Sixnet

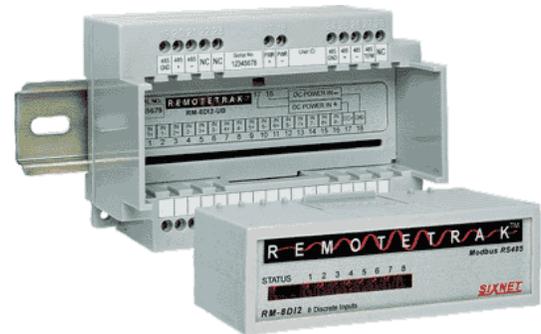# USER MANUAL

RemoteTRAK™

RS485 Distributed I/O for Modbus and Sixnet Systems

Installation & Maintenance

Contents at a Glance:

This manual applies to the following products:
All RemoteTRAK I/O modules (RM-)
RemoteTRAK Field Setup Module (RM-232-SETUP)
RemoteTRAK RS232 to RS485 Converter (RM-232-485-4U)

PROTECTED TECHNOLOGY POLICY

Sixnet protects your investment in Sixnet systems with long-term planned technology and our unique Protected Technology Policy. We will continue to support the specified capabilities of standard Sixnet products for at least five years. We plan each product improvement and new feature to be upward compatible with existing designs and installations. Our goals are to make each new software release bring new power to your Sixnet systems and have every existing feature, applications program and data file continue to work.

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Sixnet protects your long-term productivity with state-of-the-art planned technology and continued support.

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Sixnet, manufacturer of SIXTRAK, VersaTRAK, RemoteTRAK and EtherTRAK products, warrants to Buyer that products manufactured by Sixnet will be free from defects in material and workmanship. Sixnet's obligation under this warranty will be limited to repairing or replacing, at Sixnet's option, the defective parts within 1 year of the date of installation, or within 18 months of the date of shipment from the point of manufacture, whichever is sooner. Products may be returned by Buyer only after permission has been obtained from Sixnet. Buyer will prepay all freight charges to return any products to the repair facility designated by Sixnet.

This limited warranty does not cover losses or damages that occur in shipment to or from Buyer or due to improper installation, maintenance, misuse, neglect or any cause other than ordinary commercial or industrial applications, This limited warranty is in lieu of all other warranties whether oral or written, expressed or implied. Sixnet's liability shall not exceed the price of the individual unit which is the basis of the claim. In no event shall Sixnet be liable for any loss of profits, loss of use of facilities or equipment or other indirect, incidental or consequential damages.

INSTALLATION AND HAZARDOUS AREA WARNINGS

These products should not be used to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of consequential equipment or personnel safety. In particular, Sixnet disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in any application.

All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2.

WARNING – EXPLOSION HAZARD – WHEN IN HAZARDOUS LOCATIONS, DISCONNECT POWER BEFORE REPLACING OR WIRING MODULES.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.
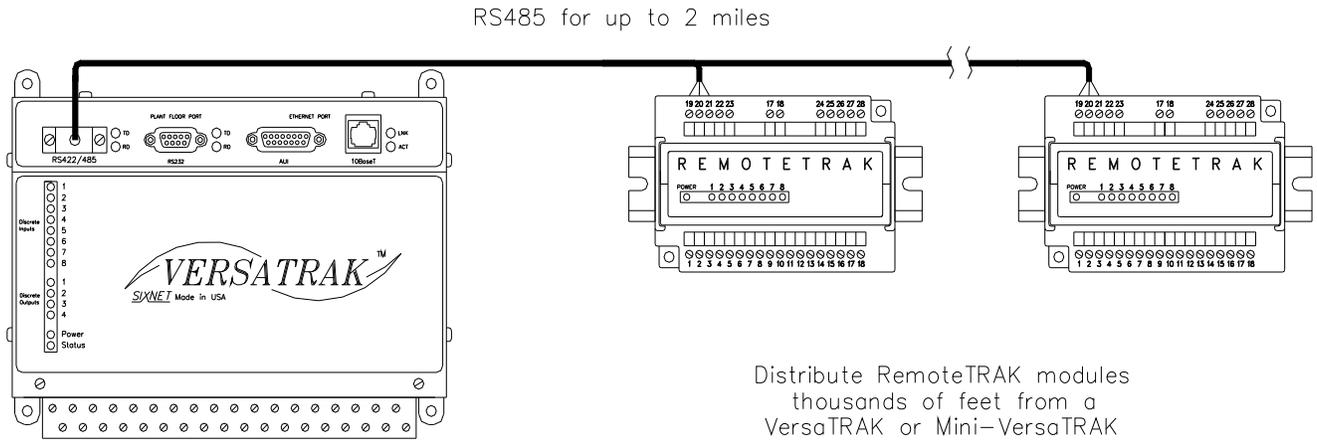
> **Note:** All information in this document applies to RemoteTRAK I/O, except where otherwise noted. Refer to the Sixnet I/O Tool Kit software online help system for detailed product specifications and configuration settings.

Section 1 | General Information

Overview

This manual will help you install and maintain RemoteTRAK I/O. In summary, wiring for power, communications and I/O is connected to each module's base. Then, setup choices are entered using the Sixnet I/O Tool Kit software and the system is ready to run.

RS485 for up to 2 miles

Distribute RemoteTRAK modules thousands of feet from a VersaTRAK or Mini-VersaTRAK

Performance Specifications

These general specifications apply to all RemoteTRAK modules.

Supply Voltage	9 - 30 VDC, 0.5 Watt typical per module (25 mA @ 24 VDC – varies by module and load).
Modules per RS485 bus	32 (use a RM-232-485-4U to drive a total of 128 modules)
RS485 Isolation	1200 Volts RMS (for 1 minute)
Operating Temperature	-30 to 70 °C
Storage Temperature	-40 to 85 °C
Humidity	5 to 95% (non-condensing)

Power Wiring

RemoteTRAK modules can be powered from the same DC source that is used to power your I/O devices. No separate power supply is required. 10 to 30 VDC needs to be applied to terminals 17 and 18 on the base of each module. Some RemoteTRAK modules distribute power or return connections to I/O terminals for your convenience in making field-wiring connections. Refer to the wiring diagram for each module for more information.

The RM-PS-024-01F can be used to power your RemoteTRAK modules, instrumentation loops, and other devices. It operates on 85264 VAC (47-63 Hz) or 120-370 VDC and outputs 24 VDC at up to 1 A. Refer to the figure below for the proper power connections. Tighten the screw terminals to a maximum of 3.48 in-lbs.
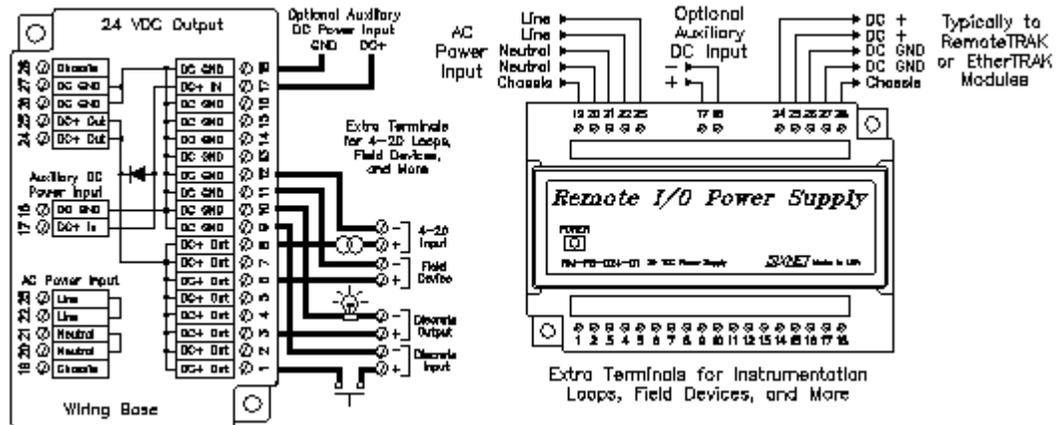
Status LED Indication

On, with a quick "OFF" BLINK (1.9 seconds ON, .1 seconds OFF) - The module is configured and fully operational, but has not received a valid request from the host for a time longer than the specified time out period. A communication time out has occurred.

Full ON - The module is configured, fully operational, and has received communication from the host device before the timeout period expired. **This is the desired LED indication during system operation.**

HALF BLINK (1 second ON, 1 second OFF) - The module is not adequately configured and requires a download from the Sixnet I/O Tool Kit utility.

Full OFF - There is no power to the module, or the status LED is being turned off intentionally by Sixnet I/O Tool Kit during the module loading operation.

Off, with a quick "ON" BLINK (1.9 seconds OFF, .1 seconds ON) - The module failed self-test at initialization. It will not attempt communication and should be replaced.

Status LED Wink Feature

The "Status" LED may be intentionally winked (10 blinks/ second) by the Sixnet I/O Tool Kit utility to visually identify the module when other modules are present.

Section 2 | RS485 Wiring

RS485 Wiring Guidelines

RemoteTRAK modules communicate with a master controller (PC, SIXTRAK Gateway, VersaTRAK, DCS, PLC, etc.) using a two wire RS485 party-line. It is recommended that in addition to the two signal wires, a shield or ground wire be connected to reference all stations to a common return. The RS485 port on all RemoteTRAK modules is isolated from its internal circuitry, local power source, and I/O wiring to improve communications reliability. It is recommended that only 32 RemoteTRAK modules be connected on an unbuffered RS485 party-line, and that the termination jumper be installed on the last module on the end of a network segment. Limiting the cabling to two network arms (segments) radiating from the master controller will yield best signal results.

RM-232-485-4U   RS232 to RS485 Four Port Converter

Overview

This interface provides a convenient way to connect RS485 bussed RemoteTRAK I/O modules to a RS232 port on a master controller. Designed specifically for driving RemoteTRAK modules, this converter is fully automatic, requiring no user settings. Four RS485 ports are provided to allow up to 128 I/O modules to be connected in a star configuration (multiple network arms). Electrical isolation is provided between the RS232 and RS485 ports for increased reliability.

This RS232 to RS485 converter is recommended when:
1. RemoteTRAK I/O modules need to be connected to an RS232 port on the master controller.
2. More than 32 RemoteTRAK modules and/or other RS485 devices are to be addressed.
3. A "star" wiring configuration (more than two network wiring segments) is needed.
4. Electrical isolation between the RS485 party-line and the RS232 port on the master controller will increase reliability.
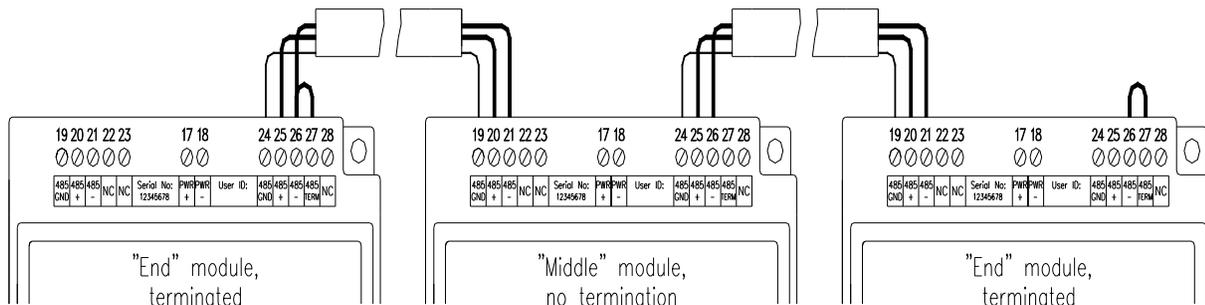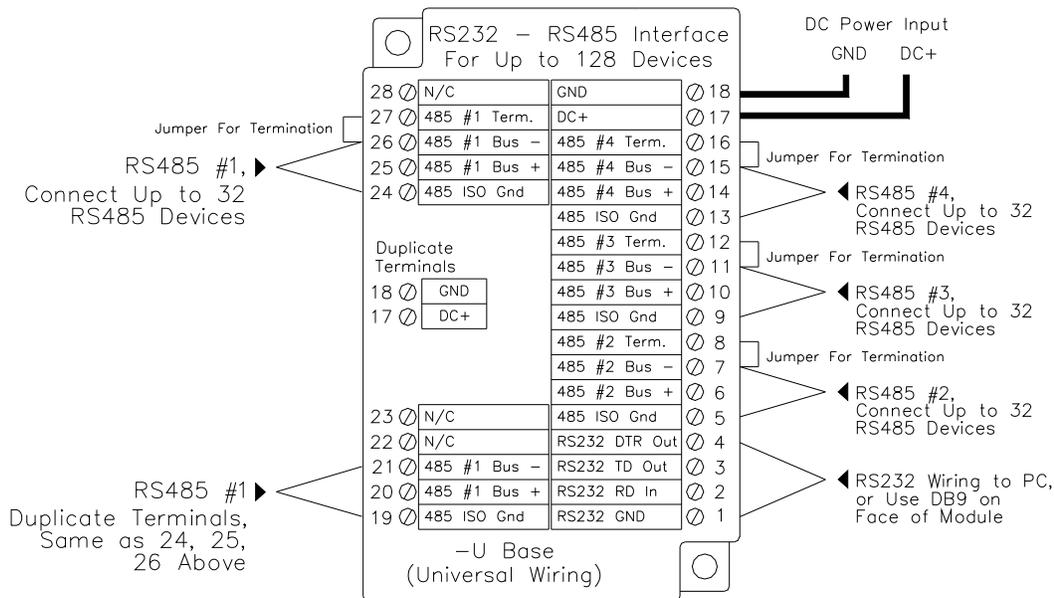
RS232 Wiring

Only the transmit (TD), receive (RD) and common return (GND) signals need be connected in the RS232 cable. A Sixnet ST-CABLE-PF or other suitable null modem cable may be connected to the DB9 connector in the face of the module. Alternatively, signals may be connected to the wiring base as shown in the upcoming diagram. The RM-232-485-4 module detects message direction and automatically generates a transmitter enable (keying) signal. The DTR signal is always high (asserted) to provide a pull up for any lines in the master controller that may need to be tied off.

RS485 Wiring

All four RS485 ports are interchangeable and may each drive up to 32 RemoteTRAK modules. In addition to the two wire signal pair, it is recommended that a shield or third ground conductor be connected to the RS485 ground terminal to reference all stations together. All four RS485 ports are referenced to the same internal signal common (ground), which is electrically isolated from the RS232 port and DC power input terminals. It is recommended that a jumper wire be connected between the "RS485(-)" terminal and "Term" terminal if this device is on the end of a network arm (i.e. it is the last station on the RS485 bus).
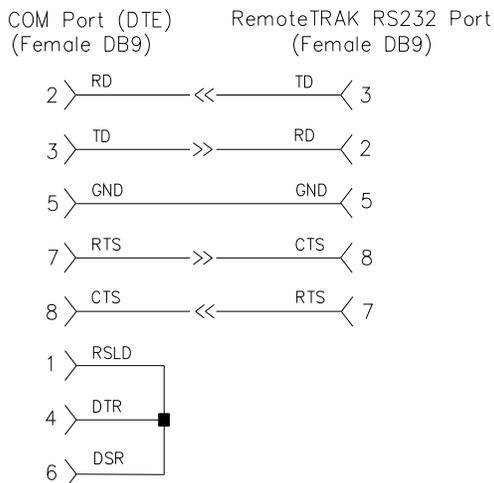
Screw Torque

All the screw terminals on the base should be tightened to a maximum of 3.48 in-lbs.

RS232 – RS485 Interface
For Up to 128 Devices

DC Power Input

GND   DC+

28	N/C	GND	18
27	485 #1 Term.	DC+	17
26	485 #1 Bus –	485 #4 Term.	16
25	485 #1 Bus +	485 #4 Bus –	15
24	485 ISO Gnd	485 #4 Bus +	14
		485 ISO Gnd	13
		485 #3 Term.	12
Duplicate Terminals		485 #3 Bus –	11
18	GND	485 #3 Bus +	10
17	DC+	485 ISO Gnd	9
		485 #2 Term.	8
		485 #2 Bus –	7
		485 #2 Bus +	6
23	N/C	485 ISO Gnd	5
22	N/C	RS232 DTR Out	4
21	485 #1 Bus –	RS232 TD Out	3
20	485 #1 Bus +	RS232 RD In	2
19	485 ISO Gnd	RS232 GND	1

–U Base
(Universal Wiring)

Jumper For Termination

RS485 #1,
Connect Up to 32
RS485 Devices

RS485 #1
Duplicate Terminals,
Same as 24, 25,
26 Above

Jumper For Termination

RS485 #4,
Connect Up to 32
RS485 Devices

Jumper For Termination

RS485 #3,
Connect Up to 32
RS485 Devices

Jumper For Termination

RS485 #2,
Connect Up to 32
RS485 Devices

RS232 Wiring to PC,
or Use DB9 on
Face of Module

"End" module,
terminated

"Middle" module,
no termination

"End" module,
terminated

ST–CABLE–PF

Cable for PC COM Port to RM–232–SETUP
or RM–232–485–4U   RS232 Port

COM Port (DTE)   RemoteTRAK RS232 Port
(Female DB9)   (Female DB9)

2	RD	<<	TD	3
3	TD	>>	RD	2
5	GND		GND	5
7	RTS	>>	CTS	8
8	CTS	<<	RTS	7
1	RSLD			
4	DTR			
6	DSR			

Section 3 | Configuration Tools

RM-232-SETUP   Portable Remote I/O Field Configuration Tool

Operation

This setup tool is the most convenient way to configure a RemoteTRAK I/O module. Unplug any module and insert this setup tool in its place. Commands from the Sixnet I/O Tool Kit software in your Windows-based PC store the configuration information into permanent memory in the module's base. This module automatically reads the unique serial number stored in the base, making it unnecessary for you to enter the serial number into the software manually. Upon reinsertion, the I/O module finds this configuration information, instantly configures itself and begins to scan I/O. It is permissible to configure RemoteTRAK modules in live systems using this setup tool.
**Note:**   RemoteTRAK "smart bases" allow hot swap of live modules -- an exclusive Sixnet feature.

Wiring

Connect this module to your Windows PC using a standard Sixnet ST-CABLE-PF RS232 cable. Only the transmit (TD), receive (RD) and common return (GND) signals are actively used. The RS232 port on this configuration tool is electrically isolated to protect your computer in the event of field wiring errors. This module requires DC supply power on terminals 17 and 18 on the wiring base it is plugged into. No other connections are required. (I/O wiring will be left undisturbed.)

RS232 Mode

This module always communicates to the host PC at 9600 baud, with no parity and eight data bits. Be sure to set the communications port on your computer to these default settings.
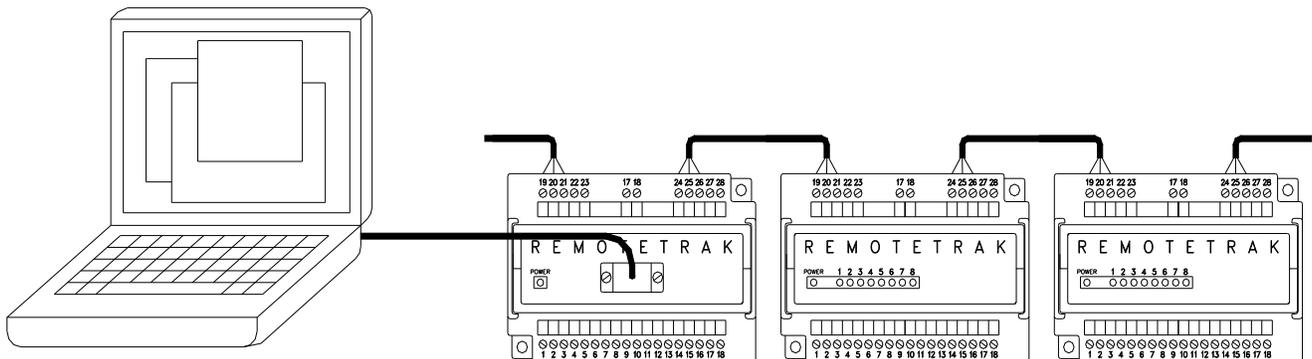
Alternative Setup Method

RemoteTRAK modules may also be configured by connecting the RS485 party-line to an RS485 port or RS232 port (through a converter) on your PC. It will be necessary to enter the serial number found on each module's base in the Sixnet I/O Tool Kit to enable this setup software to initially talk to each module. In most situations, setup through the RS485 port can only be done with the system off-line. Use a RM-232-SETUP module for on-line setup changes. (See above.)

Sixnet I/O Tool Kit

All configuration parameters are entered using the Sixnet I/O Tool Kit Windows software, which stores all setup information into permanent memory in each module's wiring base. No field jumpers or DIP switches are required on RemoteTRAK module (except wiring jumpers in the base of some 4 - 20 mA input modules).

Section 4 | Discrete Input Modules

RM-8DI2-F   8 Discrete Inputs / Counters with Direct Field Wiring Base
RM-8DI2-U   8 Discrete Inputs / Counters with Isolated Inputs

Overview

The popular field wired (**-F**) base provides a pre-wired connection to DC power for each of the eight discrete input channels. For applications which require individually isolated, ground sinking, or AC inputs, the universal wiring (**-U**) base is recommended. An input count feature uses analog input registers to accumulate the positive transitions of each input. More information on this and other features can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

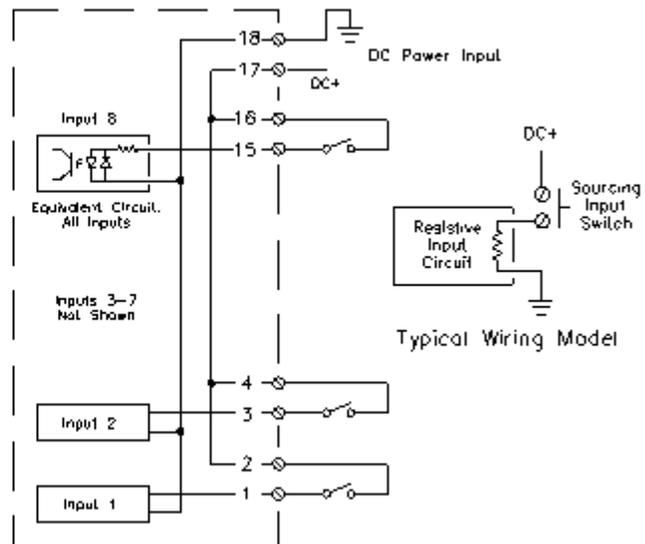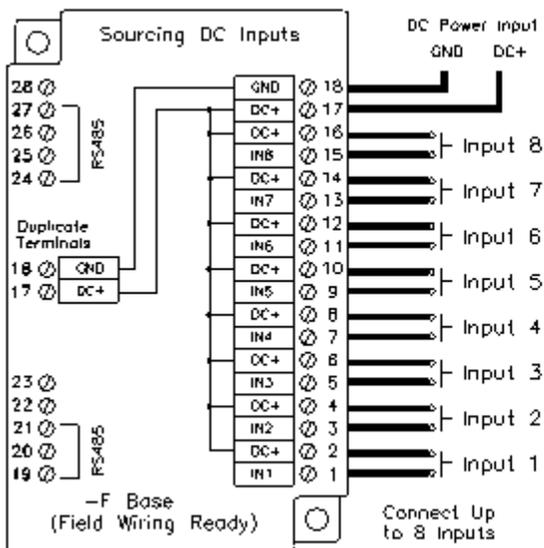|	
Number of Channels	8 discrete inputs with pulse counter feature
Input Voltage Range	10 - 30 VDC (-F base), 10 - 30 VDC/VAC (-U base)
Maximum Count Rate	100 Hz (6000 / minute) each input, plus selectable 2KHz (120,000 / minute) mode for input 1 only

-F Wiring

The even numbered terminals (2 - 16) on this field wiring ready base are pre-wired to the DC power (+) terminal. Adjacent pairs of terminals are connected to each input (switch) device.
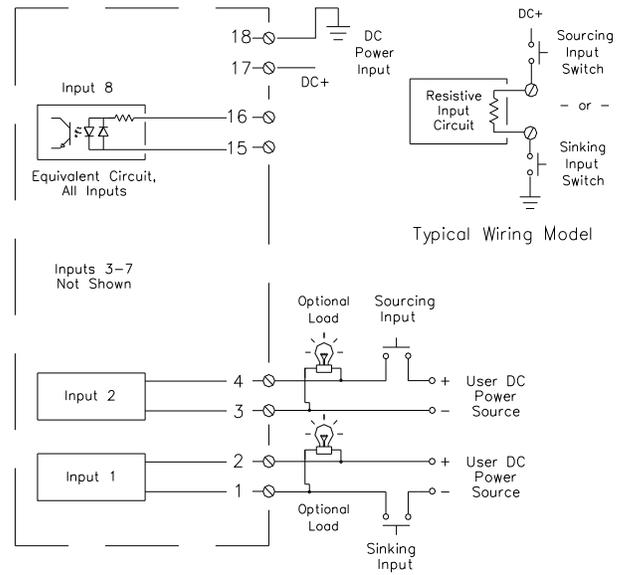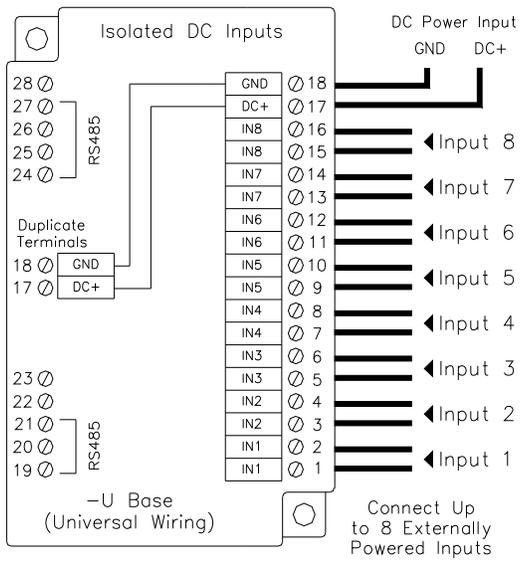
-U Wiring

A pair of floating terminals is provided for each input to provide channel-to-channel isolation (floating inputs) and a choice of sourcing (power switching), sinking (ground switching) or AC signals on each input.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Discrete Inputs	X0 - X7	10001 – 10008
Counter Inputs	AX0 - AX7	30001 - 30008 Unsigned values: 0 → 65,535

Isolated DC Inputs

			DC Power Input
			GND DC+

28			GND	18
27			DC+	17
26	RS485		IN8	16
25			IN8	15
24			IN7	14
			IN7	13
Duplicate Terminals			IN6	12
			IN6	11
18	GND		IN5	10
17	DC+		IN5	9
			IN4	8
			IN4	7
23			IN3	6
22			IN3	5
21	RS485		IN2	4
20			IN2	3
19			IN1	2
			IN1	1

Input 8
Input 7
Input 6
Input 5
Input 4
Input 3
Input 2
Input 1

–U Base
(Universal Wiring)

Connect Up
to 8 Externally
Powered Inputs

18 — DC Power Input
17 — DC+

Input 8
16
15

Equivalent Circuit,
All Inputs

DC+
Sourcing Input Switch
– or –
Resistive Input Circuit
Sinking Input Switch

Typical Wiring Model

Inputs 3–7
Not Shown

Optional Load   Sourcing Input

Input 2   4
           3
+ User DC Power Source
−

Input 1   2
           1
+ User DC Power Source
−
Optional Load

Sinking Input

RM-16DI2-H   High Density Discrete Input Module

Overview

Sixteen discrete inputs accept DC sourcing signals that are all tied to a common return. More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Channels	**16 discrete inputs (connected to a common DC source)**
Input Voltage Range	**10 - 30 VDC**
Input Current @ 12 VDC	**3.5 mA**
Input Current @ 24 VDC	**7.0 mA**

-H Wiring

This high density input module provides a single terminal input for each channel. Positive DC voltage must be applied to an input to indicate an ON condition. All channels are referenced to a common return which is connected to the negative side (ground) of the DC power source.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Discrete Inputs	X0 - X15	10001 – 10016
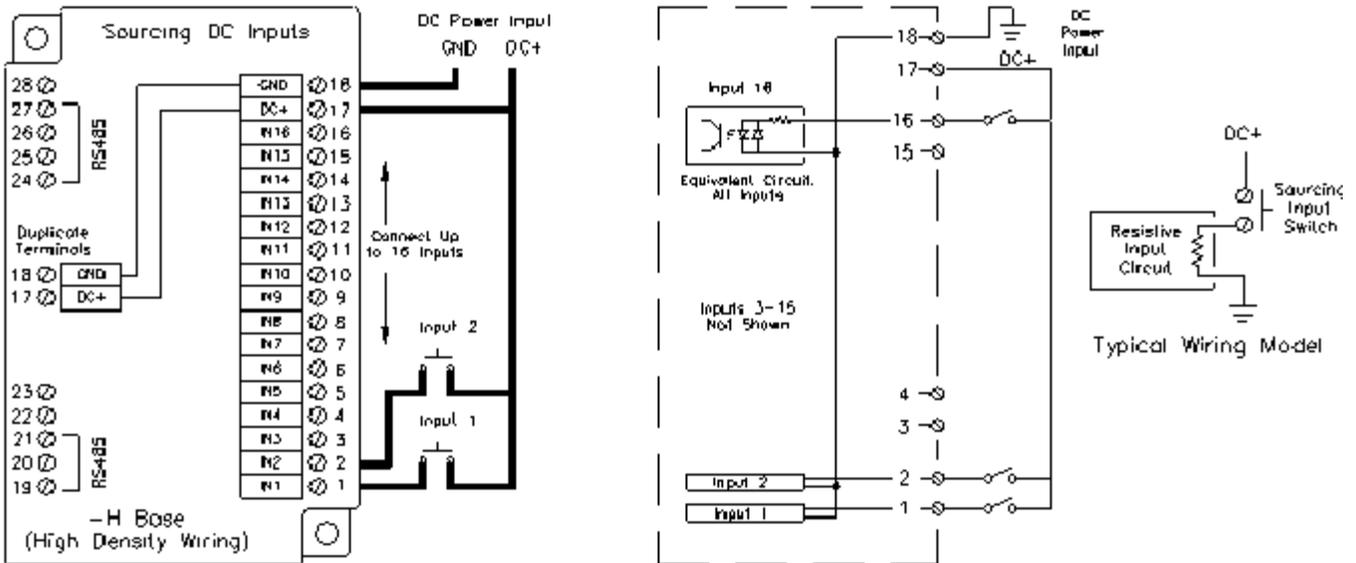
Section 5 | Discrete Output Modules

RM-8DO2-F   8 Channel High Output Current Module

Overview

Eight discrete output channels provide up to 3 Amps DC to motor contactors, valves, and other loads. Overload and thermal shutdown protection are provided. Each of the eight outputs may optionally be configured as Time Proportioned Outputs that pulse ON at a duty cycle proportional to an analog output register value. Typically these TPO outputs are controlled by a PID loop or other process algorithm in a control program. More information may be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Channels	**8 discrete outputs connected to a common DC source**
Output Voltage Range	**10 - 30 VDC**
Max. Load per Output	**3 Amps**
Max. Load per Module	**10 Amps**
Max. Inrush Current	**10 Amps (for 100 mS)**

-F Wiring

Two terminals, including a ground return, are provided for each output channel. All channels are powered by a common DC source which is connected to the DC power input terminal.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Discrete Outputs	Y0 - Y7	00001 - 00008
TPO Values	AY0 - AY7	40001 - 40008 0 to 100% ON: 0 → 32767

TPO Feature

Time proportioned outputs pulse ON and OFF with a duty cycle proportional to an analog value stored in an analog output register. TPO outputs are a low cost way to get smooth proportional control of heaters and other process variables. Typically, TPO analog output registers are assigned to the output of PID or other control logic in an ISaGRAF or other program. Use the Sixnet I/O Tool Kit to set pulse cycling as fast as 10 mS or as slow (many minutes) as your system dynamics require. Each output may be individually configured as a TPO or ordinary discrete output.
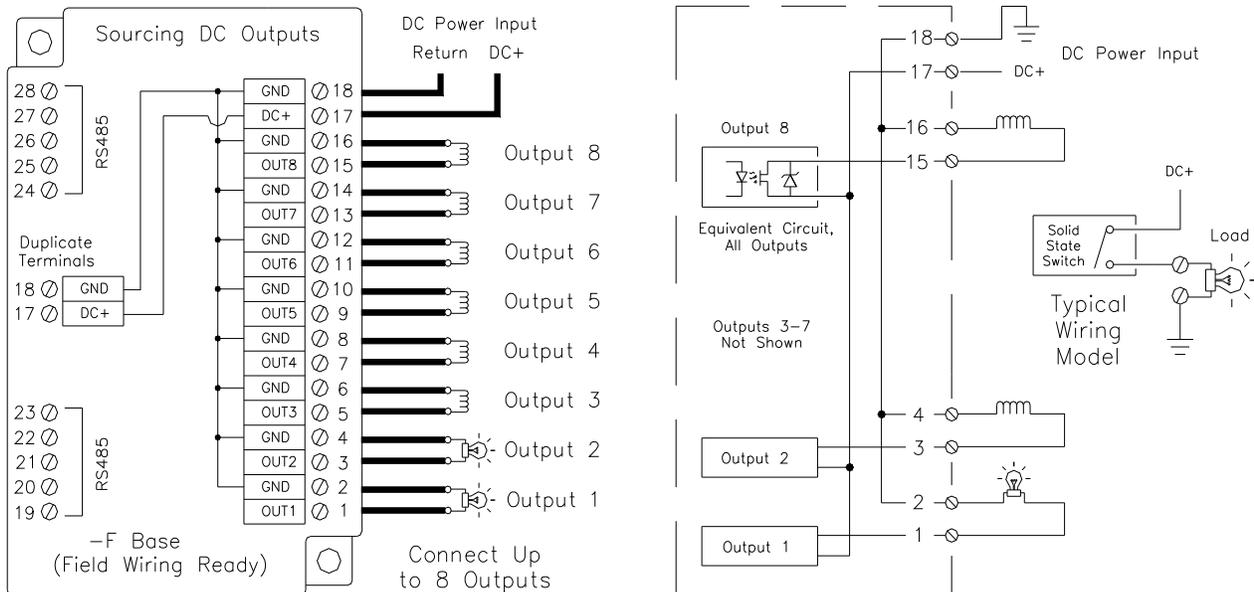
RM-16DO2-H   High Density Discrete Output Module

Overview

Sixteen discrete outputs provide power for loads up to 1 Amp. This module does not provide over current protection or TPO capabilities. More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Channels	**16 discrete outputs connected to a common DC source**
Output Voltage Range	**10 - 30 VDC**
Max. Load per Output	**1 Amp**
Max. Load per Module	**10 Amps**
Max. Inrush Current	**5 Amps (for 100 mS)**

-H Wiring

A single terminal is provided for each output channel. All outputs are powered from the DC power terminal. All channels are referenced to a common return which is connected to the negative side (ground) of the DC power source.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Discrete Outputs	Y0 - Y15	00001 - 00016

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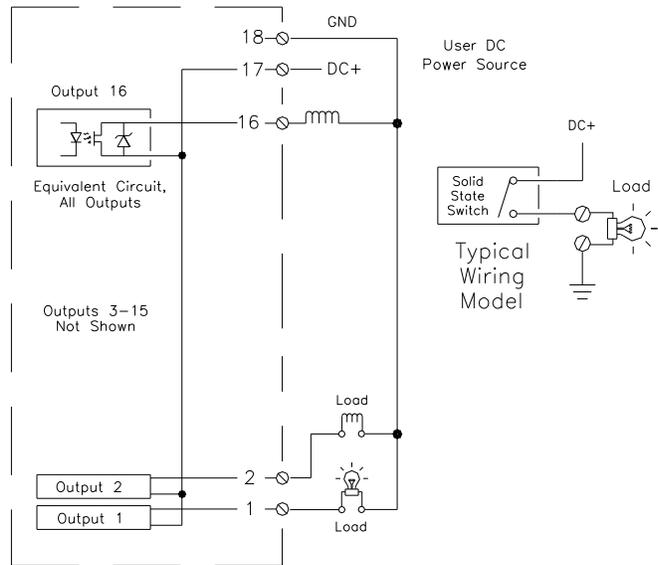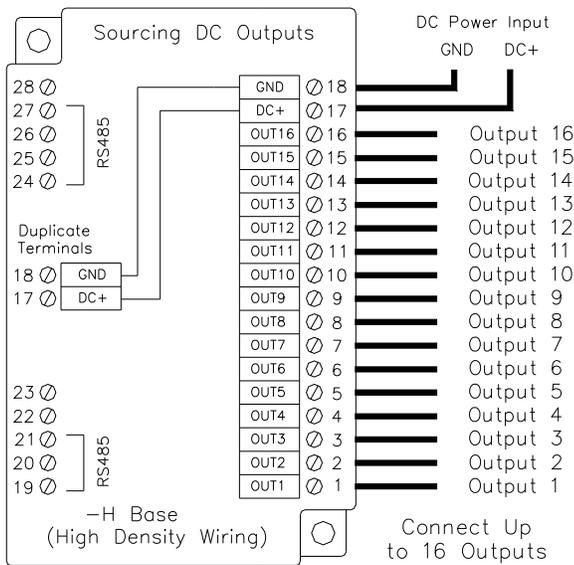
Section 6 | Analog Input Modules

RM-8AI2-F   8 Channel 4-20 mA Analog Inputs

Overview

Eight 4-20 mA inputs provide 16 bit high resolution analog measurements. Each input circuit in this module provides a field selectable choice of providing DC power (for loop powered transmitters) or accepting a ground return (from internally powered instruments). More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

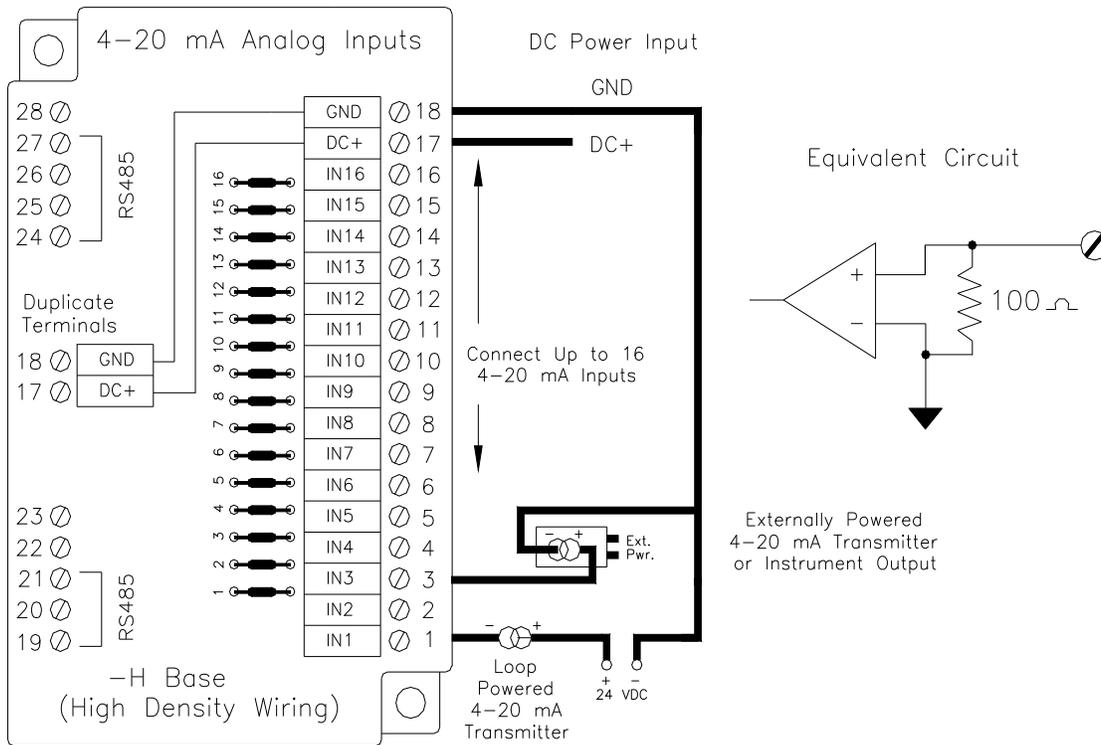|	
Number of Channels	**8 (16 bit resolution)**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA

-F Wiring

Two terminals are provided for each input channel. Either DC power or ground may be provided for each input device by setting a jumper inside the base. (Access these jumpers by unplugging the module and then opening the hinged door in the wiring base.) Refer to the diagram below. Please be sure to provide a suitable instrumentation ground to avoid measurement errors due to ground loops.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any socketed shunt that open circuits as a result of a current overload.

I/O Registers

Function	Sixnet Registers	Modbus Registers	
Analog Inputs	AX0 - AX7	30001 - 30008	Bipolar values: -32768 → 32767

RM-16AI2-H   High Density 4-20 mA Analog Input Module

Overview

Sixteen 4-20 mA inputs provide 16 bit high resolution analog measurements. More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Channels	**16 (16 bit resolution)**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA

-H Wiring

A single input terminal is provided for each measurement channel. Care must be taken to externally provide a suitable instrumentation ground for these single ended input circuits.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any socketed shunt that open circuits as a result of a current overload.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Analog Inputs	AX0 - AX15	30001 - 30016 Bipolar values: -32768 → 32767

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RM-8INS-U   Instrumentation Analog Input Module
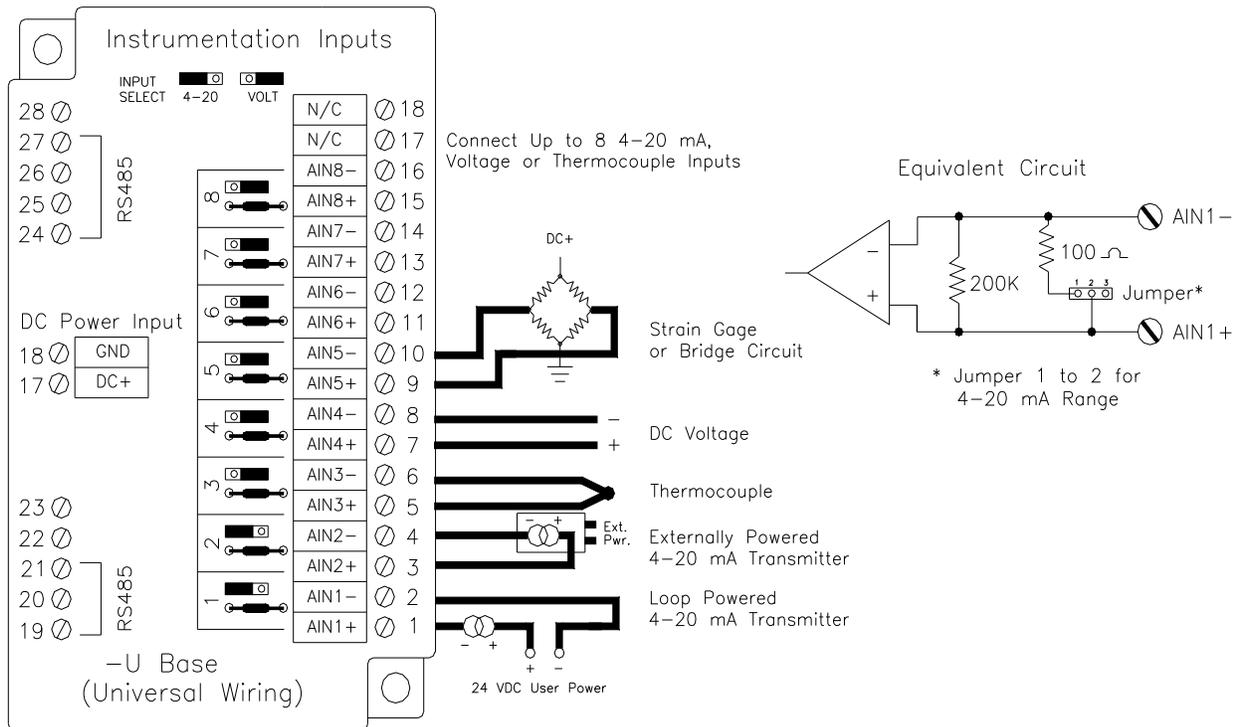
Overview

Eight isolated input channels provide 16 bit high resolution analog measurements. More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Channels	**8 (16 bit resolution)**
Input Ranges	**JKERTBCNS Thermocouples, 62 mV to 10V, 4 - 20 mA**
Input Impedance (4-20 mA)	**100 ohms Note:** input voltage drop = 2 volts at 20 mA
Input Impedance (other ranges)	**200K Ohms**

-U Wiring

Two input terminals are provided for each measurement channel. Channel to channel isolation is provided.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any socketed shunt that open circuits as a result of a current overload.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Analog Inputs	AX0 – AX7	30001 – 30008 Bipolar values: -32768 → 32767

Section 7 | Analog Output Modules

RM-8AO2-F   8 Channel 4-20 mA Analog Output Module
RM-4AO2-F   4 Channel 4-20 mA Analog Output Module

Overview

These analog output modules provide 4-20 mA signals as proportional control for process signals or to drive chart recorders or other measurement devices. More information may be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Channels	**4 or 8 (13 bit resolution -- 0.03% of full scale)**
Output Range	**4 - 20 mA**
Load Resistance Range	**0 - 750 ohms (at a supply voltage of 24 VDC)**

-F Wiring

Two terminals are provided for each output channel. Outputs are directly powered from the DC power connected to this module.

Note: Both modules use a RM-8AO2-FB wiring base. Only the first four channels are used on the RM-4AO2-F. System capacity may be increased by plugging a RM-8AO2-M eight channel module into a base previously occupied by a RM-4AO2-M four channel module.

I/O Registers

Function	Sixnet Registers	Modbus Registers
Analog Outputs	AY0 - AY7	40001 - 40008 Positive values: 0 → 32767

Note: Only the first four registers are used on the RM-4AO2-F.
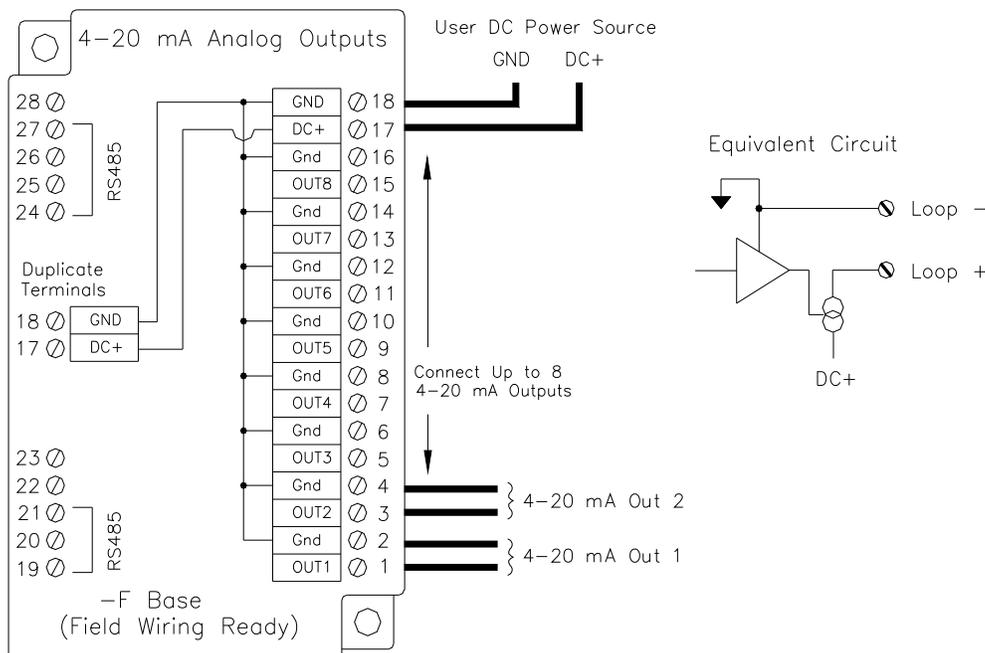
Section 8 | Combination I/O Modules

RM-4DI2-4DO2-U   Combined Discrete Input and Output Module

Overview

This module combines four discrete inputs and four discrete outputs. An input count feature uses analog input registers to accumulate the positive transitions of each input. Each of the four outputs may optionally be configured as Time Proportioned Outputs that pulse ON at a duty cycle proportional to an analog output register value. More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.
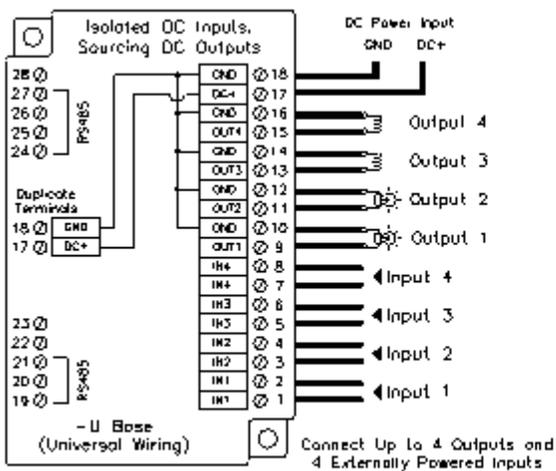
Number of Discrete Inputs	**4**
Input Voltage Range	**10 - 30 VDC/VAC**
Number of Discrete Outputs	**4**
Max. Load per Output	**1 Amp**
Max. Inrush Current	**5 Amps (for 100 mS)**

-U Wiring

A pair of floating terminals is provided for each input to provide channel-to-channel isolation and a choice of sourcing (power switching), sinking (ground switching) or AC signals on each input. The outputs all switch power from the DC power input terminal. A ground return for each output is provided for your convenience.

I/O Registers

Function	Sixnet Registers	Modbus Registers	
Discrete Inputs	X0 - X3	10001 – 10004	
Discrete Outputs	Y0 - Y3	00001 – 00004	
Counter Inputs	AX0 - AX3	30001 - 30004	Unsigned values: 0 → 65,535
TPO Values	AY0 - AY3	40001 - 40004	0 to 100% ON: 0 → 32767

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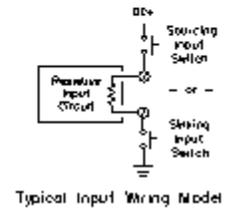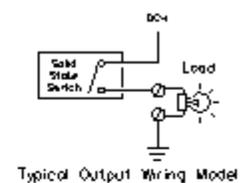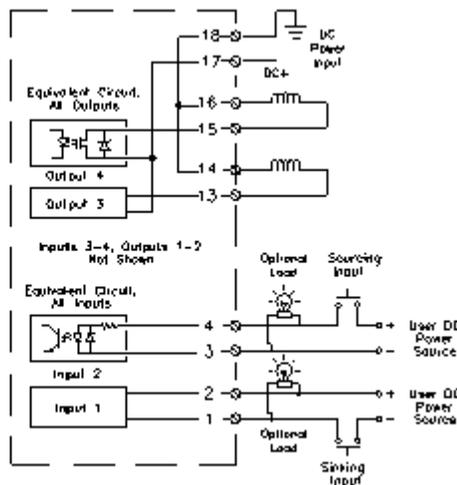
RM-4DI2-4AI2-U   Combined Discrete Input and Analog Input Module

Overview

This module combines four discrete inputs and four analog inputs. A discrete input count feature uses analog input registers to accumulate the positive transitions of each input. The four analog inputs accepts signals from internally powered or loop powered devices. More information can be found in the on-line help of the Sixnet I/O Tool Kit.

|	
Number of Discrete Inputs	**4**
Input Voltage Range	**10 - 30 VDC**
Number of Analog Inputs	**4**
Input Range	**4 - 20 mA**
Input Impedance	**100 ohms** **Note:** input voltage drop = 2 volts at 20 mA

-U Wiring

A pair of floating terminals is provided for each discrete input to provide channel-to-channel isolation and a choice of sourcing (power switching), sinking (ground switching) or AC signals on each input. Two terminals are provided for each analog input channel. Either DC power or ground may be provided for each input device by setting a jumper inside the base. (Access these jumpers by unplugging the module and then opening the hinged door in the wiring base.) Refer to the diagram below. Please be sure to provide a suitable instrumentation ground to avoid measurement errors due to ground loops.

Current Shunts

Precision 100 ohm current shunts, beneath the hinged access door in the wiring base, pass current and maintain loop integrity for each of the four analog input channels even if the module is unplugged. A spare shunt is provided and may be simply inserted in place of any socketed shunt that open circuits as a result of a current overload.

I/O Registers

Function	Sixnet Registers	Modbus Registers	
Discrete Inputs	X0 - X3	10001 - 10004	
Analog Inputs	AX0 - AX3	30001 - 30004	Bipolar values: -32768 $\rightarrow$ 32767
Counter Inputs	AX4 - AX7	30005 - 30008	Unsigned values: 0 $\rightarrow$ 65,535
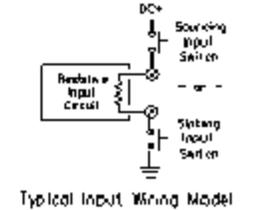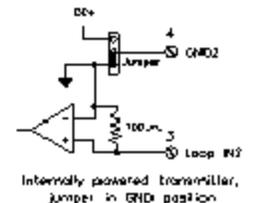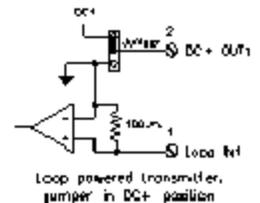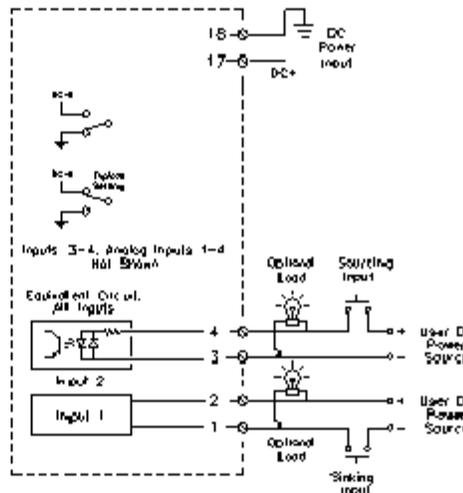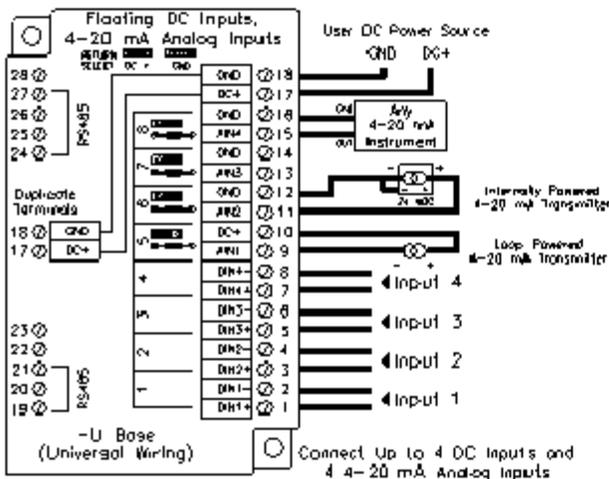
Section 9 | RemoteTRAK RTU

RM-RTU-8440-F   Combination I/O module and RTU

Overview

This I/O module / RTU combines eight sourcing or sinking (jumper selectable) discrete inputs, four sourcing discrete outputs and four 4-20 mA analog inputs. An input count feature uses analog input registers to accumulate the positive transitions of each input. Optionally, the first two inputs can be configured as high-speed (10 KHz) counter inputs. More information can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

Number of Discrete Inputs	8
Input Voltage Range	10 - 30 VDC
Number of Discrete Outputs	4
Max. Load per Output	1 Amp
Max. Inrush Current of Outputs	5 Amps (for 100 mS)
Number of Analog Inputs	4
Standard Range	4-20 mA with internal, self-resetting fuse protection

Discrete Inputs

The eight discrete inputs of this module are jumper selectable to be sourcing or sinking. You must set this jumper to match the way the inputs are connected or the input LEDs of the module will not light under any circumstances. The default factory setting is: "Sourcing (jumper to -)", which is appropriate for most situations in which a positive voltage is applied to an input to indicate an "ON" condition. Select "Sinking (jumper to +)" for "ON" inputs corresponding to ground closures that require a positive reference as an opposing return connection.

I/O Registers

Function	Sixnet Registers	Modbus Registers	
Discrete Inputs	X0 – X7	10001 – 10008	
Discrete Outputs	Y0 - Y3	00001 – 00004	
Counter Inputs	AX0 – AX7	30001 - 30008	Unsigned values: 0 → 65,535
Analog Inputs	AX8 – AX11	30009 – 30012	

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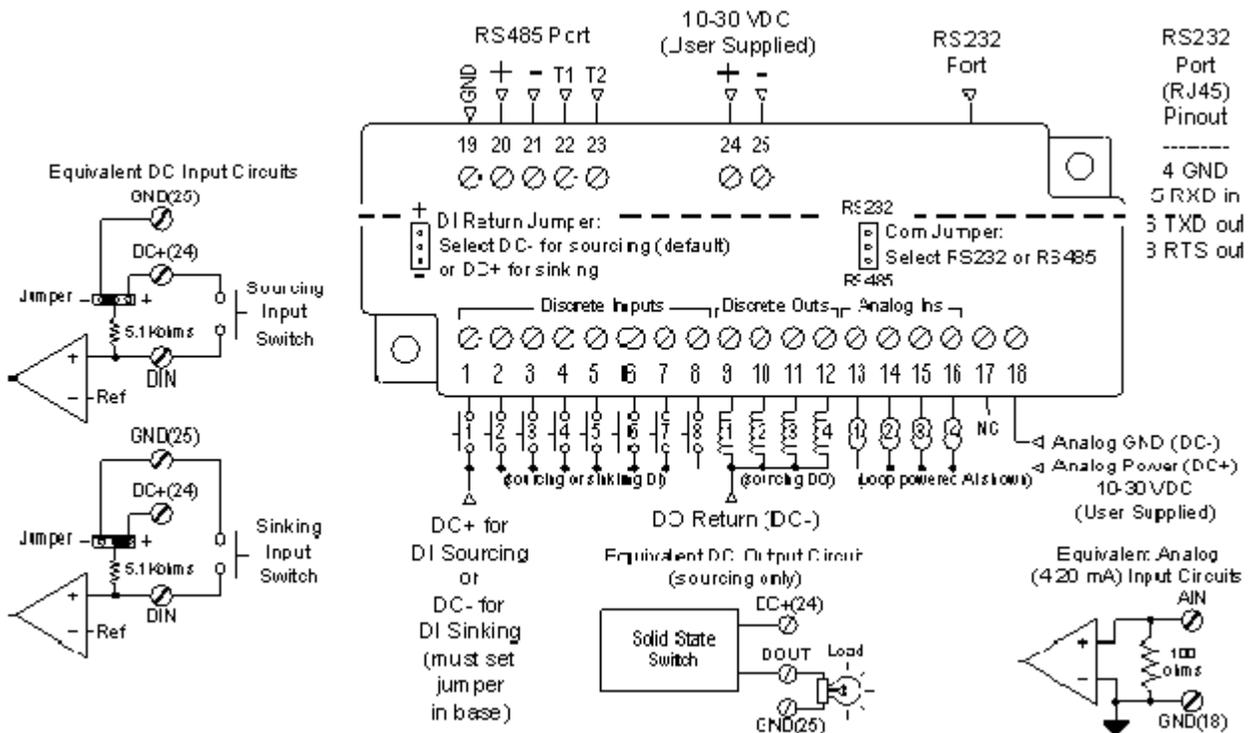
| **Serial port Connections** | The RM-RTU-8440-F has one communication port that is jumper-selectable to be connected to the RS485 interface or the RS232 interface. This jumper is factory defaulted to the RS232 position. |

RS485 connections are made through screw terminals 19 through 23 on the base. RS232 connections are made through a RJ45 connector on the topside of the base. Signals supported include RD, TD, RTS and GND. Communication is half duplex. The RS485 / RS232 jumper is located behind an access door in the base assembly. This door is accessed by unplugging the RM-RTU-8440 logic module from the base.

**Resetting the Serial Port**

The default communication parameters for the serial port are 9600 baud, 8 data bits, 1 stop bit and no parity. The serial port can be reset to the default communication parameters by using the "Reset System Com Port" command in the Sixnet I/O Tool Kit program. More information on this feature can be found in the on-line help supplied with the Sixnet I/O Tool Kit.

RS232 Interface Connections

A RJ45 female connector is provided on the base of the RM-RTU-8440-F. The pin-outs follow the EIA/TIA-561standard (See the figure below.) A pre-wired DB9F to RJ45F adapter is included with these units. Use this adapter along with a RJ45 male to RJ45 male straight-thru wired patch cable (not included) to make a connection between a com port on your PC (DB9 male) and this RJ45 female connector. Refer to the Sixnet Electronic catalog for more information on connecting to other equipment.
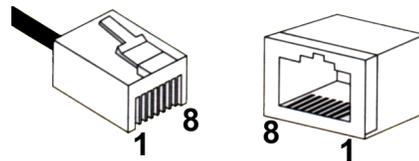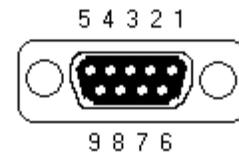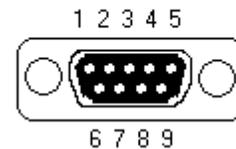
Typical PC Adapter Wiring:

Sixnet RJ45F Pin #, Signal Name	RJ45F to DB9F Adapter wire color	DB9 Female Connector Pin #, Signal Name
1 N/A	Blue	4 DTR out
2 N/A	Orange	N/C
3 N/A	Black	6 DSR in
4 GND	Red	5 GND
5 RXD in	Green	3 TXD out
6 TXD out	Yellow	2 RXD in
7 N/A	Brown	7 RTS out
8 RTS out	White	8 CTS in

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Typical Modem Adapter Wiring:

Sixnet RJ45F Pin #, Signal Name	RJ45F to DB9M Adapter wire color	DB9 Male Connector Pin #, Signal Name
1 N/A	Blue	9 RI out
2 N/A	Orange	1 DCD out
3 N/A	Black	4 DTR in
4 GND	Red	5 GND
5 RXD in	Green	2 RXD out
6 TXD out	Yellow	3 TXD in
7 N/A	Brown	8 CTS out
8 RTS out	White	7 RTS in

RS485 Interface Connections

RS485 connections are made to screw terminals on the base assembly. These terminals provide a RS485 (2-wire, half duplex only) connection to a network of Sixnet RemoteTRAK I/O modules and/or other equipment. Four terminals (for signal ground, 485+, 485-, & termination) are provided. Generally, you connect + to + and – to – between units. However, since there is no standard for RS485 terminal designations you may need to connect + to – and – to + in some cases. No damage to Sixnet equipment will result if you connect incorrectly. It is highly recommended that you tie the signal ground to an appropriate ground (if available) between all RS485 units. Make sure to use a good quality communication cable with three conductors (twisted is preferred) plus a shield. To prevent ground loops, the shield should be connected to chassis ground on only one end of any cable run.

Note: If you have existing wiring that has only two conductors and a shield, you can use the shield to connect the signal grounds between stations. This is not optimal (especially for long cable runs) but should work in most situations.

RS485 Termination: The RM-RTU-8440-F has RS485 termination components (150 ohm resistor and a 0.1 µF capacitor connected in series) already inside. To terminate your RS485 network just tie the "T" terminal to the RS485 – terminal. Make sure to use the same type and size conductor as used already used for your RS485 – connection. It is recommended that both end stations of your RS485 network be terminated. Avoid terminating more than two stations. Refer to section 2 of this User Manual for information on terminating RemoteTRAK I/O Modules. For 3rd party devices, please refer to their user manual for termination instructions.

Bias Resistors: On a RS485 2-wire network, a pair of bias resistors (1K ohm typically) acting upon the transmit/receive wires may be required. If bias resistors are not present, the receive inputs on some RS485 devices may react to noise on the floating wires. The bias resistors will force the transmit/receive wires to a known (non-floating) state when none of the RS485 devices are transmitting data. Some RS485 devices have bias resistors built-in, and are enabled through DIP-switch or jumper settings. Make sure there is only one pair of bias resistors acting upon the network.

Note: If your RS485 network is made up exclusively of Sixnet devices then these bias resistors are not necessary.

Section 10

Service Information

We sincerely hope that you never experience a problem with any **Sixnet** product. If you do need service, call **Sixnet** at (518) 877-5173 and ask for Applications Engineering. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

Sixnet tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

The applications engineer you are speaking with will fill out an RMA request for you. If the unit has a serial number, we will not need detailed financial information. Otherwise, be sure to have your original purchase order number and date purchased available.

We suggest that you give us a repair purchase order number in case the repair is not covered under our warranty. You will not be billed if the repair is covered under warranty.

Please supply us with as many details about the problem as you can. The information you supply will be written on the RMA form and supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner. Normally, repairs are completed in two days. Sometimes difficult problems take a little longer to solve.

If you need a quicker turnaround, ship the unit to us by air freight. We give priority service to equipment that arrives by overnight delivery. Many repairs received by mid-morning (typical overnight delivery) can be finished the same day and returned immediately.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

For Your Convenience:
Please fill in the following and keep this manual with your **Sixnet** system for future reference:

P.O. #:_____   Date Purchased: _____

Purchased From:_____

Product Support

To obtain support for Sixnet products, call Sixnet and ask for applications engineering. Our phone numbers are:

    1.518.877.5173 Office
    1.518.877.8346 Fax
    e-mail: support@sixnet.com

Our mailing address:
Sixnet
331 Ushers Rd.
Ballston Lake, NY 12019