



Technology Solutions

TEK-FC 8000FX ***Custody Transfer Field Mount*** ***Flow Computer***

Instruction Manual



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1 Hazardous Area Installations

1.1 Intended Use

8000FX3 and 8000FX7 Flow Computers, rated 11-30 Vdc, 5A; Chassis mounted measurement devices for oil and gas volume calculations based on inputs from primary devices such as differential and linear meters, and provide data archiving, control, and monitoring of flow via direct connection to other devices. The chassis configuration can be 3-slot or 7- slot.

**Maximum Ambient and Process Temperature: -40 °C to +85 °C,
Class I, Division 2, Groups C, and D**

The following instructions are specific to Tektrol's 8000FX installed in hazardous areas.

1. All circuits including power supply, connecting the 8000FX3, or 8000FX7 shall be sourced from a Class 2 or Limited Energy Source with a maximum voltage of 30Vdc in accordance with CSA 61010-1- 12 and UL 61010-1 Third Edition.
2. The maximum surface temperature does not exceed 160°C considering a maximum service temperature of +85°C.
3. 8000FX3 and 8000FX7 with chassis configuration shall be completely installed inside a suitable Type rated enclosure that provides ingress protection appropriate for the end application, and acceptable to the Authority Having Jurisdiction (AHJ). The enclosure shall not be opened in the presence of explosive atmosphere.
4. The units shall not be installed directly to, or adjacent to a heat source.
5. Service and maintenance connections shall not be connected or disconnected in explosive atmospheres.
6. The final installation of the device shall meet the requirements of CEC (for Canada) and NEC (for USA) for wiring method in Class I, Division 2 Hazardous Locations and is subject to acceptance of local authority having jurisdiction.
7. End-user shall ensure the device is properly connected to earth ground upon installation.
8. All wiring requires a minimum insulation rating of 90°C. System wiring and relay wiring should also handle related current rating.
9. Equipment must be installed by qualified personnel.
10. System power supply for 8000FX should be provided with appropriate fuse on customer side.
11. The earth ground connection should be sufficient to handle potential surge.

1.2 Certifications

Class 1 Div 2 Approval.

1.3 Manufacturer Safety Instructions

1.3.1 Disclaimer

The manufacturer will not be held accountable for any damage that happens by using its product, including, but not limited to direct, indirect, or incidental and consequential damages.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has the right to modify the content of this document, including the disclaimer, at any time for any reason without prior notice, and will not be answerable in any way for the possible consequence of such changes.

1.3.2 Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. Wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

1.3.3 Information Concerning the Documentation

To prevent any injury to the operator or damage to the device it is essential to read the information in this document and the applicable national standard safety instructions. This operating manual contain all the information that is required in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation, and commissioning, troubleshooting, maintenance, and disposal.

1.4 Safety Precautions

You must read these instructions carefully prior to installing and commissioning the device. These instructions are an important part of the product and must be kept for future reference. Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured.

For additional information that are not discussed in this manual, contact the manufacturer.

Warnings and Symbols Used

The following safety symbol marks are used in this operation manual and on the instrument.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.5 Packaging, Transportation and Storage

1.5.1 Packaging

The original package consists of

1. Tek-FC 8000FX Custody Transfer Field Mount Flow Computer
2. Documentation



NOTE

Unpack and Check the contents for damages or sign of rough handling. Report damage to the manufacturer immediately. Check the contents against the packing list provided.

1.5.2 Transportation

- Avoid impact shocks to the device and prevent it from getting wet during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.

1.5.3 Storage

If this product is to be stored for a long period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- Storage location should conform to the following requirements:
 1. Free from rain and water
 2. Free from vibration and impact shock
 3. At room temperature with minimal temperature and humidity variation
- Properties of the instrument can change when stored outdoors.

1.5.4 Nameplate

The nameplate lists the order number and other important information, such as design details and technical data.

i NOTE

Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.



Fig 1-1



Fig 1-2



Fig – 2.2 8000FX7 Chassis with Modules

3 Module Information

Module I/O (inputs/outputs)

- AI: Analog Input
- AO: Analog Output
- DI: Digital/Discrete Input
- DO: Digital/Discrete Output
- PI: Pulse Input

The Tek- FC 8000FX Flow Computer system power supply input should be provided with appropriate fuse at customer side. The certificate is for individual chassis. Each individual chassis should get the power from system power input.

In the main chassis, the CPU board must be installed in the first slot. Other modules (i.e. Comm and I/O) are optional. Comm module if used must be installed in second slot and limited to use in primary chassis only.

1. Main Chassis slot 0 is dedicated to CPU board.
2. COMM module(s) in Main chassis must be installed in slot 1 or/and 2 only.

Expansion chassis requires I/O module installation in order to recognize chassis address correctly.

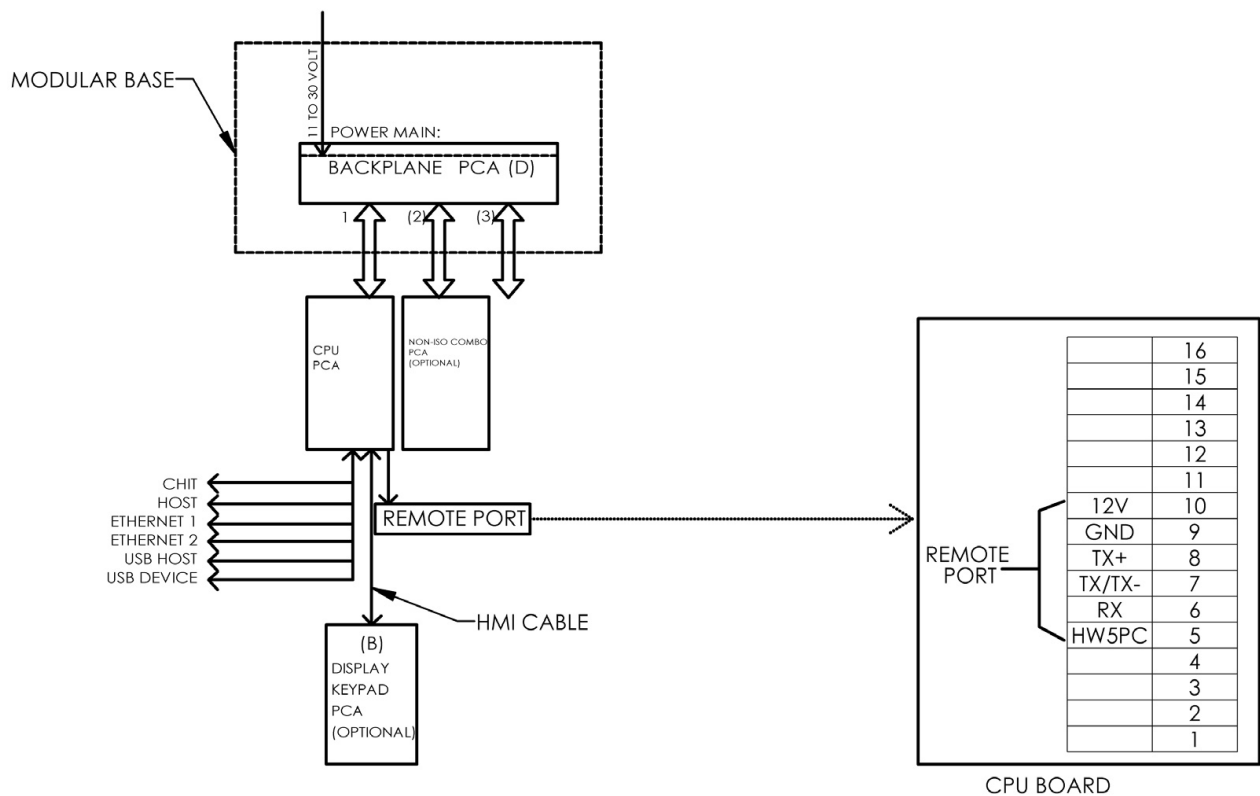
The communication from the main chassis to expansion chassis is RS485

Item	Function Description
3-Slot Backplane Board	3 slot Backplane board to provide the connection among modules installed in chassis slots.
7-Slot Backplane Board	7 slot Backplane board to provide the connection among modules installed in chassis slots.
CPU Board	<p>The CPU module provides the main function as communication, configuration, storage, and calculation.</p> <p>For internal system connection: It connects to and controls COMM module and HMI board through digital peripheral signal. It communicates I/O modules through RS485 (except for prover module), since other I/O modules have their own MCU.</p> <p>For customer connection: the module provides local CHIT serial port (RS232 only) or Bluetooth, Host serial port (RS232/485), remote port (RS485), 2 Ethernet ports and 2 USB port, and Honeywell transducer connection.</p>
Non-ISO Combo Board	<p>The non-isolated combo provides 5AI, 2DO/PI/DO, 4DO/DI, 1DO/FO/DI, 1AO, 1RTD. The selection of different I/O type is through Tek-ACONFIG Software. Analog inputs take either 0–5 Vdc voltage input signal or 4–20mA current input signal. When DI or DO type is selected, pull up is optional. The pulse input can accept input type slot sensor, contact closure sensor or magnetic sensor. Analog output loop can be internally or externally powered. There is no isolation provided to system or backplane signals with exception of analog output.</p>
COMM Board	<p>The communication module provides four serial ports: two ports configurable as either RS232, RS485 full duplex (4-wire), or RS485 half-duplex (2-wire), one as RS485 (full duplex 4-wire or half-duplex 2-wire), one as</p>

	<p>isolated RS485 full duplex (full duplex 4-wire or halfduplex 2-wire). There is max of 2 COMM modules in the main chassis.</p> <p>Note: COMM Board can not be installed in expansion chassis</p>
Relay DO Board	The relay output module provides 8 relay outputs. The insulation between contact and coil is up to 5KV
ISO PI/DI/DO Board	The ISO PI/DI/DO modules provide 6 pulse inputs, 4 digital inputs and 4 digital outputs. The pulse input can accept input type slot sensor, contact closure sensor or magnetic sensor. The digital input has optional pull up and digital output selectable as FET output.
ISO Combo Board	The isolated combo provides 4AI, 4DO/PI/DO, 4DO/DI, 1AO, 1RTD. The selection of different I/O type is through Tek-ACONFIG Software. Analog inputs accept either 0–5 Vdc voltage input signal or 4–20mA current input signal. When DI or DO type is selected, pull up is optional. The pulse input can accept input type slot sensor, contact closure sensor or magnetic sensor. Analog output loop can be internally or externally powered. Analog output is isolated from other channels and system backplane signals.
ISO AI Board	The Isolated analog input module provides 12 analog input channels, each of which accepts a 0–5 Vdc voltage input signal or 4–20mA current input signal.
ISO AO Board	The Isolated analog output module provides 6 channels of 4–20 mA current output. The current loop can be internally or externally powered. In addition to isolation to the system backplane, channel isolation is also supported.
ISO DI Board	The Isolated digital input module provides 8 digital input channels with optional pull up.
PROVER board	The prover board module provides two field input signals, to be used as start and stop

	switches when proving liquid flow meters utilizing prover
HMI	The HMI board provides the function of display and infrared key input. It is connected to the CPU board by latched cable. The display has power saving mode operation to minimize power consumption.

Table 3-1 I/O Modules and Components

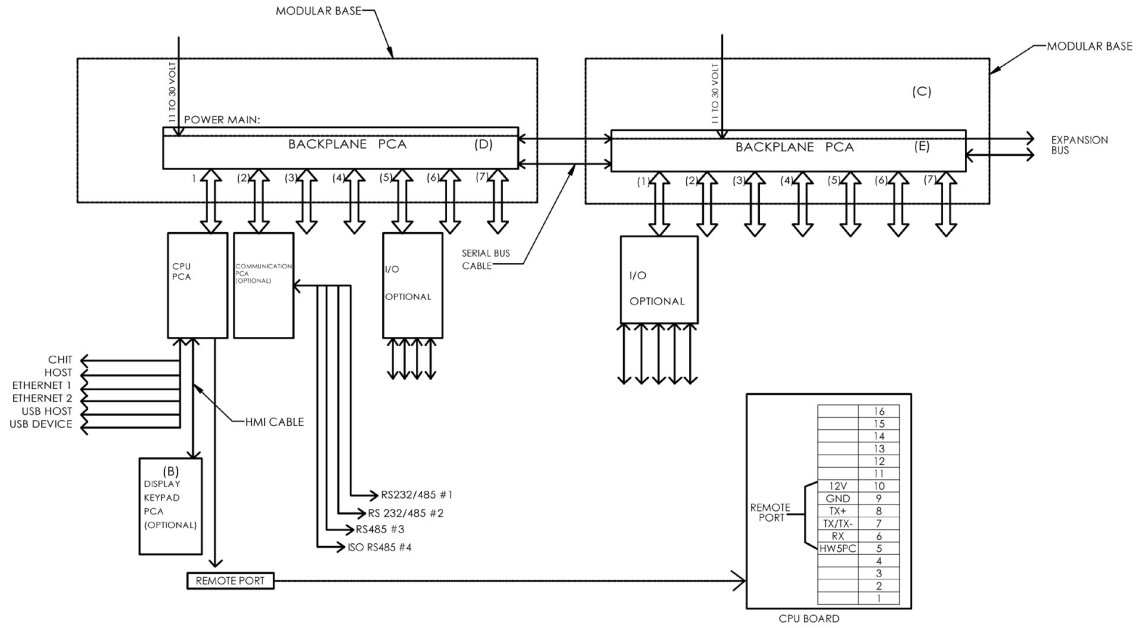


INSTALLATION OPTION CHART AUTOFLEX3		
OPTION NO.	LOCATION (B)	LOCATION (D) (BACKPLANE SLOT 2-3)
1	HMI MONOCHROME	PCBA, ISO ANALOG INPUT
2		PCBA, COMM EXPANSION
3		PCBA, ISO COMBO
4		PCBA, NON-SIO COMBO
5		PCBA, DIGITAL INPUT
6		PCBA, ISO ANALOG OUTPUT
7		PCBA, PROVER
8		PCBA, RELAY DO
9		PCBA, PI/DI/DO

Fig 3-2 8000FX3 Installation

i NOTE

USB HOST-For future development.



INSTALLATION OPTION CHART AUTOFLEX7				
OPTION NO.	LOCATION (B)	LOCATION (C)	LOCATION (D) [BACKPLANE SLOT 2-7]	LOCATION (E) [EXPANSION BACKPLANE SLOT 1-7]
1	HMI MONOCHROME	MODULAR EXPANSION BASE	PCBA, ISO ANALOG INPUT	PCBA, ISO ANALOG INPUT
2			PCBA, COMM EXPANSION**	PCBA, ISO COMBO
3			PCBA, ISO COMBO	PCBA, NON-SIO COMBO
4			PCBA, NON-SIO COMBO	PCBA, DIGITAL INPUT
5			PCBA, DIGITAL INPUT	PCBA, ISO ANALOG OUTPUT
6			PCBA, ISO ANALOG OUTPUT	PCBA, RELAY DO
7			PCBA, PROVER	PCBA, PI/DI/DO
8			PCBA, RELAY DO	
9			PCBA, PI/DI/DO	

**= ONLY SLOTS 2 AND 3

Fig 3-3 8000FX7 Installation

i NOTE

USB HOST-For future development.

4 Wiring and Jumper Settings

4.1.1 Chassis Wiring

i NOTE

3-slot backplane and 7-slot backplane boards share the same wiring diagrams and same surge ground wiring diagrams.

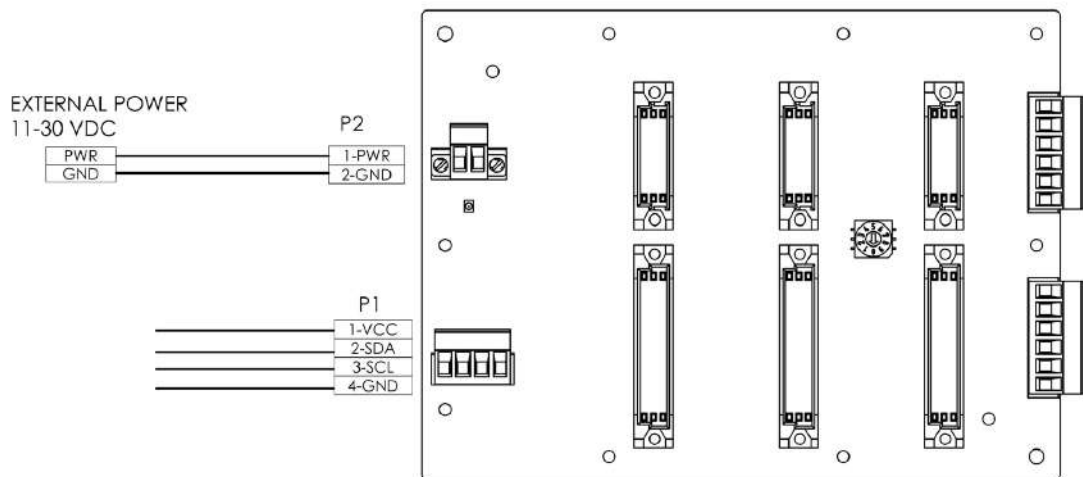


Figure 4-1. 3 Slot backplane board

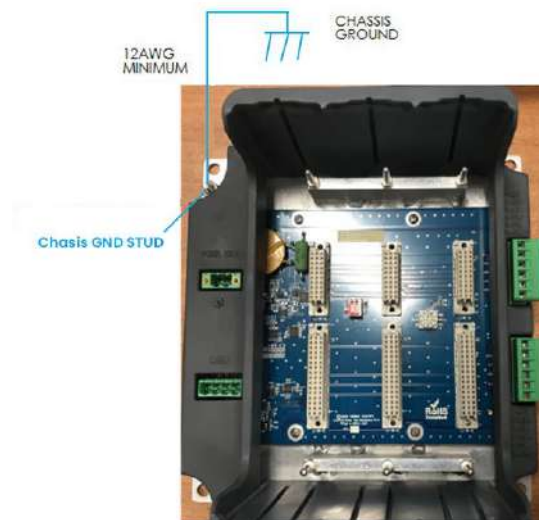


Figure 4-2. 3 Slot backplane chassis ground stud

4.1.2 Daisy Chain Connection of 8000FX Chassis

All chassis ground studs of backplane boards are connected to the same chassis ground point and switches in different backplane boards should be set to different numbers.

i NOTE

3-slot backplane and 7-slot backplane boards share the same wiring diagrams

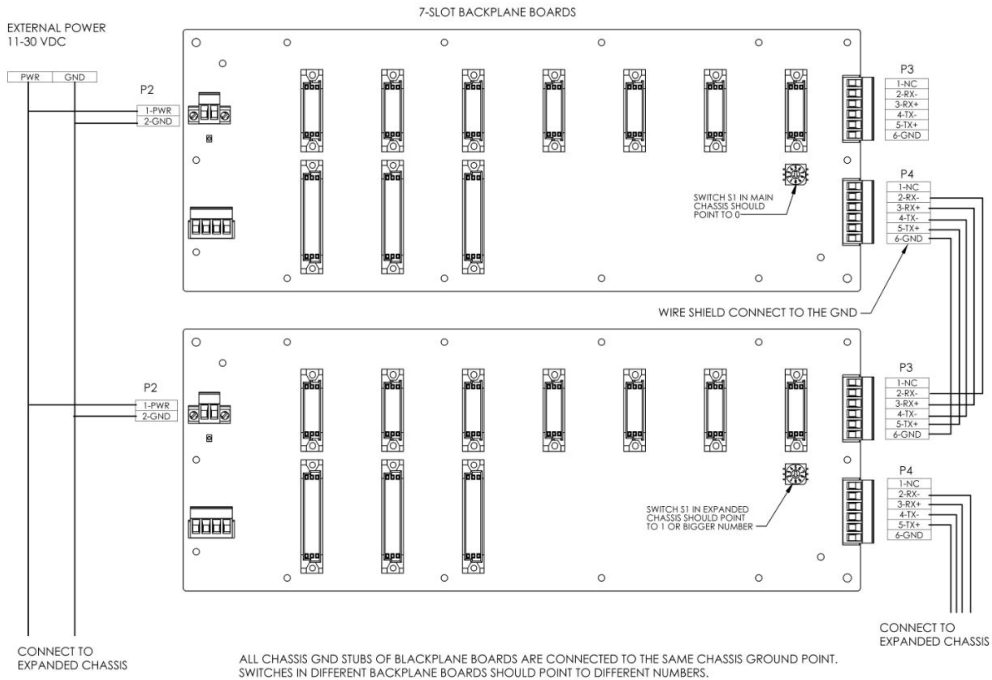


Figure 4-3. 7 slot chassis daisy chain

4.2 CPU Module Wiring (PN:30512)

4.2.1 CPU Host Port (4 – Wire RS485)

Tek-FC 8000FX Flow Computer CPU board host port to user interface with 4-wire RS485

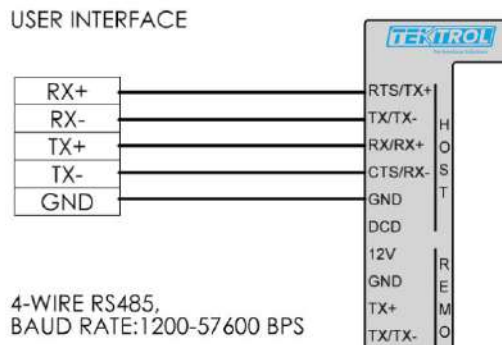


Fig 4-4 Tek -FC 8000FX CPU Host port 4-wire RS485

4.2.2 CPU Host Port (2-Wire RS485)

Tek-FC 8000 FX Flow Computer CPU board host port to user interface with 2-wire RS485

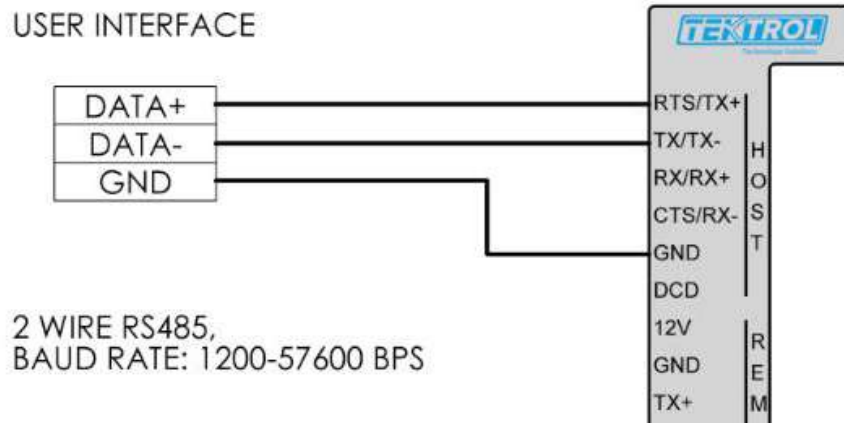


Fig 4-5 Tek-FC 8000FX CPU Host port 2-wire RS485

4.2.3 CPU Host Port (RS232)

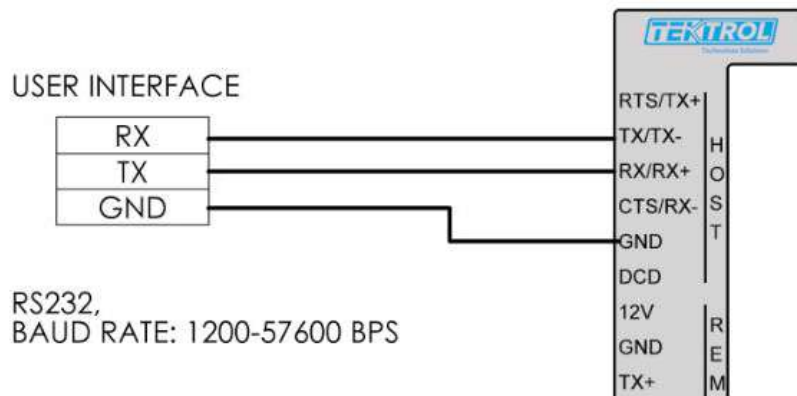


Fig 4-6 Tek-FC 8000FX CPU Host Port RS232

4.2.4 CPU Host Port to DCE (Data Communication Equipment)

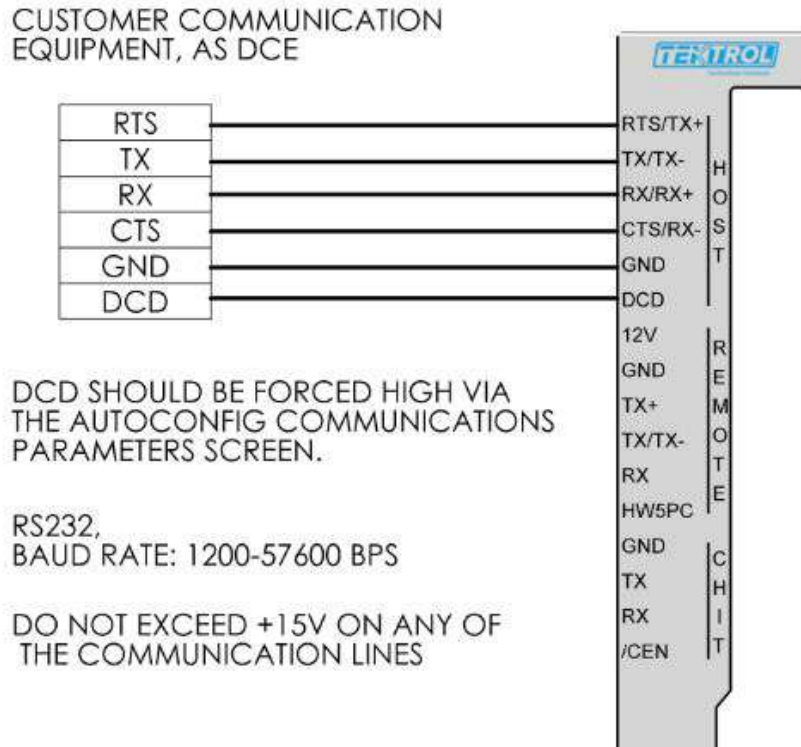


Fig 4-7 Tek -FC 8000FX CPU Host to DTE

4.2.5 CPU Host Port to DTE (Data Terminal Equipment)

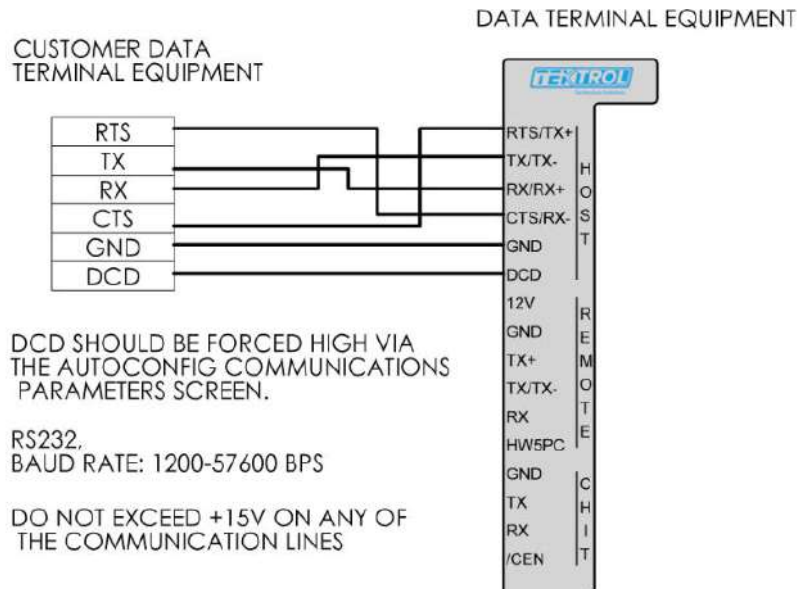


Fig 4-8 Tek-FC 8000FX CPU Host to DTE

4.2.6 CPU Remote Port to 8000FX Terminal Board

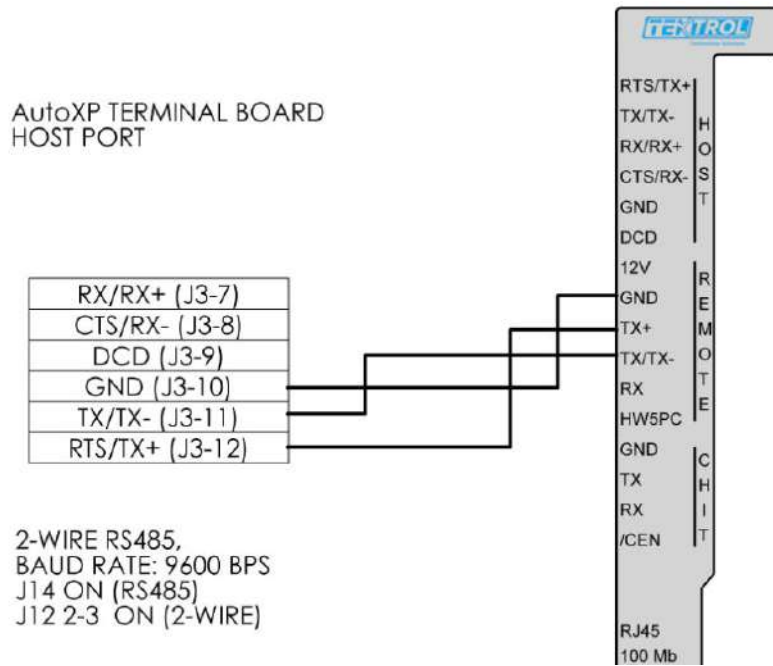


Fig 4-9 Tek -FC 8000FX CPU Remote port to user interface RS232

4.2.7 CPU Remote Port to User Interface with RS232

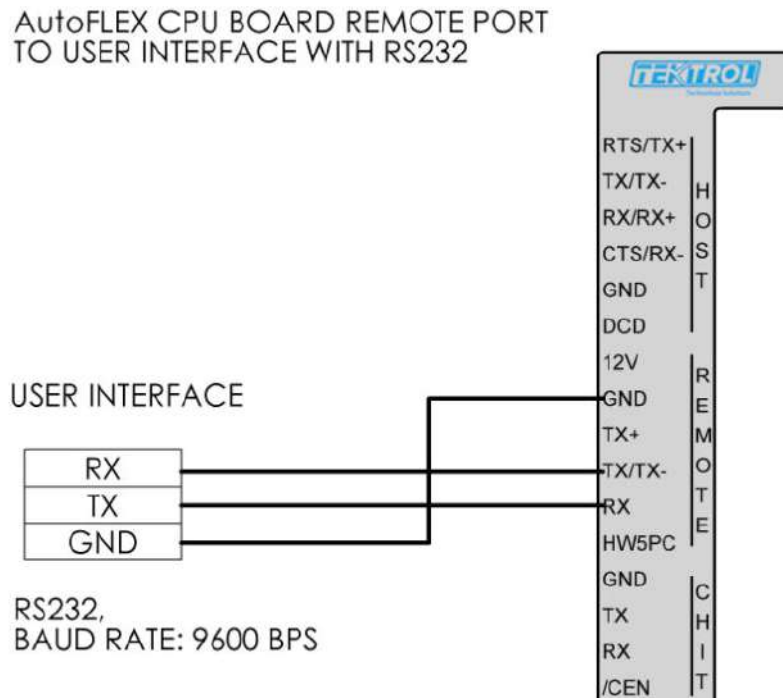


Fig 4-10 Tek-FC 8000FX CPU CHIT and Ethernet Ports

4.2.8 Tek-FC 8000FX Flow Computer Board CHIT Port, 100mb, 1Gb RJ45 Ports

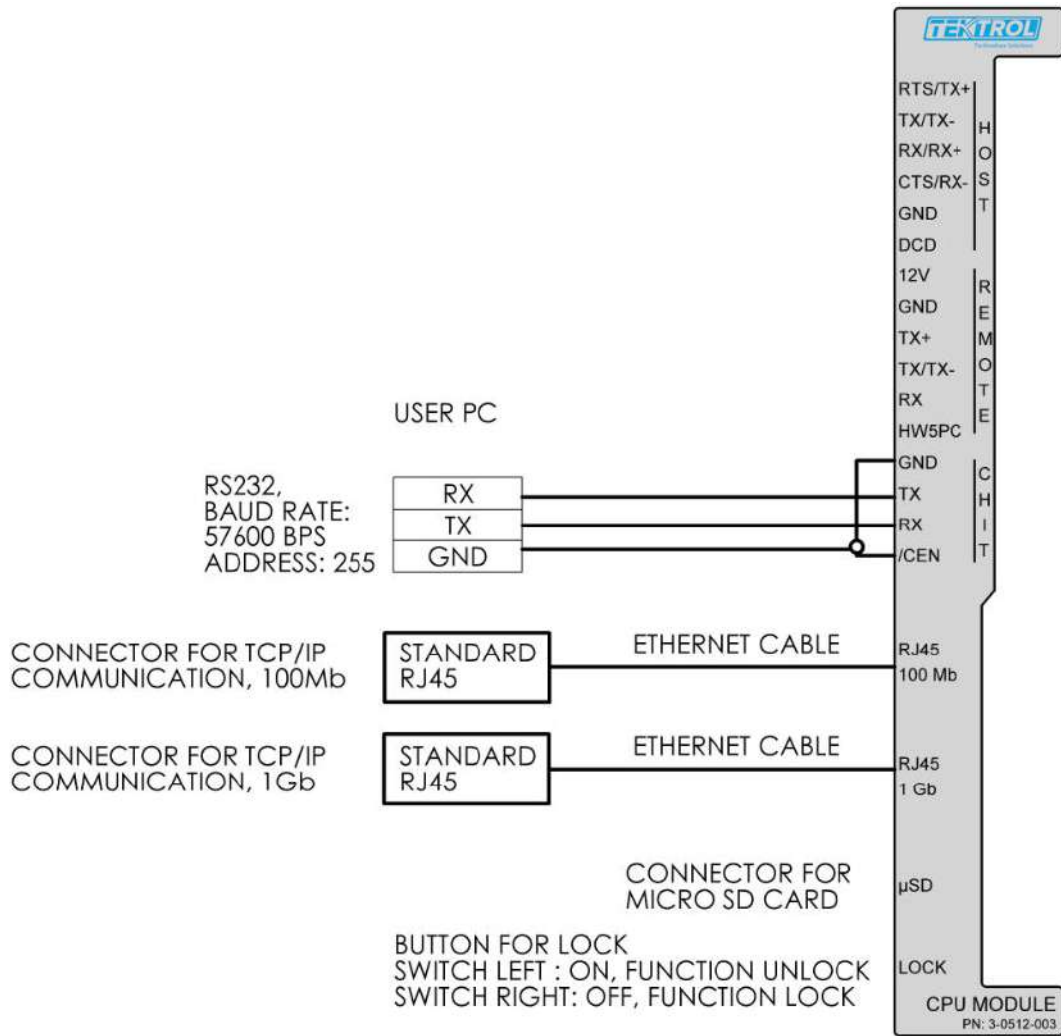


Fig 4-11 Tek-FC 8000FX CPU CHIT and Ethernet Ports

4.2.9 Tek-FC 8000FX Flow Computer Board HMI Port and USB Port

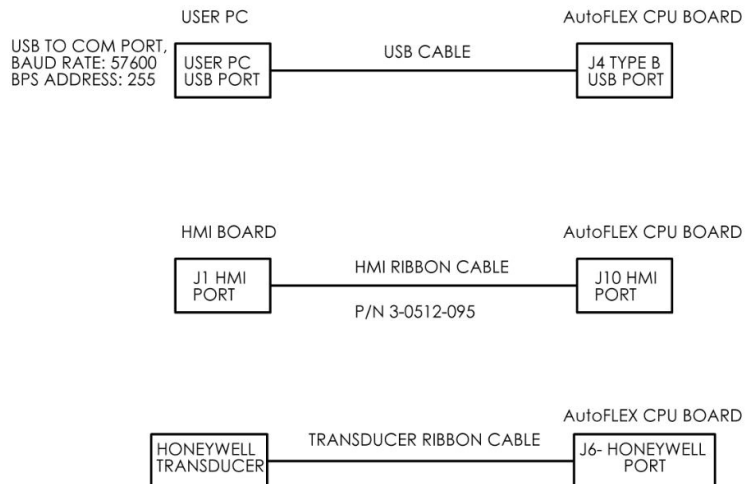


Fig 4-12 Tek -FC 8000FX CPU HMI and USB port

4.2.10 Tek-FC 8000FX Flow Computer CPU Board Side View

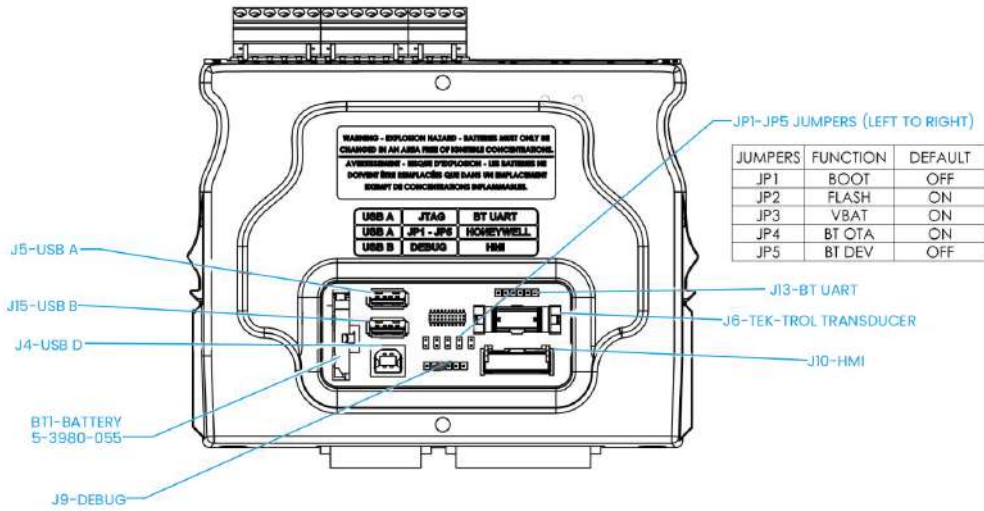


Fig 4-13 Tek-FC 8000FX CPU HMI and USB port

4.3 Communication Module Wiring

4.3.1 2-Wire RS232 Communication

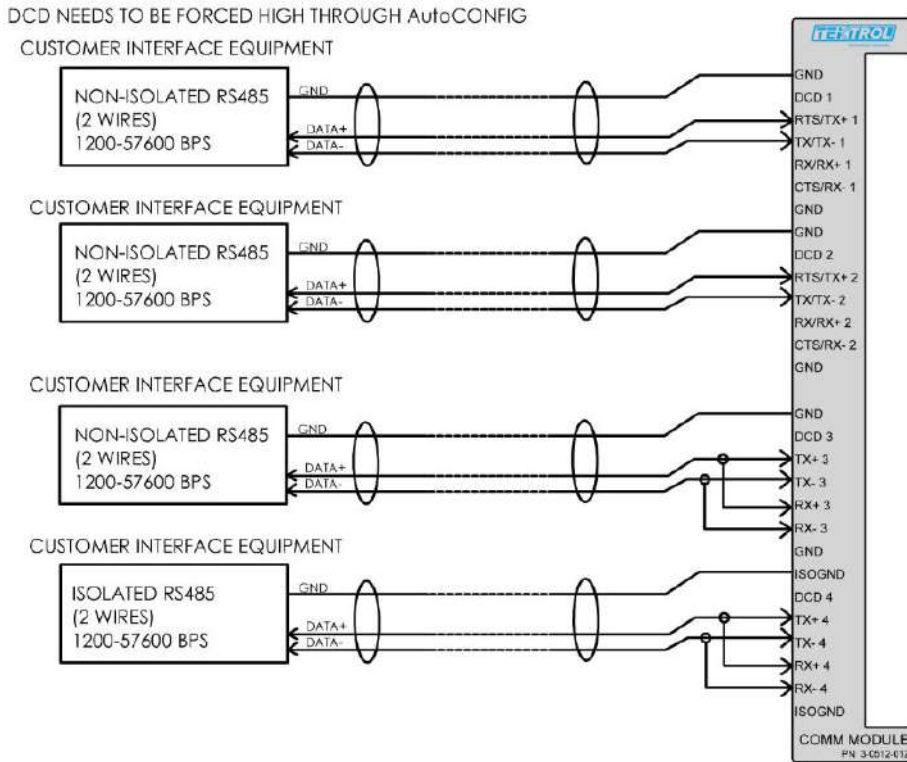


Fig 4-14 Tek-FC 8000FX Comm 2-Wire RS485

4.3.2 4-Wire RS485 Communication

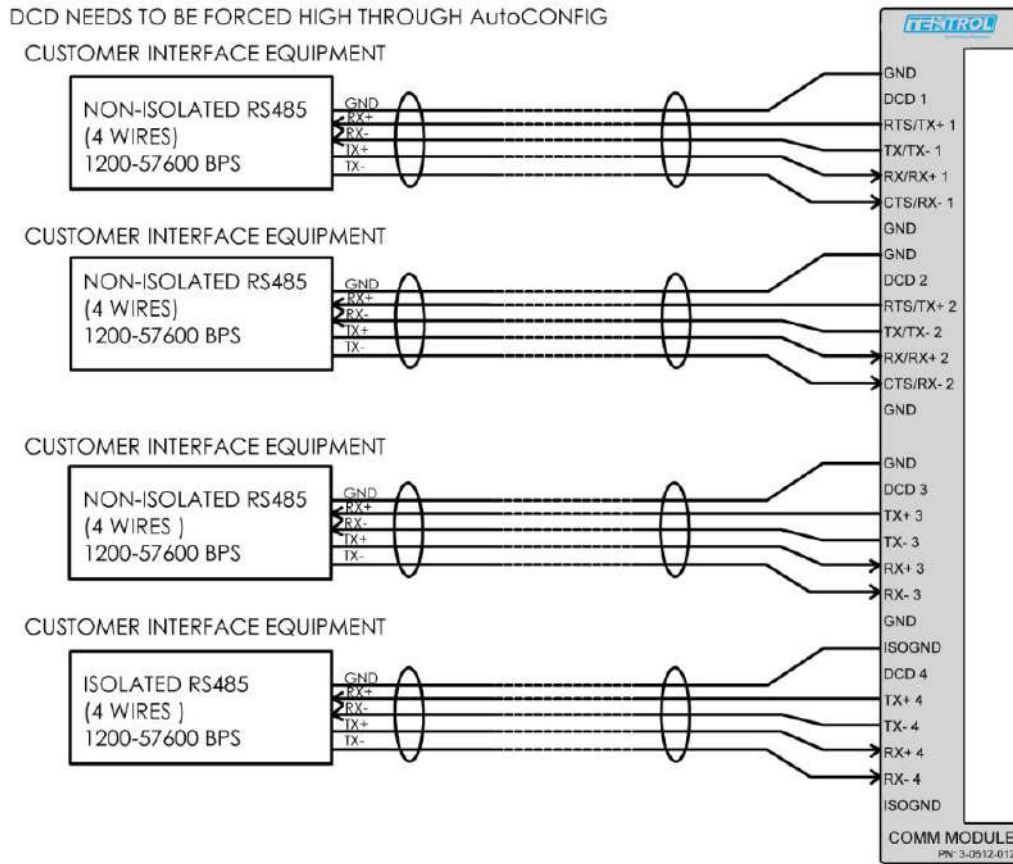


Fig 4-15 Tek-FC 8000FX Comm 4-wire RS485

4.3.3 2-Wire RS232 Communication

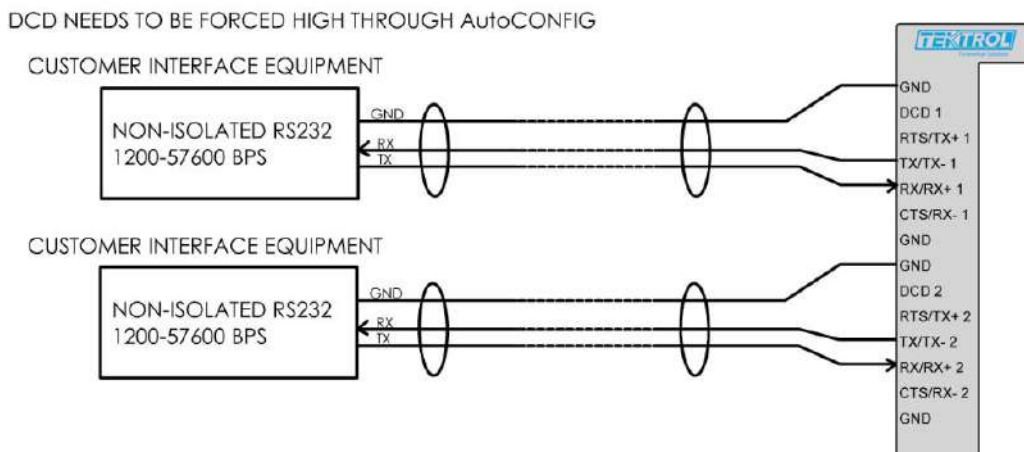


Fig 4-16 Tek-FC 8000FX Comm 2-wire RS232

4.3.4 RS232 Communication: Tek-FX 8000FC to Customer data Communication equipment

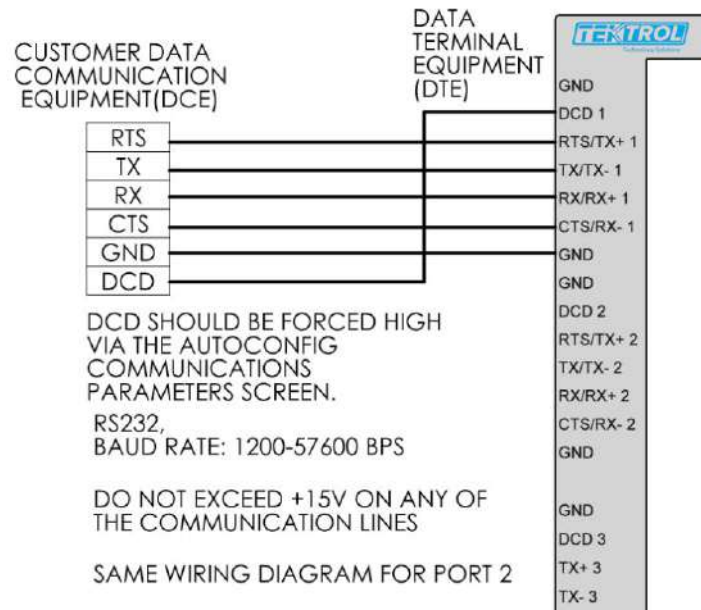


Fig 4-17 Tek-FC 8000FX RS232 to customer DCE

4.3.5 RS232 Communication: Tek-FC 8000FX to Customer data terminal equipment

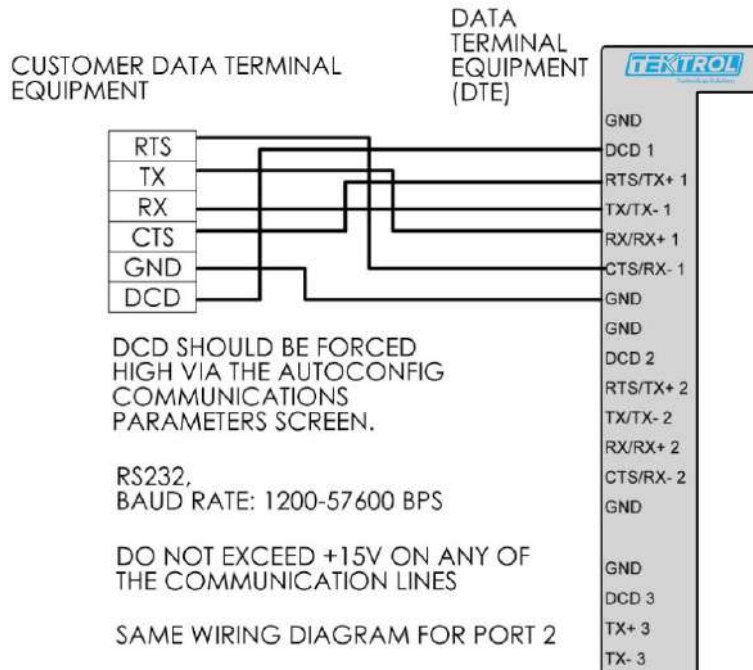


Fig 4-18 Tek -FC 8000FX RS232 to customer DTE

4.4 Non-Isolated Combo Module Wiring

4.4.1 1-5V input w/External Power

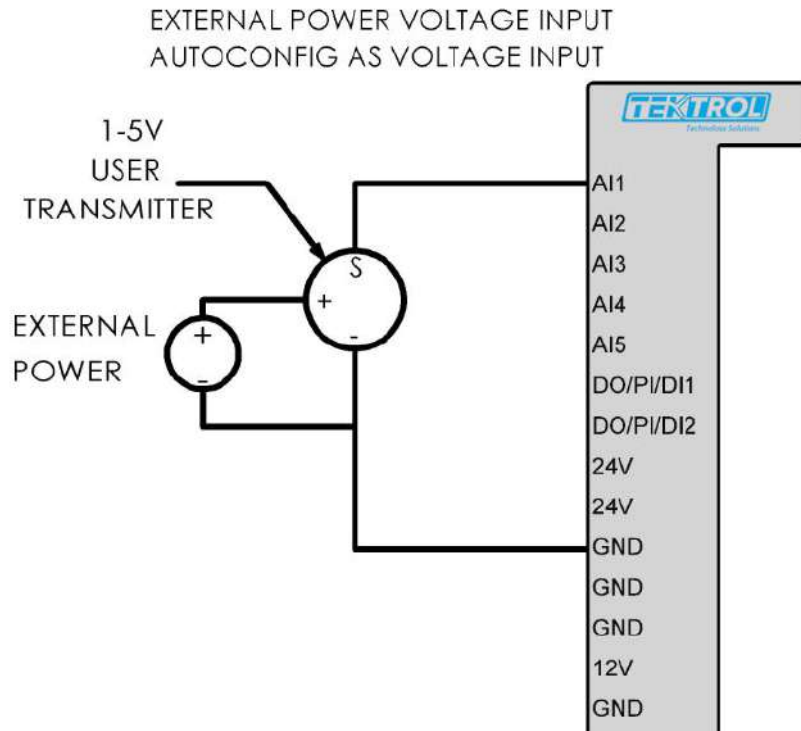


Fig 4-19 Tek -FC 8000FX 1-5V voltage input (external power)

4.4.2 1-5V input w/Internal Power

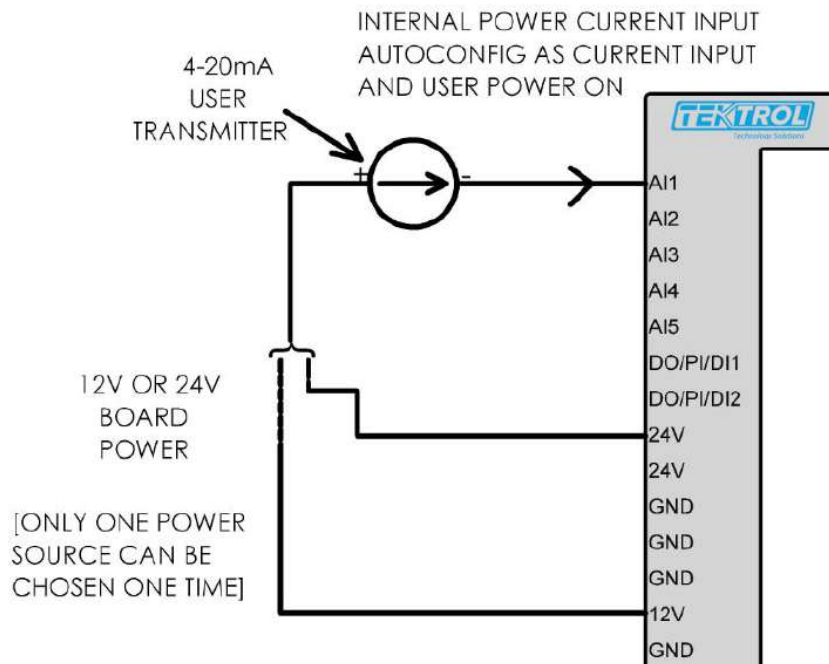


Fig 4-20 Tek-FC 8000FX 1-5V voltage input (internal power)

4.4.3 4-20mA current input w/Internal Power

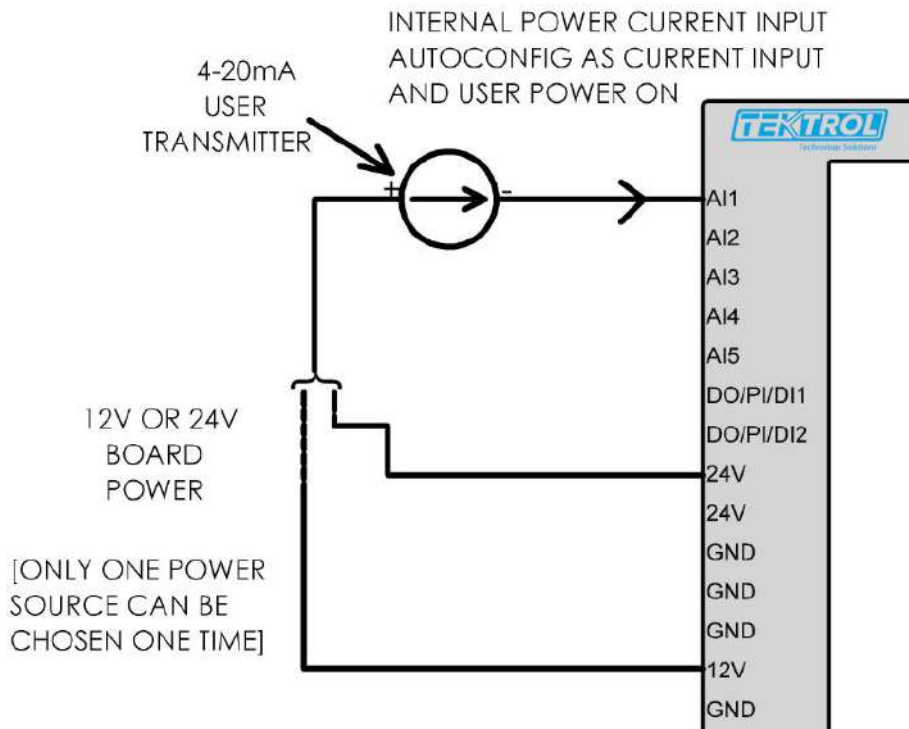


Fig 4-21 Tek-FC 800 FX Flow Computer 4-20mA current input (internal power)

4.4.4 4-20mA current input w/External Power

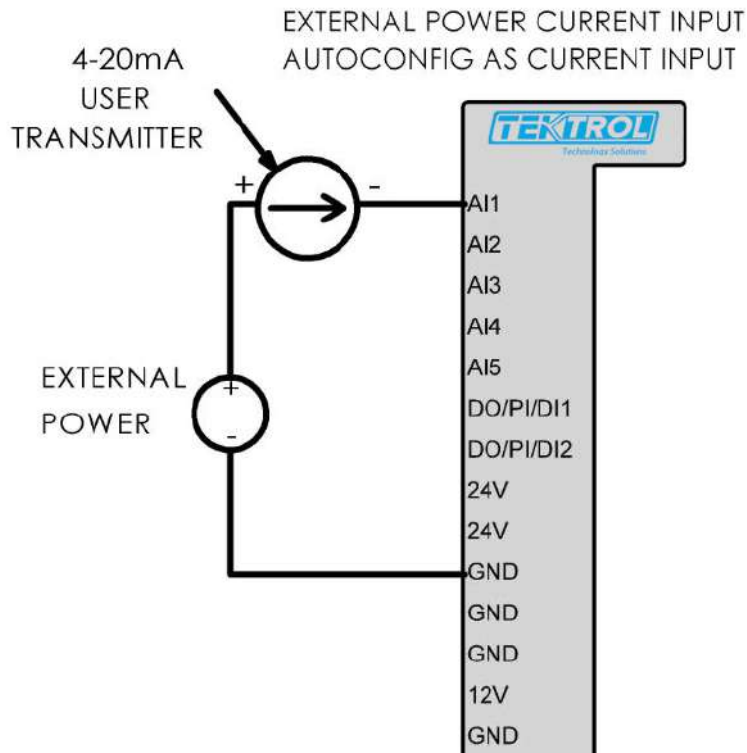


Fig 4-22 Tek-FC 8000FX Multi-run Flow Computer 4-20mA current input (external power)

4.5 Discrete Output (Non-iso)

4.5.1 Discrete Output with internal power configured as FET output

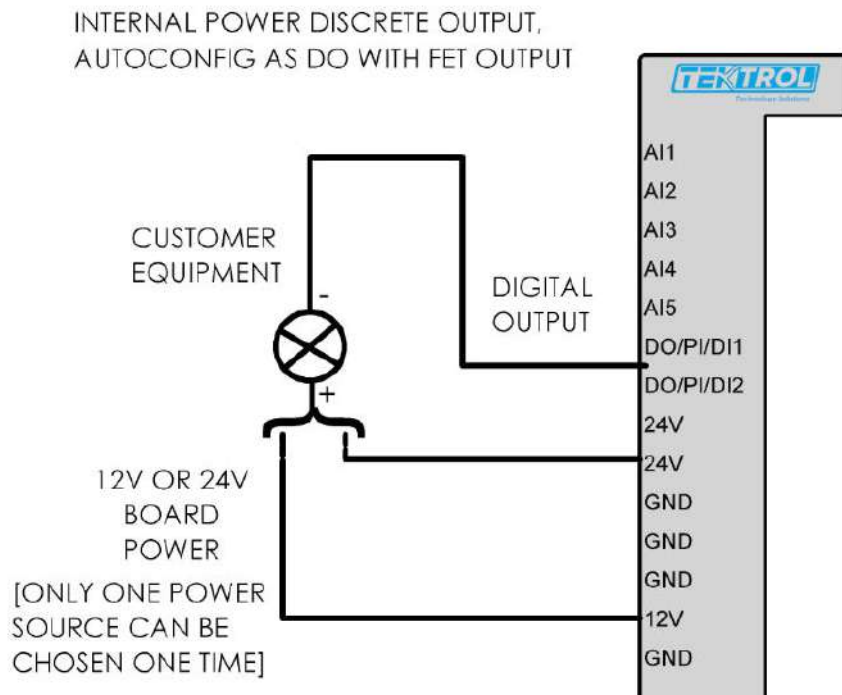


Figure 4-23. Non-iso DO as FET w/internal power

4.5.2 Discrete Output with internal power as DO with 24V or 5V/12V pull-up

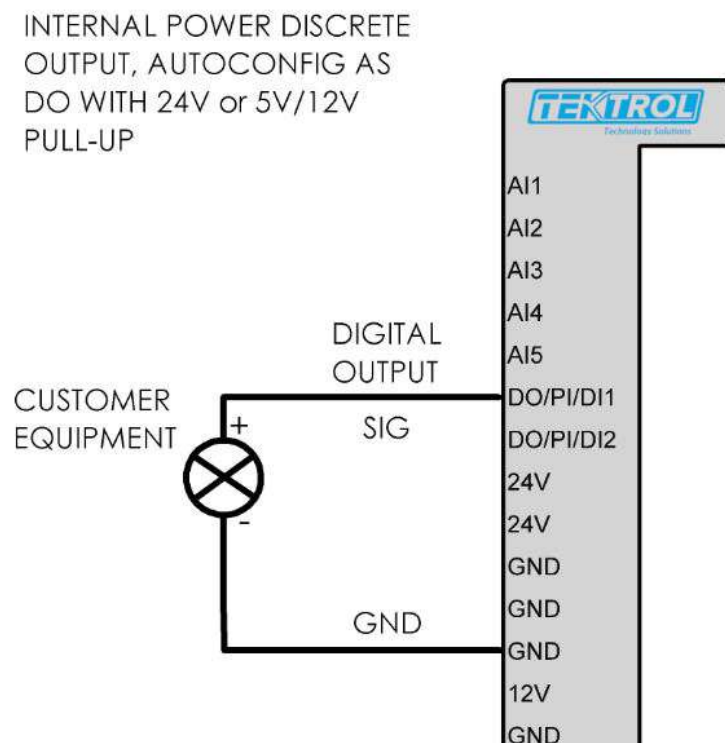


Figure 4-24 Non-iso DO w/24V or 5V/12V Pull-UP

4.5.3 Discrete Output with external power configured as FET output

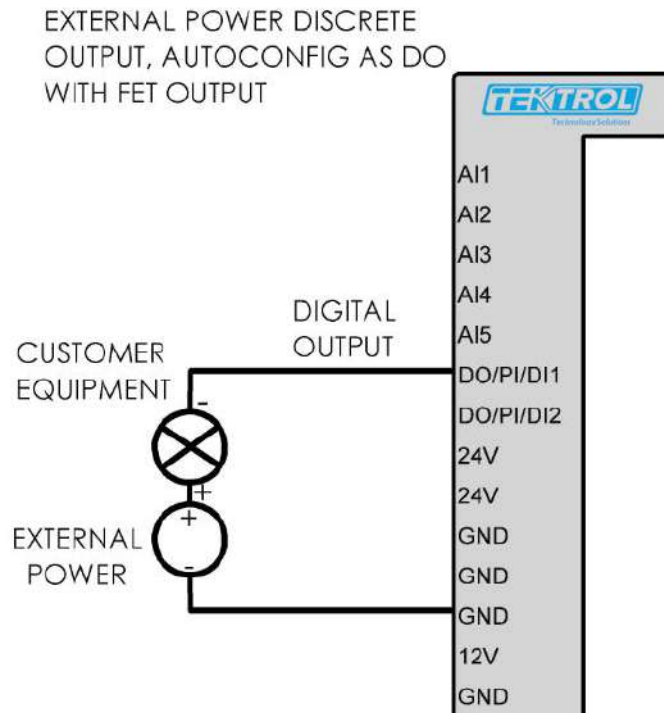
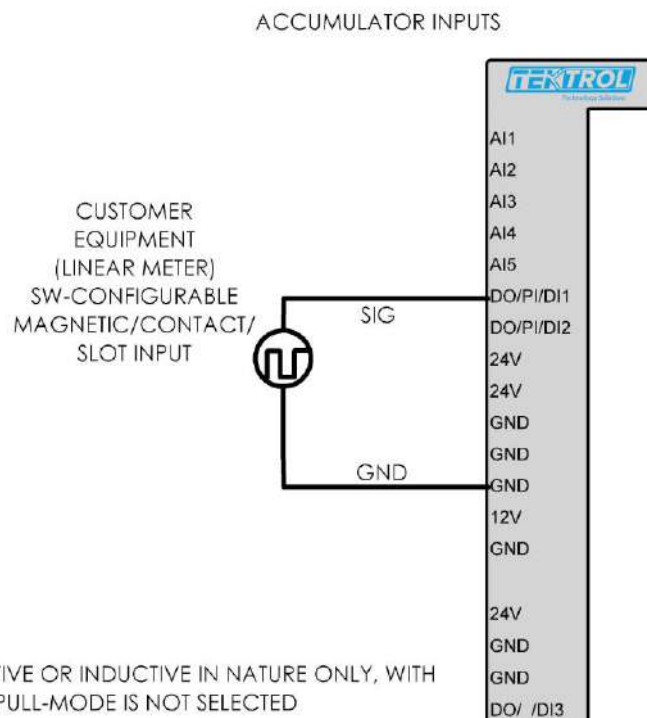


Figure 4-25. Non-iso DO as FET w/external power

4.6 Pulse/Accumulator Input (Non-iso)

4.6.1 Non-iso Accumulator Inputs



THE PULSE INPUT MUST BE RESISTIVE OR INDUCTIVE IN NATURE ONLY, WITH MAXIMUM OUTPUT OF +15V IF PULL-MODE IS NOT SELECTED

Figure 4-26. Tek-FC 8000FX Flow Computer Non-iso PI inputs

4.7 Discrete Input (Non-iso)

4.7.1 Discrete input w/internal power with 24V or 5V/12V Pull-up

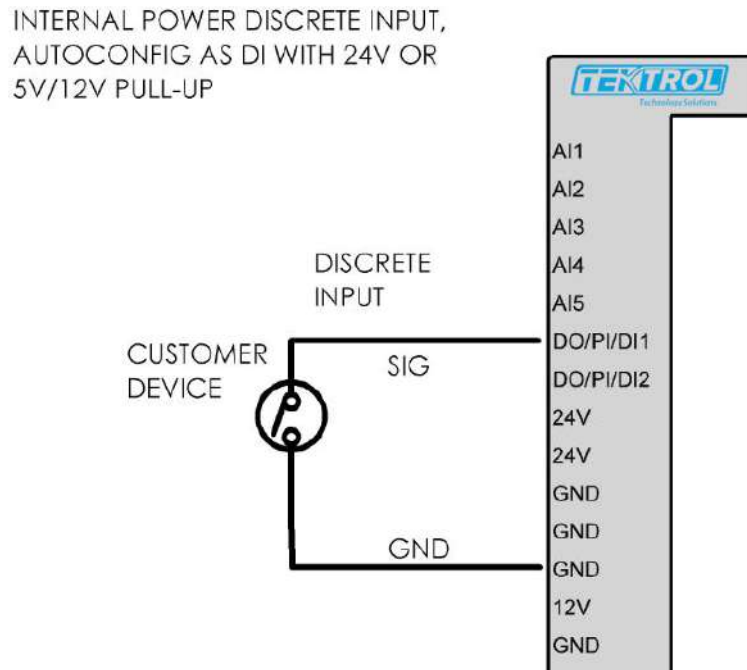


Figure 4-27. Discrete input (internal power) with 24V or 5V/12V Pull-up

4.7.2 Discrete input w/internal power with no Pull-up

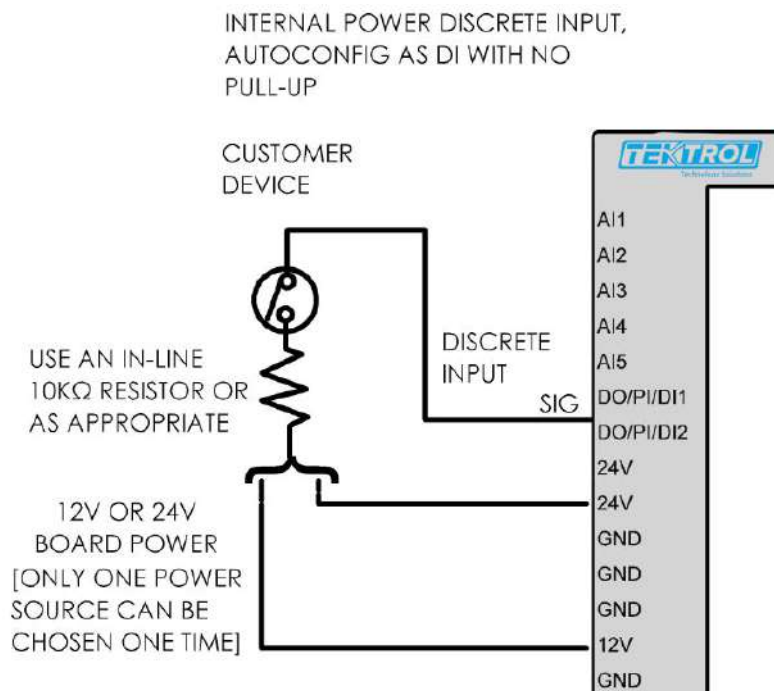


Figure 4-28. Discrete input (internal power) with no pull-up

4.7.3 Discrete input w/external power and no Pull-up

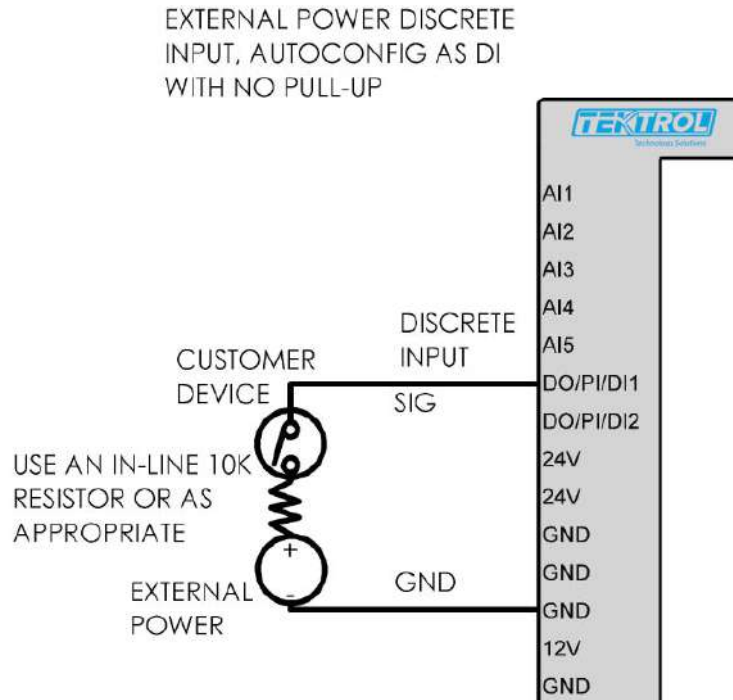


Figure 4-29. Discrete input (external power) with no pull-up

4.8 Analog Output (Non-iso)

4.8.1 Analog Output with External Loop Power

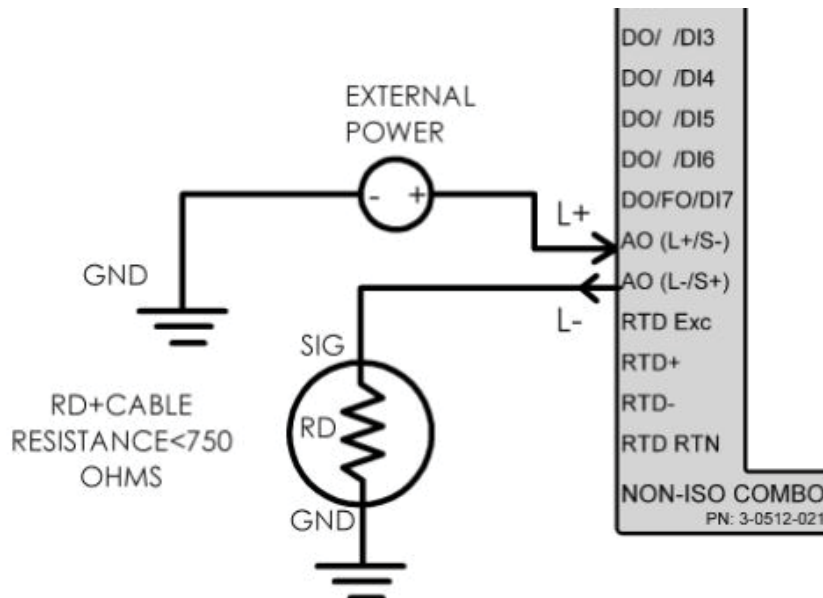


Figure 4-30. Analog out with external power

4.8.2 Analog Output with self/internal power

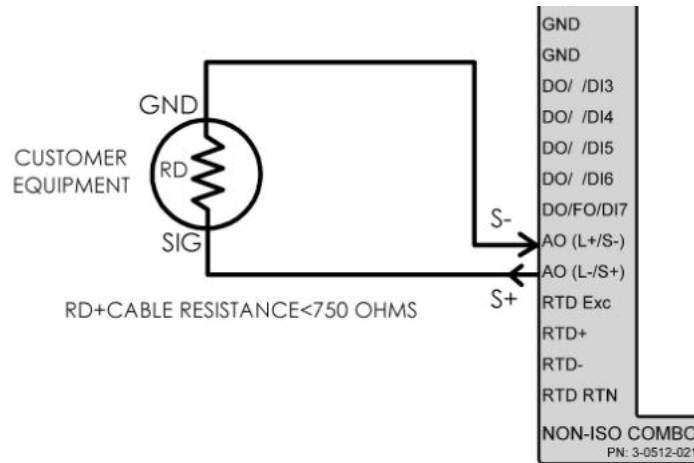


Figure 4-31. Analog out with self/internal power

4.9 RTD Wiring (Non-iso)

4.9.1 RTD 4-Wire Configuration

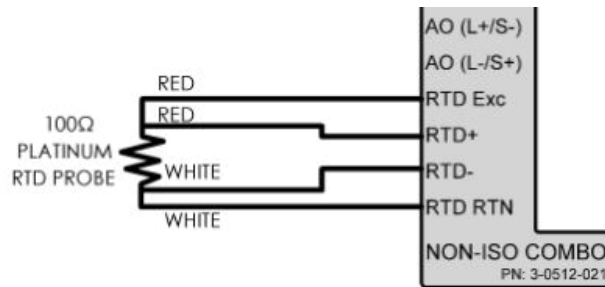


Figure 4-32. 4-wire RTD

4.9.2 RTD 2-Wire Configuration

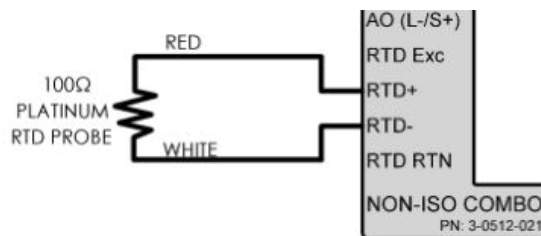


Figure 4-33. 2-wire RTD

4.9.3 RTD 3-Wire Configuration

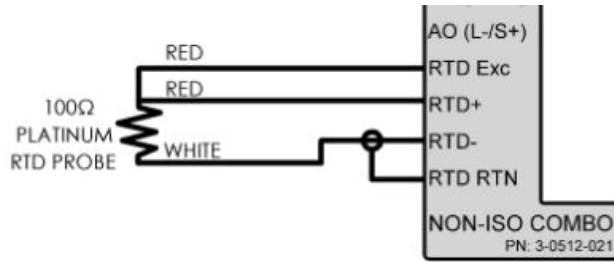


Figure 4-34. 3-wire RTD

4.10 Isolated Combo Module Wiring

4.10.1 Analog Input (1-5V) with External Power

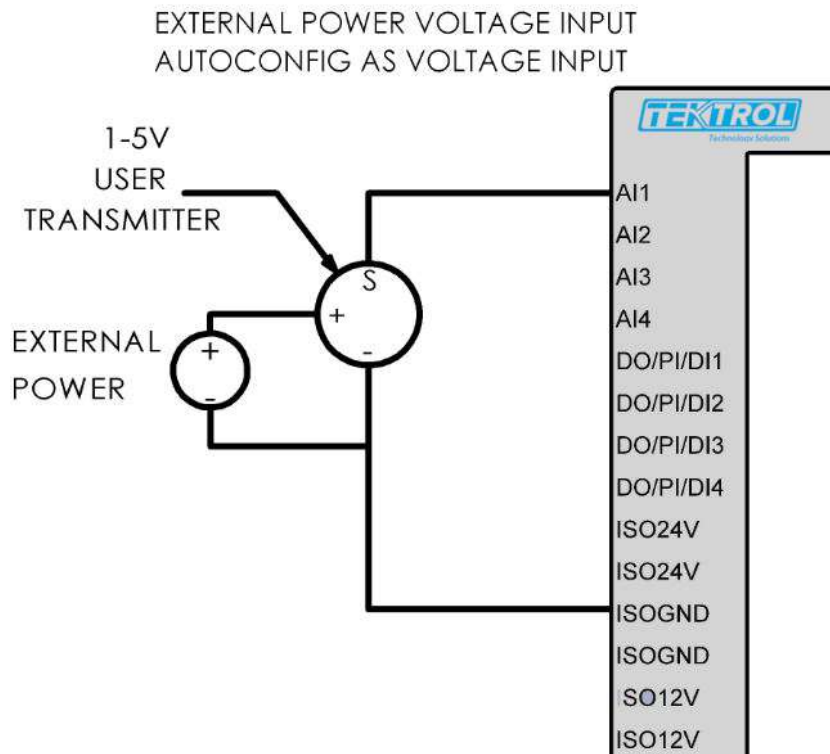


Figure 4-35. 1-5V voltage input with external power

4.10.2 Analog Input (1-5V) with Internal Power

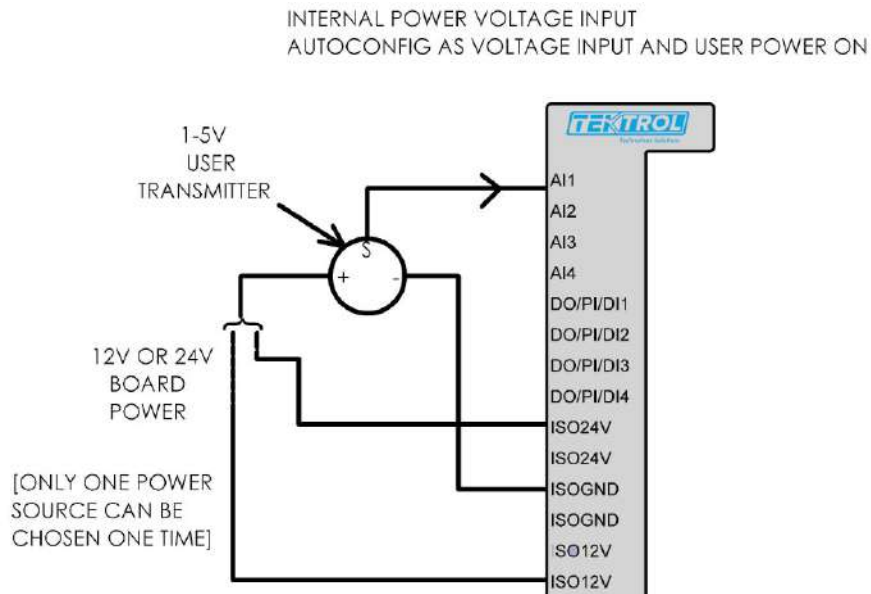


Figure 4-36. 1-5V voltage input with internal power

4.10.3 Analog Input (4-20mA) with External Power

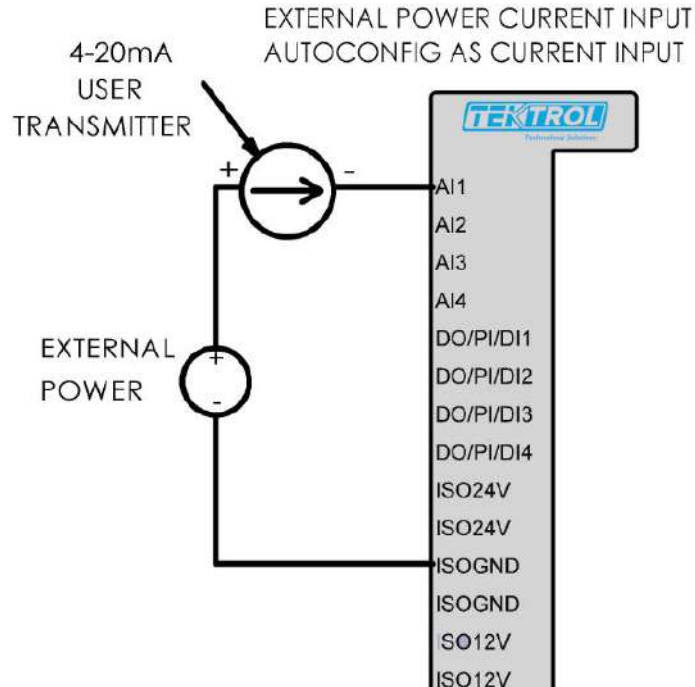


Figure 4-37. 4-20mA current input with external power

4.11.2 Discrete output with 24V or 5V/12V Pull-up

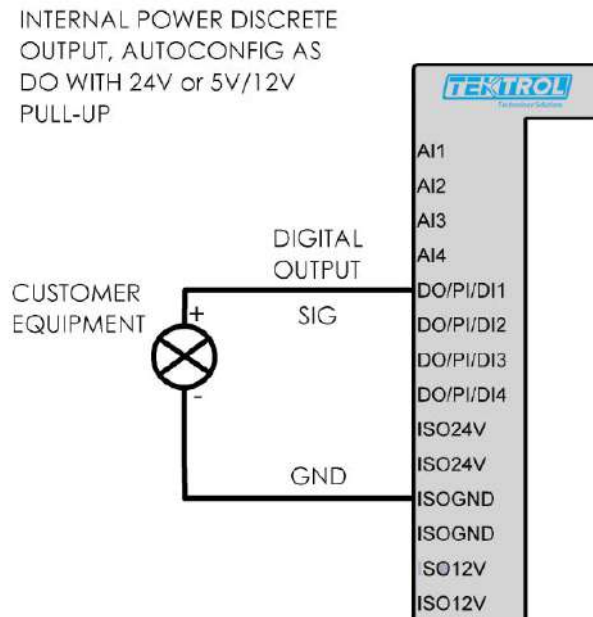


Figure 4-40. Discrete output with 24V or 5V/12V pull-up

4.11.3 Discrete output we FET with external power

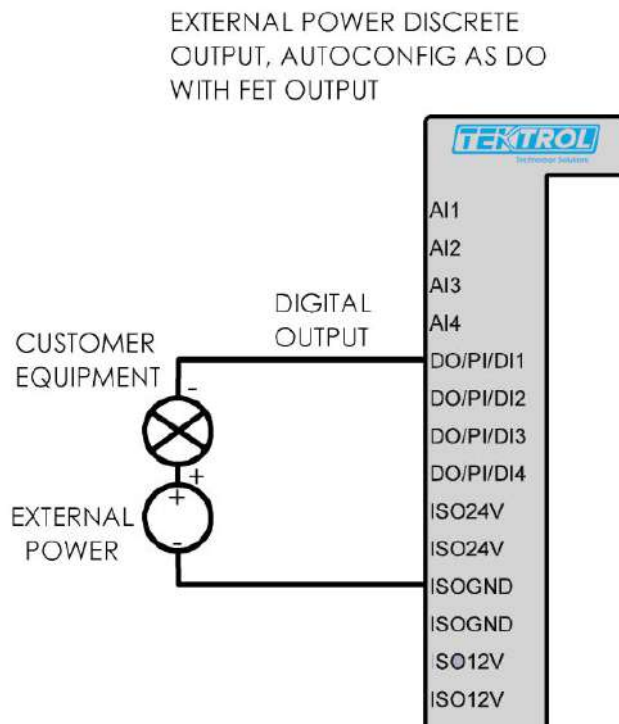


Figure 4-41. FET discrete output with external power

4.12 Pulse/Accumulator Input (Iso-combo)

4.12.1 Pulse input as magnetic /Contact/Slot Sensor

i NOTE

The pulse input must be resistive or inductive in nature only, with maximum output of +15V if Pull-mode is not selected.

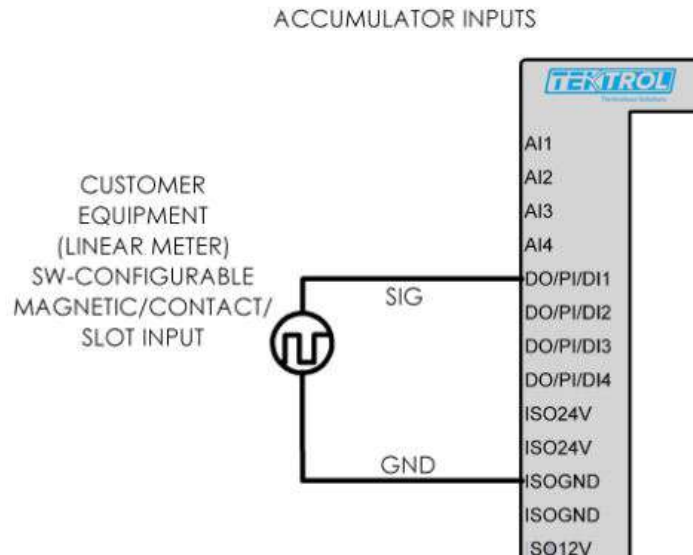


Figure 4-42. Pulse input

4.13 Discrete Input (Iso-Combo)

4.13.1 Discrete input with internal power and 24V or 5V/12V Pull-up

INTERNAL POWER DISCRETE INPUT, AUTOCONFIG AS DI WITH 24V OR 5V/12V PULL-UP

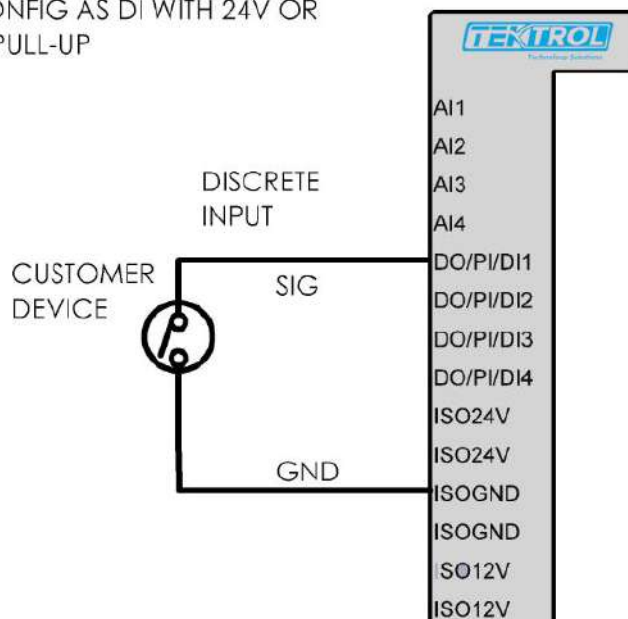


Figure 4-43. Discrete input with 24V or 5V/12V pull-up

4.13.2 Discrete input with internal power no Pull-up

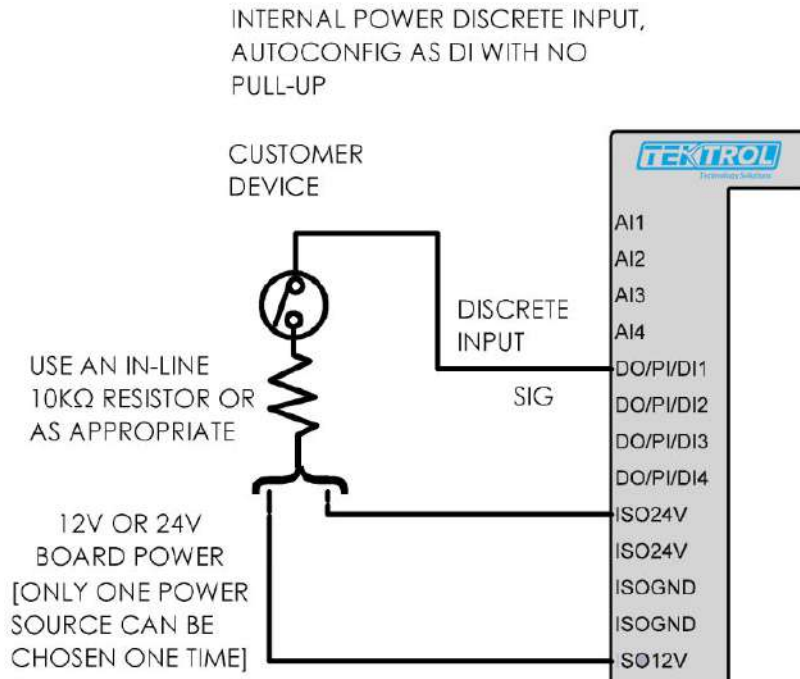


Figure 4-44. Discrete input with no pull-up

4.13.3 Discrete input with external power no Pull-up

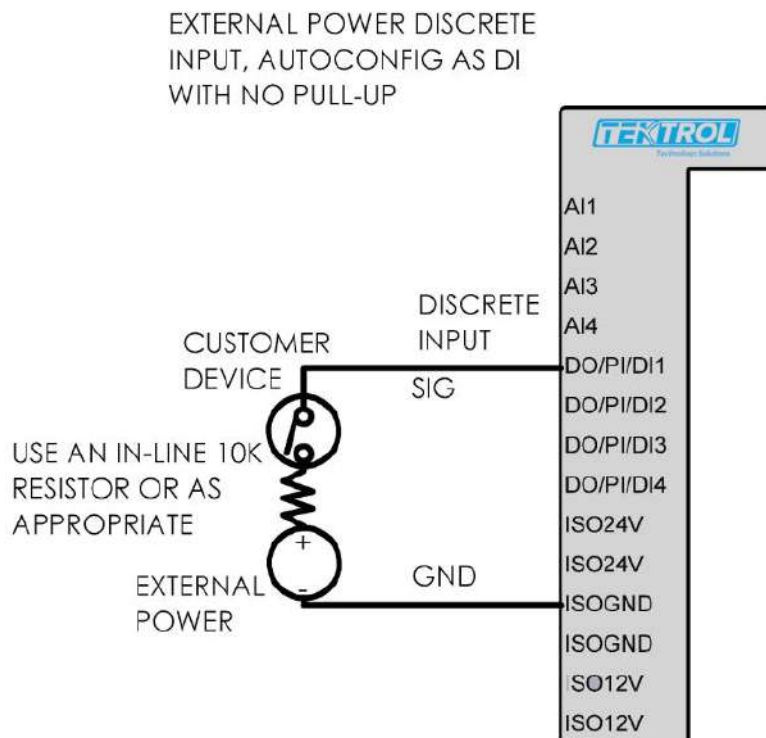


Figure 4-45. Discrete input no pull-up (external power)

4.14 Analog Output (Iso-combo)

4.14.1 Analog Output external power loop power

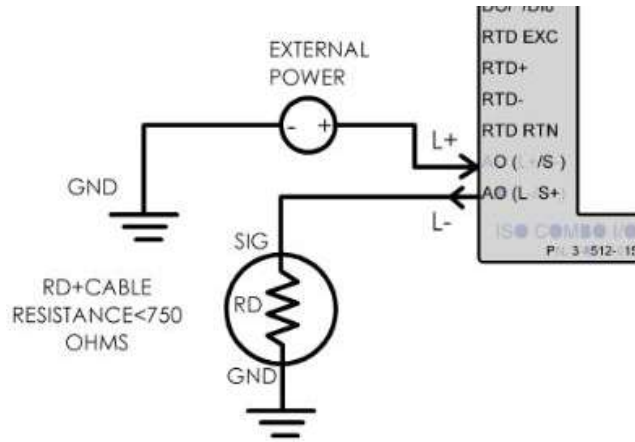


Figure 4-46. Analog output external loop power

4.14.2 Analog Output self-powered loop

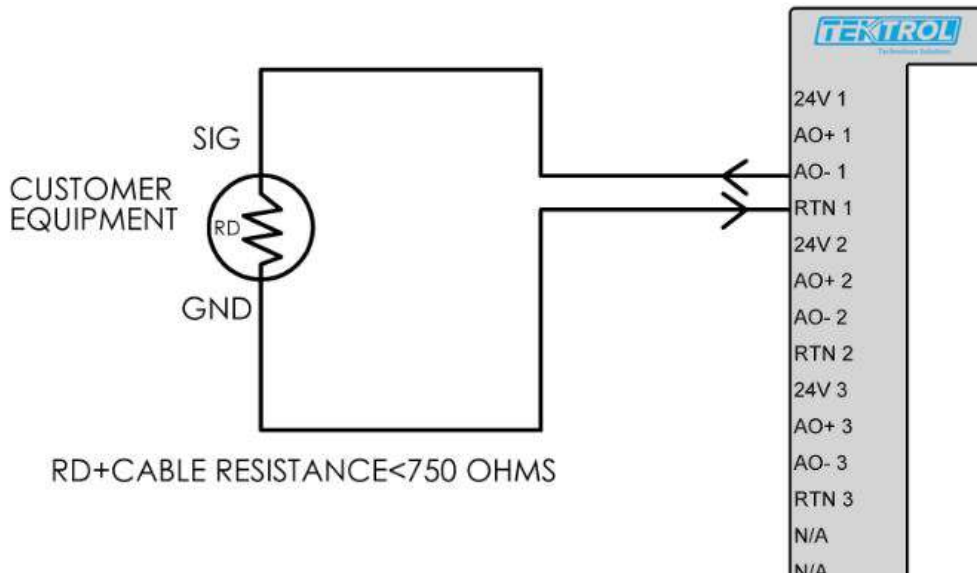


Figure 4-47. Analog output self-power

4.15 RTD Input (Iso-combo)

4.15.1 4-wire RTD Configuration

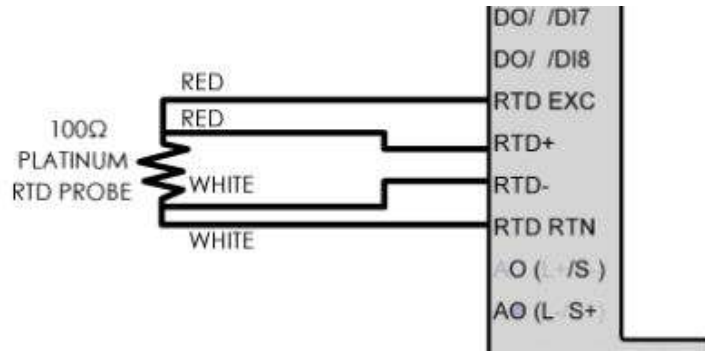


Figure 4-48. 4-wire RTD

4.15.2 2-wire RTD Configuration

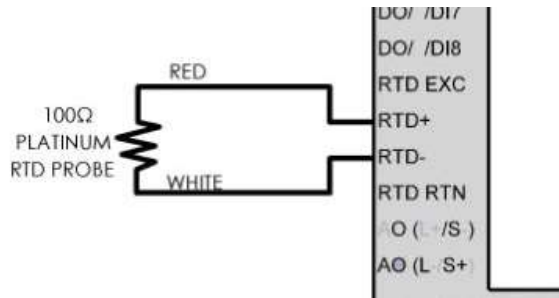


Figure 4-49. 2-wire RTD

4.15.3 3-wire RTD Configuration

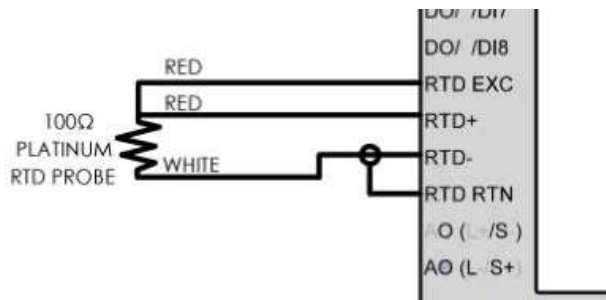


Figure 4-50. 3-wire RTD

4.16.3 Analog input (4-20mA) with external power

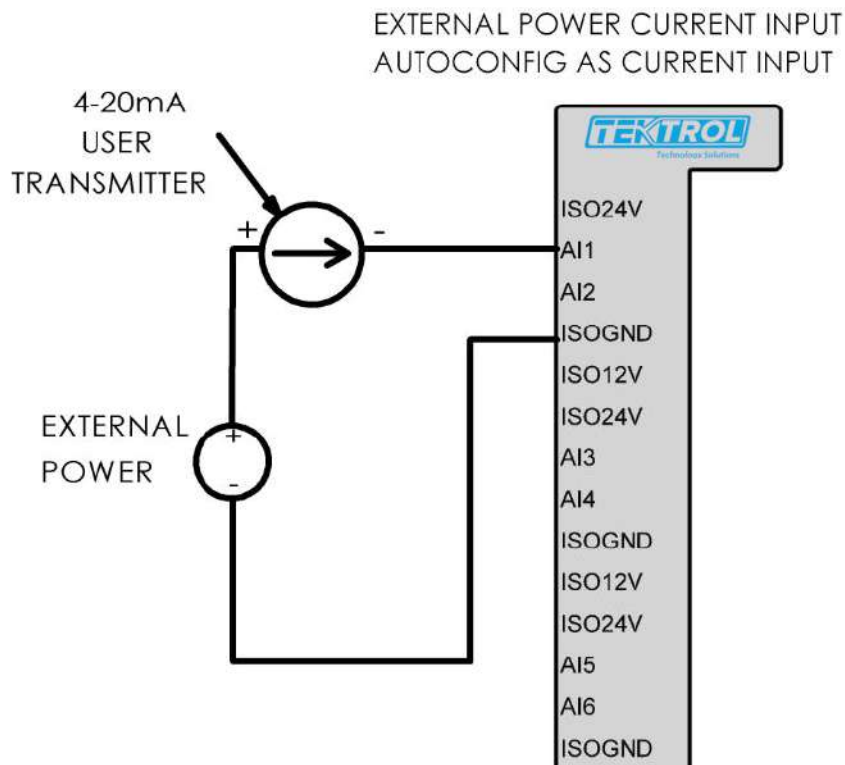


Figure 4-53. 4-20mA current input with external power

4.16.4 Analog input (4-20mA) with internal power

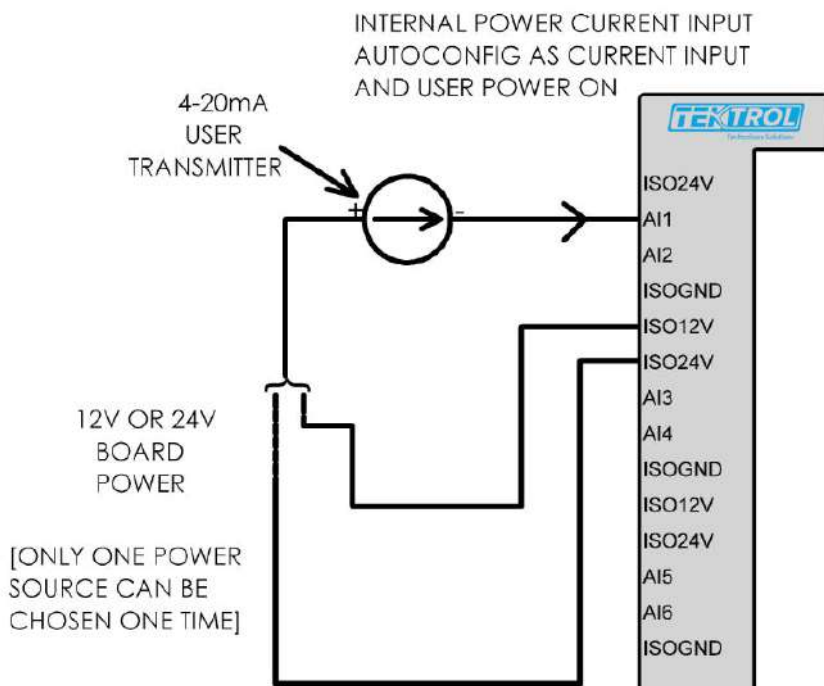


Figure 4-54. 4-20mA current input with internal power

4.17 Analog Output Module Wiring

4.17.1 Analog output with self-power loop

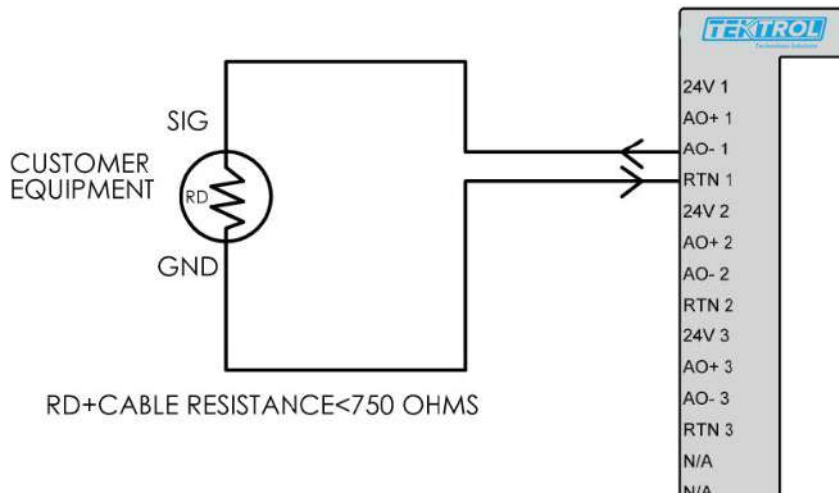


Figure 4-55. Analog output with self-power

4.17.2 Analog output external power

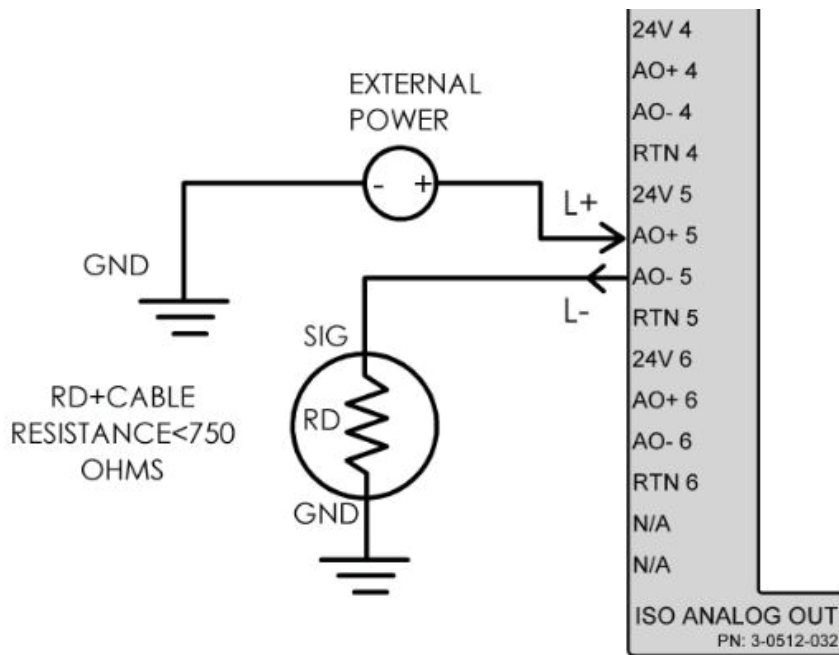


Figure 4-56. Analog output with external loop power

4.18 Discrete Input Module Wiring

4.18.1 Discrete input with external power or board power loop

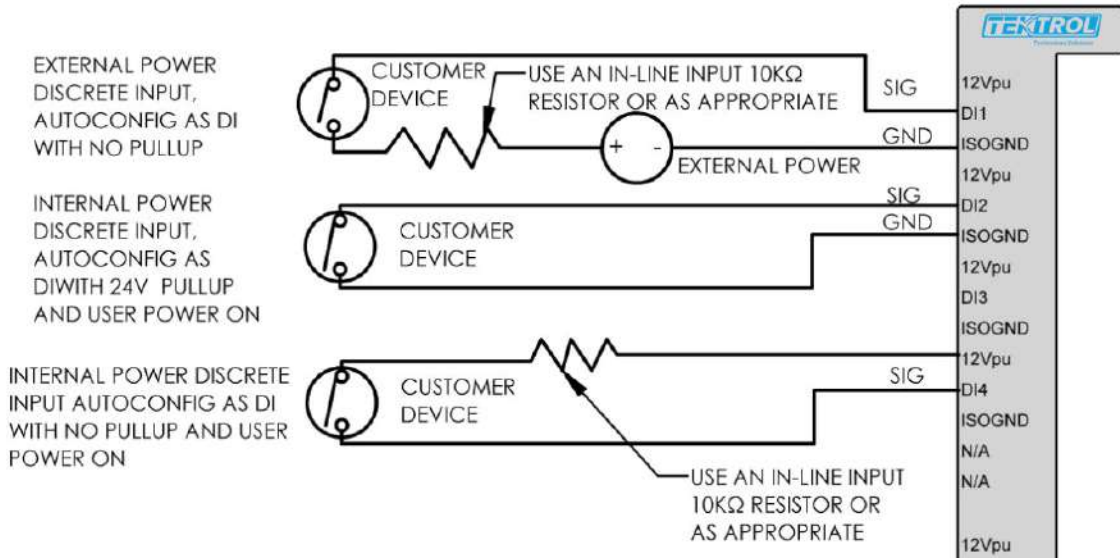


Figure 4-57. Discrete input with external power or board power

4.19 Relay DO Module Wiring

4.19.1 Relay DO

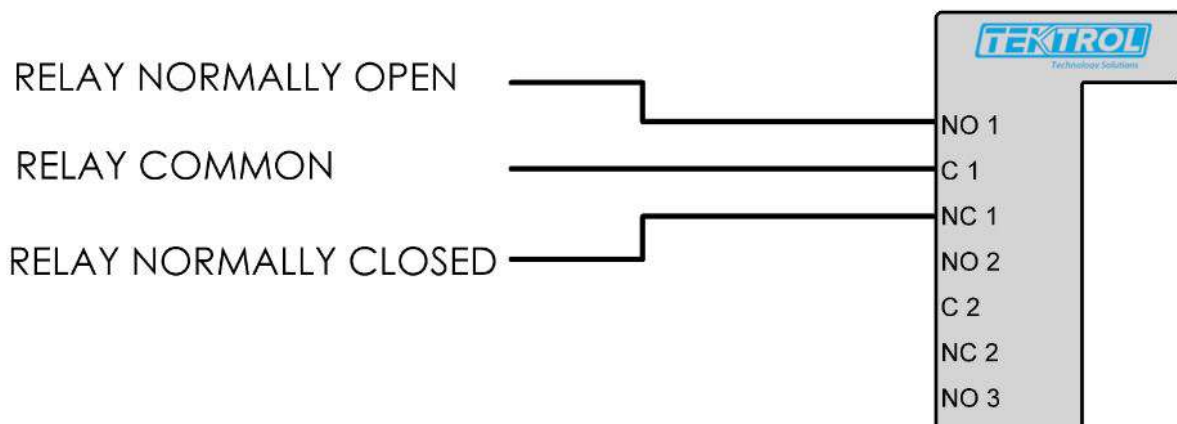


Figure 4-58. Relay DO

4.20 PI/DI/DO Module Wiring

4.20.1 Pulse input/Accumulator

i NOTE

The pulse input must be resistive or inductive in nature only, with maximum output of +15V if pull-mode is not selected.

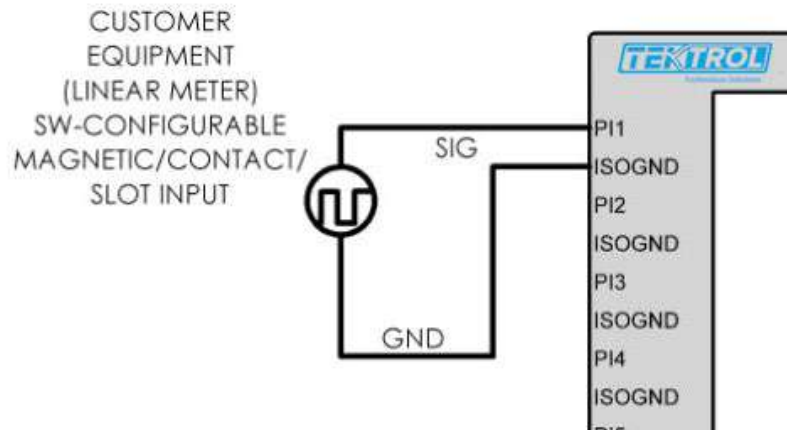


Figure 4-59. Pulse input

4.20.2 Discrete input with internal power with 24V pull-up

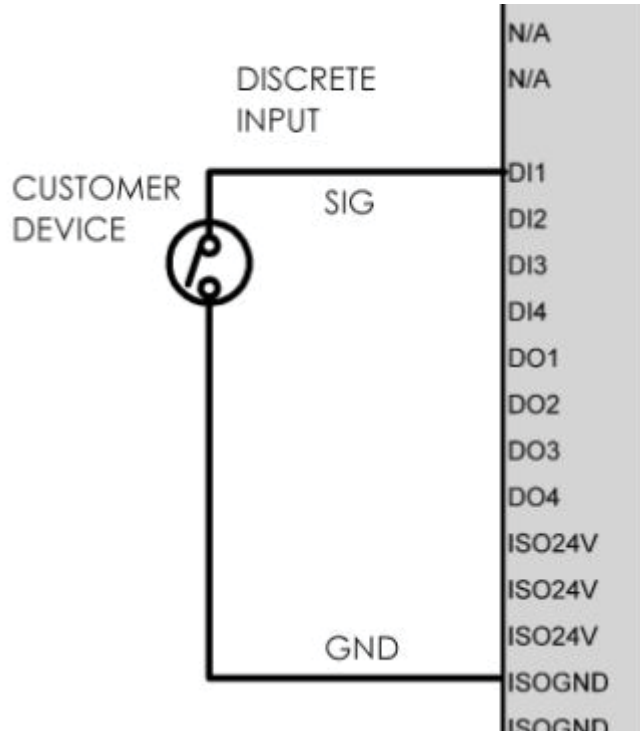


Figure 4-60. Discrete input internal power 24V pull-up

4.20.3 Discrete input with internal power and No pull-up

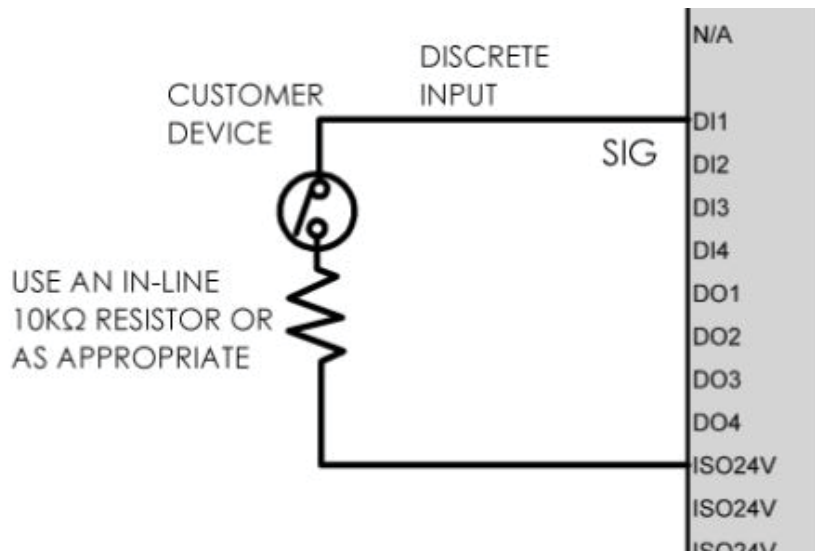


Figure 4-61. Discrete input with internal power no pull-up

4.20.4 Discrete input with external power and No pull-up

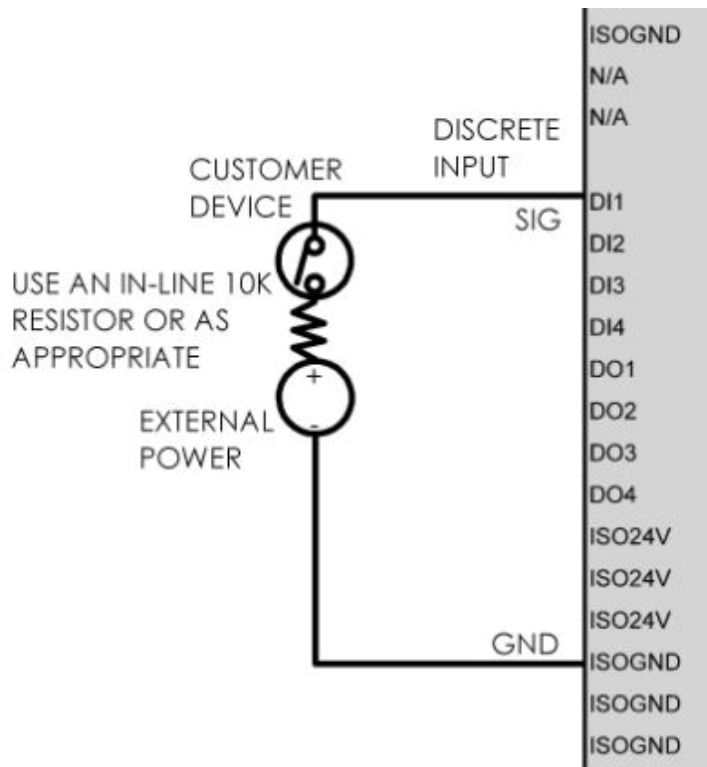


Figure 4-62. Discrete input with external power no pull-up

4.20.5 Discrete output as FET with internal power

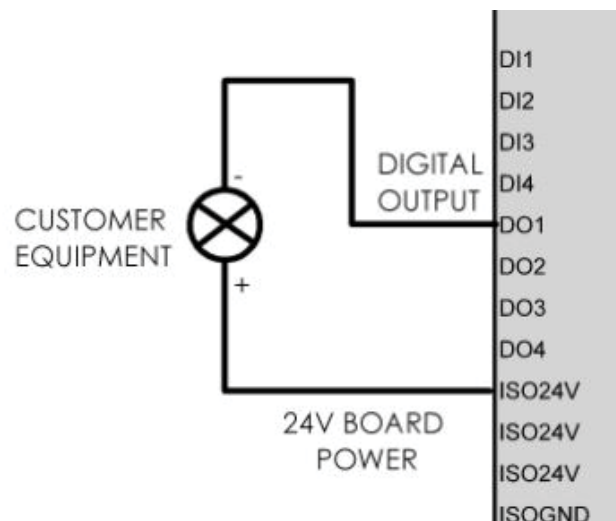


Figure 4-63. FET Discrete output with internal power

4.20.6 Discrete output as FET with external power

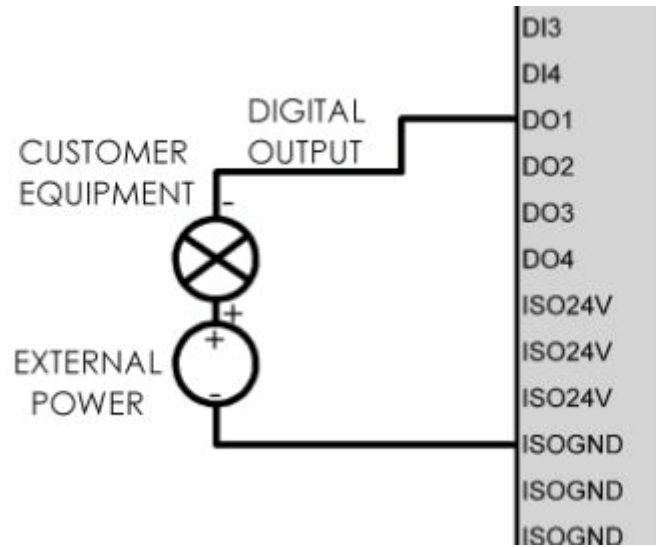


Figure 4-64. FET Discrete output with external power

4.21 Prover Module Wiring

4.21.1 Prover Board Wiring

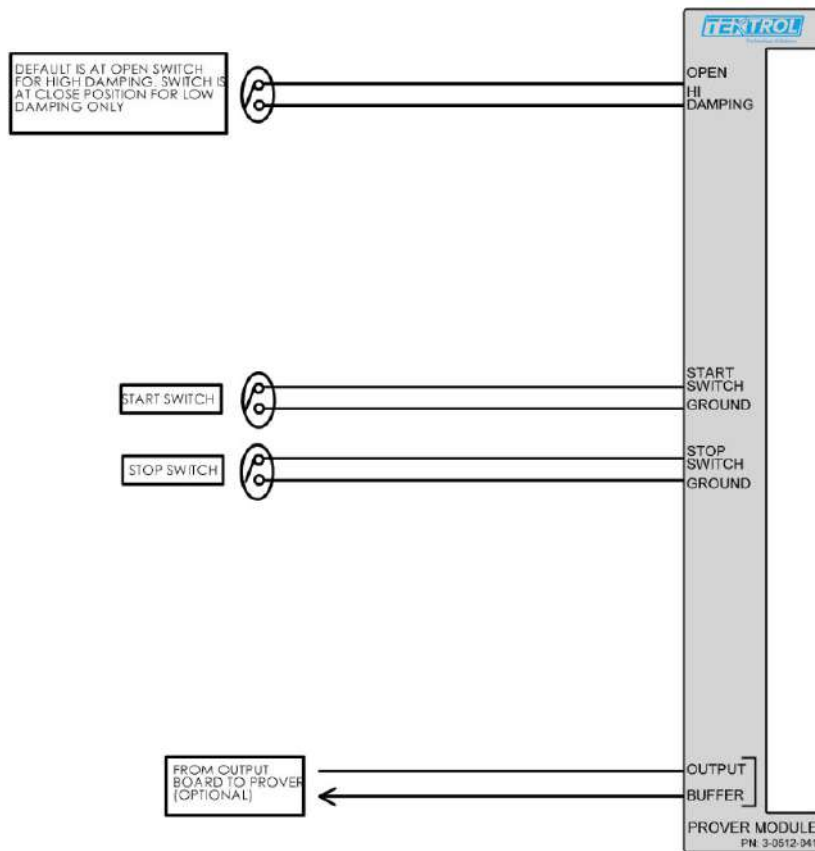


Figure 4-65. Prover board wiring

5 Field Replacement



WARNING

Substitution of un-approved components may impair the safety of the product



WARNING

The module swap and switch setting shall happen during power down mode even in safe area.



WARNING

The replacement of battery should be implemented at safe area during power down mode.



WARNING

Before the replacement of battery, it is suggested to back up configuration.



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