



*Manufacturers of Process
Controls and Instrumentation*

Instruction Manual

Model: *MTS-XXX*

Function: *Modular Telemetry System*

- Module:
- XXX=8DI: 8-Channel Digital Input*
 - XXX=8DO: 8-Channel Digital Output*
 - XXX=4AI: 4-Channal Analog Input*
 - XXX=4AO: 4-Channel Analog Output*
 - XXX=PWR: Power Distribution*
 - XXX=RAD: Radio Communication*
 - XXX=4DIO: 4-Channel Digital Input & Output*

Input: (8) Dry Contact

Serial #: _____

(If special or required)

For Technical Assistance And Questions Call
USA: (231) 788-2900 CANADA: (905) 660-5336

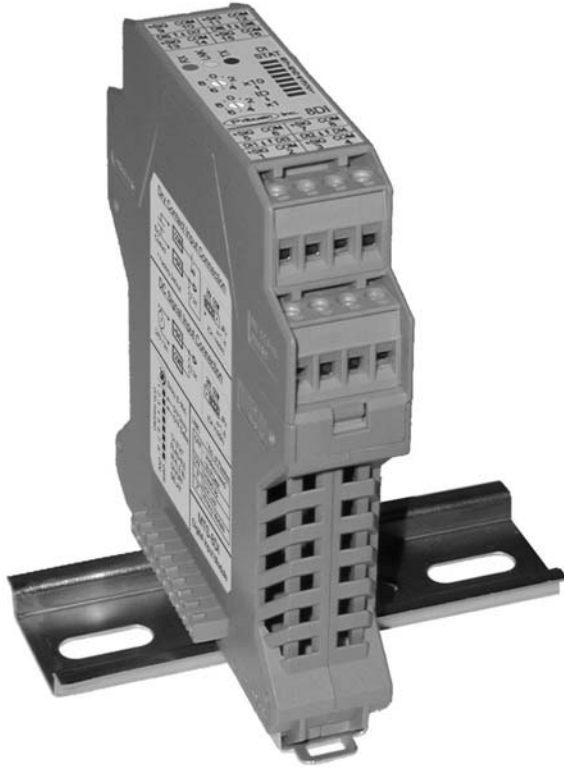
WARNING

THIS INSTRUCTION MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING OR SERVICING THIS PRODUCT. LIKE ANY PIECE OF COMPLEX EQUIPMENT, THIS PRODUCT WILL PERFORM AS DESIGNED ONLY IF INSTALLED, USED AND SERVICED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. OTHERWISE, IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE PERSONAL INJURY OR DEATH.

The warranties made by Pribusin Inc. with respect to these products are voided if the products are not installed, used and serviced in accordance with the instructions in this instruction manual. Please protect yourself and others by following them.

General Warnings and Cautions

- This apparatus is suitable for use in Class I, Division 2 Groups A, B, C & D
- **WARNING: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE FOLLOWING DEVICES:**
 - Relay (MTS-8DO only): AROMAT (NAIS), JQ1-24V & JS1-24V (Inspect relays periodically to ensure that no degradation is found)
- **WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE LAMPS, FUSES OR PLUG-IN MODULES UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS OF FLAMMABLE GASES OR VAPORS.**
- **WARNING: EXPLOSION HAZARD. SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.**
- **WARNING: EXPLOSION HAZARD. DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.**
- **AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.**
- **AVERTISSEMENT: RISQUE D'EXPLOSION. LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1, DIVISION 2.**



Function:

The MTS-8DI is an 8 channel digital input module. It provides digital input capability for an MTS series telemetry system. The MTS-8DI communicates with its counterpart, the MTS-8DO digital output module.

Each input can be configured as a dry or wet contact input. An adjustable ON/OFF delay can be invoked to provide hysteresis. The input status of each channel is indicated individually. While an input is in its ON or OFF delay mode the indicator flashes.

Deployment and installation is as simple as plugging the needed I/O modules into the communications module and assigning unique module ID's. Power and communication for the modules are provided through an integral bus.

Standard Features:

- 8 Digital Inputs
- Inputs Individually Selectable as Dry or Wet Contacts
- Input Status Indication
- Adjustable On/Off Delay For Hysteresis
- Integrated Power & Data Bus Reduces Wiring
- Modular Design Provides Maximum Flexibility
- No Programming Required - Easy to Configure
- Microprocessor Controlled for High Accuracy
- Power: 24 VDC (From Integrated Bus)
- Easy Future Expansion

Configuration:

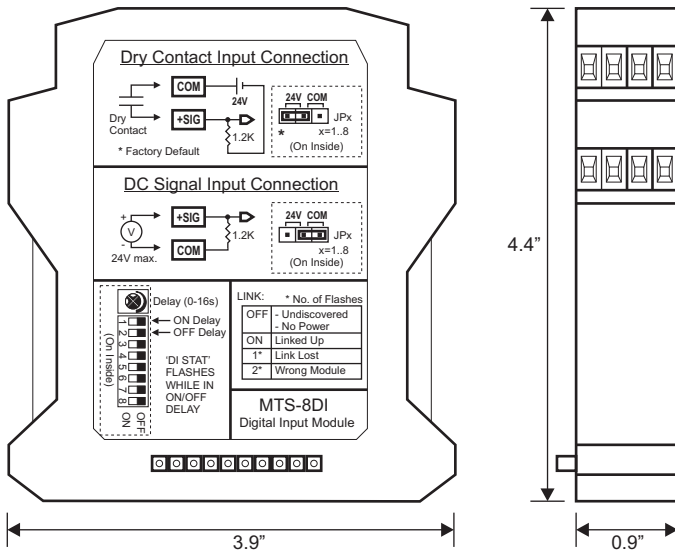
The MTS-8DI input module must be paired up with the MTS-8DO output module. Both modules must be set to the same ID with the ID Selector Switches. Each input can be selected as 'Dry Contact' input or 'DC Signal' input with jumpers JP1-JP8. An ON/OFF delay can be imposed from 0-16 seconds to filter out nuisance signals or noise.

Specifications:

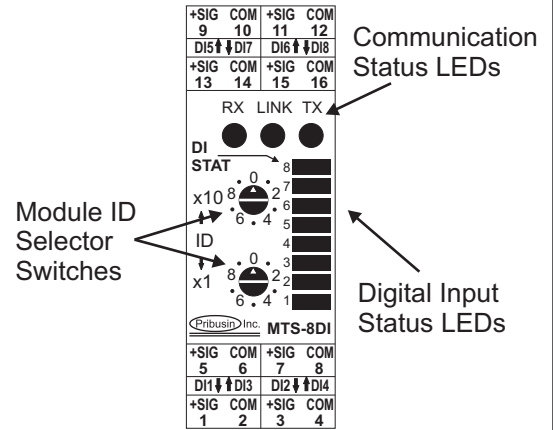
- Inputs: Dry Contact (excited with 24V from Module)
DC Signal (0-24VDC max.)
- Input Impedance: 1200 ohms
- Reverse Polarity Protection: Yes
- Power Consumption: 0.5VA (All Inputs Open)
4.8VA (All Inputs Closed)

MTS-8DI

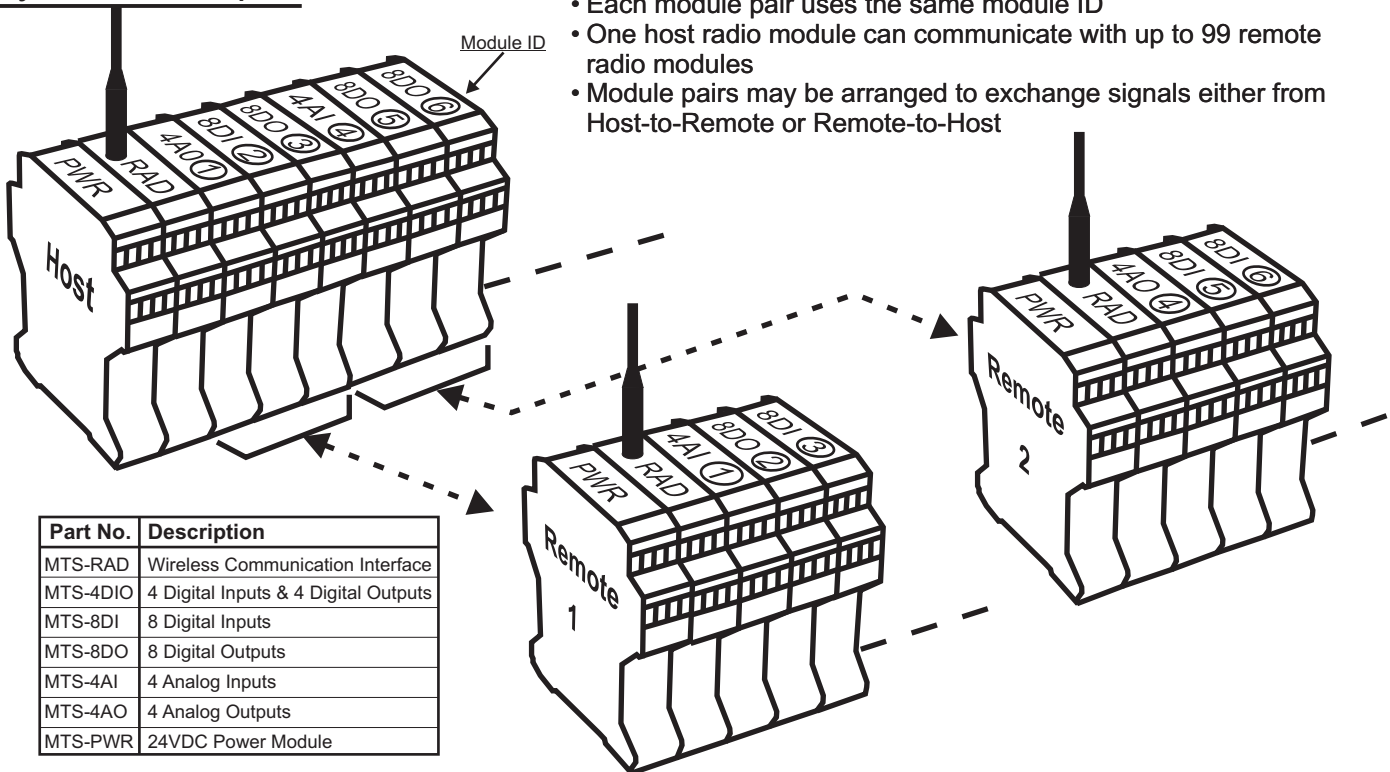
Module Dimensions:



Top View:



System Example:



Manufactured By:

Pribusin Inc.

www.pribusin.com
info@pribusin.com

USA:

Pribusin Inc.
743 Marquette Ave.
Muskegon, MI 49442
Ph: (231) 788-2900
Fx: (231) 788-2929



CANADA:

Pribusin Inc.
101 Freshway Dr. Unit 57
Concord, Ontario, L4K 1R9
Ph: (905) 660-5336
Fx: (905) 660-4068

MTS-8DI Functional Description:

The MTS-8DI is an 8-channel digital input module. It reads the input status of its 8 inputs and transmits it via an MTS communications module to its counterpart, the MTS-8DO digital output module. Both input and output modules must be set to the same module ID to allow them to communicate.

Inputs can be configured as *dry contacts* or 0-24VDC on-off signals (also known as *wet contacts*). Power and communication signal connections are achieved via the integral connector at the bottom of the module. Assembling a stack of several MTS modules on a DIN Rail and sliding them together is all that is required to interconnect I/O modules with a communications or power module.

Input Types:

Each of the 8 inputs can be configured individually to be either a *dry contact* or *wet contact*. 8 jumpers on the inside of the module select between *dry contact* (24V position) and *wet contact* (COM position) input type.

Dry Contact Input: If an input is configured as a *dry contact* the MTS-8DI provides 24VDC excitation on the COM terminal of the input. The +SIG terminal is used as the return signal. A closed contact will produce a current flow of approximately 20mA from COM to +SIG.

Wet Contact Input: If an input is configured as a *wet contact* the MTS-8DI sinks a voltage signal from 0-24VDC at the +SIG terminal through a 1.2K Ω to the COM terminal. A voltage input between 0 and 1 VDC is considered an open input. A voltage input from 5-24VDC is considered a closed input.

Input Indication:

Each of the 8 inputs has its own status indicator. If the input is open then the indicator is off; if the input is closed then the indicator is on. A flashing indicator means that the input is currently in transition mode and is being delayed by either the ON delay or OFF delay setting.

Input Delay (Hysteresis):

The MTS-8DI has selectable hysteresis settings for both ON (input closing) and OFF (input opening). A selected hysteresis setting affects all 8 inputs collectively. The hysteresis is implemented by a selector DIP switch that activates the function and a trim-pot that selects the amount of hysteresis. The trim-pot adjusts the input hysteresis from 1-16 seconds. The same trim-pot value is used for both ON and OFF hysteresis.

If an input is changing state and the new state has the input hysteresis function activated, the status indicator for that input will flash for the length of time selected by the trim-pot. Once the hysteresis delay has expired the status indicator will go solid.

MTS-8DI Installation:

Physical Mounting:

The MTS-8DI module easily snaps onto standard 35mm top-hat style DIN rail for mounting. Each module has a 10-position interconnect bus near the base that provides power and inter-module communication. Once modules are snapped onto the DIN rail they simply slide together and connect via their integrated interconnect bus. See figure 1 below for an illustration.

To remove a module, slide it off the end of the DIN rail or insert a screwdriver into the slot of the retaining clamp at the base of the module and push the screwdriver towards the module – now lift it out.

WHEN ASSEMBLING A STACK OF MODULES OR ADDING OR REMOVING A MODULE MAKE SURE POWER TO THE WHOLE STACK IS OFF.

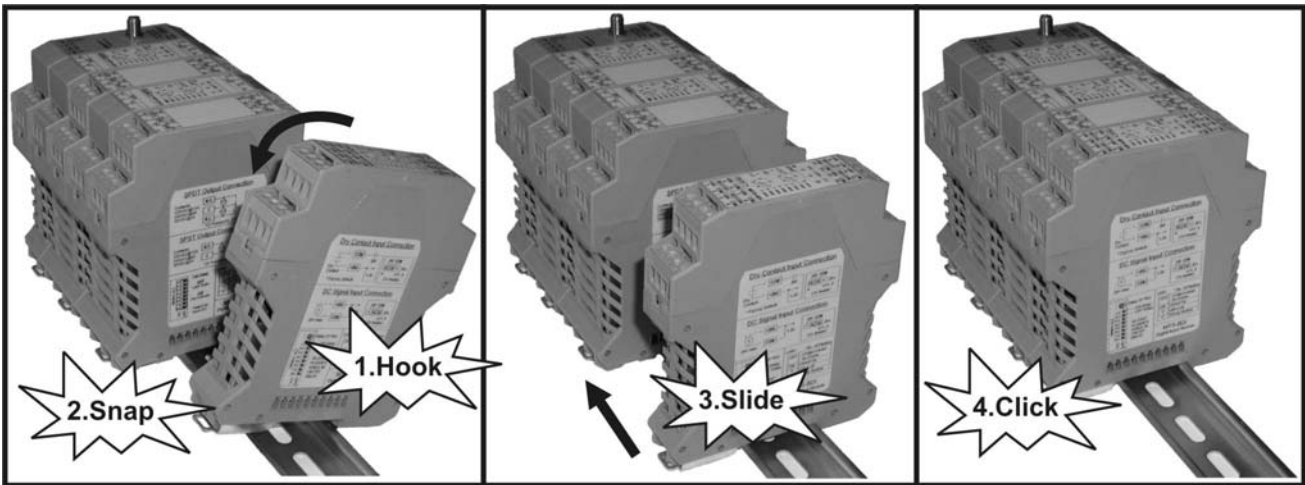


Figure 1

Signal Wiring:

To facilitate easy installation, all terminals are plug-in style and can be removed for wiring purposes. Figure 2a shows the arrangement of the various inputs.

WARNING: MORE THAN ONE LIVE CIRCUIT – SEE DIAGRAM.

AVERTISSEMENT: PLUS QU'UN CIRCUIT SOUS TENSION – VOIR LE DIAGRAM

WARNING: EXPLOSION HAZARD. DO NOT DISCONNECT WHILE CIRCUIT IS LIVE OR UNLESS THE ARE IS KNOW TO BE FREE OF IGNITIBLE CONCENTRATIONS OF FLAMMABLE GASES OR VAPORS.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISEE D'UN EMPLACEMENT NON DANGEREUX.

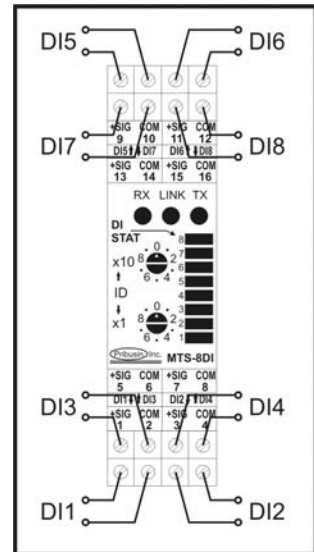


Figure 2a

Signal Wiring (cont'd):

Figure 2b shows how inputs of the same type (Dry or Wet) can make use of a common return wire. Use any of the COM terminals to connect to the common side of all input contacts or signals and the individual +SIG terminals to connect to the individual signal sources.

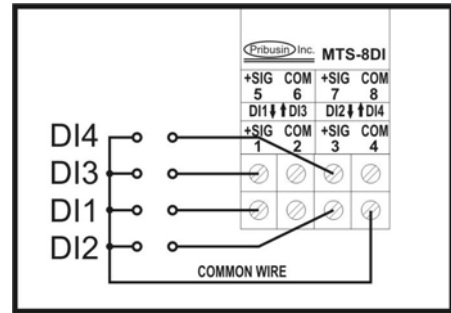


Figure 2b

Figure 3a shows the typical input wiring for an input that is configured as a Dry Contact. The COM terminal is connected internally to the +24V supply to provide the excitation for the Dry Contact.

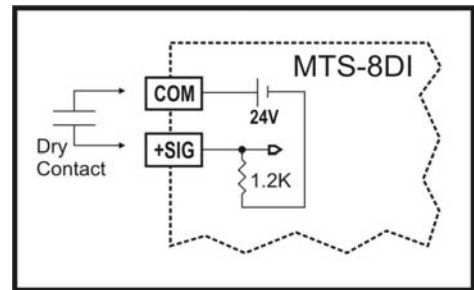


Figure 3a

Figure 3b shows the typical input wiring for an input that is configured as a Wet Contact. The COM terminal is connected internally to the system common.

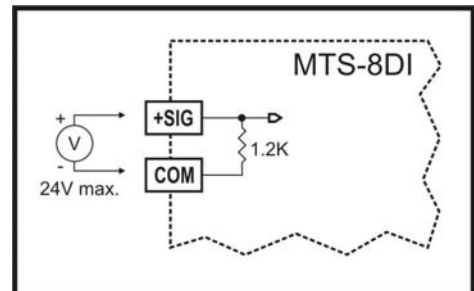


Figure 3b

MTS-8DI Configuration:

To configure some functions of the MTS-8DI it may be necessary to remove the circuit board and cover assembly from the enclosure body. When doing so, make sure that you adequately protect yourself against static electricity buildup by wearing proper grounding straps.

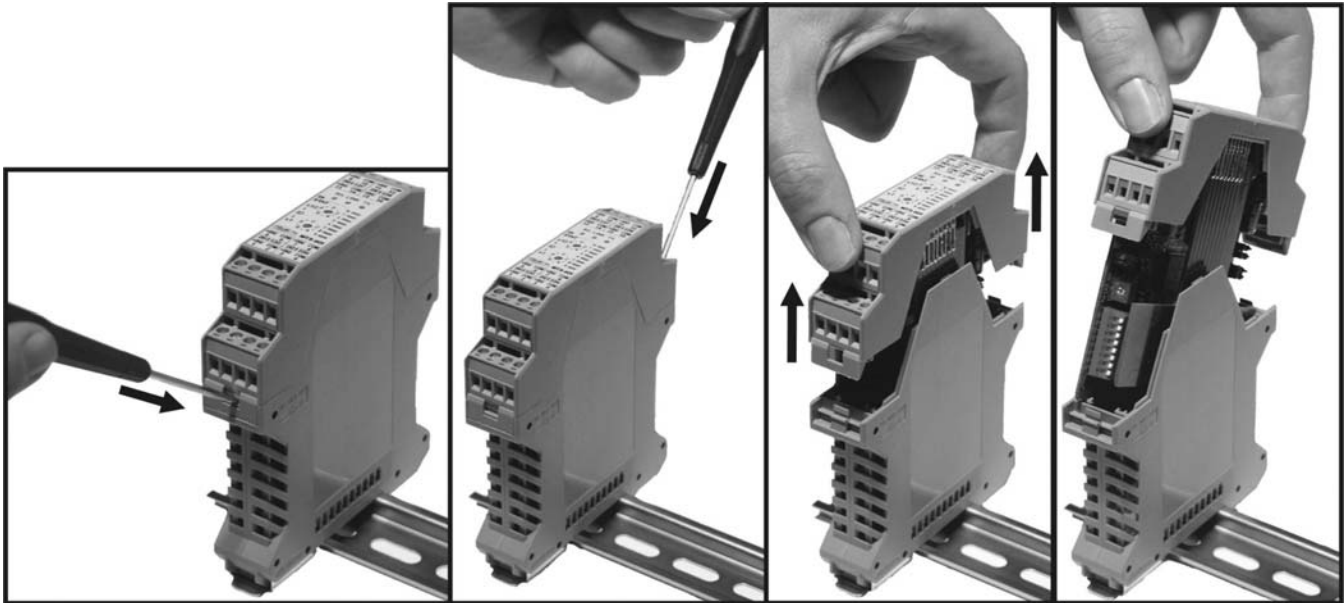


Figure 4

Figure 4 shows how to open the MTS enclosure. **Before proceeding, make sure all power is turned off to the MTS stack.** Using a small screwdriver, push in the two locking tabs on either side of the MTS just below the lower terminal plug. This unlocks the cover. Gently pull on the cover away from the enclosure body until the circuit board is free of the enclosure. Make the necessary adjustments and replace the cover and board assembly in the same orientation as it was removed. Be sure not to accidentally rotate the assembly by 180° when re-inserting it into the enclosure body. When inserting the lower end of the circuit board(s), make sure the board(s) slides into the guide-rails on the inside of the enclosure. Gently push on the top cover until it is firmly seated and the locking tabs click in place.

Input Configuration:

Each input can be configured as a *Dry Contact* or a *Wet Contact* input. A jumper on the circuit board inside the enclosure determines the type for each input. Each jumper has two positions: 24V and COM. The 24V position is for a *Dry Contact* input and the COM position is for the *Wet Contact* input.

Figure 5 shows the location of these jumpers. The upper right corner of Figure 4 shows two jumpers enlarged. DI1 is in the 24V position (Dry Contact) and DI2 is in the COM position (Wet Contact).

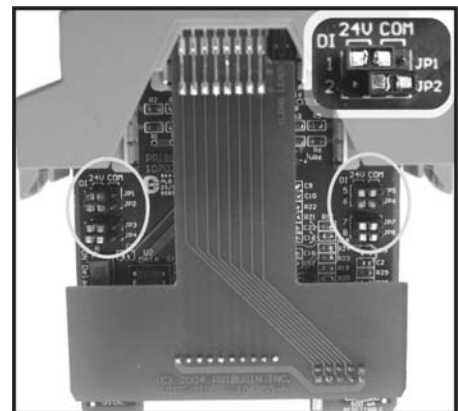
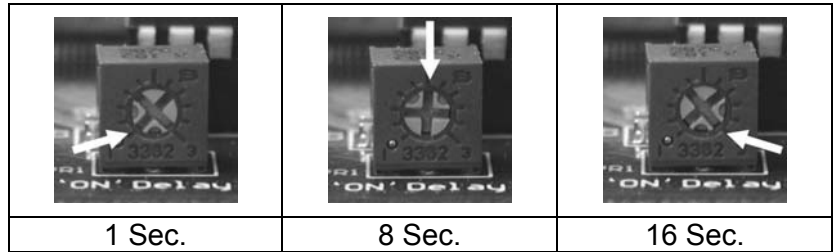


Figure 5

Input Configuration (cont'd):

Hysteresis can be added to all inputs in the form of ON Delay and OFF Delay. A trim-pot is used to adjust the amount of delay from 1-16 seconds. Two DIP switches are then used to enable the ON and OFF delay. The delay amount set by the trim-pot is the same for both the ON and OFF delay.



If the ON Delay is active and an input changes state to ON, the indicator light for that input will flash for the amount of time determined by the delay trim-pot. Once the delay has expired, the input indicator will go solid ON and the module now recognizes the input as ON. Similarly, if the OFF Delay is active and an input changes state to OFF, the indicator light for that input will flash for the amount of time determined by the delay trim-pot. Once the delay has expired, the input indicator will go solid OFF and the module now recognizes the input as OFF.

Hysteresis	SW1	SW2	
No Delays	UP	DOWN	
ON Delay	DOWN	UP	
OFF Delay	UP	DOWN	
ON & OFF Delay	DOWN	DOWN	

Module ID:

An MTS system consists of at least two 'stacks' of modules – one host stack and one or more remote stacks. Each stack consists of a communications module and one or more I/O modules. Each I/O module must be assigned a Module ID before it will be recognized in a stack. Module ID's allow multiple I/O modules to share the common communications module.

MTS modules always operate in pairs - one input module is paired up with one output module. These two modules are assigned the same Module ID so that they can communicate with one another from one stack to the other. These two modules are also the *only two* modules in an MTS system that have that particular Module ID. One module is part of the host stack and the other module is part of a remote stack.

Module ID's in a stack of MTS modules do not have to be consecutive but must be unique – there cannot be two modules with the same Module ID in one stack. Module ID's range from 1-99 and are set using the two rotary switches on the top of each I/O module. One switch is for the 1's digit and the other for the 10's digit of the Module ID. Figure 6 shows some examples of Module ID's.

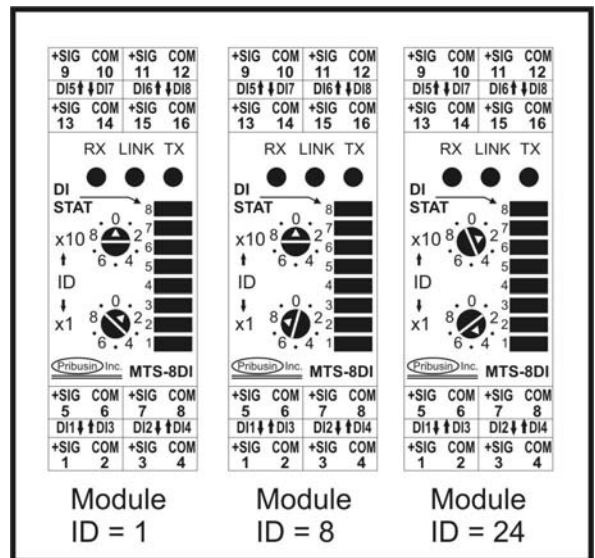


Figure 6

Module ID (cont'd):

Figure 7 shows a typical MTS system consisting of one Host Stack and two Remote Stacks.

Module ID's in a system do not have to be consecutive (Module ID's 4 & 5 are not present).

Only two modules can have the same Module ID: one of them is an input module, the other is an output module. Input and output modules may be located on either the Host or Remote stacks depending on which way the signal is intended to be sent.

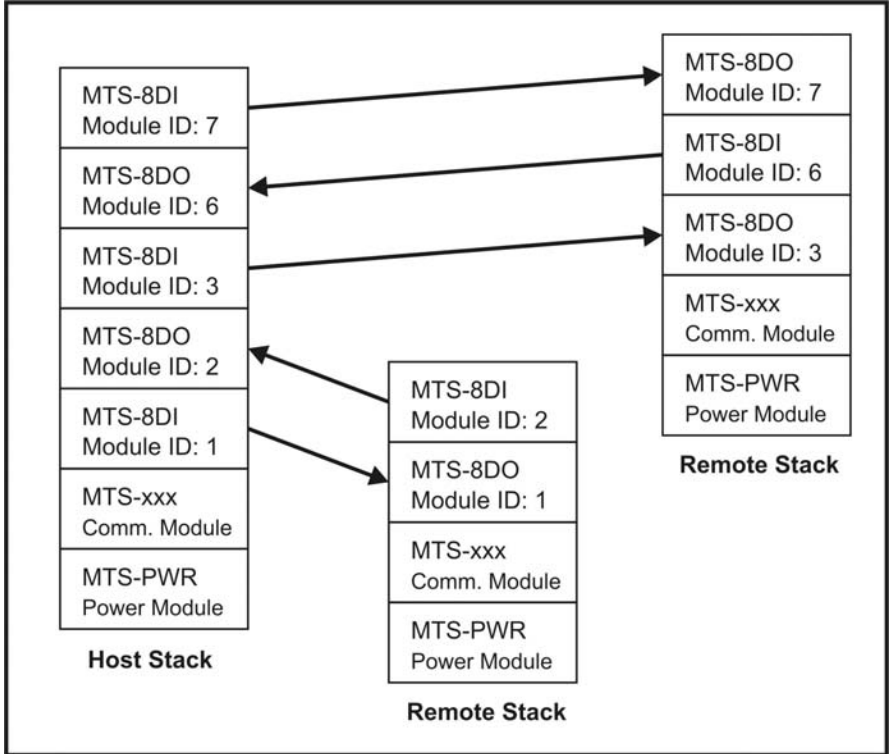


Figure 7

MTS-8DI Operation:

When an MTS system is first powered on, there is a brief time of inactivity (approx. 30 seconds) while the Communication Modules discover which I/O modules are present in their stack. After the discovery period is over, the modules on the Host Stack will begin communicating with their counter part modules on a Remote Stack. Communication occurs one module at a time and in numerical order for all Module ID's present on the Host Stack. A careful observer can witness this by the TX (transmit) and RX (receive) lights on each module.

Link Status Light:

Once two modules have communicated for the first time, they illuminate their Link lights to indicate that the modules have found each other and that a successful data exchange has taken place. This Link light will remain in a solid on state while communication between the two modules continues to be successful.

The Link light will flash when there is a problem with the communication between the two modules. Several flashing sequences indicate the nature of the problem.

Link Status	Description
Off	Undiscovered or No Power
On	Linked with other Module
1 Flash	Link with other Module Lost
2 Flashes	Linked with Wrong Module Type

Link Status Light (cont'd):

A **single flash** indicates that the module has lost communication with its counterpart module. Reasons for this include, but are not limited to:

Problem	Check
'Other Stack' lost Power	<ul style="list-style-type: none">• Verify power on 'Other Stack'• Check other Modules - Not likely if another Module from the 'Other Stack' is still communicating with a Module from 'This Stack'
Communication Module Bad on 'This Stack'	<ul style="list-style-type: none">• Check other Modules on 'This Stack' – Not Likely if any are still linked and communicating
Bad counter-part I/O Module on 'Other Stack'	<ul style="list-style-type: none">• Check TX/RX Lights on Module on 'Other Stack'
Bad I/O Module on 'This Stack'	<ul style="list-style-type: none">• Check TX/RX Lights on Module on 'This Stack'

The above table describes some scenarios that could result in lost communication. For further assistance please contact your local representative or Pribusin Inc.

A **double flash** indicates that the module is trying to communicate with a counter-part module that is not the correct input or output type. Examples of this are: 1) an analog module tries to communicate with a digital module or 2) an input module tries to communicate with another input module. This is most likely the result of improperly assigned Module ID's. Check all Module ID's carefully and make sure that modules with the same ID are the correct pair (one input and one output) and that they are of the same type (both digital or analog, but not mixed).

MTS System Overview:

This section describes the concept and operation of a typical MTS system. The example below uses two remote sites, labeled 'Remote 1' and 'Remote 2'. Following are important points to note when designing or installing an MTS system:

- Every MTS system has one Host Stack and one or more Remote Stacks
- Each stack consists of at least one power module (MTS-PWR), one communications module (MTS-xxx, see table below for xxx), and one or more I/O modules
- I/O modules are always paired (one input module and one output module)
- One module of each pair (either input module or output module) **MUST** be on the Host Stack
- Each module pair **MUST** use the same Module ID
- Modules may be arranged to send their signals from Host-to-Remote or Remote-to-Host depending on which stack the input and output modules are located

Figure 8 shows a typical two remote system with a mixture of I/O modules arranged in ways so that some modules send signals from the Host Stack to the Remote Stacks while other modules send signals from a Remote Stack back to the Host Stack.

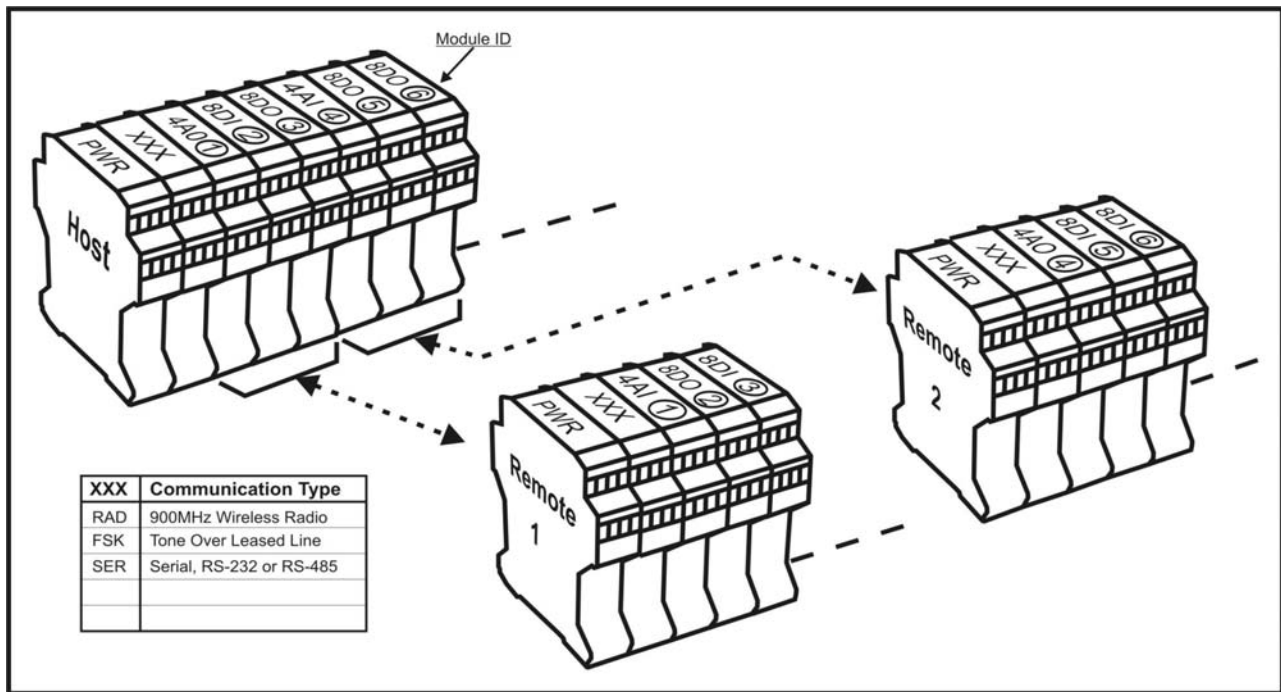


Figure 8

This table shows the modules that are currently available. Check our website at www.pribusin.com or with your local representative for the latest list of available modules.

Model No.	Description
MTS-RAD	900MHz Wireote Comm. Module
MTS-8DI	8 Channel Digital Input Module
MTS-8DO	8 Channel Digital Output Module
MTS-4AI	4 Channel Analog Input Module
MTS-4AO	4 Channel Analog Output Module
MTS-PWR	24VDC Power Module

Restocking Policy

All product returned to Pribusin Inc. in prime condition (not damaged, scratched or defaced in any way) within seven (7) months from the original date of shipment is subject to a 50% restocking charge. All product must be accompanied by a Return Authorization number (RA number) which must be obtained from Pribusin Inc. prior to returning any product.

After seven (7) months from the original date of shipment, products cannot be returned for restocking.

Custom designed products, modified products or all non-standard products may not be returned for restocking.

Warranty Policy

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