# P2-04AD-1 Analog Input

**The P2-04AD-1 Current Analog Input Module provides four channels for receiving 0–20 mA signals for use with the Productivity2000 system.**

# Removable Terminal Block Specifications

| Part Number | P2-RTB | P2-RTB-1 |
|---|---|---|
| Number of positions | 18 Screw Terminals | 18 Spring Clamp Terminals |
| Wire Range | 30–16 AWG (0.051–1.31 mm²) Solid / Stranded Conductor 3/64 in. (1.2 mm) Insulation Maximum 1/4 in (6–7 mm) Strip Length | 28–16 AWG (0.081–1.31 mm²) Solid / Stranded Conductor 3/64 in (1.2 mm) Insulation Maximum 19/64 in (7–8 mm) Strip Length |
| Conductors | "USE COPPER CONDUCTORS, 75ºC" or equivalent. | |
| Screw Driver Width | 1/8 in (3.8 mm) Maximum | |
| Screw Size | M2 | N/A |
| Screw Torque | 2.5 lb·in (0.28 N·m) | N/A |

**Terminal Block sold separately, (see wiring options on page 5).**
Warranty: Thirty-day money-back guarantee. Two-year limited replacement. (See www.productivity2000.com for details).

## General Specifications

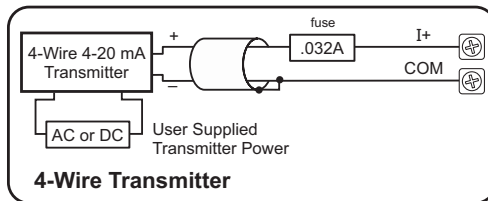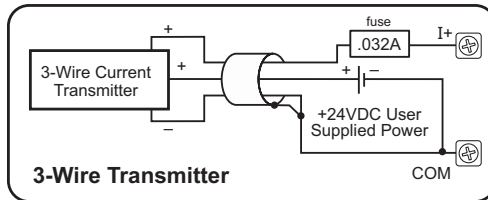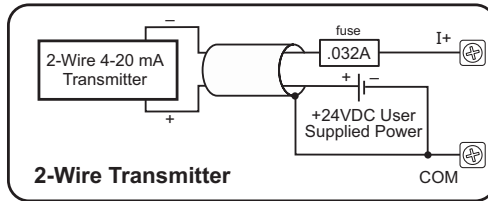| | |
|---|---|
| Operating Temperature | 0º to 60ºC (32º to 140ºF) |
| Storage Temperature | -20º to 70ºC (-4º to 158ºF) |
| Humidity | 5 to 95% (non-condensing) |
| Altitude | 2,000 meters max |
| Pollution Degree | 2 |
| Environmental Air | No corrosive gases permitted |
| Vibration | IEC60068-2-6 (Test Fc) |
| Shock | IEC60068-2-27 (Test Ea) |
| Field to Logic Side Isolation | 1800VAC applied for 1 second |
| Insulation Resistance | > 10MΩ @ 500VDC |
| Heat Dissipation | 1200mW |
| Overvoltage Category | II |
| Enclosure Type | Open Equipment |
| Module Keying to Backplane | Electronic |
| Module Location | Any I/O slot in a Productivity2000 System |
| Field Wiring | Use *ZIP*Link Wiring System or removable terminal block (not included). See "Wiring Options" on page 5. |
| Connector Type (not included) | 18-position removable terminal block |
| Weight | 90g (3.2 oz) |
| Agency Approvals | UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)* |

*Meets EMC and Safety requirements. See the D.O.C. for details.

## Input Specifications

| | |
|---|---|
| Input Channel | 4 |
| Input Ranges | 0–20 mA |
| Signal Resolution | 16-bit |
| Resolution Value of LSB (least significant bit) | 0–20 mA = 0.305 µA per count (1 LSB = 1 count) |
| Data Range | 0 to 65535 counts |
| Input Type | Sinking, Single-ended (1 common) |
| Maximum Continuous Overload | ±31mA |
| Input Impedance | 250Ω ±0.1% 1/4 W |
| Hardware Filter Characteristics | Low Pass, -3dB @ 100Hz |
| Sample Duration Time | 9ms per channel (does not include ladder scan time) |
| All Channel Update Rate | 80ms |
| Open Circuit Detection Time | Zero reading within 1s |
| Conversion Method | Successive approximation |
| Accuracy vs. Temperature | ±25PPM / ºC maximum |
| Maximum Inaccuracy | 0.1% of range (including temperature drift) |
| Linearity Error | ±0.015% of range Monotonic with no missing codes |
| Input Stability and Repeatability | ±0.015% of range (after 10 min warmup) |
| Maximum Full Scale Calibration Error | ±0.015% of range maximum |
| Offset Calibration Error | ±0.015% of range maximum |
| Maximum Crosstalk at DC, 50Hz and 60Hz | -76dB, ±10 LSB |
| Recommended Fuse (external) | Edison S500-32-R, 0.032A fuse |
| External Power Supply Required | 24VDC (-20% / +25%) 35mA |

## Current Input Circuits

An Edison S500-32-R  0.032A fast-acting fuse is recommended for current loops.



**2-Wire Transmitter**

2-Wire 4-20 mA Transmitter

fuse .032A   I+

+24VDC User Supplied Power

COM

**3-Wire Transmitter**

3-Wire Current Transmitter

fuse .032A   I+

+24VDC User Supplied Power

COM

**4-Wire Transmitter**

4-Wire 4-20 mA Transmitter

fuse .032A   I+

COM

AC or DC   User Supplied Transmitter Power

Note: Do not connect both ends of shield.



INTERNAL MODULE CIRCUITRY

COM
I1+
I2+
I3+
I4+

250Ω   CH1 ADC
250Ω   CH2 ADC
250Ω   CH3 ADC
250Ω   CH4 ADC

COM
COM
COM
COM
COM
COM
COM
0V
24V+

24 VDC User Supplied Power

ISOLATED ANALOG CIRCUIT POWER

ISOLATED ANALOG CIRCUIT COMMON
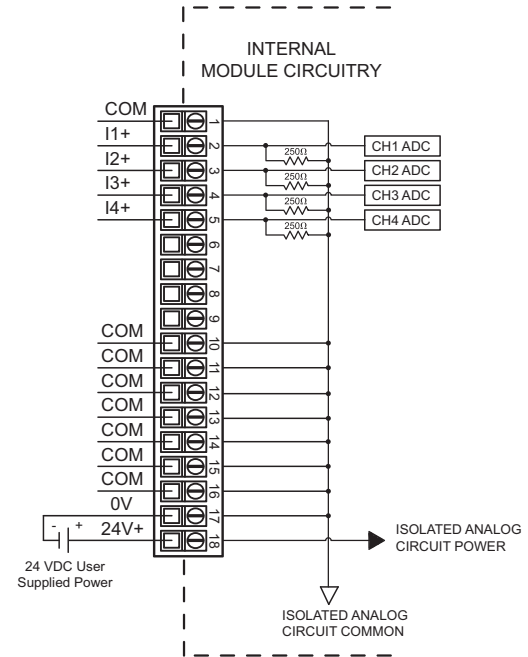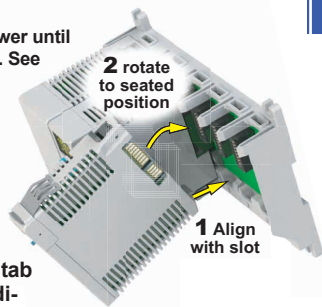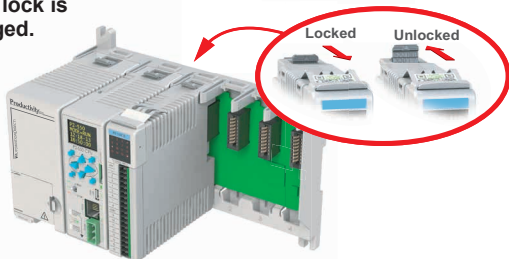
# Module Installation

**WARNING:** Do not apply field power until the following steps are completed. See hot-swapping procedure for exceptions.

**Step One:** Align module catch with base slot and rotate module into connector.

**2** rotate to seated position

**1** Align with slot

**Step Two:** Pull top locking tab toward module face. Click indicates lock is engaged.

Locked    Unlocked

**Step Three:** Attach field wiring using the removable terminal block or *ZIP*Link wiring system.

WIRE STRIP LENGTH
MAX
MIN

# QR Code

Use any QR Code reader application to display the module's product insert.

**Caution:** *If possible, remove field power prior to proceeding. If not, then EXTREME care MUST be taken to prevent damage to the module, or even personal injury due to a short circuit from the live terminal block.*

## Important Hot-Swap Information

**The Productivity2000 System supports hot-swap!** Individual modules can be taken offline, removed, and replaced while the rest of the system continues controlling your process. Before attempting to use the hot-swap feature, be sure to read the hot-swap topic in the programming software's help file or our online documentation at AutomationDirect.com for details on how to plan your installation for use of this powerful feature.

# Wiring Options

## 1 ZIPLink Feed Through *Modules and Cables*[1]
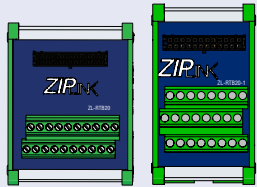


**ZIP**LINK
▼AUTOMATIONDIRECT®

ZL-RTB20
ZL-RTB20-1

*0.5 m (1.6 ft) cable*  ZL-P2-CBL18
*1.0 m (3.3 ft) cable*  ZL-P2-CBL18-1
*2.0 m (6.6 ft) cable*  ZL-P2-CBL18-2

## 2 *Terminal Block with pigtail cable*



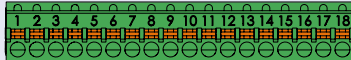*1.0 m (3.3 ft) cable*  ZL-P2-CBL18-1P
*2.0 m (6.6 ft) cable*  ZL-P2-CBL18-2P

## 3 *Screw Terminal Block only*



P2-RTB
(Quantity 1)

## 4 *Spring Clamp Terminal Block only*



P2-RTB-1
(Quantity 1)

## 5 *Accessories*[2]
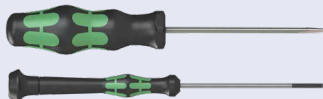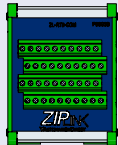


ZL-RTB-COM

TW-SD-SL-1

TW-SD-MSL-1

1. Cable + **ZIP**Link Module = Complete System
2. ZL-RTB-COM provides a common connection point for power or ground

# Module Configuration

Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P2-04AD-1 module into the base configuration.



The "Under Range Error" bit for each channel activates for a signal around 0mA ± offset error.
The "Over Range Error" bit for each channel activates for a signal around 19.999 mA ± gain error.

**The Scale (Linear) function can be used to:**

- **Convert analog field input signals from the range which is native to the analog input module to an application specific range.**
- **Make other linear conversions in ranges appropriate to the application.**

**The Scale (Non-Linear) function can be used for Non-Linear applications.**

## Scale (Linear) (SCL)

Input Level Transmitter   Output Tank Level

| | |
|---|---|
| In Min | 0 |
| In Max | 65535 |
| Out Min | 220 |
| Out Max | 12500 |

☐ Show Instruction Comment

Select the Input and Output tags appropriate for the application. Convert raw input signals to engineering units for use in the program, or convert engineering units to output signals for control purposes

max

min

min        max

## Scale (Non Linear) (SCLN)

Input Level Transmitter   Output Tank Level

| Input value | Desired Output |
|---|---|
| 0 | 0 |
| 1 | .5 |
| 2 | 1 |
| 3 | 1.55 |
| 4 | 2.25 |
| 5 | 3 |
| 6 | 4.55 |
| 6.5 | 6.75 |
| 7 | 7 |
| 0 | 0 |
| 0 | 0 |
| 0 | |
| 0 | |
| 0 | |
| 0 | |
| 0 | |

☐ Show Instruction

Select the minimum and maximum values of the raw input signal. These values will relate to the minimum and maximum scaled values.

OK    Cancel    Help

7
6
5
4
3
2
1
0
  1  2  3  4  5  6  7

# OLED Panel Display

## Power On

PASSED
SELF
TEST

Appears initially

These screens will then auto cycle

P2-04AD-1

Fw. Rev.
1.00

16-BIT
0-20mA
3 CH
ENABLED

Hold **SEL** button down to cycle through primary screens. Release button to select screen.

DISPLAY
SETUP
INFO

DISPLAY
STATUS
INFO

DISPLAY
UNITS
DECIMAL
COUNTS

DISPLAY
UNITS
HEX
COUNTS

DISPLAY
UNITS
MILIAMP
0-20mA

This screen will auto cycle with status information

Momentarily Press **SEL** button to toggle through secondary displays

End of
Status
Menu
List

1  00000
2  00000
3  00000
4  SPARE

1 0000H
2 0000H
3 0000H
4 SPARE

1 0.00mA
2 0.00mA
3 0.00mA
4  SPARE

**Error Messages:**
An existing error will be inserted into the cycling Status Info screen.

MISSING
EXTERNAL
24VDC

SELFTEST
FAIL
REPLACE
MODULE

MISSING
CONFIG
DATA

End of
Status
Menu
List

## Diagnostic/Status

| | |
|---|---|
| Under Range Error | 1 bit per channel |
| Over Range Error | 1 bit per channel |
| Module Failed | 1 bit per module |
| Missing 24V | 1 bit per module |