

## PID Controllers and Signal Conditioners

# iSeries

### iDR Series



#### Universal Inputs

- ✓ Thermocouple
- ✓ RTD
- ✓ Process Voltage
- ✓ Process Current
- ✓ Strain

#### Multiple Outputs

- ✓ Ethernet TCP/IP
- ✓ Serial RS232/RS485
- ✓ Autotune PID Control
- ✓ 2 Form "C" Relays
- ✓ 2 Solid State Relays
- ✓ 2 DC Pulse
- ✓ Programmable: Scalable Analog Voltage, 0 to 10 Vdc; Analog Current, 0 to 20 mA
- ✓ High Accuracy:  $\pm 0.5^{\circ}\text{C}$  ( $0.9^{\circ}\text{F}$ ), 0.03% Rdg
- ✓ User Friendly, Simple to Configure
- ✓ Built-In Excitation
- ✓ Plug Connectors
- ✓ Free Software Download

The Trodex<sup>®</sup> iDR DIN rail iSeries is a family of microprocessor-based instruments offered in 3 sizes. The instruments have a similar setup and configuration menu and method of operation, which is a tremendous time saver for integration of a large system.

The iDR instruments offer a broad selection of signal inputs. The choices are easily selected from the remote programmer menu with 4 front-panel pushbuttons, or by serial or Ethernet communications.

The temperature and process iDR handles 10 common types of thermocouple, multiple RTDs and several process (DC) voltage and current ranges. This model also features built-in excitation, 24 Vdc @ 25 mA. With its wide choice of signal inputs, this model is an excellent choice for measuring or controlling temperature with a thermocouple, RTD, or 4 to 20 mA transmitter.



The strain and process instruments (iSDR models) measure inputs from load cells, pressure transducers, and most any strain gage sensor as well as process voltage and current ranges. The iS has built-in 5 or 10 Vdc excitation for bridge transducers, 5 Vdc @ 40 mA or 10 Vdc @ 60 mA (any excitation voltage between 5 and 24 Vdc is available by special order). This model supports 4- and 6-wire bridge communications, ratiometric measurements.

The iSDR features fast and easy "in process" calibration/scaling of the signal inputs to any engineering units. This model also features 10-point linearization which allows the user to linearize the signal input from extremely nonlinear transducers of all kinds.

The iDR offers either simple manual on/off operation or full autotune PID control (selectable preset tune, adaptive tune, PID, PI, PD control modes). The dual control outputs can be configured for a variety of independent control and alarm applications, such as heat/heat, heat/cool, heat/alarm, cool/cool, cool/alarm, or alarm/alarm. The ramp-to-setpoint feature allows the user to define the rate of rise to setpoint, minimizing thermal shock to the load is during start-up. For those who only need simplified menus and no PID control, a limit alarm (-AL) option is available.

Users have a choice of 2 control or alarm outputs in almost any combination: solid state relays (SSRs) form "C" SPDT relays and pulsed 10 Vdc output for use with an external SSR.

The optional analog output can be programmed within a range of 0 to 10 Vdc or 0 to 20 mA. It is selectable as either a control output or as a calibrated retransmission of the process value—a unique feature among controllers.

The remote programmer/display can be programmed to change color at any setpoint or alarm point. For example, the instrument can be programmed to display the process value in **GREEN** during warm-up, in **AMBER** to signal the normal operating range, and in **RED** to signal an alarm condition.

Embedded Web Server option allows you to connect directly to an Ethernet network and transmit data in standard TCP/IP packets, or serve Web pages over a LAN or the Internet. With the serial communication option, the user can select from the pushbutton menu between RS232, RS422, and RS485, with straightforward ASCII commands.

## Specifications

### Universal Temperature and Process Input Model (iDR)

#### Accuracy:

±0.5°C temp; 0.03% rdg process

**Resolution:** 1°/0.1°; 10 µV process

#### Temperature Stability:

RTD: 0.04°C/°C

T/C @ 25°C (77°F): 0.05°C/°C

cold-junction compensation

Process: 50 ppm/°C

NMRR: 60 dB

CMRR: 120 dB

**A/D Conversion:** Dual-slope

**Reading Rate:** 3 samples per second

**Digital Filter:** Programmable

**Input Types:** Thermocouple, RTD, analog voltage, analog current

**Thermocouple Lead Resistance:** 100 Ω max

**Thermocouple Type (ITS 90):**

J, K, T, E, R, S, B, C, N, L

**RTD Input (ITS 68):**

100/500/1000 Ω Pt sensor; 2-, 3- or 4-wire; 0.00385 or 0.00392 curve

**Voltage Input:**

0 to 100 mV, 0 to 1 V, 0 to 10 Vdc

**Input Impedance:** 10 MΩ for 100 mV, 1 MΩ for 1 or 10 Vdc

**Current Input:** 0 to 20 mA (5 Ω load)

**Configuration:** Single-ended

**Polarity:** Unipolar

**Step Response:** 0.7 s for 99.9%

**Decimal Selection:** None, 0.1 for temperature; none, 0.1, 0.01 or 0.001 for process

**Setpoint Adjustment:** -1999 to 9999 counts

**Span Adjustment:** 0.001 to 9999 counts

**Offset Adjustment:** -1999 to 9999

**Excitation:** 24 Vdc @ 25 mA (not available with "-DC", "-C24" or "-C4EIT" option)

### Universal Strain and Process Input Model (iSDR)

**Accuracy:** 0.03% rdg

**Resolution:** 10/1 µV

**Temperature Stability:** 50 ppm/°C

NMRR: 60 dB

CMRR: 120 dB

**A/D Conversion:** Dual-slope

**Reading Rate:** 3 samples per second

**Digital Filter:** Programmable

**Input Types:**

Analog voltage, analog current

**Voltage Input:** 0 to 100 mVdc,

-100 mVdc to 1 Vdc, 0 to 10 Vdc

**Input Impedance:** 10 MΩ for 100 mV; 1 MΩ for 1 or 10 Vdc

**Current Input:** 0 to 20 mA (5 Ω load)

**Linearization Points:** Up to 10

**Configuration:** Single-ended

**Polarity:** Unipolar

**Step Response:** 0.7 s for 99.9%

**Decimal Selection:**

None, 0.1, 0.01 or 0.001

**Setpoint Adjustment:**

-1999 to 9999 counts

**Span Adjustment:** 0.001 to 9999 counts

**Offset Adjustment:** -1999 to 9999

**Excitation:** 5 Vdc @ 40 mA;

10 Vdc @ 60 mA (not available with

"-DC", "-C24" or "-C4EIT" option)

### Control

**Action:** Reverse (heat) or direct (cool)

**Modes:** Time and amplitude proportional control modes; selectable manual or auto PID, proportional, proportional with integral, proportional with derivative with anti-reset windup and on/off

**Rate:** 0 to 399.9 seconds

**Reset:** 0 to 3999 seconds

**Cycle Time:** 1 to 199 seconds; set to 0 for on/off operation

**Gain:** 0.5 to 100% of span; setpoints 1 or 2

**Damping:** 0000 to 0008

**Soak:** 00.00 to 99.59 (HH:MM), or off

**Ramp to Setpoint:**

00.00 to 99.59 (HH:MM), or off

**Autotune:**

Operator-initiated from front panel

### Control Output 1 and 2

**Relay:** 250 Vac or 30 Vdc @ 3 A (resistive load); configurable for on/off, PID and ramp and soak

**Output 1:** SPDT type, can be configured as alarm 1 output

**Output 2:** SPDT type, can be configured as alarm 2 output

**SSR:** 20 to 265 Vac @ 0.05 to 0.5 A (resistive load); continuous

**DC Pulse:** Non-isolated; 10 Vdc @ 20 mA

### Analog Output (Output 1 Only):

Non-isolated, proportional 0 to 10 Vdc or 0 to 20 mA; 500 Ω max

### Analog Output (Optional Output 3):

Isolated, retransmission, 0 to 10 Vdc or 0 to 20 mA, 500 Ω max; accuracy is 1% of FS, for scaling gain from 0.03 to 100 mV per count. Isolation is 1000 Vdc; linearity is 0.2%

### Network and Communications Options (-C24, -C4EIT, -EIT)

**Ethernet:** Standards compliance IEEE 802.3 10 Base-T

**Supported Protocols:**

TCP/IP, ARP, HTTPGET

### RS232/RS422/RS485/MODBUS:

Selectable from menu; both ASCII and MODBUS protocol selectable from menu. Programmable 300 to 19.2K baud; complete programmable setup capability; program to transmit current display, alarm status, min/max, actual measured input value and status.

**RS485:** Addressable from 0 to 199

Connection: Screw terminals

### Alarm 1 and 2 (Programmable)

**Type:** Same as output 1 and 2

**Operation:** High/low, above/below, band, latch/unlatch, normally open/normally closed and process/deviation

### Analog Output (Programmable):

Non-isolated, retransmission, 0 to 10 Vdc or 0 to 20 mA, 500 Ω max (output 1 only); accuracy is ±1% of FS when the following conditions are satisfied:  
1. Input is not scaled below 1% of input FS  
2. Analog output is not scaled below 3% of output FS

### General

**Line Voltage/Power:** 90 to 240 Vac ±10%, 50 to 400 Hz\*, 110 to 300 Vdc, equivalent voltage.

No CE compliance above 60 Hz.

**Low-Voltage/Power Option:** 24 Vac\*\*, 12 to 36 Vdc; 20 to 36 Vdc for Ethernet and isolated analog output from qualified safety approved source

\*\* Units can be powered safely with 24 Vac power, but no certification for CE/UL is claimed.

### Insulation

#### Power to Input/Output:

2300 Vac per 1-minute test

1500 Vac per 1-minute test

(for low-voltage power option)

#### Power to Relays/SSR Outputs:

2300 Vac per 1-minute test

#### Relays/SSR to Relay/SSR Outputs:

2300 Vac per 1-minute test

#### RS232/485 to Input/Outputs:

500 Vac per 1-minute test

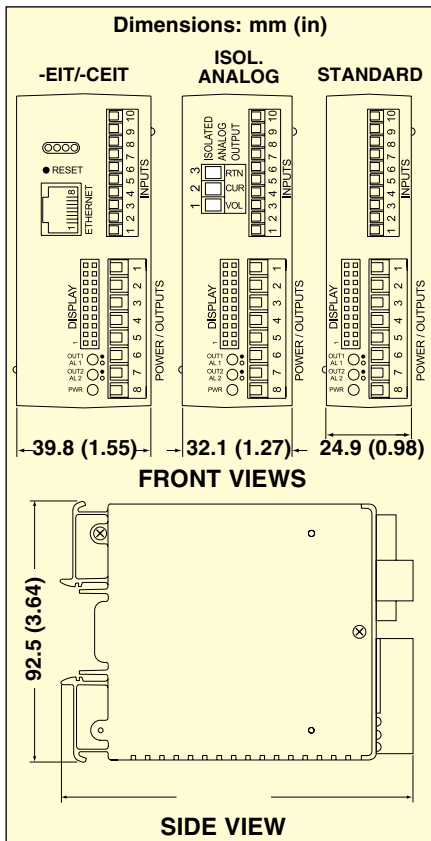
#### Environmental Conditions:

0 to 55°C (32 to 131°F) (0 to 50°C for UL), 90% RH (non-condensing)

#### Approvals:

UL, C-UL, CE per 2014/35/EU, FM (temperature units only)

# DATA ACQUISITION SYSTEMS



## Options

Ordering Suffix	Description
-AL	Limit alarm version (alarms only, no PID control) <sup>3,4</sup>
<b>Networks Options</b>	
-EIT	Ethernet with embedded Web server <sup>3</sup>
-C24	Isolated RS232 and RS485/422, 300 to 19.2 Kb <sup>1</sup>
-C4EIT	Ethernet with embedded Web server + isolated RS485/422 hub for up to 31 devices <sup>1,3</sup>
<b>Power Supply</b>	
*	Standard power input: 90 to 240 Vac/dc, 50 to 400 Hz (no entry required)
-DC	12 to 36 Vdc, 24 Vac <sup>1,5</sup>
<b>Factory Setup</b>	
-FS	Factory setup and configuration
<b>Accessories</b>	
iDRP	Remote programmer/display, 4-digit, 9-segment LED 21 mm (0.83")
<b>Software (Requires Network Option)</b>	
OPC-SERVER LICENSE	OPC server/driver software license

\*1 "-DC", "-C24" or "-C4EIT" not available with excitation.

\*2 Analog output (option 5) is not available with "-AL" units.

\*3 Ethernet options are not available for the iDRA controller.

\*4 "iDRA0\*-AL": 1 analog retransmission and 1 alarm.

\*5 20 to 36 Vdc for -C4EIT and -EIT

## To Order

Model No.		Description	
iDR		Temperature/process (no outputs); 90 to 240 Vac/dc standard power; use with iDRP for split meter/display	
Control Outputs #1 and 2 Direct (Cool) or Reverse (Heat) Acting			
iDR	(*)	(*)	Temperature/process with 2 control outputs
	2	2	2 solid state relays (SSRs): 0.5 A @ 120/240 Vac continuous
	2	3	SSR and relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	2	4	SSR and pulsed 10 Vdc @ 20 mA (for use with external SSR)
	3	3	2 relays: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	4	2	Pulsed 10 Vdc @ 20 mA (for use with external SSR) and SSR
	4	3	Pulsed 10 Vdc @ 20 mA (for use with external SSR) and relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	4	4	2 pulsed 10 Vdc @ 20 mA (for use with external SSR)
	5	2	Analog output selectable as either control or retransmission of process value; 0 to 10 Vdc or 0 to 20 mA @ 500 Ω maximum and SSR
	5	3	Analog output 0 to 10 Vdc or 0 to 20 mA @ 500 Ω maximum and relay
	5	4	Analog output 0 to 10 Vdc or 0 to 20 mA @ 500 Ω maximum and pulse 10 Vdc
			-AL Limit alarm version (alarm menu; no PID control) <sup>2</sup>
Model No.		Isolated Analog Output (Medium Case)	
iDRA		(no outputs) w/ isolated analog output <sup>3</sup>	
Control Outputs #1 and 2 Direct (Cool) or Reverse (Heat) Acting			
iDRA	(*)	(*)	Temperature/process with 2 control outputs <sup>3</sup>
	2	2	2 solid state relays (SSRs): 0.5 A @ 120/240 Vac continuous
	2	3	SSR and relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	2	4	SSR and pulsed 10 Vdc @ 20 mA (for use with external SSR)
	3	3	2 relays: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	4	2	Pulsed 10 Vdc @ 20 mA (for use with external SSR) and SSR
	4	3	Pulsed 10 Vdc @ 20 mA (for use with external SSR) and relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	4	4	2 pulsed 10 Vdc @ 20 mA (for use with external SSR)
Limit Alarm (*Select One Combination)			
iDRA	0	(*)	-AL Temp/process with 1 output for isolated analog output, 1 output for limit alarm (alarm menu; no PID control) <sup>3,4</sup>
		2	Solid state relays (SSRs): 0.5 A @ 120/240 Vac continuous
		3	Relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
		4	Pulsed 10 Vdc @ 20 mA (for use with external SSR)
Model No.		Isolated Analog Output (Medium Case)	
iSDR		Strain/process (no outputs); 90 to 240 Vac/dc standard power use with iDRP for split meter/display	
Control Outputs #1 and 2 Direct (Cool) or Reverse (Heat) Acting			
iSDR	(*)	(*)	Strain/process with (no outputs)
	2	2	2 solid state relays (SSRs): 0.5 A @ 120/240 Vac continuous
	2	3	SSR and relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	2	4	SSR and pulsed 10 Vdc @ 20 mA (for use with external SSR)
	3	3	2 relays: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	4	2	Pulsed 10 Vdc @ 20 mA (for use with external SSR) and SSR
	4	3	Pulsed 10 Vdc @ 20 mA (for use with external SSR) and relay: form "C" SPDT 3 A @ 120 Vac, 3 A @ 240 Vac
	4	4	2 pulsed 10 Vdc @ 20 mA (for use with external SSR)
	5	2	Analog output selectable as either control or retransmission of process value; 0 to 10 Vdc or 0 to 20 mA @ 500 Ω maximum and SSR
	5	3	Analog output 0 to 10 Vdc or 0 to 20 mA @ 500 Ω maximum and relay
	5	4	Analog output 0 to 10 Vdc or 0 to 20 mA @ 500 Ω maximum and pulse 10 Vdc
			-AL Limit alarm version (alarm menu; no PID control) <sup>2</sup>

Comes complete with operator's manual.

**Ordering Examples:** iDR33-EIT, controller with 2 form "C" relays and Ethernet.

iDRA03-C24-AL, limit alarm meter with isolated analog output, form "C" relay and serial communications