



*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: (4) 4-20mA

Serial #: _____

(If special or required)

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

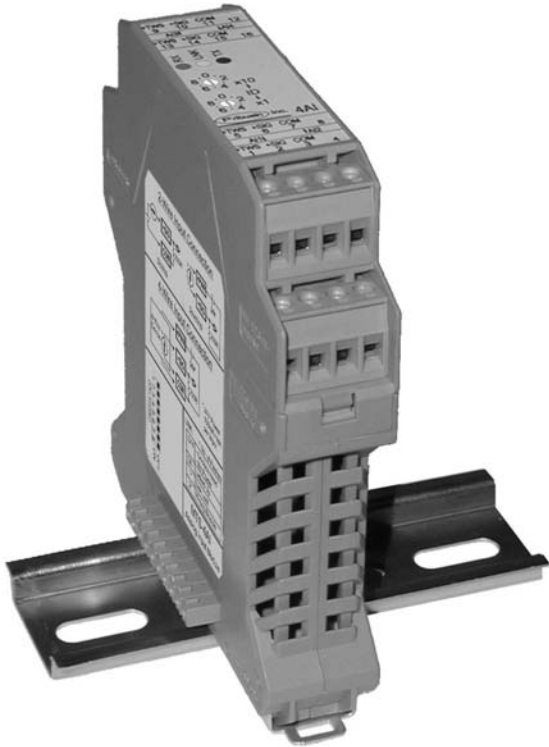
WARNING

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-4AI is a 4 channel analog input module. It provides analog input capability for an MTS series telemetry system. The MTS-4AI communicates with its counterpart, the MTS-4AO analog output module.

Inputs can be wired to be sinking or sourcing depending on the 4-20mA signal source. 24VDC is also available on the input terminals for 3- and 4-wire connections. Input resolution is 16-bits for high accuracy.

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:

- 4 Analog Inputs (4-20mA)
- 2-Wire Sinking or Sourcing Inputs
- 24V Power Supply Output for 3- & 4- Wire Inputs
- 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:

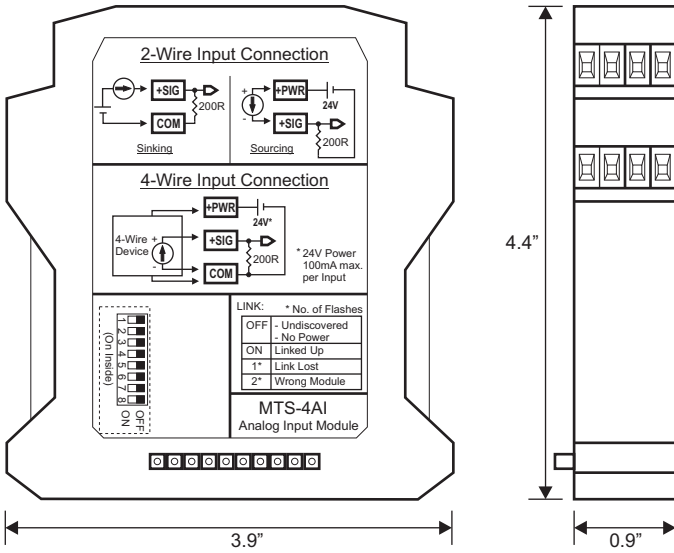
The MTS-4AI input module must be paired up with the MTS-4AO output module. Both modules must be set to the same ID with the ID Selector Switches. Each input can be wired as either sinking or sourcing type.

Specifications:

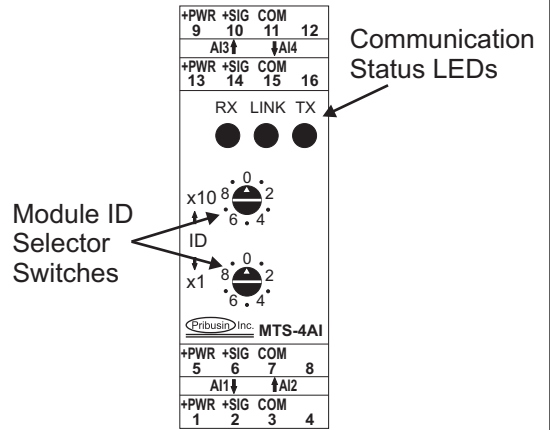
- Inputs: 4-20mA sinking (200 ohm load)
- 4-20mA sourcing (max. 20mA)
- 3- & 4-Wire (24VDC @ 100mA max.)
- Power Consumption: 0.7VA min., 2.5VA max.
- Input Impedance: 200 ohms
- Reverse Polarity Protection: Yes

MTS-4AI

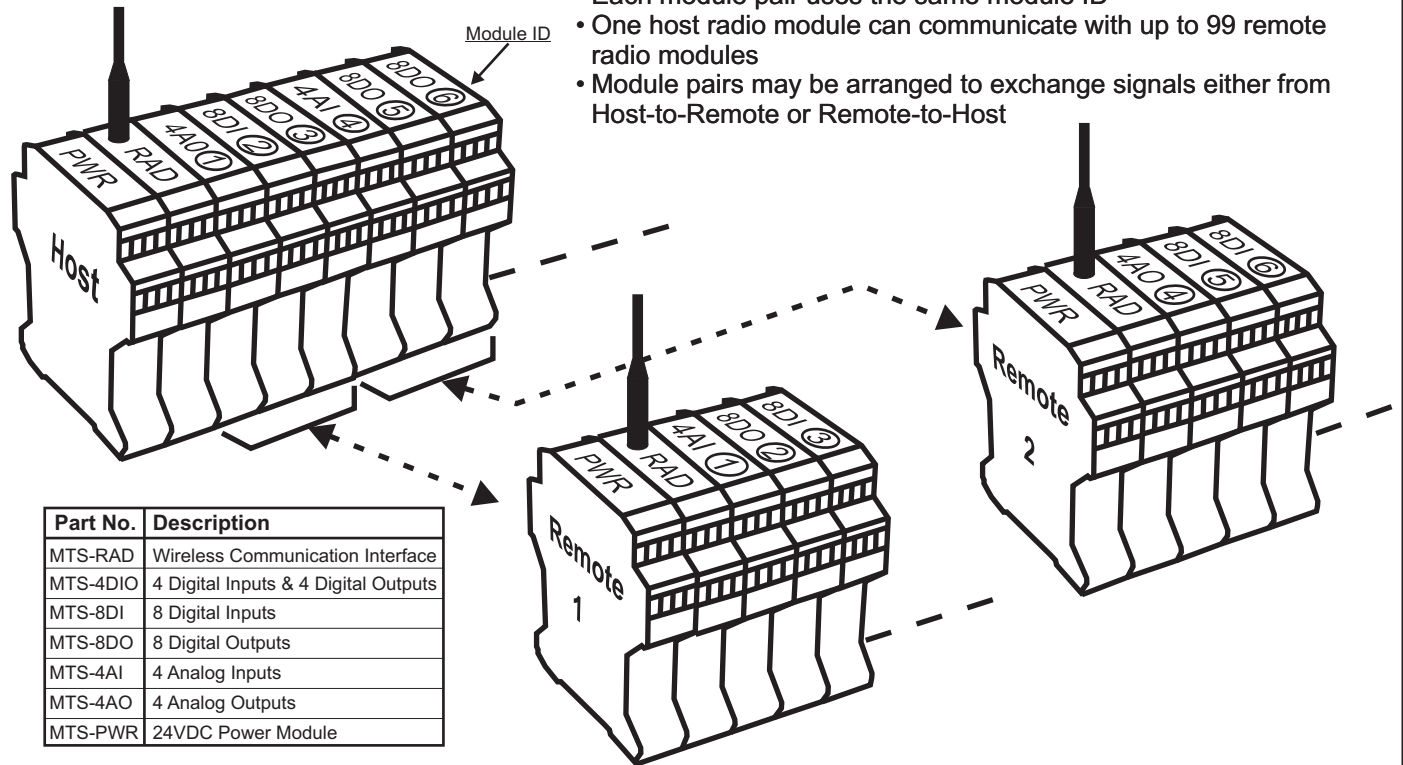
Module Dimensions:



Top View:



System Example:



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MTS-4AI Functional Description:

The MTS-4AI is a 4-channel analog input module. It reads the input values of its 4 inputs and transmits it via an MTS communications module to its counterpart, the MTS-4AO analog output module. Both input and output modules must be set to the same module ID to allow them to communicate.

Inputs can be wired as *2-wire sinking*, *2-wire sourcing* or *4-wire*. 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 4 inputs can be wired individually to be a *2-wire sinking*, a *2-wire sourcing* or a *4-wire* input type.

2-Wire Sinking: If an input is wired as a 2-wire sinking input, it presents a 200 Ω load to the 4-20mA loop. The power for the 4-20mA current loop is supplied by another device.

2-Wire Sourcing: If an input is wired as a 2-wire sourcing input, it provides 24VDC excitation to the 4-20mA loop and presents a 200 Ω load. Only 2-wires are used in this connection and the 4-20mA source (field transmitter) is powered from the 24V loop excitation and consumes no more than 20mA.

4-Wire: If an input is wired as a 4-wire input, it provides 24VDC power to the field transmitter which then provides a powered 4-20mA signal to the +SIG input. There the input presents a 200 Ω load.

MTS-4AI Installation:

Physical Mounting:

The MTS-4AI 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.

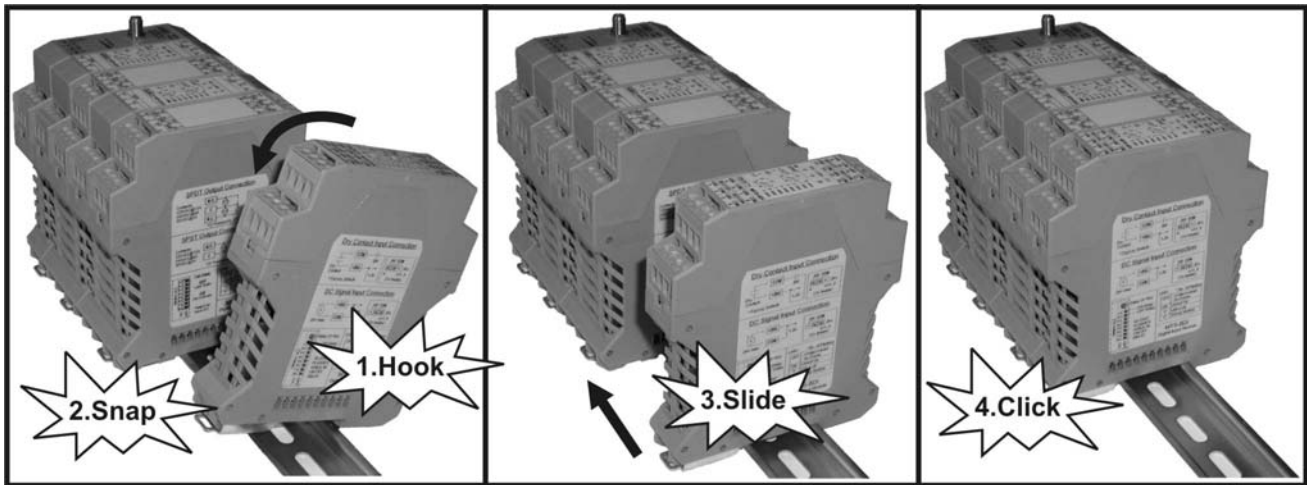


Figure 1

Signal Wiring:

To facilitate easy installation, all terminals are plug-in style and can be removed for wiring purposes. Figure 2 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.

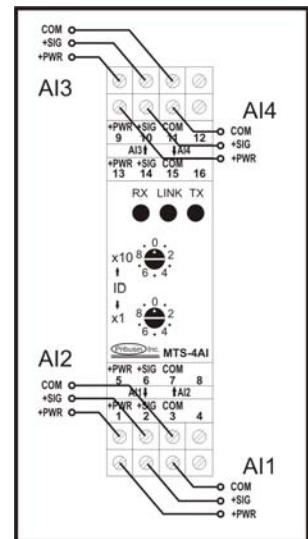


Figure 2

Signal Wiring (cont'd):

Figure 3a shows the typical input wiring for an input that is wired as a *2-Wire Sinking Input*. The MTS-4AI merely presents a 200 Ω load to the 4-20mA loop but provides no power to it.

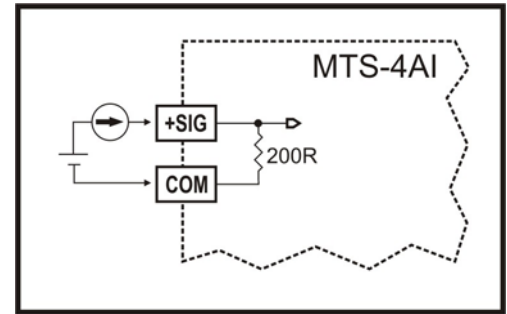


Figure 3a

Figure 3b shows the typical input wiring for an input that is wired as a *2-Wire Sourcing Input*. The MTS-4AI provides both a 24V loop excitation as well as a 200 Ω load to the 4-20mA loop. The signal source (field transmitter) is a 2-wire device that consumes no more than 20mA.

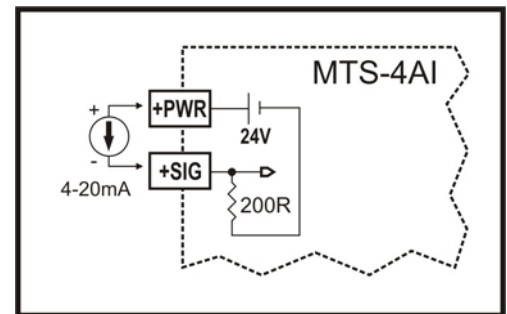


Figure 3b

Figure 3c shows the typical input wiring for an input that is wired as a *4-Wire Input*. The MTS-4AI provides both 24V power as well as a 200 Ω load to the 4-20mA loop. The signal source (field transmitter) provides a powered 4-20mA signal back to the MTS-4AI Input. The current consumption of the attached field transmitter may not exceed 100mA.

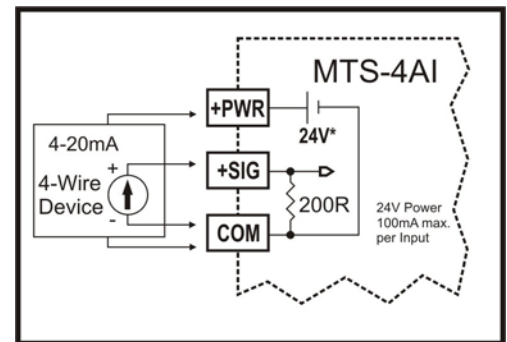


Figure 3c

MTS-4AI Configuration:

To configure some functions of the MTS-4AI 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.

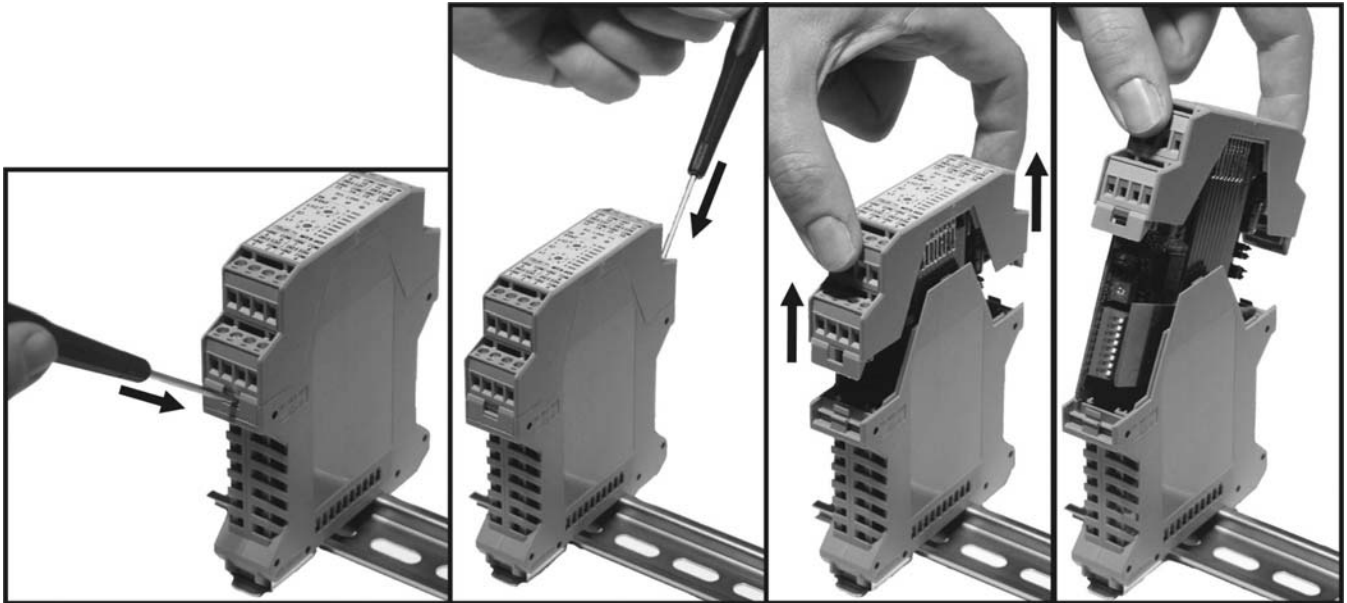


Figure 4

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.

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 5 shows some examples of Module ID's.

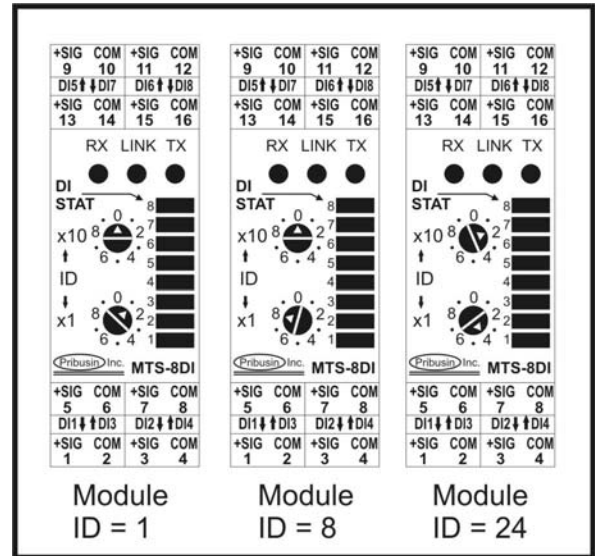
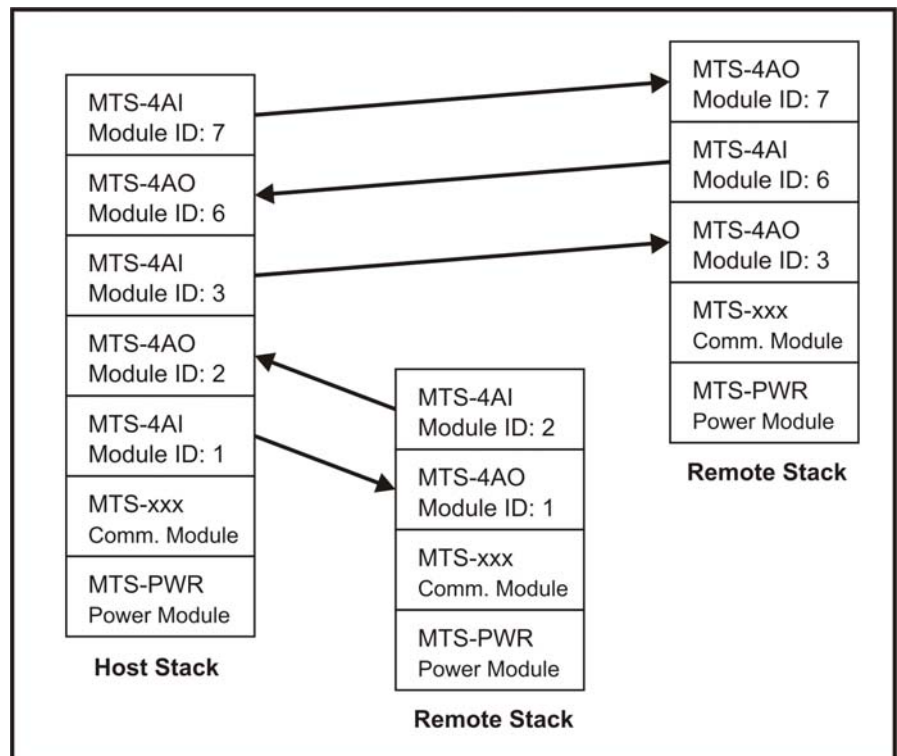


Figure 5

Figure 6 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.



MTS-4AI 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

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 7 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.

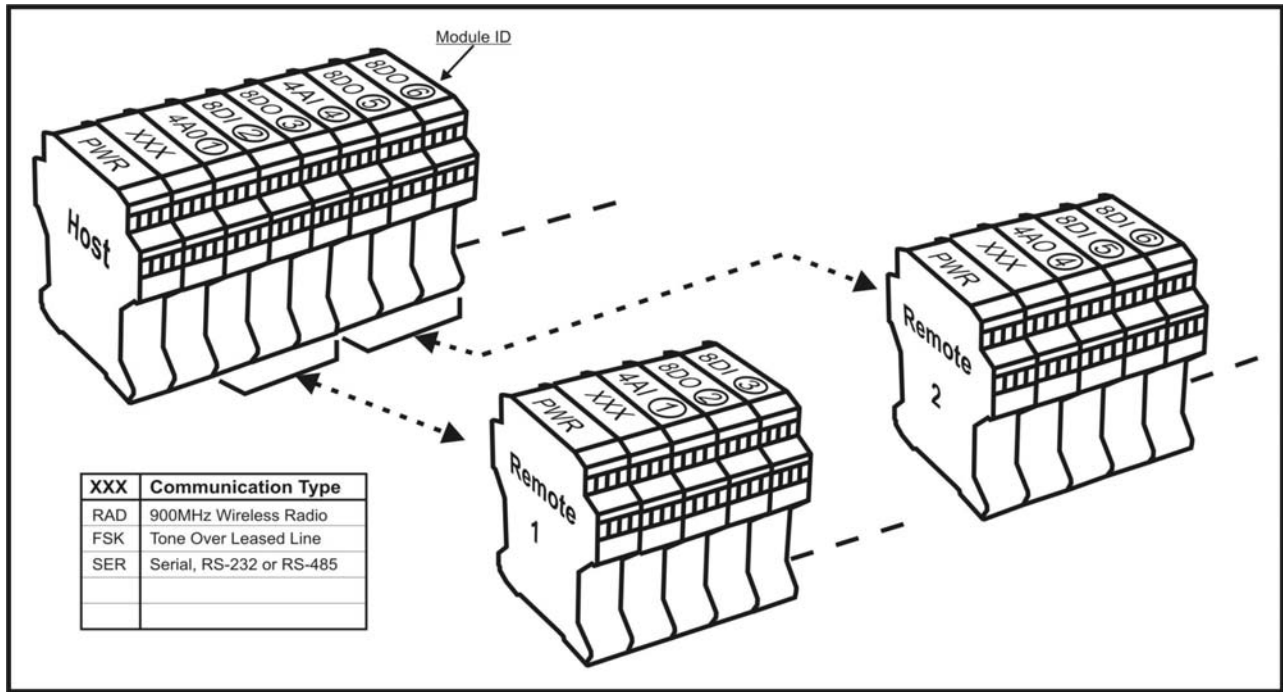


Figure 7

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

Pribusin Inc. warrants equipment of its own manufacture to be free from defects in material and workmanship, under normal conditions of use and service, and will replace any component found to be defective, on its return to Pribusin Inc., transportation charges prepaid, within one year of its original purchase. Pribusin Inc. will extend the same warranty protection on equipment, peripherals and accessories which is extended to Pribusin Inc. by the original manufacturer. Pribusin Inc. also assumes noliability, expressed or implied, beyond its obligation to prelace any component involved. Such warranty is in lieu of all other warranties, expressed or implied.