## MODEL PAX - 1/8 DIN DIGITAL INPUT PANEL METERS



- COUNT, DUAL COUNTER, RATE AND SLAVE DISPLAY
- 0.56" RED SUNLIGHT READABLE DISPLAY
- VARIABLE INTENSITY DISPLAY
- 10 POINT SCALING FOR NON-LINEAR PROCESSES (PAXI)
- FOUR SETPOINT ALARM OUTPUTS (W/Option Card)
- RETRANSMITTED ANALOG OUTPUT (W/Option Card) (PAXI)
- COMMUNICATION AND BUS CAPABILITIES (W/Option Card) (PAXI)
- BUS CAPABILITIES; DEVICENET, MODBUS, AND PROFIBUS-DP
- CRIMSON PROGRAMMING SOFTWARE (PAXI)
- ETHERNET(W/ External Gateway) (PAXI)
- NEMA 4XIIP65 SEALED FRONT BEZEL

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## GENERAL DESCRIPTION

The PAX Digital Input Panel Meters offer many features and performance capabilities to suit a wide range of industrial applications. Available in three different models, PAXC Counter/Dual Counter, PAXR Rate Meter and the PAXI which offers both counting and rate in the same package. Refer to pages 4-5 for the details on the specific models. The PAXC and PAXR offer only the Setpoint Option, while the PAXI is the fully featured version offering all the capabilities as outlined in this bulletin as well as a slave display feature. The optional plugin output cards allow the opportunity to configure the meter for present applications, while providing easy upgrades for future needs.

The meters employ a bright $0.56^{\prime \prime}$ LED display. The meters are available with a red sunlight readable or standard green LED display. The intensity of the display can be adjusted from dark room applications up to sunlight readable, making it ideal for viewing in bright light applications.

The meters accept digital inputs from a variety of sources including switch contacts, outputs from CMOS or TTL circuits, magnetic pickups and all standard RLC sensors. The meter can accept directional, uni-directional or Quadrature signals simultaneously. The maximum input signal varies up to 34 KHz depending on the count mode and function configurations programmed. Each input signal can be independently scaled to various process values.

The Rate Meters provide a MAX and MIN reading memory with programmable capture time. The capture time is used to prevent detection of false max or min readings which may occur during start-up or unusual process events.

The meters have four setpoint outputs, implemented on Plug-in option cards. The Plug-in cards provide dual FORM-C relays (5A), quad FORM-A (3A), or either quad sinking or quad sourcing open collector logic outputs. The setpoint alarms can be configured to suit a variety of control and alarm requirements.

Communication and Bus Capabilities are also available as option cards for the PAXI only. These include RS232, RS485, Modbus, DeviceNet, and Profibus-DP. Readout values and setpoint alarm values can be controlled
through the bus. Additionally, the meters have a feature that allows a remote computer to directly control the outputs of the meter. With an RS232 or RS485 card installed, it is possible to configure the meter using Red Lion's Crimson software. The configuration data can be saved to a file for later recall.

A linear DC output signal is available as an optional Plug-in card for the PAXI only. The card provides either 20 mA or 10 V signals. The output can be scaled independent of the input range and can track any of the counter or rate displays.

Once the meters have been initially configured, the parameter list may be locked out from further modification in its entirety or only the setpoint values can be made accessible.

The meters have been specifically designed for harsh industrial environments. With NEMA 4X/IP65 sealed bezel and extensive testing of noise effects to CE requirements, the meter provides a tough yet reliable application solution.

## SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in this literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use this meter to directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the meter.


CAUTION: Risk of Danger.
Read complete instructions prior to
installation and operation of the unit.

## DIMENSIONS In inches (mm)

. 10
(2.5)


Note: Recommended minimum clearance (behind the panel) for mounting clip installation is $2.1^{\prime \prime}(53.4) \mathrm{H} \times 5^{\prime \prime}(127) \mathrm{W}$.


## Ordering Information

Meter Part Numbers


## Option Card and Accessories Part Numbers

| TYPE | MODEL NO. | DESCRIPTION | PART NUMBERS |
| :---: | :---: | :---: | :---: |
| Optional Plug-In Cards | PAXCDS | Dual Setpoint Relay Output Card | PAXCDS10 |
|  |  | Quad Setpoint Relay Output Card | PAXCDS20 |
|  |  | Quad Setpoint Sinking Open Collector Output Card | PAXCDS30 |
|  |  | Quad Setpoint Sourcing Open Collector Output Card | PAXCDS40 |
|  | PAXCDC | RS485 Serial Communications Card with Terminal Block | PAXCDC10 |
|  |  | Extended RS485 Serial Communications Card with Dual RJ11 Connector | PAXCDC1C |
|  |  | RS232 Serial Communications Card with Terminal Block | PAXCDC20 |
|  |  | Extended RS232 Serial Communications Card with 9 Pin D Connector | PAXCDC2C |
|  |  | DeviceNet Communications Card | PAXCDC30 |
|  |  | Modbus Communications Card | PAXCDC40 |
|  |  | Extended Modbus Communications Card with Dual RJ11 Connector | PAXCDC4C |
|  |  | Profibus-DP Communications Card | PAXCDC50 |
|  |  | Analog Output Card | PAXCDL10 |
| Accessories | SFCRD* | Crimson 2 PC Configuration Software for Windows 98, ME, 2000 and XP | SFCRD200 |
|  | ICM8 | Communication Gateway | ICM80000 |

*Crimson software is available for free download from http://www.redlion.net/
Shaded areas are only available for the PAXI

PANEL CUT-OUT


## General Meter Specifications

1. DISPLAY: 6 digit, $0.56^{\prime \prime}(14.2 \mathrm{~mm})$ red sunlight readable or standard green LED
2. POWER:

AC Versions:
AC Power: 85 to $250 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}, 18 \mathrm{VA}$
Isolation: 2300 Vrms for 1 min . to all inputs and outputs. ( 300 V working)
DC Versions:
DC Power: 11 to 36 VDC, 14 W
(derate operating temperature to $40^{\circ} \mathrm{C}$ if operating $<15 \mathrm{VDC}$ and three plug-in option cards are installed)
AC Power: $24 \mathrm{VAC}, \pm 10 \%, 50 / 60 \mathrm{~Hz}, 15 \mathrm{VA}$
Isolation: 500 Vrms for 1 min . to all inputs and outputs ( 50 V working).
3. SENSOR POWER: $12 \mathrm{VDC}, \pm 10 \%, 100 \mathrm{~mA}$ max. Short circuit protected
4. KEYPAD: 3 programmable function keys, 5 keys total
5. USER INPUTS: Three programmable user inputs

Max. Continuous Input: 30 VDC
Isolation To Sensor Input Commons: Not isolated
Logic State: Jumper selectable for sink/source logic

| INPUT STATE | SINKING INPUTS <br> $5.1 \mathrm{~K} \Omega$ pull-up to +12 V | SOURCING INPUTS <br> $5.1 \mathrm{~K} \Omega$ pull-down |
| :---: | :---: | :---: |
| Active | $\mathrm{V}_{\mathbb{I N}}<0.9 \mathrm{VDC}$ | $\mathrm{V}_{\text {IN }}>3.6 \mathrm{VDC}$ |
| Inactive | $\mathrm{V}_{\mathbb{I N}}>3.6 \mathrm{VDC}$ | $\mathrm{V}_{\text {IN }}<0.9 \mathrm{VDC}$ |

Response Time: 6 msec . typical; function dependent. Certain resets, stores and inhibits respond within $25 \mu \mathrm{sec}$ if an edge occurs with the associated counter or within 6 msec if no count edge occurs with the associated counter. These functions include [tr5tL, [tr5tE, HLr5tL, HLr5tE,
 50 msec min . to 100 msec max. After that period, another edge/level may be recognized.
6. MEMORY: Nonvolatile E2PROM retains all programmable parameters and display values.
7. CERTIFICATIONS AND COMPLIANCES: SAFETY

UL Recognized Component, File \#E179259, UL61010A-1, CSA C22.2 No. 1010-1
Recognized to U.S. and Canadian requirements under the Component
Recognition Program of Underwriters Laboratories, Inc.
UL Listed, File \#E137808, UL508, CSA C22.2 No. 14-M95
LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
Type 4X Enclosure rating (Face only), UL50
IECEE CB Scheme Test Certificate \#US/8843/UL
CB Scheme Test Report \#04ME11209-20041018
Issued by Underwriters Laboratories, Inc.
IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
IP65 Enclosure rating (Face only), IEC 529
IP20 Enclosure rating (Rear of unit), IEC 529

ELECTROMAGNETIC COMPATIBILITY
Immunity to EN 50082-2

| Electrostatic discharge | EN 61000-4-2 | Level 2; 4 Kv contact |
| :---: | :---: | :---: |
|  |  | Level 3; 8 Kv air |
| Electromagnetic RF fields | EN 61000-4-3 | Level 3; $10 \mathrm{~V} / \mathrm{m}$ |
|  |  | $80 \mathrm{MHz}-1 \mathrm{GHz}$ |
| Fast transients (burst) | EN 61000-4-4 | Level 4; $2 \mathrm{Kv} \mathrm{I/O}$ |
|  |  | Level 3; 2 Kv power |
| RF conducted interference | EN 61000-4-6 | Level 3; $10 \mathrm{~V} / \mathrm{rms}$ |
|  |  | $150 \mathrm{KHz}-80 \mathrm{MHz}$ |
| Simulation of cordless telephones | ENV 50204 | Level 3; $10 \mathrm{~V} / \mathrm{m}$ |
|  |  | $900 \mathrm{MHz} \pm 5 \mathrm{MHz}$ |
|  |  | $200 \mathrm{~Hz}, 50 \%$ duty cycle |
| Emissions to EN 50081-2 |  |  |
| RF interference | EN 55011 | Enclosure class A |
|  |  | Power mains class A |

Note:
Refer to EMC Installation Guidelines section of the bulletin for additional information.
8. ENVIRONMENTAL CONDITIONS:

Operating Temperature Range: 0 to $50^{\circ} \mathrm{C}\left(0\right.$ to $45^{\circ} \mathrm{C}$ with all three plug-in cards installed)
Storage Temperature Range: -40 to $60^{\circ} \mathrm{C}$
Operating and Storage Humidity: 0 to $85 \%$ max. relative humidity noncondensing
Altitude: Up to 2000 meters
9. CONNECTIONS: High compression cage-clamp terminal block

Wire Strip Length: 0.3" ( 7.5 mm )
Wire Gage: 30-14 AWG copper wire
Torque: 4.5 inch-lbs ( $0.51 \mathrm{~N}-\mathrm{m}$ ) max.
10. CONSTRUCTION: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.
11. WEIGHT: 10.1 oz . $(286 \mathrm{~g})$

## Model PAXC - $1 / 8$ DIN Counter

- 6-DIGIT LED DISPLAY (Alternating 8 digits for counting)
- DUAL COUNT QUAD INPUTS
- UP TO 3 COUNT DISPLAYS
- SETPOINT ALARM OUTPUTS (W/Plug-in card)


## ANNUNCIATORS:

A - Counter A
B - Counter B
C - Counter C
$\boldsymbol{\square F}$ - Upper significant digit display of counter
SP1 - setpoint 1 output state
SP2 - setpoint 2 output state
SP3 - setpoint 3 output state
SP4 - setpoint 4 output state

## COUNTER DISPLAYS:

Maximum display: 8 digits: $\pm 99999999$ (greater than 6 digits display Alternates between high order and low order.)

## INPUTS A and B

DIP switch selectable to accept pulses from a variety of sources including switch contacts, TTL outputs, magnetic pickups and all standard RLC sensors.
LOGIC: Input trigger levels $\mathrm{V}_{\mathrm{IL}}=1.5 \mathrm{~V}$ max.; $\mathrm{V}_{\mathrm{IH}}=3.75 \mathrm{~V}$ min.
Current sinking: Internal $7.8 \mathrm{~K} \Omega$ pull-up to $+12 \mathrm{VDC}, \mathrm{I}_{\mathrm{MAX}}=1.9 \mathrm{~mA}$.
Current sourcing: Internal $3.9 \mathrm{~K} \Omega$ pull-down, 7.3 mA max. @ 28 VDC , $\mathrm{V}_{\mathrm{MAX}}=30 \mathrm{VDC}$.
Filter: Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec . minimum.
DUAL COUNT MODES:
When any dual count mode is used, then User Inputs 1 and/or 2 will accept the second signal of each signal pair. The user inputs do not have the Logic/Mag, HI/LO Freq, and Sink/Source input setup switches. The user inputs are inherently a logic input with no low frequency filtering. Any mechanical contacts used for these inputs in a dual count mode must be debounced externally. The user input may only be selected for sink/source by the User Jumper placement.

## Model PAXR - $1 / 8$ DIN Rate Meter

- 5-DIGIT LED DISPLAY
- RATE INDICATION
- MINIMUM/MAXIMUM RATE DISPLAYS
- SETPOINT ALARM OUTPUTS (W/Plug-in card)


## PAXR SPECIFICATIONS

## ANNUNCIATORS:

r - Rate
$\boldsymbol{H}$ - Maximum (High) Rate
L - Minimum (Low) Rate
SP1 - setpoint 1 output state
SP2 - setpoint 2 output state
SP3 - setpoint 3 output state
SP4 - setpoint 4 output state

## RATE DISPLAY:

Accuracy: $\pm 0.01 \%$
Minimum Frequency: 0.01 Hz
Maximum Frequency: 34 KHz
Maximum Display: 5 Digits: 99999
Adjustable Display (low) Update: 0.1 to 99.9 seconds
Over Range Display: "r ot ol"

INPUT A:
DIP switch selectable to accept pulses from a variety of sources including
TTL outputs, magnetic pickups and all standard RLC sensors.
LOGIC: Input trigger levels $\mathrm{V}_{\mathrm{IL}}=1.5 \mathrm{~V}$ max.; $\mathrm{V}_{\mathrm{IH}}=3.75 \mathrm{~V}$ min.
Current sinking: Internal $7.8 \mathrm{~K} \Omega$ pull-up to $+12 \mathrm{VDC}, \mathrm{I}_{\mathrm{MAX}}=1.9 \mathrm{~mA}$.
Current sourcing: Internal $3.9 \mathrm{~K} \Omega$ pull-down, $7.3 \mathrm{~mA} \max$ @ 28 VDC ,
$\mathrm{V}_{\mathrm{MAX}}=30 \mathrm{VDC}$.
MAGNETIC PICKUP:
Sensitivity: 200 mV peak
Hysteresis: 100 mV
Input impedance: $3.9 \mathrm{~K} \Omega @ 60 \mathrm{~Hz}$
Maximum input voltage: $\pm 40 \mathrm{~V}$ peak, 30 Vrms

- COUNT, RATE AND SLAVE DISPLAY
- 6-DIGIT 0.56" RED SUNLIGHT READABLE DISPLAY
- VARIABLE INTENSITY DISPLAY
- 10 POINT SCALING (FOR NON-LINEAR PROCESSES)
- FOUR SETPOINT ALARM OUTPUTS (WIOPTION CARD)
- RETRANSMITTED ANALOG OUTPUT (W/OPTION CARD)
- COMMUNICATION AND BUS CAPABILITIES (WIOPTION CARD)
- BUS CAPABILITIES; DEVICENET, MODBUS, AND PROFIBUS-DP
- CRIMSON PROGRAMMING SOFTWARE


## PAXI SPECIFICATIONS

## MAXIMUM SIGNAL FREQUENCIES TABLE

To determine the maximum frequency for the input(s), first answer the questions with a yes $(\mathrm{Y})$ or no $(\mathrm{N})$. Next determine the Count Mode to be used for the counter(s). If dual counters are used with different Count Modes, then the lowest frequency applies to both counters.

| FUNCTION QUESTIONS | Single: Counter A or B (with/without rate) or Rate only |  |  |  |  |  |  |  | Dual: Counter A \& B or Rate not assigned to active single counter |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Are any setpoints used? | N | N | N | N | Y | Y | Y | Y | N | N | N | N | Y | Y | Y | Y |
| Is Prescaler Output used? | N | N | Y | Y | N | N | Y | Y | N | N | Y | Y | N | N | Y | Y |
| Is Counter C used? | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y |
| COUNT MODE | (Values are in KHz) |  |  |  | (Values are in KHz ) |  |  |  | (Values are in KHz ) |  |  |  | (Values are in KHz ) |  |  |  |
| Count x1 | 34 | 25 | 21 | 17 | 18 | 15 | 13 | 11 | 13 | 12 | 13 | 11 | 9 | 7.5 | 9 | 7 |
| Count $\times 2$ | 17 | 13 | 16 | 12 | 9 | 7 | 8 | 7 | 9 * | 7 * | 9 * | 7* | 5* | 4 * | 5 * | 4* |
| Quadrature $\times 1$ | 22 | 19 | 20 | 17 | 12 | 10 | 11 | 10 | 7 * | 6 * | 6 * | 5 * | 4 * | 3.5 * | 3.5 * | 3 * |
| Quadrature $\times 2$ | 17 | 13 | 16 | 12 | 9 | 7 | 8 | 6 | 7* | 6 * | 6 * | 5* | 4 * | 3.5 * | 3.5 * | 3 * |
| Quadrature $\times 4$ | 8 | 6 | 8 | 6 |  | 3 | 4 | 3 |  |  |  |  |  |  |  |  |
| Rate Only | 34 | N/A | 21 | N/A | 34 | N/A | 21 | N/A |  |  |  |  |  |  |  |  |

## Notes:

1. Counter Modes are explained in the Module 1 programming section.
2. If using Rate with single counter with direction or quadrature, assign it to Input A for the listed frequency.
3.     * Double the listed value for Rate frequency.
4. Listed values are with frequency DIP switch set on HI frequency.
5. Derate listed frequencies by $20 \%$ during serial communications. (Placing a 5 msec . delay between serial characters will eliminate the derating.)

## ANNUNCIATORS:

A - Counter A
B - Counter B
C - Counter C
$\boldsymbol{r}$-Rate
$\boldsymbol{H}$ - Maximum (High) Rate
L - Minimum (Low) Rate
$\boldsymbol{D F}$ - Upper significant digit display of counter
SP1 - setpoint 1 output state
SP2 - setpoint 2 output state
SP3 - setpoint 3 output state
SP4 - setpoint 4 output state
RATE DISPLAY:
Accuracy: $\pm 0.01 \%$
Minimum Frequency: 0.01 Hz
Maximum Frequency: see Max Signal Frequencies Table.
Maximum Display: 5 Digits: 99999
Adjustable Display (low) Update: 0.1 to 99.9 seconds
Over Range Display: "r GL OL"

## COUNTER DISPLAYS:

Maximum display: 8 digits: $\pm 99999999$ (greater than 6 digits display Alternates between high order and low order.)

## INPUTS A and B:

DIP switch selectable to accept pulses from a variety of sources including switch contacts, TTL outputs, magnetic pickups and all standard RLC sensors.
LOGIC: Input trigger levels $\mathrm{V}_{\mathrm{IL}}=1.5 \mathrm{~V}$ max.; $\mathrm{V}_{\mathrm{IH}}=3.75 \mathrm{~V}$ min.
Current sinking: Internal $7.8 \mathrm{~K} \Omega$ pull-up to $+12 \mathrm{VDC}, \mathrm{I}_{\mathrm{MAX}}=1.9 \mathrm{~mA}$.
Current sourcing: Internal $3.9 \mathrm{~K} \Omega$ pull-down, $7.3 \mathrm{~mA} \max$. @ 28 VDC , $\mathrm{V}_{\mathrm{MAX}}=30 \mathrm{VDC}$.
Filter: Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec . minimum.
MAGNETIC PICKUP:
Sensitivity: 200 mV peak
Hysteresis: 100 mV
Input impedance: $3.9 \mathrm{~K} \Omega @ 60 \mathrm{~Hz}$
Maximum input voltage: $\pm 40 \mathrm{~V}$ peak, 30 Vrms
DUAL COUNT MODES:
When any dual count mode is used, then User Inputs 1 and/or 2 will accept the second signal of each signal pair. The user inputs do not have the Logic/Mag, HI/LO Freq, and Sink/Source input setup switches. The user inputs are inherently a logic input with no low frequency filtering. Any mechanical contacts used for these inputs in a dual count mode must be debounced externally. The user input may only be selected for sink/source by the User Jumper placement.

## PRESCALER OUTPUT:

NPN Open Collector: $\mathrm{I}_{\mathrm{SNK}}=100 \mathrm{~mA}$ max. @ $\mathrm{V}_{\mathrm{OL}}=1 \mathrm{VDC} \max . \mathrm{V}_{\mathrm{OH}}=30$ VDC max. With duty cycle of $25 \% \mathrm{~min}$. and $50 \%$ max.

