TECHNICAL NOTE TNDA09

Title: PAX Input Wiring

Product(s): PAX Meters

NOTE: ALL WIRING INFO IS ALSO IN THE PRODUCT DATASHEETS AND MANUALS, THIS IS JUST A QUICK SETUP GUIDE. DATASHEETS/MANUALS CAN BE FOUND ON RED LION CONTROLS WEBSITE http://www.redlion.net/Support/Literature.html

GENERAL WIRING CONSIDERATIONS

Electrical connections are made via screw-clamp terminals located on the back of the meter. All conductors should conform to the meter's voltage and current ratings. All cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that the power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker. When wiring the meter, compare the numbers embossed on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.3" (7.5 mm) bare lead exposed (stranded wires should be tinned with solder.) Insert the lead under the correct screw clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.) Each terminal can accept up to one #14 AWG (2.55 mm) wire, two #18 AWG (1.02 mm), or four #20 AWG (0.61 mm).

WIRING TO AVOID ELECTRICAL NOISE OR INTERFIRENCE

Although the meters are designed with a high degree of immunity to Electro-Magnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the meter may be different for various installations. The meters become more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be mounted in a metal enclosure, which is properly connected to protective earth.

2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.

a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).

b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.

c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.

3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be ran in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.

4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.

5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:

Ferrite Suppression Cores for signal and control cables:
Fair-Rite # 0443167251 (RLC# FCOR0000)
TDK # ZCAT3035-1330A
Steward # 28B2029-0A0
Line Filters for input power cables:
Schaffner # FN610-1/07 (RLC# LFIL0000)
Schaffner # FN670-1.8/07
Corcom # 1 VR3

Note: Reference manufacturer's instructions when installing a line filter.

6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

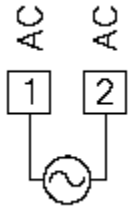
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.

Snubber: RLC# SNUB0000.

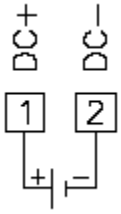
TERMINAL CONNECTIONS FOR PAX DIGITAL METERS

POWER CONNECTIONS

AC Power
Terminal 1: VAC
Terminal 2: VAC



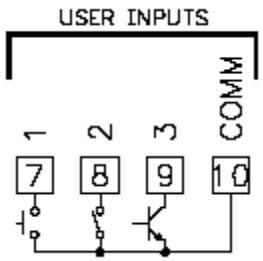
DC Power
Terminal 1: +VDC
Terminal 2: -VDC



USER INPUT CONNECTIONS (PAX DIGITAL METERS)

Before connecting the wires, the User Input Logic Jumper should be verified for proper position. If User Input 1 and/or 2 are wired for quadrature or directional counting, an additional switching device should not be connected to that User Input terminal. Only the appropriate User Input terminal has to be wired.

Sinking Logic
(Picture is of external devices that can be used)



The user inputs of the meter are internally pulled up to +12 V with 5.1 K resistance.

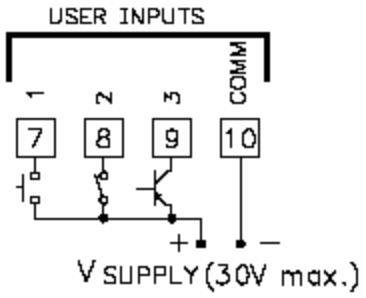
The input is active when it is pulled low (<0 .9 V).

Connect external switching device between the appropriate User Input terminal and User Comm

Sourcing Logic
(Picture is of external devices that can be used)

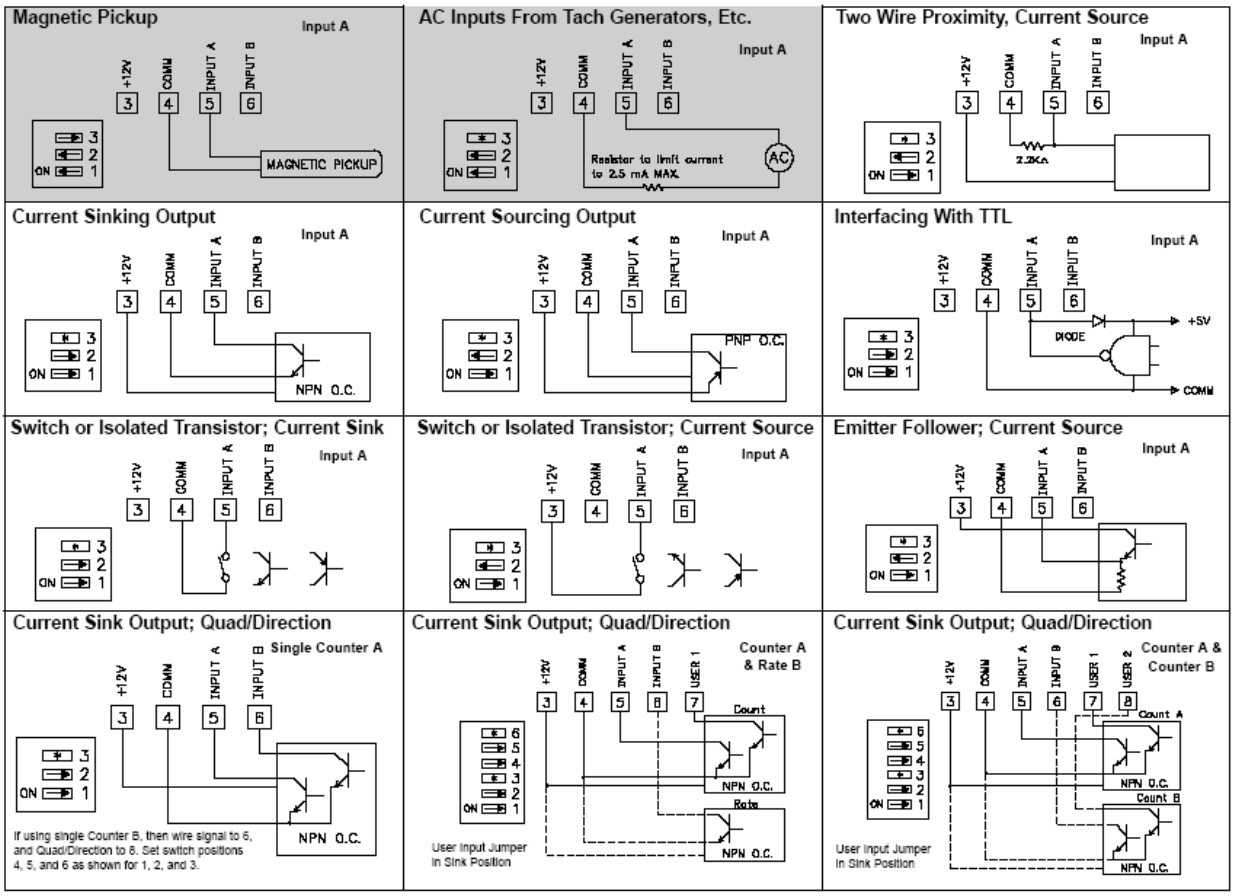
The user inputs of the meter are internally pulled down to 0 V with 5.1 K resistance.

The input is active when a voltage greater than 3.6 VDC is applied.



INPUT WIRING PAX DIGITAL (ENCODERS, RELAYS, AND OTHERS)

CAUTION: Sensor input common is NOT isolated from user input common. In order to preserve the safety of the meter application, the sensor input common must be suitably isolated from hazardous live earth referenced voltage; or input common must be at protective earth ground potential. If not, hazardous voltage may be present at the User Inputs and User Input Common terminals. Appropriate considerations must then be given to the potential of the user input common with respect to earth ground; and the common of the isolated plug-in cards with respect to input common.

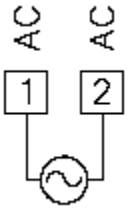


TERMINAL CONNECTIONS FOR PAX ANALOG METERS

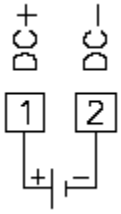
CAUTION: *Sensor input common is NOT isolated from user input common. In order to preserve the safety of the meter application, the sensor input common must be suitably isolated from hazardous live earth referenced voltages; or input common must be at protective earth ground potential. If not hazardous live voltage may be present at the User Inputs and User Input Common terminals. Appropriate considerations must then be given to the potential of the user input common with respect to earth common; and the common of the isolated plug-in cards with respect to input common.*

POWER CONNECTIONS

AC Power
Terminal 1: VAC
Terminal 2: VAC



DC Power
Terminal 1: +VDC
Terminal 2: -VDC



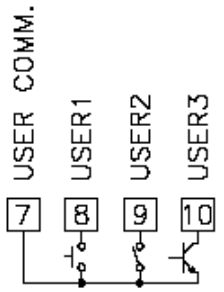
USER INPUT CONNECTIONS (PAX ANALOG METERS)

(NOT PAXH!!! – PAXH shown below)

Before connecting the wires, the User Input Logic Jumper should be verified for proper position. If not using User Inputs, then skip this section. Only the appropriate User Input terminal has to be wired.

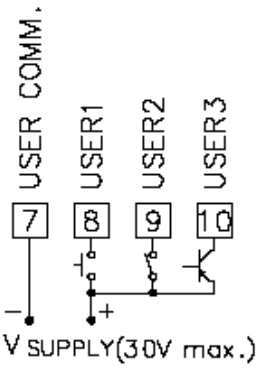
Sinking Logic
(Picture is of external devices that can be used)

In this logic, the user inputs of the meter are internally pulled up to +5 V with 22 K resistance. The input is active when it is pulled low (<0 .9 V).



Sourcing Logic
(Picture is of external devices that can be used)

In this logic, the user inputs of the meter are internally pulled down to 0 V with 22 K resistance. The input is active when a voltage greater than 3.6 VDC is applied.

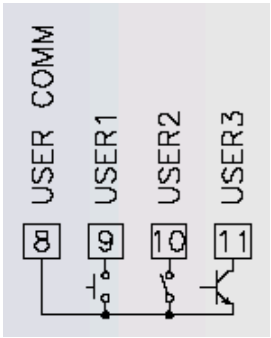


PAXH USER INPUT WIRING

Sinking Logic
(Picture is of external devices that can be used)

In this logic, the user inputs of the meter are internally pulled up to +5 V with 22 K resistance.

The input is active when it is pulled low (<0 .9 V).

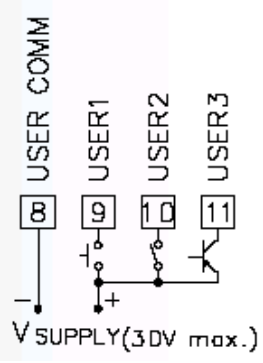


Sourcing Logic

(Picture is of external devices that can be used)

In this logic, the user inputs of the meter are internally pulled down with 22 K resistance.

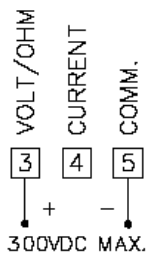
The input is active when a voltage greater than 3.6 VDC is applied.



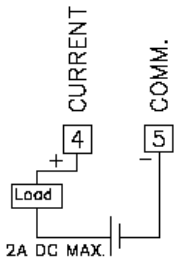
INPUT WIRING PAXD

+/-300V DC VOLTAGE AND 2A CURRENT

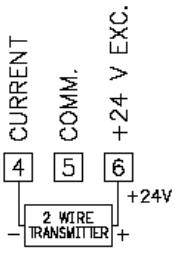
Voltage Signal (self powered)
Terminal 3: +VDC
Terminal 5: -VDC



Current Signal (self powered)
Terminal 4: +ADC
Terminal 5: -ADC

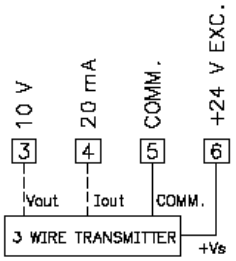


Current Signal (2 wire requiring excitation)
Terminal 4: -ADC
Terminal 6: +ADC
Excitation Jumper: 24 V

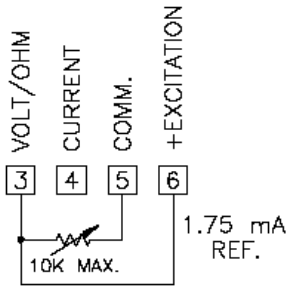


Current Signal (3 wire requiring excitation)
Terminal 4: +ADC (signal)
Terminal 5: -ADC (common)
Terminal 6: +Volt supply
Excitation Jumper: 24 V

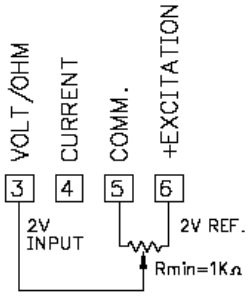
Voltage Signal (3 wire requiring excitation)
Terminal 3: +VDC (signal)
Terminal 5: -VDC (common)
Terminal 6: +Volt supply
Excitation Jumper: 24 V



Resistance Signal (3 wire requiring excitation)
Terminal 3: Resistance
Terminal 5: Resistance
Terminal 6: Jumper to terminal 3
Excitation Jumper: 1.75 mA REF.



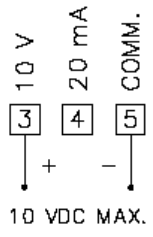
Potentiometer Signal (3 wire requiring excitation)
Terminal 3: Wiper
Terminal 5: Low end of pot.
Terminal 6: High end of pot.
Excitation Jumper: 2 V REF.
Input Range Jumper: 2 Volt
Module 1 Input Range: 2 Volt
Note: The Apply signal scaling style should be used because the signal will be in volts.



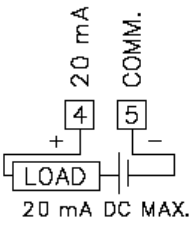
INPUT WIRING PAXP

PROCESS INPUTS

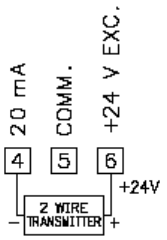
Voltage Signal (self powered)
Terminal 3: +VDC
Terminal 5: -VDC



Current Signal (self powered)
Terminal 4: +ADC
Terminal 5: -ADC

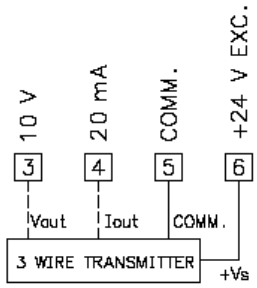


Current Signal (2 wire requiring excitation)
Terminal 4: -ADC
Terminal 6: +ADC



Current Signal (3 wire requiring excitation)
Terminal 4: +ADC (signal)
Terminal 5: -ADC (common)
Terminal 6: +Volt supply

Voltage Signal (3 wire requiring excitation)
Terminal 3: +VDC (signal)
Terminal 5: -VDC (common)
Terminal 6: +Volt supply



INPUT WIRING PAXH

AC VOLTAGE AND CURRENT INPUTS

CAUTION: Connect only one input signal range to the meter. Hazardous signal levels may be present on unused inputs.

CAUTION: The isolation rating of the input common of the meter with respect to the option card commons and the user input common Terminal 8 (If used) is 125 Vrms; and

250 Vrms with respect to AC Power (meter Terminals 1 & 2). To be certain that the ratings are not exceeded, these voltages should be verified by a high-voltage meter before wiring the meter.

CAUTION:

1. Where possible, connect the neutral side of the signal (including current shunts) to the input common of the meter. If the input signal is sourced from an active circuit, connect the lower impedance (usually circuit common) to the input signal common of the meter.

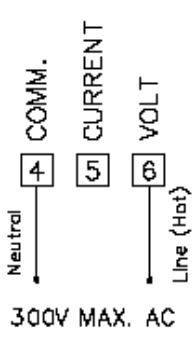
2. For phase-to-phase line monitoring where a neutral does not exist, or for any other signal input in which the isolation voltage rating is exceeded, an isolating potential

transformer must be used to isolate the input voltage from earth. With the transformer, the input common of the meter can then be earth referenced for safety.

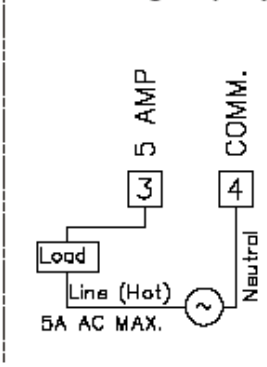
3. When measuring line currents, the use of a current transformer is recommended. If using external current shunts, insert the shunt in the neutral return line. If the

isolation voltage rating is exceeded, the use of an isolating current transformer is necessary

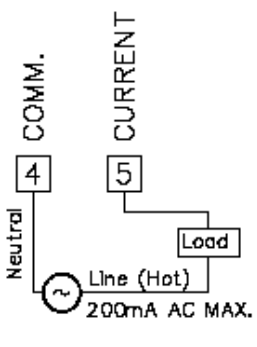
Voltage Signal



Current Signal (Amps)

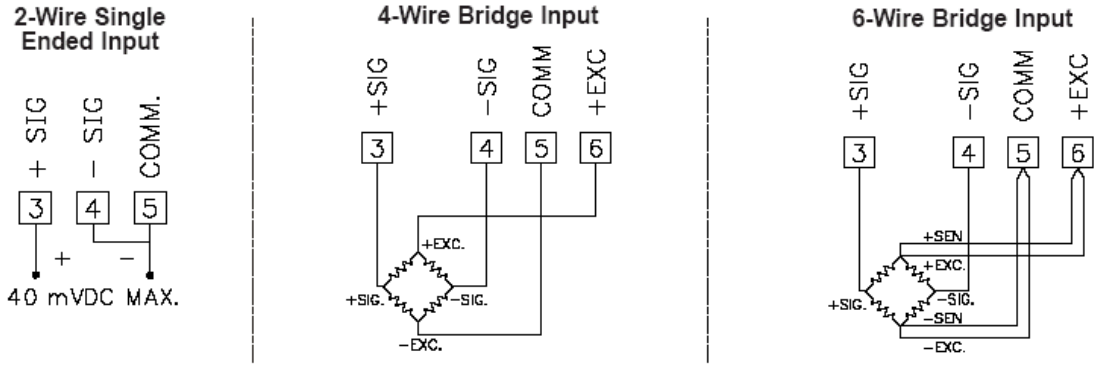


Current Signal (Milliamps)



INPUT WIRING PAXS

(LOAD CELLS, STRAIN GAGE)



BRIDGE COMPLETION RESISTORS

For single strain gage applications, bridge completion resistors must be employed externally to the meter. Only use metal film resistors with a low temperature coefficient of resistance. Load cells and pressure transducers are normally implemented as full resistance bridges and do not require bridge completion resistors.

INPUT WIRING PAXT

(THERMOCOUPLES RTDS)