

- Voltage and Current Input
- 1500 V Isolation Field to Logic
- Modbus Communications
- Adjustable Sampling Time
- Input Protection to 60 V
- Configuration and Setup Software IEC 61131
- Flexible Power (10-40 Vdc or 19-28 Vac)
- DIN Rail Mount (TS 35)
- Removable Terminal Blocks



The Z-NET™ model Z-4AI has 4 configurable analog input channels that are single-ended inputs. That is, there is a single common for the 4 input signals. The input signals may be mixed, some current and some voltage, if desired. Four 100 Ω resistors are included for use as shunt resistors for current inputs with the input set to the ±2 V scale. The Z-4AI allows the user to select between higher sampling time or higher resolution. The communications and sampling time are configured through software. The current version of the Z-NET software or Z-PROG may be used for configuration of the Z-4AI parameters.

The Z-NET™ Series offers flexible, cost effective solutions to industry's increasingly diverse applications including distributed control, data acquisition, SCADA & telemetry. An ideal solution for process control and management using distributed I/O on plant and machinery. The I/O modules can be widely distributed or grouped together and accept all standard field signals. Modbus RTU protocol guarantees universal connectivity so applications are limitless: data acquisition, automation, telemetry control, etc.

More flexibility from ioSelect.

### General Specifications

|                   |                                       |
|-------------------|---------------------------------------|
| Voltage Input     | ±10 V or ±2 V scales                  |
| Impedance         | 100 kΩ                                |
| Resolution        | 14/13 bit + sign                      |
| Current Input     | ±20 mA                                |
| Impedance         | 100 Ω, external shunt                 |
| Resolution        | 14/13 bit + sign                      |
| Sensor Supply     | 20 V @ 40 mA max.                     |
| Power Supply      | 10 to 40 Vdc<br>19 to 28 Vac 50/60 Hz |
| Power Consumption | 1 W @ 24 V, 2.5 W max.                |
| Isolation         | 1500 Vac, Field to Logic              |
| Status Indicators | Error, Power, RX & TX                 |

### Performance Specifications

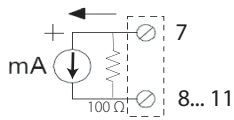
|                     |   |          |
|---------------------|---|----------|
| Communications Port | RS-485 - 2-Wire                               |          |
| Speed (baud)        | 9600, 19,200, 38,400, 57,600                  |          |
| Sampling Time       | 400 mS @ 14 bit, 200 mS @ 13                  |          |
| Protocol            | Modbus RTU                                    |          |
| Input               | Voltage                                       | Current  |
| Calibration Error   | 0.1%  | 0.2%     |
| Linearity           | 0.02%   | 0.02%    |
| Zero Stability      | 0.02%   | 0.02%    |
| Thermal Stability   | 0.01%/°C                                      | 0.01%/°C |
| Operating Temp      | 0 to 55 °C (32 to 131 °F)                     |          |
| Humidity            | 30 to 90% @ 40 °C non-cond.                   |          |
| Weight              | 140 g (5 oz)                                  |          |
| Dimensions          | 100 x 112 x 17.5 mm<br>(3.94 x 4.41 x .69 in) |          |

**Ordering Information:** **IOS-ZNET-4AI** 4-Channel Analog Input Module (V/I)

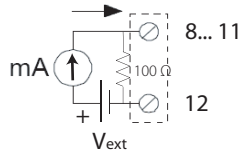
**Accessories:** IOS-ZNET-DINAL Din Rail Power and Comms Connector  
 IOS-ZNET-DIN2 Din Rail Power and Comms Connector for 2 modules  
 IOS-ZNET-DIN4 Din Rail Power and Comms Connector for 4 modules  
 IOS-ZNET-DIN8 Din Rail Power and Comms Connector for 8 modules

### Wiring Instructions

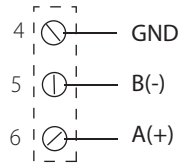
Input with Sensor Excitation (2-wire Device)



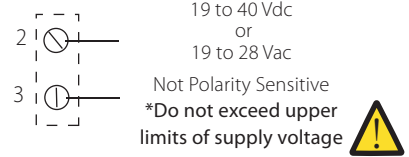
Input with External Power Supply (2-wire Device)



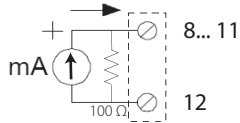
RS-485



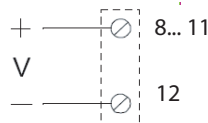
Power



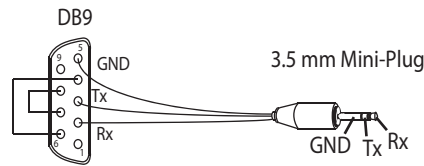
Passive Input (4-wire Device)



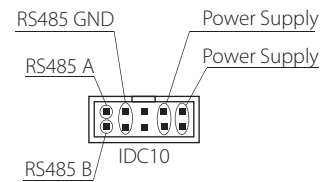
Voltage Input



RS-232 Configuration Cable



Rear Connector



### Configuration

DIP-SWITCH SW1

|   |   |   |   |   |   |       |                                  |  |
|---|---|---|---|---|---|-------|----------------------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | SW1-1 | Channel 1                        | On for ± 2 V range, use 100 Ω resistor for 4-20 or 0-20 mA input                             |
|   |   |   |   |   |   | SW1-2 | Channel 2                        | On for ± 2 V range, use 100 Ω resistor for 4-20 or 0-20 mA input                             |
|   |   |   |   |   |   | SW1-3 | Channel 3                        | On for ± 2 V range, use 100 Ω resistor for 4-20 or 0-20 mA input                             |
|   |   |   |   |   |   | SW1-4 | Channel 4                        | On for ± 2 V range, use 100 Ω resistor for 4-20 or 0-20 mA input                             |
|   |   |   |   |   |   | SW1-5 | Address, baud rate, parity, etc. | On to set via EEPROM, Off = Address=001, baud rate=9600, parity= none, nR bit=8, stop bit=1. |
|   |   |   |   |   |   | SW1-6 | Not used                         |  |

DIP-SWITCH SW2

|   |   |       |                   |                    |
|---|---|-------|-------------------|--------------------|
| 1 | 2 | SW1-1 | RS-485 terminator | On = On; Off = Off |
|   |   | SW1-2 | Not used          |                    |



CAUTION: Set the switches prior to applying power or connecting the input of the ZNET-4AI

### Installation

The ZNET™ Z-4AI is designed to be mounted on 35 mm DIN rail. Adequate ventilation may be needed to ensure optimal operating conditions. Avoid mounting modules over devices that generate heat. If operating at the high end of the temperature specifications (near 45 °C/ 113 °F) it may be necessary to separate the modules by at least 5 mm (0.2 in).

Other Conditions that may Contribute to High Operational Temperature:

- High power voltage (> 30Vdc / > 26 Vac)
- Powering an input sensor and one output consistently at a high output level

Power supply upper limits must not be exceeded. Excessive power level will result in damage to the module.

### Serial Interface

The RS485 serial interface is based on a balanced differential communication line with typical impedance of 120 ohm. The maximum length of the connection is not defined but depends on the communication speed, the signal-interference ratio and the cable quality. Generally, the maximum length with guaranteed operation is fixed at 1200 m. The connection cable does not have to be shielded if the distance is only a few meters in a "low noise" electrical environment. For distances between 15 and 100 m, a shielded twisted cable can be used without particular specifications; whereas, for connections over 100 m you are advised to use, for example, CEAM CPR 6003 or BELDEN 9841 cable.

The communication line should preferably be of the chain type, avoiding star configurations and limiting branches to a few meters. Terminate the ends of the lines by setting the related dip-switch on the module to ON, or by fitting a 120 Ω resistor parallel to the line. Connect the cable shield to the terminal on both sides, and connect to earth on at least one side. If necessary to reduce interference, connect the other side to earth by means of a 10 nF capacitor.

### Modbus Register

#### Modbus Commands

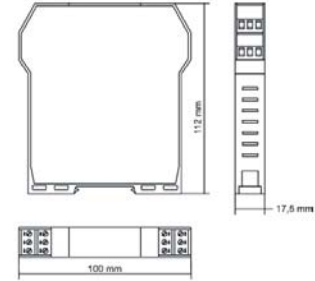
| Code | Function                 | Description                   |
|------|--------------------------|-------------------------------|
| 03   | Read Holding Registers   | Read up to 12 word registers  |
| 06   | Write Single Register    | Write a word register         |
| 16   | Write Multiple Registers | Write up to 10 word registers |

#### Modbus Holding Registers

The following table lists and describes the Holding Registers present in the module. For many registers the original copy exists in EEPROM. The address of this copy is given by the register number plus 64. In the table below, for each address the EEPROM address is indicated, if present. When the device is switched on (or at reset controlled serially) the RAM registers are initialized with the values contained in EEPROM. Program the EEPROM registers for configuration of the module. This configuration can be performed with the module inserted in the bus together with other modules (obviously with a different address) or with the module connected to the PC alone.

| Register    | Description  | ADDRESS |
|-------------|--|---------|
| MTYPE, VERS | Bit [15:8]: contain the module's ID or type<br>Bit [7:0]: contain the firmware's revision.                                     | 40001   |
| BAUDR       | Set the Baud Rate and the Response Delay Time  | 40002   |
| Bit [15:8]  | Set the Baud rate:<br>0x00: 4800 Baud<br>0x01: 9600 Baud<br>0x02: 19200 Baud<br>0x03: 38400 Baud (Default)<br>0x04: 57600 Baud |         |
| Bit [7:0]   | Set the Module's Address (1 - 255)   |         |
| EPRFLG      | Flag for setting various functions   | 40003   |
| Bit [15:5]  | None   |         |
| Bit [4]     | Parity: 0= Even, 1=Odd   |         |
| Bit [3]     | Use of serial communication parity: 0= no parity, 1=active parity  |         |
| Bit [2]     | Sets the serial communication response delay: 1= delay of 12 msec  |         |
| Bit [1]     | Doubles the conversion speed:<br>0=400ms (resolution = 14 bit + sign);<br>1= 200 ms (resolution = 13 bit + sign)               |         |
| Bit [0]     | None   |         |
| INFILT1     | 0= no filter, 1= lower filter, 2=upper filter  | 40004   |
| INFILT2     | 0= no filter, 1= lower filter, 2=upper filter  | 40005   |
| INFILT3     | 0= no filter, 1= lower filter, 2=upper filter  | 40006   |
| INFILT4     | 0= no filter, 1= lower filter, 2=upper filter  | 40007   |
| FSCALE1     | Measured full scale mV; MAX =10000   | 40008   |
| FSCALE2     | Measured full scale mV; MAX =10000   | 40009   |
| FSCALE3     | Measured full scale mV; MAX =10000   | 40010   |
| FSCALE4     | Measured full scale mV; MAX =10000   | 40011   |
| ISCALE1     | Beginning of scale in mV; value = 0  | 40012   |
| ISCALE2     | Beginning of scale in mV; value = 0  | 40013   |
| ISCALE3     | Beginning of scale in mV; value = 0  | 40014   |
| ISCALE4     | Beginning of scale in mV; value = 0  | 40015   |
| STATUS      | Flags state indication   | 40016   |

### Dimensions



| Register  | Description  | ADDRESS  |
|-----------|--|----------|
| Bit [15]  | =1: if the value of the channel 4 is less than the maximum negative value allowed  | 40016:15 |
| Bit [14]  | =1: if the value of the channel 4 is greater than the maximum positive value allowed   |          |
| Bit [13]  | =1: if the value of the channel 3 is less than the maximum negative value allowed  |          |
| Bit [12]  | =1: if the value of the channel 3 is greater than the maximum positive value allowed   |          |
| Bit [11]  | =1: if the value of the channel 2 is less than the maximum negative value allowed  |          |
| Bit [10]  | =1: if the value of the channel 2 is greater than the maximum positive value allowed   |          |
| Bit [9]   | =1: if the value of the channel 1 is less than the maximum negative value allowed  |          |
| Bit [8]   | =1: if the value of the channel 1 is greater than the maximum positive value allowed   |          |
| Bit [7:4] | None   |          |
| Bit[3]    | =1: Data programming error. Active if input type or filter value is outside of allowed values.   |          |
| Bit[2]    | =1: EEPROM programming error. Results if last programming of EEPROM failed.  |          |
| Bit[1]    | Reserved   |          |
| Bit[0]    | 1 = RESET. After this operation it automatically returns to 0.   |          |
| NCH1      | Measured value of channel with scale 0-10000, normalized with span and zero setting by FSCALEx and ISCALEx.                                  | 40017    |
| NCH2      | As above for channel 2   | 40018    |
| NCH3      | As above for channel 3   | 40019    |
| NCH4      | As above for channel 4   | 40020    |
| UCH1      | Measured value of channel with scale ± 0.16000 not normalized. From FSCALEx and ISCALEx depends on end scale used that can't be 2V or 10Vdc. | 40021    |
| UCH2      | As above for channel 2   | 40022    |
| UCH3      | As above for channel 3   | 40023    |
| UCH4      | As above for channel 4   | 40024    |