internal use only
76	4C	1 Byte	CNF	AMOD	Internal use only
77	4D	8 Bits	CNF	IOMAP	Extension Module I/O Map
		X8 X7 X6 X5 X4 X3 X2 X1			
		X1 = 0			XP1A : I/O1 & I/O2 Not Used
		X1 = 1			XP1A : I/O1 & I/O2 Used
		X2 = 0			XP1A : I/O3 & I/O4 Not Used
		X2 = 1			XP1A : I/O3 & I/O4 Used
		X3 = 0			XP1B : I/O5 & I/O6 Not Used
		X3 = 1			XP1B : I/O5 & I/O6 Used
		X4 = 0			XP1B : I/O7 & I/O8 Not Used
		X4 = 1			XP1B : I/O7 & I/O8 Used
		X5 = 0			XP2A : I/O1 & I/O2 Not Used
		X5 = 1			XP2A : I/O1 & I/O2 Used
		X6 = 0			XP2A : I/O3 & I/O4 Not Used
		X6 = 1			XP2A : I/O3 & I/O4 Used
		X7 = 0			XP2B : I/O5 & I/O6 Not Used
		X7 = 1			XP2B : I/O5 & I/O6 Used
		X8 = 0			XP2B : I/O7 & I/O8 Not Used
		X8 = 1			XP2B : I/O7 & I/O8 Used

ADDRESS Dec.	Hex.	TYPE	R/W	TAG	DESCRIPTION
78	4E	8 Bits	CNF	IOTYP	Extension Module I/O Type
		0 0 0 0 X4 X3 X2 X1			
		X1 = 0			XP1A : I/O1 & I/O2 Digital
		X1 = 1			XP1A : I/O1 & I/O2 Analog
		X2 = 0			XP1A : I/O3 & I/O4 Digital
		X2 = 1			XP1A : I/O3 & I/O4 Analog
		X3 = 0			XP1B : I/O5 & I/O6 Digital
		X3 = 1			XP1B : I/O5 & I/O6 Analog
		X4 = 0			XP1B : I/O7 & I/O8 Digital
		X4 = 1			XP1B : I/O7 & I/O8 Analog
		X8...X5			Not Used
79	4F	8 Bits	CNF	IOMOD	Extension Module I/O Mode
		X8 X7 X6 X5 X4 X3 X2 X1			
		X1 = 0			XP1A : I/O1 & I/O2 Input
		X1 = 1			XP1A : I/O1 & I/O2 Output
		X2 = 0			XP1A : I/O3 & I/O4 Input
		X2 = 1			XP1A : I/O3 & I/O4 Output
		X3 = 0			XP1B : I/O5 & I/O6 Input
		X3 = 1			XP1B : I/O5 & I/O6 Output
		X4 = 0			XP1B : I/O7 & I/O8 Input
		X4 = 1			XP1B : I/O7 & I/O8 Output
		X5 = 0			XP2A : I/O1 & I/O2 Input
		X5 = 1			XP2A : I/O1 & I/O2 Output
		X6 = 0			XP2A : I/O3 & I/O4 Input
		X6 = 1			XP2A : I/O3 & I/O4 Output
		X7 = 0			XP2B : I/O5 & I/O6 Input
		X7 = 1			XP2B : I/O5 & I/O6 Output
		X8 = 0			XP2B : I/O7 & I/O8 Input
		X8 = 1			XP2B : I/O7 & I/O8 Output
80	50	1 Byte			Spare
81	51	8 Bits	CNF	DCM1	Display Common Manual Override in DIS1
		0 0 0 0 X4 0 0 0			
		X3...X1			Not used
		X4 = 0			Digital Input Status in DI4 of XP1
		X4 = 1			Common Manual Override Status in DI4 of XP1
		X8...X5			Not used
					(Note: Bit X4 set to 0 or 1 by GX Tool)

ADDRESS		TYPE	R/W	TAG	DESCRIPTION
Dec.	Hex.				
82	52	8 Bits	CNF	DCM2	Display Common Manual Override in DIS2
		0 0 0 0 X4 0 0 0			
		X3...X1			Not used
		X4 = 0			Digital Input Status in DI4 of XP2
		X4 = 1			Common Manual Override Status in DI4 of XP2
		X8...X5			Not used
					(Note: Bit X4 set to 0 or 1 by GX Tool)
83	53	8 bits	CNF	DML1	Display Manual Override in DIS1 LEDs
		0 0 0 0 X4 X3 X2 X1			
		Xn = 0	(n = 1-4)		LED (DIn) shows Digital Input Status
		Xn = 1			LED (DIn) shows Manual Override Status (DOn+4) (if selected in DMI1 or DCM1)
		Xn	(n = 5-8)		Unused
84	54	8 bits	CNF	DML2	Display Manual Override in DIS2 LEDs
		0 0 0 0 X4 X3 X2 X1			
		Xn = 0	(n = 1-4)		LED (DIn) shows Digital Input Status
		Xn = 1			LED (DIn) shows Manual Override Status (DOn+4) (if selected in DMI2 or DCM2)
		Xn	(n = 5-8)		Unused
85	55	1 Byte	CNF		Not used (set to 0)
86	56	2 Bytes	CNF	MTBC	Maximum Time Between Communications (default = 60 seconds)
87	57	16 Bits	CNF	AOT	Analog Output Type
		X16 X15 X14 X13 X12 X11 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1			
		X2 X1			Signal Analog Output #1
		= 00			Output Disabled
		= 01			Output 0 to 10 V
		= 10			Output 0 to 20 mA
		= 11			Output 4 to 20 mA
		X4 X3			Signal Analog Output #2 (as X2 X1)
		X6 X5			Signal Analog Output #3 (as X2 X1)
		X8 X7			Signal Analog Output #4 (as X2 X1)
		X10 X9			Signal Analog Output #5 (as X2 X1)
		X12 X11			Signal Analog Output #6 (as X2 X1)
		X14 X13			Signal Analog Output #7 (as X2 X1)
		X16 X15			Signal Analog Output #8 (as X2 X1)

ADDRESS Dec.	ADDRESS Hex.	TYPE	R/W	TAG	DESCRIPTION
88	58	16 Bits	CNF	AIT1	Input Type of Analog Input #1
		0 X15 0 0 X12 X11 X10 X9 X8 X7 X6 X5 X4 X3 X2 X1			
		X4 X3 X2 X1			Measurement Units
			= 0000		Linear (active sensor)
			= 0001		Degrees Celsius (RTD)
			= 0010		Degrees Fahrenheit (RTD)
			= 0011		Linear (Potentiometer)
		X5 = 1			Enable Square Root of Input
		X6 = 1			Alarm on Unfiltered Value
		X7 = 0			0-10 Volts (default) or Potentiometer
		X7 = 1			0-2 Volts, 0-20 mA or RTD
		X8 = 1			20 % Suppression
		X12 X11 X10 X9			Linearization and Sensor Type
			= 0000		Linear (active sensor)
			= 0001		Nickel 1000 Sensor (JCI)
			= 0010		Nickel 1000 Extended Range (JCI)
			= 0011		A99 Sensor (JCI)
			= 0100		PT1000 Sensor (DIN)
			= 0101		Nickel 1000 Sensor (L&G) - XPA-4x1 only
			= 0110		Nickel 1000 Sensor (DIN) - XPA-4x1 only
			= 0111		Unused
			= 1000		Potentiometer 5 Kohms - XPA-4x1 only
			= 1001		PT100 Sensor (DIN) - XPA-4x1 only
			= 1010		Nickel 100 Sensor (DIN) - XPA-4x1 only
			X15 = 0		RTD 2- or 4-wire connection - XPA-4x1 only
			X15 = 1		RTD 3-wire connection - XPA-4x1 only
89	59	Float	CNF	HR1	High Range Analog Input #1 (default = 100)
90	5A	Float	CNF	LR1	Low Range Analog Input #1 (default = 0)
91	5B	Float	R/W (E)	HIA1	High Alarm Limit Analog Input #1 (default =100)
92	5C	Float	R/W (E)	LOA1	Low Alarm Limit Analog Input #1 (default = 0)
93	5D	Float	R/W (E)	ADF1	Differential on Alarm Limit (default = 1)
94	5E	Float	CNF	FTC1	Filter Constant Analog Input #1 (default = 0)
95	5F	Float	CNF	OFS1	Analog Input AI1 Offset (default = 0)
96	60	16 Bits	CNF	AIT2	Input Type of Analog Input #2 (bits as AIT1)
97	61	Float	CNF	HR2	High Range Analog Input #2 (default = 100)
98	62	Float	CNF	LR2	Low Range Analog Input #2 (default = 0)
99	63	Float	R/W (E)	HIA2	High Alarm Limit Analog Input #2 (default =100)
100	64	Float	R/W (E)	LOA2	Low Alarm Limit Analog Input #2 (default = 0)
101	65	Float	R/W (E)	ADF2	Differential on Alarm Limit (default = 1)
102	66	Float	CNF	FTC2	Filter Constant Analog Input #2
103	67	Float	CNF	OFS2	Analog Input AI2 Offset (default = 0)

ADDRESS		TYPE	R/W	TAG	DESCRIPTION
Dec.	Hex.				
104	68	16 Bits	CNF	AIT3	Input Type of Analog Input #3 (bits as AIT1)
105	69	Float	CNF	HR3	High Range Analog Input #3 (default = 100)
106	6A	Float	CNF	LR3	Low Range Analog Input #3 (default = 0)
107	6B	Float	R/W (E)	HIA3	High Alarm Limit Analog Input #3 (default =100)
108	6C	Float	R/W (E)	LOA3	Low Alarm Limit Analog Input #3 (default = 0)
109	6D	Float	R/W (E)	ADF3	Differential on Alarm Limit (default = 1)
110	6E	Float	CNF	FTC3	Filter Constant Analog Input #3
111	6F	Float	CNF	OFS3	Analog Input AI3 Offset (default = 0)
112	70	16 Bits	CNF	AIT4	Input Type of Analog Input #4 (bits as AIT1)
113	71	Float	CNF	HR4	High Range Analog Input #4 (default = 100)
114	72	Float	CNF	LR4	Low Range Analog Input #4 (default = 0)
115	73	Float	R/W (E)	HIA4	High Alarm Limit Analog Input #4 (default =100)
116	74	Float	R/W (E)	LOA4	Low Alarm Limit Analog Input #4 (default = 0)
117	75	Float	R/W (E)	ADF4	Differential on Alarm Limit (default = 1)
118	76	Float	CNF	FTC4	Filter Constant Analog Input #4
119	77	Float	CNF	OFS4	Analog Input AI4 Offset (default = 0)
120	78	16 Bits	CNF	AIT5	Input Type of Analog Input #5 (bits as AIT1)
121	79	Float	CNF	HR5	High Range Analog Input #5 (default = 100)
122	7A	Float	CNF	LR5	Low Range Analog Input #5 (default = 0)
123	7B	Float	R/W (E)	HIA5	High Alarm Limit Analog Input #5 (default =100)
124	7C	Float	R/W (E)	LOA5	Low Alarm Limit Analog Input #5 (default = 0)
125	7D	Float	R/W (E)	ADF5	Differential on Alarm Limit (default = 1)
126	7E	Float	CNF	FTC5	Filter Constant Analog Input #5
127	7F	Float	CNF	OFS5	Analog Input AI5 Offset (default = 0)
128	80	16 Bits	CNF	AIT6	Input Type of Analog Input #6 (bits as AIT1)
129	81	Float	CNF	HR6	High Range Analog Input #6 (default = 100)
130	82	Float	CNF	LR6	Low Range Analog Input #6 (default = 0)
131	83	Float	R/W (E)	HIA6	High Alarm Limit Analog Input #6 (default =100)
132	84	Float	R/W (E)	LOA6	Low Alarm Limit Analog Input #6 (default = 0)
133	85	Float	R/W (E)	ADF6	Differential on Alarm Limit (default = 1)
134	86	Float	CNF	FTC6	Filter Constant Analog Input #6
135	87	Float	CNF	OFS6	Analog Input AI6 Offset (default = 0)

ADDRESS		TYPE	R/W	TAG	DESCRIPTION
Dec.	Hex.				
136	88	16 Bits	CNF	AIT7	Input Type of Analog Input #7 (bits as AIT1)
137	89	Float	CNF	HR7	High Range Analog Input #7 (default = 100)
138	8A	Float	CNF	LR7	Low Range Analog Input #7 (default = 0)
139	8B	Float	R/W (E)	HIA7	High Alarm Limit Analog Input #7 (default =100)
140	8C	Float	R/W (E)	LOA7	Low Alarm Limit Analog Input #7 (default = 0)
141	8D	Float	R/W (E)	ADF7	Differential on Alarm Limit (default = 1)
142	8E	Float	CNF	FTC7	Filter Constant Analog Input #7
143	8F	Float	CNF	OFS7	Analog Input AI7 Offset (default = 0)
144	90	16 Bits	CNF	AIT8	Input Type of Analog Input #8 (bits as AIT1)
145	91	Float	CNF	HR8	High Range Analog Input #8 (default = 100)
146	92	Float	CNF	LR8	Low Range Analog Input #8 (default = 0)
147	93	Float	R/W (E)	HIA8	High Alarm Limit Analog Input #8 (default =100)
148	94	Float	R/W (E)	LOA8	Low Alarm Limit Analog Input #8 (default = 0)
149	95	Float	R/W (E)	ADF8	Differential on Alarm Limit (default = 1)
150	96	Float	CNF	FTC8	Filter Constant Analog Input #8
151	97	Float	CNF	OFS8	Analog Input AI8 Offset (default = 0)
152	98	Byte	CNF	AOR1	Analog Output #1 Ramp Time (units of 5 ms per 1% change, default = 0)
153	99	Byte	CNF	AOR2	Analog Output #2 Ramp Time (units of 5 ms per 1% change, default = 0)
154	9A	Byte	CNF	AOR3	Analog Output #3 Ramp Time (units of 5 ms per 1% change, default = 0)
155	9B	Byte	CNF	AOR4	Analog Output #4 Ramp Time (units of 5 ms per 1% change, default = 0)
156	9C	Byte	CNF	AOR5	Analog Output #5 Ramp Time (units of 5 ms per 1% change, default = 0)
157	9D	Byte	CNF	AOR6	Analog Output #6 Ramp Time (units of 5 ms per 1% change, default = 0)
158	9E	Byte	CNF	AOR7	Analog Output #7 Ramp Time (units of 5 ms per 1% change, default = 0)
159	9F	Byte	CNF	AOR8	Analog Output #8 Ramp Time (units of 5 ms per 1% change, default = 0)