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Z-NET™ Z-PID

Programmable PID Module, Universal AI, DC Out

- Universal Input
- Current Output
- Integrated PID Controller
- 1500 V Isolation Field to Logic
- Modbus Communications
- Configuration and Setup Software IEC 61131
- Flexible Power (19-40 Vdc or 19-28 Vac)
- DIN Rail Mount (TS 35)
- Removable Terminal Blocks

The Z-NET™ model Z-PID has a single universal analog input channel and one dc output channel. The universal input can be a DC current or voltage, an RTD, a thermocouple (or millivolts) or a potentiometer. The current output signals can be 0-20 mA or 4-20 mA. 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-PID 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	±50 mV, ±200 mV, ±2 V, ±5V or ±10 V
Impedance	1 MΩ
Current Input	±20 mA
Impedance	100 Ω
Input resolution	0.01%
RTD	
PT100	-200 to 600 °C, 0.1 °C resolution
NI100	-60 to 180 °C, 0.1 °C resolution
Excitation	0.56 mA
Thermocouple	J, K, R, S, T, B, E, N
CJC	±2 °C, 10 to 40 °C Ambient
Resolution	5 µA
Potentiometer	0-3500 Ω, 0-8700Ω or 0-15,000 Ω
Resolution	0.01%
Excitation	0.56 mA
Current Output	0(2)-10 mA, 4-20 mA or 0-20 mA
Impedance	Maximum 500 Ω
Resolution	12 bit 5 µA
Status Indicators	Error, Power, RX & TX

Performance Specifications

Communications Port	RS-485 - 2-Wire				
Speed (baud)	9600, 19,200, 38,400, 57,600, 115,200				
Front Jack	2400 Baud				
Sampling Time	300 mS 10-90 %				
Input Error	Voltage	Current	RTD	T/C	Pot
Calibration	0.1 %	0.1%	0.2%	0.2%	0.2%
Linearity	0.05%	0.05%	0.2 °C	1-3 °C	0.05%
Thermal Stability			0.02%/ °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 (3.94 x 4.41 x .69 in)				
Power Supply	19 to 40 Vdc 19 to 28 Vac 50/60 Hz				
Power Consumption	2.5 W max, 1.6 W @ 24 V				
Isolation	1500 Vac, Field to Logic				

Ordering Information:	**IOS-ZNET-PID**	Programmable PID Module, Universal AI, DC Out
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

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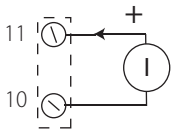
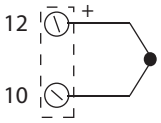
Wiring Instructions

Inputs

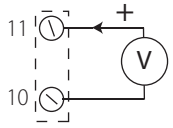
Current



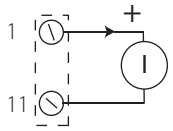
TC or mV
(<50 mV)



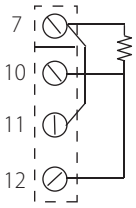
Voltage
(>50 mV)



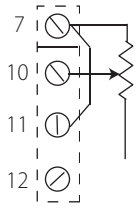
Current
(2-wire)



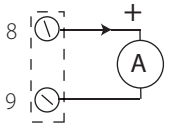
RTD



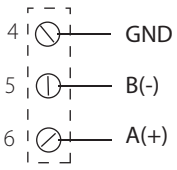
Rheostat
or 2-wire resistance



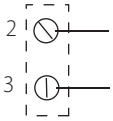
Output



RS-485



Power

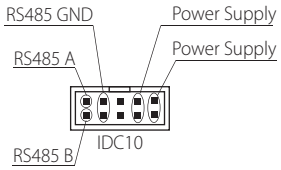


19 to 40 Vdc
or
19 to 28 Vac

Not Polarity Sensitive

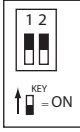
*Do not exceed upper limits of supply voltage

Rear Connector



Configuration

DIP-SWITCH SW1



SW1-1	Address	On = EEPROM; Off = 001 & 9600
SW1-2	Current	On = On; Off = Off

DIP-SWITCH SW2

SW1-1	RS-485 terminator	On = On; Off = Off
SW1-2	Reserved	

CAUTION: Set the switches prior to applying power or connecting the output of the ZNET-PID

Installation

The ZNET™ Z-PID 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 suppy 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 resostor 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	R/W
MTYPE, VERS 0401 = 1025	Bit [15:8]: contain the module's ID or type (4) Bit [7:0]: contain the firmware's revision. (1)	40001	R
CNFIN, TFILTRO	Pre-sets the type of input and the value of the filter time	40002	R/W
Bit [15:8]	1-13 sets the input type: 1 = Voltage: 0.05 to 10 V 2 = Resistance: 0.35 to 15 kΩ 3 = Current: 2.00 to 20.00 mA 4 = RTD PT100: -200 to 600 °C (-328 to 1112 °F) 5 = RTD NI100 : -60 to 180 °C (-76 to 356 °F) 6 = Type J: -200 to 1000 °C (-328 to 1832 °F) 7 = Type K: -200 to 1300 °C (-328 to 2372 °F) 8 = Type R: 0 to 1750 °C (32 to 3182 °F) 9 = Type S: 0 to 1750 °C (32 to 3182 °F) 10 = Type T: -200 to 400 °C (-328 to 752 °F) 11 = Type B: 0 to 1800 °C (32 to 3272 °F) 12 = Type E: -200 to 800 °C (-328 to 1472 °F) 13 = Type N: -200 to 1300 °C (-328 to 2372 °F)		
Bit [7:0]	One pole digital filter applied to the input: 0 = 0 seconds 1 = 1 second 2 = 2 seconds 3 = 5 seconds 4 = 10 seconds 5 = 20 seconds 6 = 60 seconds		
FSCAM	Full scale measurement: in mV if the input is voltage or TC; µA if the input is current; Ω if the input is resistance.	40003	R/W
ISCAM	Measurement scale beginning. (units as above)	40004	R/W
FSCALA	Full scale in engineering units, temperature set automatically.	40005	R/W
ISCALA	Beginning of scale in engineering units	40006	R/W
STRIM	Device span calibration. The rated value is 10000 and can be modified to adjust calibration of the measurement span	40007	R/W
ZTRIM	Device zero calibration. The rated value is 0 and can be modified to adjust calibration of the measurement zero	40008	R/W
BAUDR	Communication speed and address of the module	40009	R/W
Bit [15:8]	Set the Baud rate: 0x00: 4800 Baud 0x01: 9600 Baud 0x02: 19200 Baud 0x03: 38400 Baud (Default) 0x04: 57600 Baud 0x05: 115200 Baud 0x06: 1200 Baud 0x07: 2400 Baud		
Bit [7:0]	Set the Address: 1-255		

Register	Description	ADDRESS	R/W
TIMEOUT	Communication control time in tenths of a second. After each communication a timer is reset with the TIMEOUT value. When the timer expires, some module values are restored, reading them from the EEPROM. This means, for example, that if the serial communication is interrupted for longer than the TIMEOUT, the PID controller can assume a predefined status. e.g.: Status: Manual, Out = 10%, or Status: Automatic, Setpoint = 50% etc. This function can be de-activated: see ERRFLG.	40010	R/W
ERRFLG	Flags for setting various functions	40011	R/W
Bit [15]	1 = Data communication timer reset on reception of a valid message valid. 0 = Timer reset for an data transmitted		
Bit [14]	1 = Sets 4-wire reading for RTD		
Bit [13]	1 = Sets analog output to 4-20 mA		
Bit [12]	1 = If the serial communication is interrupted the register restore function is activated		
Bit [11]	1 = Sets PID regulator inverse action		
Bit [10]	1 = Activates PID regulator automatic function		
Bit [9]	Sets burnout for sensor break: 1 = upscale, 0 = down.		
Bit [8]	1 = Root extraction on for non-temperature inputs		
Bit [7:5] and [1:0]	None		
Bit [4]	Sets type of Parity: 0 = even; 1 = odd		
Bit [3]	Parity: 0 = no parity; 1 = parity active		
Bit [2]	1 = Communication response delay = 12 ms.		
SETPOINT	PID regulator setpoint, 10,000 = 100%	40012	R/W
GAIN	PID regulator gain, 1000 = 100%	40013	R/W
INTTIME	Integral time in seconds	40014	R/W
DERTIME	Derivative time in tenths of a second, 100 = 10.0	40015	R/W
MANRST	Manual reset of PID regulator, 5000 = 50 %	40016	R/W
OUTHLIM	Upper limit for regulator output	40017	R/W
OUTLLIM	Lower limit for regulator output	40018	R/W
OUTPUT	PID regulator output, 10000 = 100%	40019	R/W
VALUT	Value measured converted into engineering units	40020	R/W
VALLIN	Value measured and scaled, 0 to 10000	40021	R/W
STATUS	Status/error flags	40022	R

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Z-NET ™ Z-PID

Programmable PID Module, Universal AI, DC Out

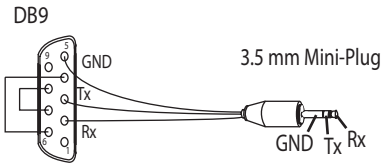
Modbus Register

Register	Description	ADDRESS	R/W
Bit [15]	1 = Output current < 3.3 mA		
Bit [14]	1 = Output current > 24 mA		
Bit [13]	1 = A/D converter failure		
Bit [12]	1 = EEPROM programming error, last programming of an EEPROM failed		
Bit [11]	1 = Burn-out of the sensor detected		
Bit [10]	1 = The measurement is below ISCAM or ISCALA set -3% (underflow)		
Bit [9]	1 = The measurement is below FSCAM or FSCALA set +3% (overflow)		
Bit [8]	1 = Data programming error		
Bit [7:2]	None		
Bit [1]	Reserved, do not set to 1		
Bit [0]	Set to 1 to reset the module. After this operation it will automatically reset to 0		

Exception messages:

Situation	*Response Code*
Illegal register address	02
Number of registers requested illegal	04
EEPROM resister programming error	08

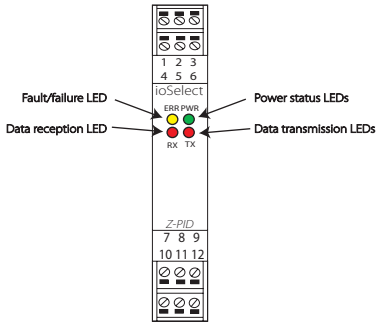
RS-232 Configuration Cable



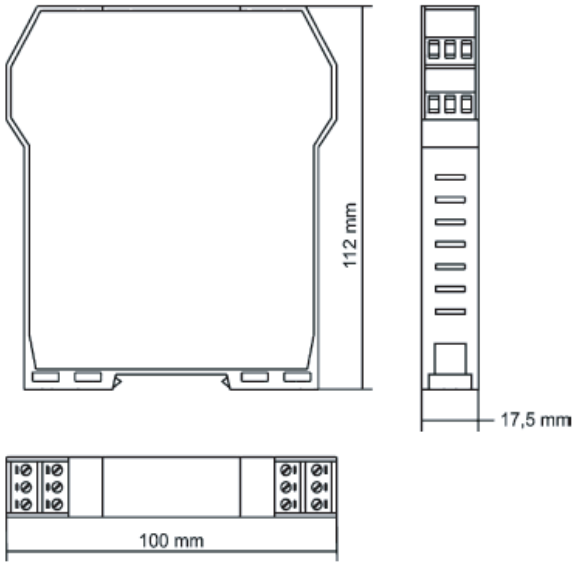
For configuration using the Z-PROG software

LED Functions

ERR	Flashes when error in EEPROM
PWR	On when power present
RX	Data received on RS485 port
TX	Data transmitted on RS485 port



Dimensions



Terminal Connections

1. Excitation (18 V @ 20 mA)
2. Power
3. Power
4. GND
5. B (-)
6. A (+)
7. RTD/Rheostat Excitation
8. Output (+)
9 Output (-)
10. DC (+)/TC (-)/RTD/Rheostat Input (+)
11. DC (-)/RTD/Rheostat Input (Common to 7)
12. TC (+)/RTD Input (Common to 10)

c UL us c UL us Pending
CE EN50081-2
EN50082-2
EN61010-1

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rev: 7/08

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