

SixTRAK I/O



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SIXNET SixTRAK® Local I/O Selection Guide

| Part Number (Module w/ Base) | I/O Count | | | | Description | Data Sheet No. |
|---------------------------------|-----------|----|----|----|--|----------------|
| | DI | AI | DO | AO | | |
| ST-DI-005-08U or F | 8 | - | - | - | 4-10 VAC/VDC | 1 |
| ST-DI-024-08U or F | 8 | - | - | - | 10-32 VAC/VDC | 2 |
| ST-DI-048-08U or F | 8 | - | - | - | 32-60 VAC/VDC | 3 |
| ST-DI-120-08U or F | 8 | - | - | - | 60-140 VAC/VDC | 4 |
| ST-DI-240-08U or F | 8 | - | - | - | 140-265 VAC | 5 |
| ST-DI-024-16H | 16 | - | - | - | 10-32 VDC, high density | 6 |
| ST-MIX16880-D * | 16 | 8 | 8 | - | Combination, double density I/O | 7 |
| ST-MIX12884-D * | 12 | 8 | 8 | 4 | Combination I/O w/4 AO | 8 |
| ST-DI-024-32D | 32 | - | - | - | 10-32 VDC, double density | 9 |
| ST-DI-CNT-08U | 8 | - | - | - | 4-30VDC, high-speed counters - 50 kHz | 10 |
| ST-D0-DC1-08U or F | - | - | 8 | - | 0-60 VDC, 2A/channel | 11 |
| ST-D0-DC3-08U or F | - | - | 8 | - | 60-150 VDC, 1A/channel | 12 |
| ST-D0-AC1-08U or F | - | - | 8 | - | 16-140 VAC, 2A/channel | 13 |
| ST-D0-AC2-08U or F | - | - | 8 | - | 140-265 VAC, 2A/channel | 14 |
| ST-DO-DC2-16H | - | - | 16 | - | 10-32 VDC, 0.5 Amps per channel | 15 |
| ST-D0-RLY-06U | - | - | 6 | - | Form C (SPDT), 0-140 VAC/VDC, 2A | 16 |
| ST-AI-INS-08U | - | 8 | - | - | Instrumentation - thermocouples, mV... | 17 |
| ST-AI-20M-08F | - | 8 | - | - | 4-20 mA, field wiring ready | 18 |
| ST-AI-20M-16H | - | 16 | - | - | 4-20 mA, high density configuration | 19 |
| ST-AI-10V-08F | - | 8 | - | - | +/- 1, 2, 5, 10 volts | 20 |
| ST-AI-RTD-06U | - | 6 | - | - | RTD (100 Ohm platinum), -200 to 850°C | 21 |
| ST-AI-RTC-06U | - | 6 | - | - | RTD (10 Ohm copper), -200 to 260 °C | 22 |
| ST-AO-20M-04F | - | - | - | 4 | 4-20 mA (requires 10-30V loop power) | 23 |
| ST-AO-20M-08F | - | - | - | 8 | 4-20 mA (requires 10-30V loop power) | 24 |
| ST-AO-10V-08F | - | - | - | 8 | 0-5, 0-10, +/-5, and +/-10 volt | 25 |

SixTRAK I/O must be connected to a **SIXNET** Controller or RTU, such as a:

- SixTRAK IPm Open DCS Controller (ST-IPM-####)
- VersaTRAK IPm Open RTU (VT-IPM-####)
- SixTRAK I/O Controller (ST-GT-1210)
- EtherTRAK Redundant Ethernet I/O Gateway (ET-GT-ST-3)
- EtherTRAK I/O Concentrator (ET-GT-ST-2) (* does not support ST-MIX modules)

* Note: The ST-MIX are supported only by IPm-based SIXNET Controllers, RTUs, & Gateways.

Select these input modules when...

...modularity and the convenience of pre-wired field terminals will reduce your panel wiring.

- Optical isolation on each channel for best reliability
- Autopolarity for DC sinking or sourcing wiring
- Counting to 6000 pulses per minute



Performance Specifications

| For each type: | -005 | -024 | -048 | -120 | -240 | |
|---------------------------------------|-------------|---|------|----------|------|--------|
| Number of channels | 8 | 8 | 8 | 8 | 8 | |
| Nominal input voltage (AC or DC) | 5 | 12/24 | 48 | 120 | – | VAC/DC |
| (AC only) | – | – | – | (Note 3) | 240 | VAC |
| Guaranteed ON voltage (AC or DC) | 4 | 10 | 32 | 60 | 140 | VAC/DC |
| Maximum AC voltage | 10 | 32 | 60 | 140 | 265 | VAC |
| Maximum DC voltage | 10 | 32 | 60 | 140 | – | VDC |
| Guaranteed OFF current | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | mA DC |
| Guaranteed OFF voltage | 1.5 | 3.5 | 6.0 | 25 | 50 | VDC |
| Input resistance | 510 | 2.2K | 7.5K | 18K | 36K | Ohms |
| Nominal input current | 7.5 | 5/10 | 6.5 | 6.5 | 6.5 | mA |
| Fast DC mode ON/OFF delay | 4 | 4 | 4 | 4 | – | mS |
| Filtered mode On/OFF delay (Note 1) | 25 | 25 | 25 | 50 | 50 | mS |
| Maximum count frequency (Note 2) | 100 | 100 | 100 | 100 | 10 | Hz |
| Channel to channel isolation w/U base | 500 | 500 | 500 | 500 | 500 | Volts |
| Maximum ST-Bus power | 250 mW | Notes: 1. Configurable smart logic filtering ignores transients, power line dropouts and switch contact bounce. 2. A count of OFF to ON transitions for each input is reported in a 16 bit register. 3. ST-DI-120-08F: specified for AC or DC sourcing wiring; not for grounded switch closures. | | | | |
| Isolation (input to ST-Bus) | 1200 V | | | | | |
| Operating temperature range | -30 to 70°C | | | | | |
| Storage temperature range | -40 to 85°C | | | | | |
| Humidity (non-condensing) | 5 to 95% | | | | | |

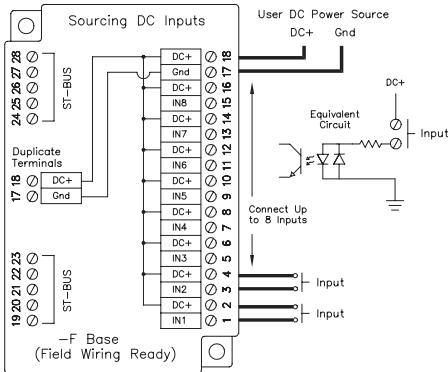
Ordering Information

| Input Range | Field Wiring Base | Universal Wiring Base | Replacement Module |
|---------------|-------------------|-----------------------|--------------------|
| 4-10 VDC | ST-DI-005-08F | ST-DI-005-08U | ST-DI-005-08M |
| 10-32 VAC/DC | ST-DI-024-08F | ST-DI-024-08U | ST-DI-024-08M |
| 32-60 VAC/DC | ST-DI-048-08F | ST-DI-048-08U | ST-DI-048-08M |
| 60-140 VAC/DC | ST-DI-120-08F | ST-DI-120-08U | ST-DI-120-08M |
| 140-265 VAC | ST-DI-240-08F | ST-DI-240-08U | ST-DI-240-08M |

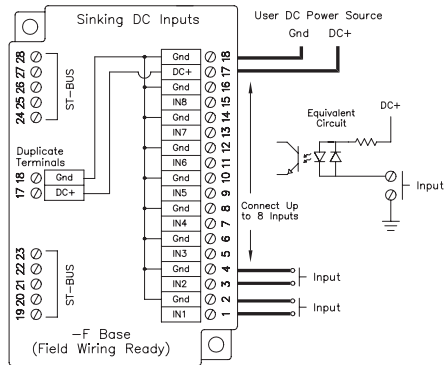
Select a Field Wiring Ready Base when...

...pre-wired field terminals will save you design, panel wiring and installation time.

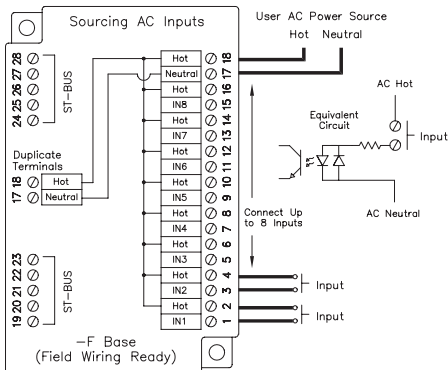
For most DC applications:



For special inputs from grounded switch closures:



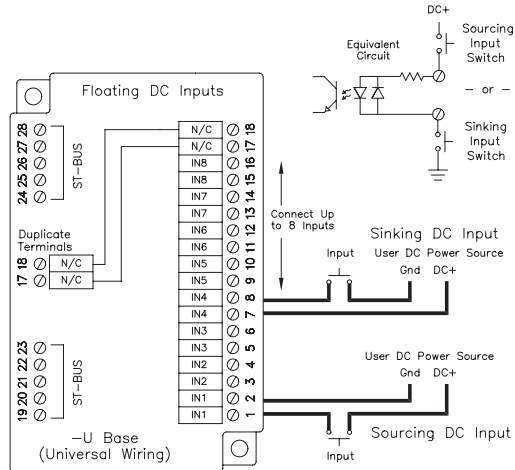
For AC applications with inputs on a single AC service:



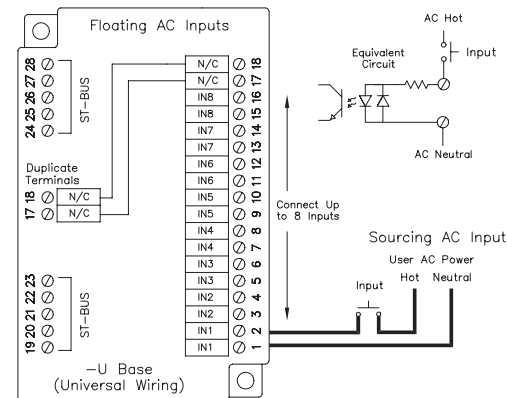
Select a Universal Base when...

...special requirements call for individually isolated input circuits with independent (floating) wiring.

For special DC applications:



For special AC applications:



Note: In AC applications, each input may be wired to independent AC sources or line phases.

High Density Discrete Input Module

Select high density discrete inputs when...

...isolation by module is suitable, and the convenience of return wiring terminals (provided on eight channel input modules) is not required.

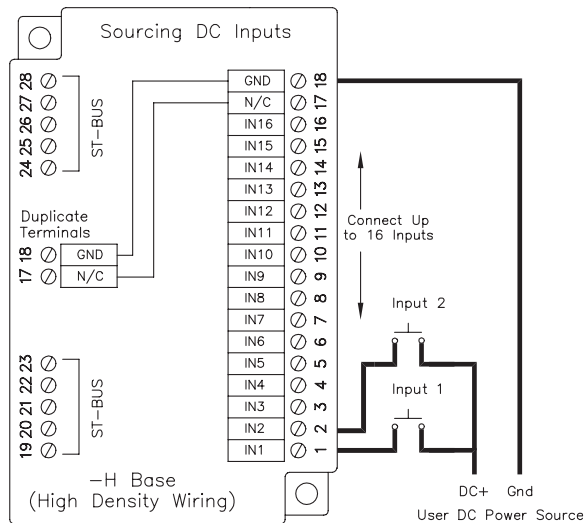
- High density inputs save space and reduce cost
- All inputs return to a common ground
- Isolation protects system wiring from faults



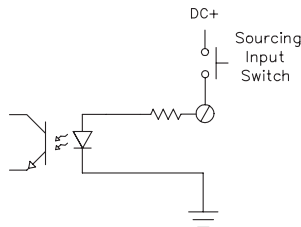
| Performance Specifications | | |
|---------------------------------|-----------------|----------------|
| | ST-DI-024-16 | ST-DI-120-16 |
| Number of channels | 16 | 16 |
| Nominal input voltage | 12/24 VDC | 120 VAC |
| Guaranteed ON voltage (note 1) | 10 VDC | 70 VAC |
| Maximum input voltage | 32 VDC | 140 VAC |
| Input resistance | 3.3K Ohms | 22K Ohms |
| Input current | 3.5 mA@12 volts | 5.5 mA@120 VAC |
| | 7 mA@24 volts | |
| Guaranteed OFF current (note 2) | 1.0 mA DC | 1.0 mA DC |
| Guaranteed OFF voltage (note 2) | 4.0 VDC | 25 VAC |
| Maximum ON delay | 4 mS | 50 mS |
| Maximum OFF delay | 4 mS | 50 mS |
| Maximum ST-Bus power | 600 mW | |
| Isolation (input to ST-Bus) | 1200 V | |
| Operating temperature range | -30 to 70°C | |
| Storage temperature range | -40 to 85°C | |
| Humidity (non-condensing) | 5 to 95% | |

Notes: 1. Minimum voltage guaranteed to turn the module ON.
2. The maximum input current/voltage that will not switch the input from OFF to ON.

ST-DI-024-16H wiring



Equivalent Circuit



Ordering Information

| Description | Module w/Base | Module Only |
|-------------|---------------|---------------|
| 10-32 VDC | ST-DI-024-16H | ST-DI-024-16M |
| 120 VAC | ST-DI-120-16H | ST-DI-120-16M |

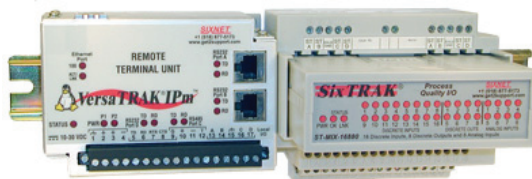
Double density I/O expansion for SIXNET controllers and RTUs

Select this SixTRAK® module when . . .

. . . you have a mix of I/O types, and reduced panel space and lowest cost are important requirements.

- ? Up to 16 Discrete Inputs, 8 Discrete Outputs, 8 Analog Inputs and 4 Analog outputs in one compact module
- ? High density design saves space and reduces cost
- ? 16 bit A/D converter for precision measurements
- ? DIN rail or direct panel mountable
- ? True hot swap of modules in live systems
- ? Ideal for small RTU or remote station applications

This module combined with a VersaTRAK IPm makes the perfect small RTU system.



The VersaTRAK IPm is the ultimate open Remote Terminal Unit with open-source Linux software, powerful communications and advanced programming capabilities.

(Note: The ST-MIX is supported only by IPm-based SIXNET Controllers, RTUs, and Gateways.)



ST-MIX16880-D

This model has 16 discrete inputs, 8 discrete outputs, and 8 analog inputs.

ST-MIX12884-D

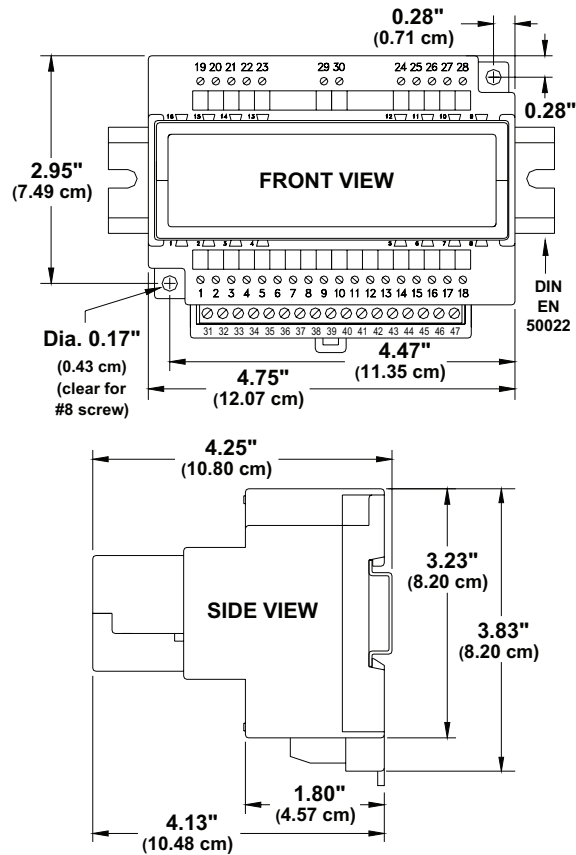
This model has 12 discrete inputs, 8 discrete outputs, 8 analog inputs and 4 analog outputs.



Performance Specifications

| | |
|--|---|
| Discrete inputs | 12 or 16 channels |
| Voltage range | 10-30 VDC (sinking or sourcing) |
| Guaranteed ON voltage | 9 VDC |
| Maximum voltage | 30 VDC |
| Guaranteed OFF volt & current | 5.0 VDC & 1.5 mA DC |
| Input resistance | 10K Ohms |
| Input current @ 24 VDC | 3 mA |
| Filtered ON/OFF delay | 25 mS (20 Hz max. counting) |
| Fast ON/OFF delay | 4 mS (100 Hz max. counting) |
| Counter Inputs | 1st 8 Discrete Channels |
| Maximum count rate | 100 Hz. (10 KHz. on channel 1) |
| Counter modes | Pulse, rate and run-time |
| Pulse-rate mode period | 0.1 second to 1 minute |
| Run-time mode options | Seconds or minutes |
| Discrete Outputs | 8 channels |
| Voltage range | 10-30 VDC (sourcing only) |
| Max. output per channel | 1 Amp |
| Max. output per module | 8 Amps |
| Max. OFF state leakage | 0.05 mA |
| Minimum load | 1 mA |
| Inrush current (100 mS surge) | 5 Amps |
| Typical ON resistance | 0.3 Ohms |
| Typical ON voltage (@1A) | 0.3 VDC |
| Analog Inputs | 8 channels |
| Range | 4-20 mA |
| A/D resolution | 16 bits (0.003%) |
| Full scale accuracy | +/-0.1% (@20°C) |
| Span & offset temp. coefficient | +/-50 ppm per degree C |
| Input impedance | 100 Ohm |
| Current protection | Self-resetting fuses |
| Open loop detection | Yes, reports negative below 4 mA |
| DMRR (differ. mode rejection) | 66 dB at 50/60 Hz |
| Analog Outputs | up to 4 channels |
| Range | 4-20 mA |
| D/A resolution | 16 bits (less than 1µA) |
| Full scale accuracy | +/- 0.02% (@20°C) |
| Span & offset temp coefficient | +/- 50 ppm per °C typical |
| Max output settling time | 5 mS (to .05%) |
| Load resistance range | 0-750 Ohms (@ +24 VDC) |
| Short Circuit protection | Current limiting |
| Environmental | DIN rail or panel mounting |
| Input voltage | 10-30 VDC |
| Maximum ST-Bus power | 1500 mW (10-30 VDC) |
| Isolation (I/O to ST-Bus) | 1200 Volts |
| Operating temp. range | -40 to +70°C (-40 to +85°C storage) |
| Humidity (non-condensing) | 5 to 95% RH |
| Vibration | IEC68-2-6 |
| Electrical safety | UL508, CSA C22.2/14;EN61010 |
| EMI emissions | FCC part 15, ICES-003, EN55022 |
| EMC immunity | EN50082-1,EN61326-1 |
| Surge withstand | IEEE-472 |
| Hazardous locations (Class 1, Div 2 and Zone 2) | UL1604, CSA C22.2/213, EN50021, EEx nA II T4 X |
| Marine/offshore locations | Det Norske Veritas (DNV) |

Specifications are subject to change. Consult the factory for latest information.



Ordering Information

| | |
|----------------------|-------------------------|
| ST-MIX16880-D | 16 DI, 8 DO, 8 AI |
| ST-MIX12884-D | 12 DI, 8 DO, 8 AI, 4 A0 |
| ST-MIX####-M | Replacement module only |
| ST-MIX####-DB | Replacement base only |

The ST-MIX combination I/O modules are part of the SixTRAK I/O product line. Up to 20 of these modules (any mix) can be connected to the high-speed I/O bus of SIXNET controllers, RTUs and I/O gateways.

(Note: The ST-MIX is supported only by IPm-based SIXNET Controllers, RTUs, and I/O Gateways. Consult SIXNET for details.)

Advanced I/O Features and Capabilities

Discrete I/O Features

There are several groups of discrete I/O in these combination I/O modules that offer different capabilities to accommodate a variety of system needs. Refer to the notes below and the wiring diagrams (next page) for further details.

? **Sinking or Sourcing Discrete Inputs** (First four on ST-MIX12884 or all sixteen on the ST-MIX16880)

This group of inputs may be configured as sourcing inputs (ON when positive voltage is applied) or sinking inputs (switch closures to ground). There is a selection jumper in the module's base that is easily accessed by unplugging the logic module and opening the hinged door. You must also make a similar selection in the Discrete Options window in the I/O tool Kit software. The module performs a check to verify that the hardware and software selections match.

? **Adjustable Threshold Voltage** (First four discrete inputs on ST-MIX12884 only)

This group of inputs may be modified to transition at a threshold voltage lower than the factory setting. This is accomplished by simply soldering an extra resistor into the base. Refer to the user manual for details.

? **Sourcing Discrete Inputs** (Second group of eight discrete inputs on the ST-MIX12884 only)

This group of eight discrete inputs on the ST-MIX12884 is sourcing only with the standard 10 – 30 volt range.

? **Sourcing Discrete Outputs and Watchdog Output** (both models)

The eight outputs are sourcing (positive voltage applied when ON) with the standard 10-30V range. The first discrete output can be configured to be a watchdog output. This system performance monitor will be ON if the output module is functioning normally, the gateway is functioning normally or the ST-Bus communications are occurring normally

? **High Speed and Special Counter Inputs** (both models)

The first eight discrete inputs can be configured as counters with a flexible choice of modes. These counters report their values in corresponding 16-bit analog input registers. Options for fast (5 mS) or slow (25 mS for contact bounce filtering) response providing a maximum count rate of 100 Hz or 20 Hz counting, respectively. The 1st channel is a high speed counter and can count up to 20 KHz. Available counter modes are pulse, rate and run-time.

Analog I/O Features

? **Self-resetting Analog Input Protection**

Each 4-20 mA input channel has a 100 ohm, high precision (0.1 percent) shunt across its input to develop a 2 volt signal when a full scale 20 mA input is applied. These shunts are located in the module's base, giving you the advantage of maintaining a continuous circuit even if the logic module is removed from the base. If excessive voltage is applied to an input, a self-resetting fuse will open to help prevent the shunt from overheating.

? **Open Loop Detection on Analog Inputs**

This module can detect and report an open instrumentation loop on its analog inputs. By allowing the module to report a negative value if the current falls below 4 mA, low limit logic in your DCS, PLC, RTU or computer can signal the loss of current. To enable this feature, select the "Go Negative Below 4 mA" software setting for each channel.

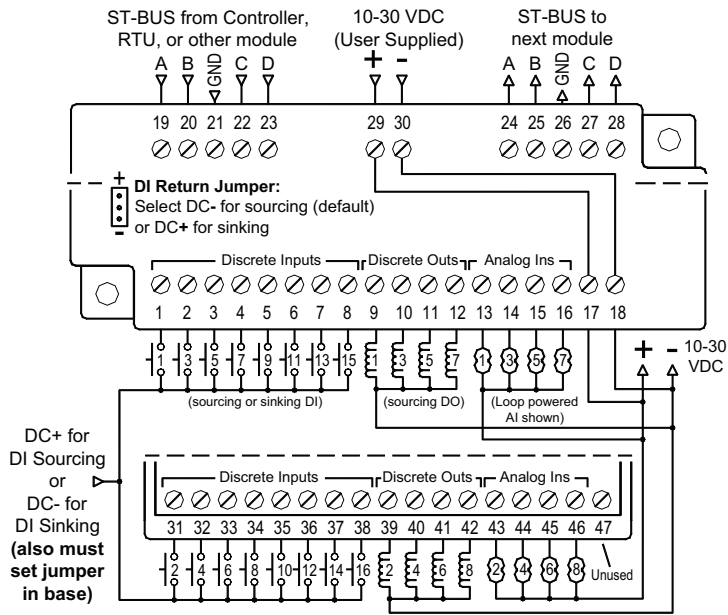
? **Reading Voltage Analog Inputs**

As an option, a voltage divider may be factory populated to replace the 20 mA (100 ohm) shunt of one or more input channels. These alterations are made in the wiring base, so they may be tailored for particular installations. (The logic modules are not altered so they remain interchangeable!) Voltage operation may be configured in the I/O Tool Kit by selecting the appropriate range for the corresponding input. Consult SIXNET for ordering instructions.

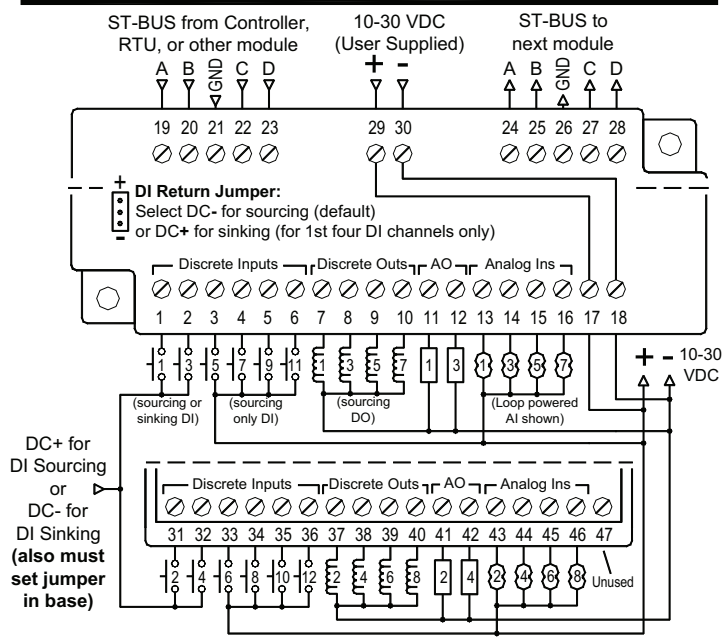
? **LED Indicators for Analog Inputs**

There is a LED for each of the analog input channels. The LED will be ON when the channel is within the normal operating range of 4-20 mA. The LED will be OFF when an open loop is detected.

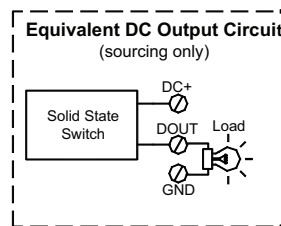
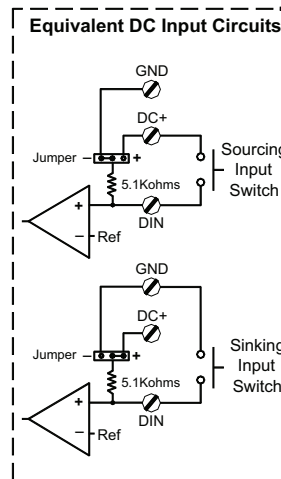
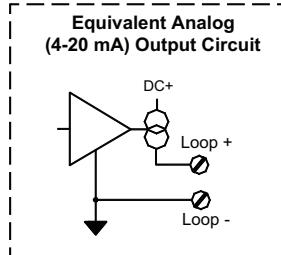
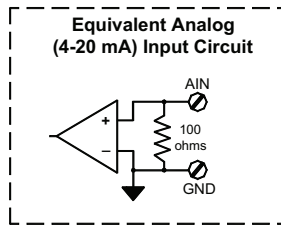
ST-MIX####-D Power, ST-BUS and I/O Wiring



ST-MIX-16880-D



ST-MIX-12884-D



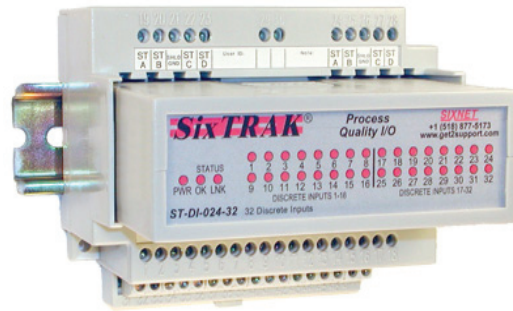
Revised 26-Oct-04

Double density I/O expansion for SIXNET controllers and RTUs

Select this SixTRAK[®] module when . . .

. . . reduced panel space and lowest cost are important requirements.

- 32 discrete inputs in a single compact module
- High density design saves space and reduces cost
- All inputs return to a common ground
- Isolation protects system from wiring faults
- True hot swap of modules in live systems
- DIN rail or direct panel mountable



| Performance Specifications | |
|---|--|
| Discrete inputs | 32 channels |
| Voltage range | 10-30 VDC (sinking or sourcing) |
| Guaranteed ON voltage | 9 VDC |
| Maximum voltage | 30 VDC |
| Guaranteed OFF current | 1.5 mA DC |
| Guaranteed OFF voltage | 5.0 VDC |
| Input resistance | 10K Ohms |
| Input current @ 24VDC | 3 mA |
| Fast ON/OFF delay | 4 mS |
| Filtered ON/OFF delay | 25 mS |
| Pulse counters | First four discrete inputs |
| Maximum count rate | 100 Hz (or 20 Hz in filtered mode) 10 KHz on channel 1 only |
| Environmental | DIN rail or direct panel mounting |
| Input voltage | 10-30 VDC |
| Max. ST-Bus power | 850 mW |
| Isolation (input to ST-Bus) | 1200 VDC |
| Operating temperature range | -40 to +70°C |
| Storage temperature range | -40 to +85°C |
| Humidity (non-condensing) | 5 to 95% RH |
| Vibration | IEC68-2-6 |
| Electrical safety | UL508, CSA C22.2/14; EN61010-1 |
| EMI emissions | FCC part 15, ICES-003, EN55022 |
| EMC immunity | EN50082-1, EN61326-1 |
| Surge withstand | IEEE-472 |
| Hazardous locations (Class 1, Div 2 and Zone 2) | UL1604, CSA C22.2/213; Cenelec EN50021, EEx nA II T4 X |
| Marine/offshore locations | Det Norske Veritas (DNV) No. 2.4 (Class A & B) |

| Ordering Information | |
|----------------------|-----------------------------|
| ST-DI-024-32D | Module and wiring base pair |
| ST-DI-024-32M | Replacement module only |
| ST-DI-024-32DB | Replacement base only |

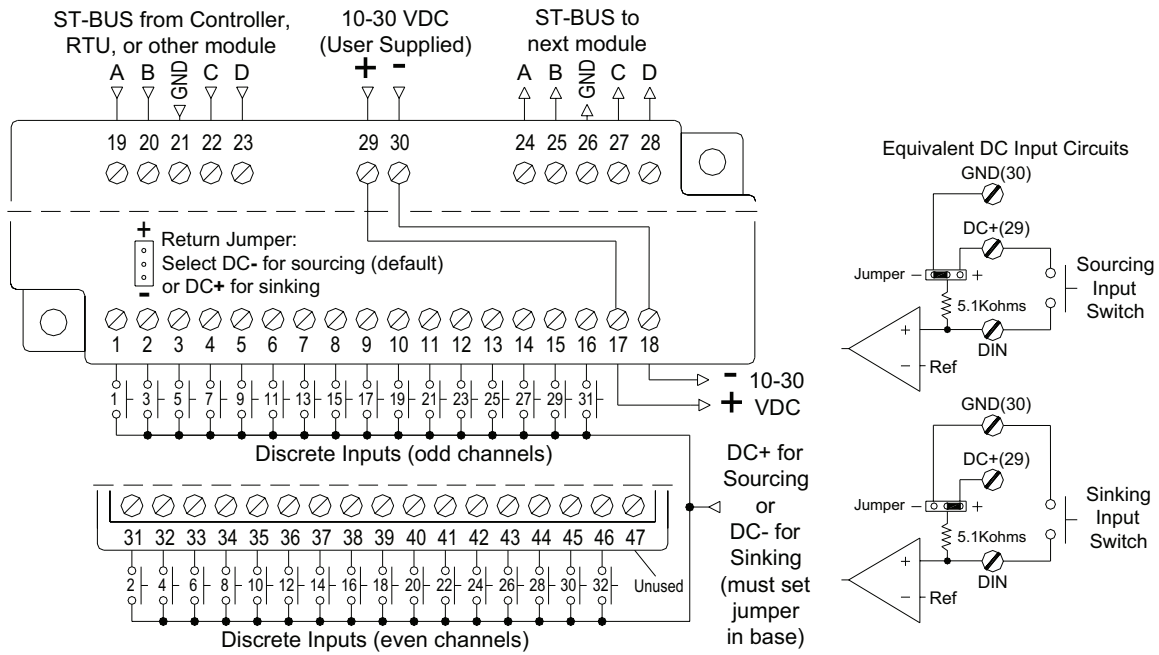
Specifications are subject to change. Consult factory for latest information.

Connect any mix of up to 20 SixTRAK[®] I/O modules to a SixTRAK[®] I/O Controller, VersaTRAK[®] Remote Terminal Unit, or EtherTRAK[®] I/O Concentrator.

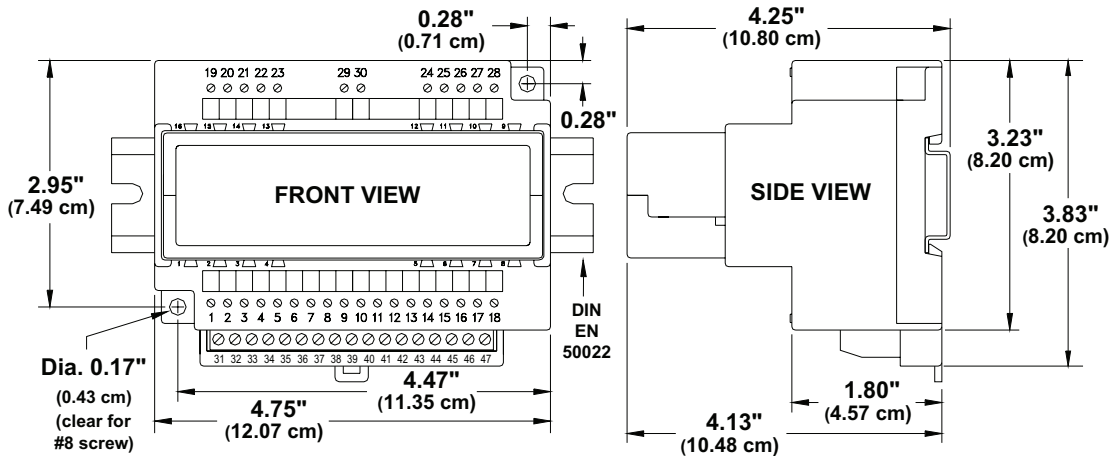


SixTRAK[®] IPm[™] Open DCS Controller

ST-DI-024-32D Power and I/O Wiring



ST-DI-024-32D Mechanical Dimensions



Select high-speed counter inputs when...

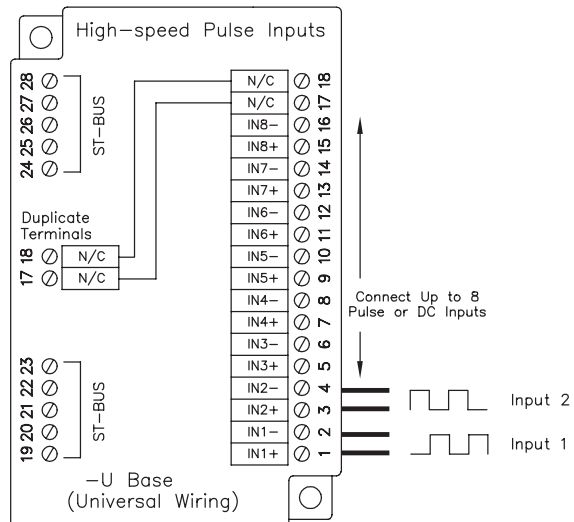
...you need pulse accumulators, pulse rate, or position information.

- Count rates to 50 KHz
- Cascade counters for 32-bit results
- Measure pulses per second or per minute
- Direct position detection from quadrature encoders
- Individually isolated inputs for best noise immunity
- Count inputs also report as discrete inputs

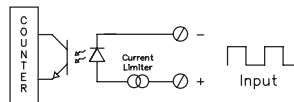


| Performance Specifications | |
|---|----------------|
| Number of counters | 8 |
| Count mode performance: | |
| Guaranteed count rate | 50 KHz |
| Count resolution | 16 bits |
| Rate (frequency) mode performance: | |
| Maximum input rate | 50,000 per sec |
| Shortest measurement period | 100 mS |
| Longest measurement period | 1 min |
| Position mode performance: | |
| Maximum position axes (two channels per axis) | 4 |
| Maximum pulses per second | 25,000 |
| Maximum quadrature states per second | 100,000 |
| Position resolution | 32 bits |
| Input performance: | |
| Guaranteed count input voltage | 4 Volts |
| Maximum count input voltage | 30 Volts |
| Guaranteed off input voltage | 1.5 Volts |
| Nominal count input current | 8 mA |
| Maximum ST-Bus power | 600 mW |
| Isolation (input to ST-Bus) | 1200 V |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |

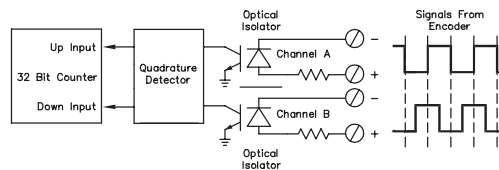
Note: A pair of counter channels can be combined to make a 32-bit up/down counter or accumulator.



Typical Count/Rate Input Circuit



Typical Position Input Circuit



Ordering Information

| Description | Part Number |
|------------------------------|---------------|
| 8 High Speed Counters w/Base | ST-DI-CNT-08U |
| Module Only | ST-DI-CNT-08M |

8-Channel Discrete Output Modules

Select these output modules when...

...modularity and the convenience of pre-wired field terminals will reduce your panel wiring.

- Optical isolation on each channel for best reliability
- High current outputs drive power loads
- AC outputs will drive a size 4 motor starter (40 HP)
- Surge suppressors safely clamp inductive loads
- Watchdog output monitors system status



Performance Specifications

| | ST-DO-DC1-08 | ST-DO-DC3-08 | ST-DO-AC1-08 | ST-DO-AC2-08 |
|---------------------------------------|--------------|--|--------------|--------------|
| Number of channels | 8 | 8 | 8 | 8 |
| Minimum output voltage | 0 VDC | 60 VDC | 16 VAC | 140 VAC |
| Maximum output voltage | 60 VDC | 150 VDC | 140 VAC | 265 VAC |
| Minimum load current (per output) | 0.1 mA | 0.1 mA | 10 mA | 10 mA |
| Maximum load current (per output) | | | | |
| at 50°C | 2 Amps | 1.5 Amps | 2 Amps | 2 Amps |
| at 70°C | 2 Amps | 1 Amp | 1.5 Amps | 1.5 Amps |
| Maximum current load (per module): | | | | |
| Field Base | 10 Amps | 8 Amps | 8 Amps | 8 Amps |
| Universal Base | 16 Amps | 12 Amps | 8 Amps | 8 Amps |
| Maximum OFF state leakage current | 0.01 mA | 0.01 mA | 2 mA | 2 mA |
| Inrush current (100 mS surge) | 10 Amps | 10 Amps | 6 Amps | 6 Amps |
| Typical ON resistance | 0.15 Ohms | 0.25 Ohms | – | – |
| Typical ON voltage drop (@ 1 Amp) | 0.15 VDC | 0.3 VDC | 1.0 VAC | 1.0 VAC |
| Channel to channel isolation w/U base | 500 V | 500 V | 500 V | 500 V |
| Maximum ST-Bus power | 600 mW | Note: The first output may be configured as a system performance watchdog. ON = OK. | | |
| Isolation (input to ST-Bus) | 1200 V | | | |
| Operating temperature range | -30 to 70°C | | | |
| Storage temperature range | -40 to 85°C | | | |
| Humidity (non-condensing) | 5 to 95% | | | |

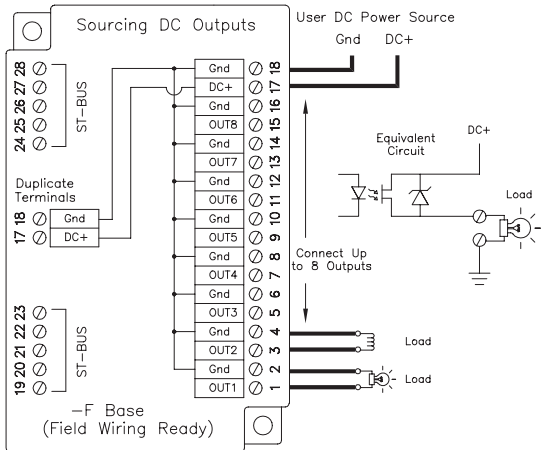
Ordering Information

| Input Range | Field Wiring Base | Universal Wiring Base | Replacement Module |
|-------------|-------------------|-----------------------|--------------------|
| 0-60 VDC | ST-DO-DC1-08F | ST-DO-DC1-08U | ST-DO-DC1-08M |
| 60-150 VDC | ST-DO-DC3-08F | ST-DO-DC3-08U | ST-DO-DC3-08M |
| 16-140 VAC | ST-DO-AC1-08F | ST-DO-AC1-08U | ST-DO-AC1-08M |
| 140-265 VAC | ST-DO-AC2-08F | ST-DO-AC2-08U | ST-DO-AC2-08M |

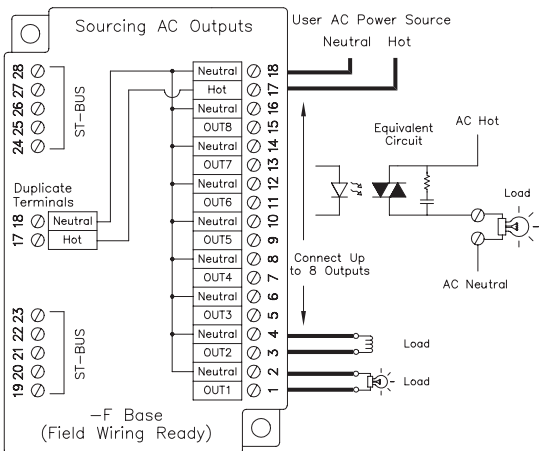
Select a Field Wiring Ready Base when...

...pre-wired field terminals will save you design, panel wiring and installation time.

Sourcing DC outputs:



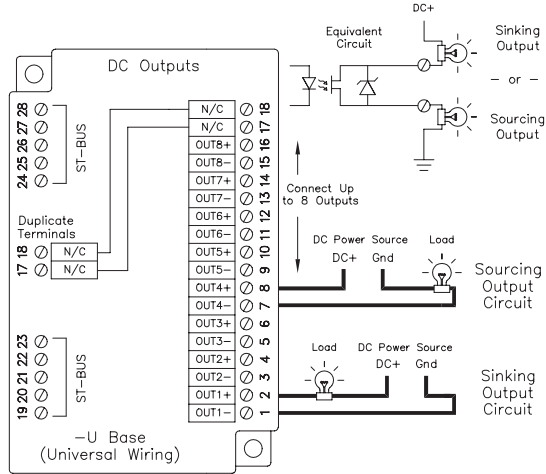
Sourcing AC outputs:



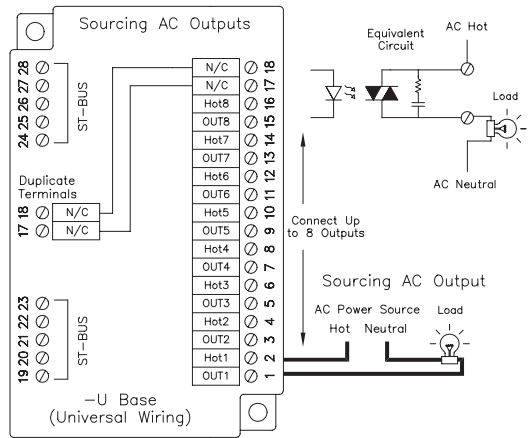
Select a Universal Base when...

...you need the flexibility of floating outputs that adapt to your special wiring requirements.

For special DC applications:



For special AC applications:



High Density Discrete Output Module

Select high density discrete outputs when...

...you need sixteen DC outputs to drive low power devices.

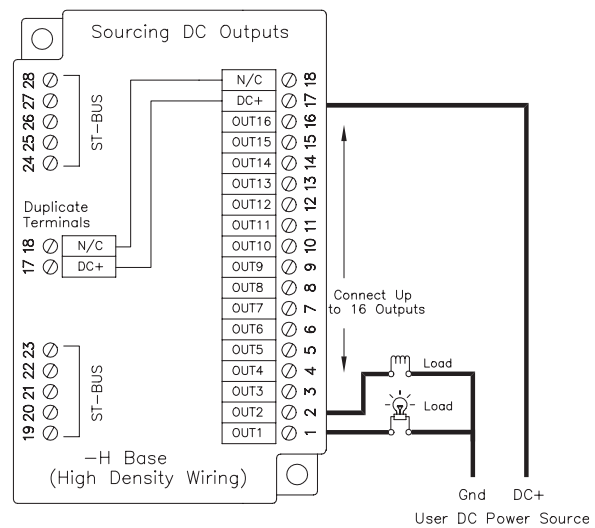
- High density outputs save space and reduce cost
- Ideal for driving indicator lights and small relays
- Isolation protects system wiring from faults
- Surge suppressors safely clamp inductive loads



Performance Specifications

| | |
|-----------------------------------|-------------|
| Number of channels | 16 |
| Minimum output voltage | 10 VDC |
| Maximum output voltage | 32 VDC |
| Minimum load current (per output) | 1 mA |
| Maximum load current (per output) | 0.5 Amps |
| Maximum load current (per module) | 8 Amps |
| Maximum OFF state leakage current | .01 mA |
| Inrush current (100 mS surge) | 1.5 Amps |
| Output ON state voltage drop | 1 VDC |
| Maximum ST-Bus power | 600 mW |
| Isolation (input to ST-Bus) | 1200V |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |

Note: The first output may be configured as a system performance watchdog. ON = OK.



Ordering Information

| Description | Part Number |
|--------------------------|---------------|
| 16 Outputs w/Wiring Base | ST-DO-DC2-16H |
| Module only | ST-DO-DC2-16M |

Dry Contact Relay Module

Select relay outputs when...

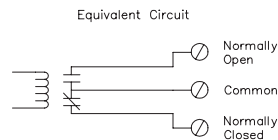
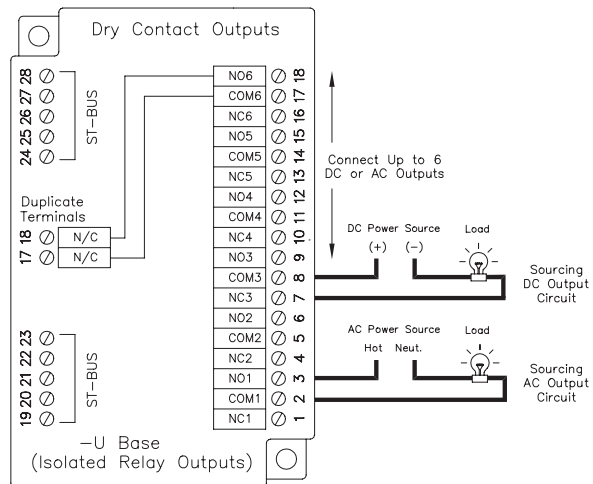
...dry contact outputs are specified or whenever normally closed contacts are required.

- Good choice for specifications that call for contact closure outputs
- Provides both normally open and normally closed contacts (SPDT)
- Normally closed contacts pass current even when module power is off (for failsafe systems)
- Ideal for low current loads



| Performance Specifications | |
|---|--------------|
| Number of channels | 6 |
| Output configuration (each output) | Form C |
| Minimum output voltage | 0 VAC/VDC |
| Maximum output voltage | 140 VAC/VDC |
| Minimum load current per output | 0.1 mA |
| Maximum load current per output (24 VDC) | 2 Amps |
| Maximum load current per output (120 VAC) | 0.5 Amps |
| Maximum load current per module (24VDC) | 12 Amps |
| Maximum OFF state leakage current (120 VAC) | 0.01 mA |
| Minimum OFF resistance | 100 Meg Ohms |
| Maximum relay turn on time | 6 mS |
| Maximum relay turn off time | 6 mS |
| Maximum ST-Bus power | 1500 mW |
| Isolation (input to ST-Bus) | 1200V |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |

Note: The first output may be configured as a system performance watchdog. ON = OK.



Ordering Information

| Description | Part Number |
|-------------------------------|---------------|
| 6 Form C Relays w/Wiring Base | ST-DO-RLY-06U |
| Module only | ST-DO-RLY-06M |

Select instrumentation analog inputs when...

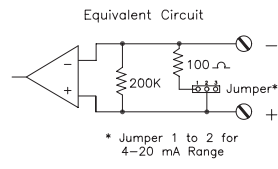
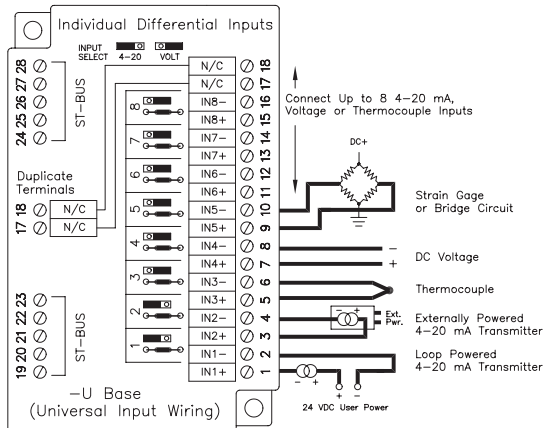
...you need to read thermocouples, or you need differential inputs for high accuracy, or you need floating 4-20 mA inputs.

- Advanced 16-bit A/D converter for extreme accuracy
- True differential inputs minimize noise and ground loops
- Software selectable ranges – mix inputs on module
- Linearizes and compensates thermocouple readings
- Upscale/downscale thermocouple burnout detection
- Fault tolerant 4-20 mA range with an auto-polarity feature



| Performance Specifications | |
|------------------------------------|-------------------|
| Number of channels | 8 |
| Lowest voltage range | +/- 0.062 Volts |
| Maximum voltage range | +/- 10.0 Volts |
| Auto-polarity current range | 4-20 mA |
| Thermocouple types (see note) | J,K,E,R,T,B,C,N,S |
| A/D resolution | 16 bits |
| Full scale accuracy (@ 20°C) | +/- 0.02% |
| Input span adjustability | +/- 25% |
| Input offset adjustability | +/- 25% |
| Span temperature coefficient | +/- 30 ppm per °C |
| Offset temperature coefficient | +/- 30 ppm per °C |
| mV and voltage input impedance | 200K Ohms |
| 4-20 mA input impedance | 100 Ohms |
| CMRR (at 50/60 Hz) | 160 db |
| DMRR (at 50/60 Hz) | 66 db |
| Common mode input voltage: | |
| Between two input terminals | +/- 25 VDC |
| Between inputs and ground | 1200 Volts |
| No damage input voltage | +/- 50 VDC |
| Fastest scan rate (all 8 channels) | 500 mS |
| Maximum ST-Bus power | 1200 mW |
| Isolation (input to ST-Bus) | 1200 VDC |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |

Note: Thermocouple inputs are cold junction compensated and reported as °F, °C or 0.1°C.



Ordering Information

| Description | Part Number |
|------------------------|---------------|
| 8 Inputs w/Wiring Base | ST-AI-INS-08U |
| Module only | ST-AI-INS-08M |

8 Channel 4-20 mA Input Module

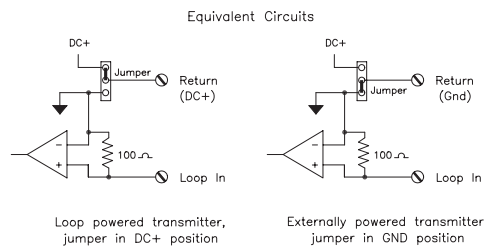
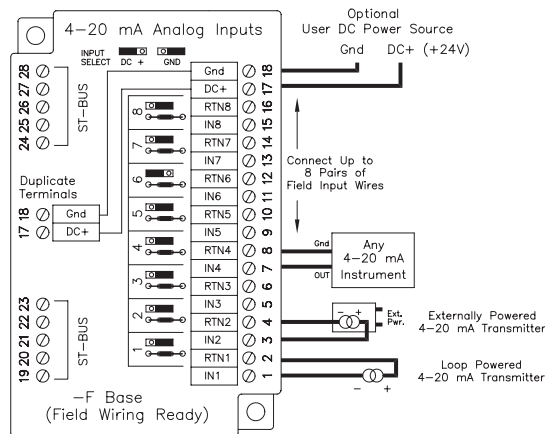
Select an 8 channel 4-20 mA input module when...

...the convenience of field wiring ready terminals will simplify your design and reduce panel wiring.

- 12-bit A/D converter for precision measurements
- Field ready wiring saves time and panel space
- Field configurable wiring choice for loop-powered transmitters or ground return instruments
- Field replaceable shunts reduce maintenance time



| Performance Specifications | |
|---|--------------------------|
| Number of channels | 8 |
| Input range | 4-20 mA |
| A/D resolution | 12 bits |
| Input resolution | 6 μ A |
| Full scale accuracy (@ 20°C) | 0.10% |
| Input span adjustability | +/- 25% |
| Input offset adjustability | +/- 25% |
| Span temperature coefficient | +/- 50 ppm per °C |
| Offset temperature coefficient | +/- 50 ppm per °C |
| Input impedance | 100 Ohms |
| DMRR (differential rejection at 50/60 Hz) | 66 db |
| Input protection | Field-replaceable shunts |
| Fastest scan rate (all 8 channels) | 5 mS |
| User DC loop power (optional) | 24 VDC |
| Maximum ST-Bus power | 600 mW |
| Isolation (input to ST-Bus) | 1200 VDC |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |



Ordering Information

| Description | Part Number |
|--------------------------------|---------------|
| 8 Current Inputs w/Wiring Base | ST-AI-20M-08F |
| Module only | ST-AI-20M-08M |

High Density 4-20 mA Input Module

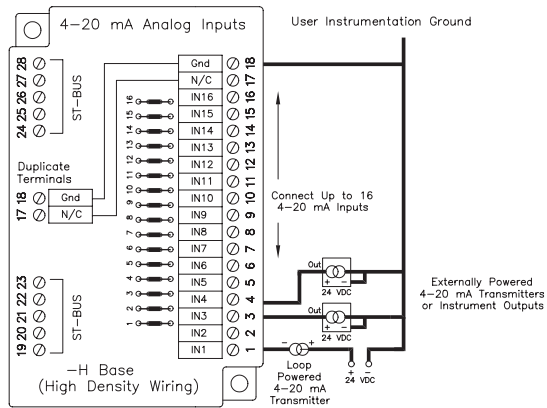
Select high density 4-20 mA inputs when...

...reduced panel space and lowest cost are primary requirements.

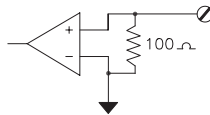
- 12-bit A/D converter for precision measurements
- High density modules have lowest cost per point
- Group isolation eliminates ground loops and interactions with other modules
- Field replaceable shunts reduce maintenance time



| Performance Specifications | |
|---|--------------------------|
| Number of channels | 16 |
| Input range | 4-20 mA |
| A/D resolution | 12 bits |
| Input resolution | 6 μ A |
| Full scale accuracy (@ 20°C) | 0.10% |
| Input span adjustability | +/- 25% |
| Input offset adjustability | +/- 25% |
| Span temperature coefficient | +/- 50 ppm per °C |
| Offset temperature coefficient | +/- 50 ppm per °C |
| Input impedance | 100 Ohms |
| DMRR (differential rejection at 50/60 Hz) | 66 db |
| Input protection | Field-replaceable shunts |
| Fastest scan rate (all 16 channels) | 10 mS |
| Maximum ST-Bus power | 600 mW |
| Isolation (input to ST-Bus) | 1200 VDC |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |



Equivalent Circuit



Ordering Information

| Description | Part Number |
|---------------------------------|---------------|
| 16 Current Inputs w/Wiring Base | ST-AI-20M-16H |
| Module only | ST-AI-20M-16M |



Application Idea

Pair this 16 channel 4-20 mA input module with the current limiter module for the highest system performance at the lowest cost.

8 Channel Voltage Input Module

Select a voltage analog input module when...

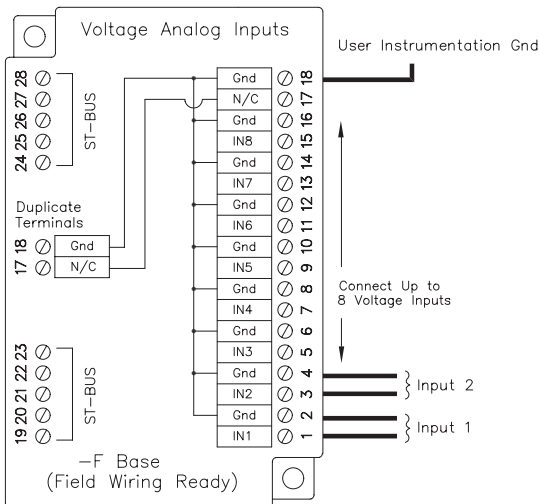
...all the voltage input signals return to a common ground point.

- Software selectable voltage ranges maximize input resolution
- Group isolation eliminates ground loops and interactions with other modules
- 50/60 Hz rejection eliminates errors from power line noise

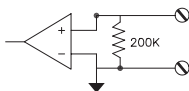


Performance Specifications

| | |
|---|-------------------------------|
| Number of channels | 8 |
| Input ranges: bipolar | +/- 1.0, 2.0, 5.0, 10.0 Volts |
| A/D resolution | 12 bits |
| Input resolution | 0.6 mV |
| Full scale accuracy (@ 20°C) | 0.10% |
| Input span adjustability | +/- 25% |
| Input offset adjustability | +/- 25% |
| Span temperature coefficient | +/- 50 ppm per °C |
| Offset temperature coefficient | +/- 50 ppm per °C |
| Input impedance | 200K Ohms |
| DMRR (differential rejection at 50/60 Hz) | 66 db |
| Input protection | +/- 50 VDC |
| Fastest scan rate (all 8 channels) | 5 mS |
| Maximum ST-Bus power | 950 mW |
| Isolation (from ST-Bus) | 1200 VDC |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |



Equivalent Circuit



Ordering Information

| Description | Part Number |
|--------------------------------|---------------|
| 8 Voltage Inputs w/Wiring Base | ST-AI-10V-08F |
| Module only | ST-AI-10V-08M |

Select 100 Ohm RTD inputs when...

...you need accurate temperature measurements using 100 Ohm platinum RTDs.

Select 10 Ohm copper RTD inputs when...

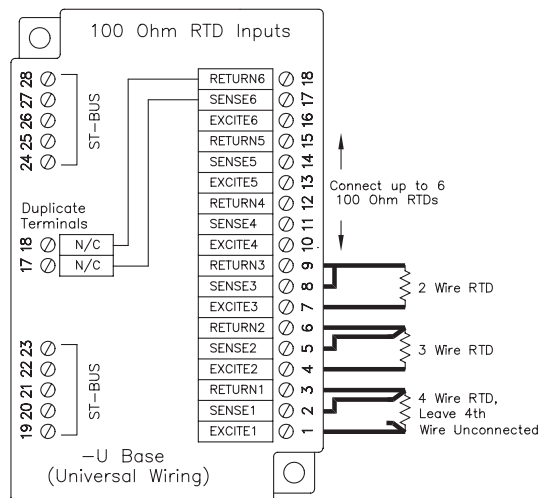
...you need to interface to existing 10 Ohm copper RTD sensors.

- Best performance/lowest cost precision temperature solution
- Resistance Temperature Detectors (RTD) are more accurate than thermocouples
- RTD linearization is performed in software for extreme accuracy and repeatability
- Excitation current is pulsed on only during the measurement to reduce self-heating of the RTD

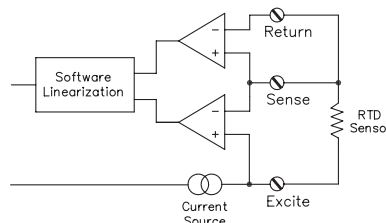
| Performance Specifications | | |
|---|---|-------------------------------|
| | ST-AI-RTD-06U | ST-AI-RTC-06U |
| Number of channels | 6 | 6 |
| RTD type | 100 Ohm platinum Alpha = .00385 or .00392 | 10 Ohm copper |
| Compatible lead configurations | 2, 3, or 4 wire | 2 or 3 wire |
| Input range | -200 to 850°C | -200 to 260°C |
| Basic A/D resolution | 16 bits | 16 bits |
| Scaled resolution | 0.1°C | 0.1°C |
| Full scale accuracy (@20°C) | 0.5°C | 1.0°C |
| Span temperature coefficient | +/- 25 ppm/°C | +/- 25 ppm/°C |
| Offset temperature coefficient | +/- 25 ppm/°C | +/- 25 ppm/°C |
| Excitation current (pulsed to reduce self-heating) | 250 µA | 1.5 mA |
| Maximum lead wire resistance | 100 Ohms per side, balanced | 40 Ohms per side, balanced |
| Input protection | +/- 25 VDC | +/- 25 VDC |
| Fastest scan rate (all 6 channels) | 700 mS | 700 mS |

Ordering Information

| Description | Module w/Base | Module Only |
|--------------------|---------------|---------------|
| 100 Ohm RTD Inputs | ST-AI-RTD-06U | ST-AI-RTD-06M |
| 10 Ohm RTD Inputs | ST-AI-RTC-06U | ST-AI-RTC-06M |



Equivalent Circuit



4-20 mA Analog Output Module

Select 4-20 mA analog outputs when...

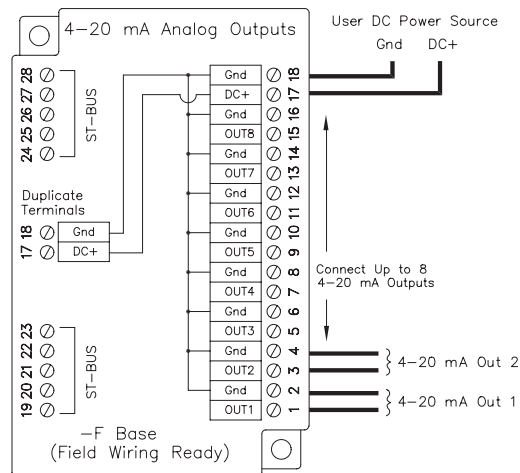
...your actuators or instruments require current loop signals.

- High precision ensures accurate transfer of data
- High resolution removes "steps" from the outputs
- Outputs are group isolated to protect the module and eliminate ground loops
- Operates from a wide range of loop power supplies

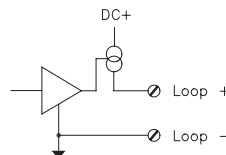


Performance Specifications

| | |
|---|-------------------|
| Number of channels | 4 or 8 |
| Output range | 4-20 mA |
| D/A resolution | 13 bits |
| Output resolution | 2 μ A |
| Full scale accuracy (@ 20°C) | +/- .05% |
| Output linearity (@ 20°C) | +/- .02% |
| Output span adjustment | +/- 25% |
| Output offset adjustment | +/- 25% |
| Span temperature coefficient | +/- 50 ppm per °C |
| Offset temperature coefficient | +/- 50 ppm per °C |
| Maximum output settling time (to 0.05%) | 5 mS |
| User loop voltage | 10-30 Volts |
| Load resistance (@ +24 volt supply) | 0-750 Ohms |
| Maximum ST-Bus power | 500 mW |
| Isolation (from ST-Bus) | 1200 VDC |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |



Equivalent Circuit



Ordering Information

| Description | Module w/Base | Module Only |
|-------------------|---------------|---------------|
| 4 Current Outputs | ST-AO-20M-04F | ST-AO-20M-04M |
| 8 Current Outputs | ST-AO-20M-08F | ST-AO-20M-08M |

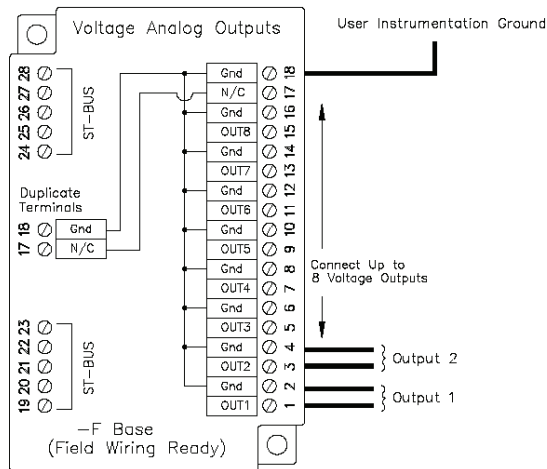
Select voltage analog outputs when...

...the inputs on your peripheral devices expect a voltage signal.

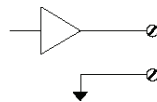
- ? Software selectable output ranges: 0-5, 0-10, +/- 5 and +/- 10 Volts
- ? High resolution removes "steps" from the outputs
- ? Outputs are group isolated to protect the module and eliminate ground loops
- ? No external power supply required. (Outputs are powered by module)



| Performance Specifications | |
|---|--------------------------------|
| Number of channels | 8 |
| Output ranges | +/- 5, +/- 10, 0-5, 0-10 Volts |
| D/A resolution | 14 bits |
| Output resolution | 1.5 mV |
| Full scale accuracy (@ 20°C) | +/- .05% |
| Output span adjustment | +/- 25% |
| Output offset adjustment | +/- 25% |
| Span temperature coefficient | +/- 50 ppm per °C |
| Offset temperature coefficient | +/- 50 ppm per °C |
| Maximum output settling time (to 0.05%) | 5 mS |
| Maximum output current (from each output) | 5 mA |
| Maximum ST-Bus power | 2200 mW |
| Isolation (from ST-Bus) | 1200 VDC |
| Operating temperature range | -30 to 70°C |
| Storage temperature range | -40 to 85°C |
| Humidity (non-condensing) | 5 to 95% |



Equivalent Circuit



Ordering Information

| Description | Part Number |
|---------------------------------|---------------|
| 8 Voltage Outputs w/Wiring Base | ST-AO-10V-08F |
| Module only | ST-AO-10V-08M |

