

# DI-5B35 Linearized 4-Wire RTD Input Modules

## FEATURES

- Interfaces to 100Ω Platinum, 10Ω Copper, or 120Ω Nickle RTDs
- True 4-wire Input
- Linearizes RTD Signal
- High Level Voltage Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1-1989 Transient Protection
- Input Protected to 240VAC Continuous
- 160dB CMR
- 95dB NMR at 60Hz, 90dB at 50Hz
- CSA Certified
- Mix and Match DI-5B Types

## DESCRIPTION

In RTD temperature measurement applications requiring a very high level of accuracy, the DI-5B35 4-Wire RTD input module offers a significant advantage over 3-wire measurement techniques (see block diagram). The DI-5B35 measures only the voltage dropped across the RTD and almost completely ignores the resistance or length of the RTD lead wires. The DI-5B34 3-Wire RTD module provides lead resistance compensation, but requires equal lead resistances, while the DI-5B35 does not require matched lead resistances.

Each DI-5B35 RTD input module provides a single channel of RTD input which is filtered, isolated, amplified, linearized, and converted to a high level analog voltage output. This voltage output is logic switch controlled, which allows these modules to share a common analog bus without the requirement of external multiplexers.

The DI-5B modules are designed with a completely isolated computer side circuit which can be floated to  $\pm 50V$  from Power Common, pin 16. This complete isolation means that no connection is required between I/O Common and Power Common for proper operation of the output switch. If desired, the output switch can be turned on continuously by simply connecting pin 22, the Read-Enable pin to I/O Common, pin 19.

RTD excitation is provided from the module by a precision current source. The excitation current is available on two leads which are separate from the two input signal measuring leads. The excitation current does not flow in the input signal leads, which allows RTD measurement to be totally independent of lead resistance. The excitation current is very small (0.25mA for 100Ω Pt and 120Ω Ni, and 1.0mA for 10Ω Cu) which minimizes self-heating of the RTD.

Signal filtering is accomplished with a six-pole filter which provides 95dB of normal-mode-rejection at 60Hz and 90dB at 50Hz. Two poles of this filter are on the field side of the isolation barrier, and the other four are on the computer side. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges. The module is powered from +5VDC,  $\pm 5\%$ .

A special input circuit on the DI-5B35 modules provides protection against accidental connection of power-line voltages up to 240VAC.

## SPECIFICATIONS

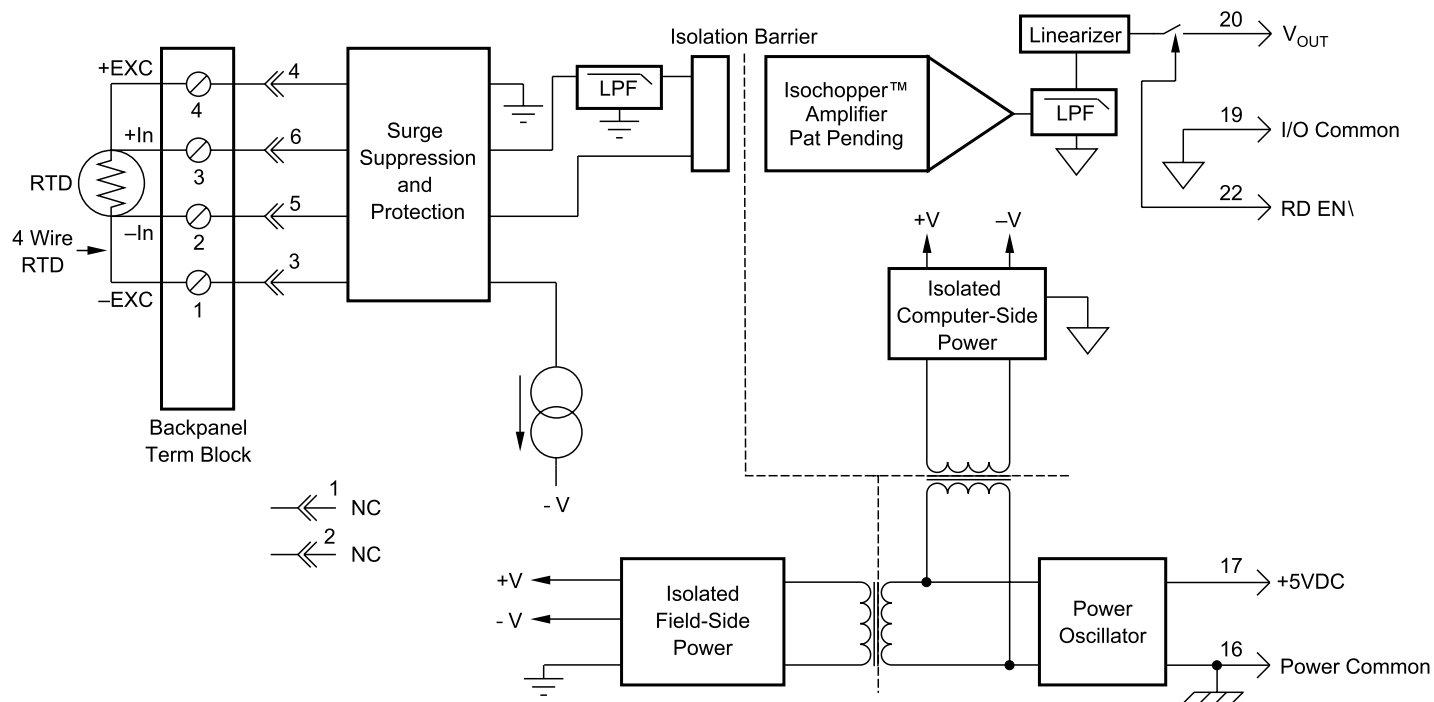
Typical at  $T_A = +25^\circ\text{C}$  and +5V Power

		DI-5B35
Input Range Limits:		-200°C to +850°C
100Ω Pt		-80°C to 320°C
120Ω Ni		-100°C to 260°C
10Ω Cu		
Input Resistance:	Normal	50MΩ
	Power Off	40kΩ
	Overload	40kΩ
Input Protection:	Continuous	240Vrms max
	Transient	ANSI/IEEE C37.90.1-1989
Sensor Excitation Current		
	100Ω Pt, 120Ω Ni	0.25mA
	10Ω Cu	1.0mA
Lead Resistance Effect		
	100Ω Pt, 120Ω Ni	$\pm 0.0005^\circ\text{C}/\Omega^*$
	10Ω	Cu $\pm 0.005^\circ\text{C}/\Omega^*$
CMV, Input to Output:		
	Continuous	1500Vrms max
	Transient	ANSI/IEEE C37.90.1-1989
CMR (50 or 60Hz)		160dB
NMR		95dB at 60Hz, 90dB at 50Hz
Accuracy		See Ordering Information
Conformity Error		$\pm 0.05\%$ Span
Stability:	Input Offset	$\pm 0.02^\circ\text{C}/^\circ\text{C}$
	Output Offset	$\pm 20\mu\text{V}/^\circ\text{C}$
	Gain	$\pm 50\text{ppm}$ of reading/ $^\circ\text{C}$
Noise:	Input, 0.1 to 10Hz	0.2μVrms
	Output, 100kHz	200μVrms
Bandwidth, -3dB		4Hz
Response Time, 90% Span		0.2s
Output Range		0V to +5V
Output Resistance		50Ω
Output Protection		Continuous Short to Ground
Output Selection Time (to $\pm 1\text{mV}$ of VOUT)		6μs at $C_{\text{load}} = 0$ to 2000pF
Output Current Limit		$\pm 14\text{mA}$ max
Output Enable Control:		
	Max Logic "0"	+0.8V
	Min Logic "1"	+2.4V
	Max Logic "1"	+36V
	Input Current, "0,1"	0.5μA
Power Supply Voltage		+5VDC $\pm 5\%$
Power Supply Current		30mA
Power Supply Sensitivity:		
	100Ω Pt, 120Ω Ni	0.2°C/V
	10Ω Cu	0.5°C/V
Operating Temperature		-40°C to +85°C
Storage Temperature		-40°C to +85°C
Relative Humidity		0 to 95% Noncondensing
RFI Susceptibility		$\pm 0.5\%$ Span Error at 400MHz, 5W, 3ft
Mechanical Dimensions		2.28" $\times$ 2.26" $\times$ 0.60" (58mm $\times$ 57mm $\times$ 15mm)

\* "Ω" refers to the resistance in one lead.

# DI-5B35 Linearized 4-Wire RTD Input Modules

## Block Diagram



## Ordering Information

Model Number	Input Range	Output Range	Accuracy*
<b>100Ω Pt, α = 0.00385</b>			
DI-5B35-01	-100°C (-148°F) to +100°C (+212°F)	0V to +5V	±0.32°C
DI-5B35-02	0°C (32°F) to +100°C (+212°F)	0V to +5V	±0.13°C
DI-5B35-03	0°C (32°F) to +200°C (+392°F)	0V to +5V	±0.26°C
DI-5B35-04	0°C (32°F) to +600°C (+1112°F)	0V to +5V	±0.78°C
<b>10Ω Cu, α = 0.004274</b>			
DI-5B35C-01	0°C (32°F) to +120°C (+248°F) (10Ω at 0°C)	0V to +5V	±0.23°C
DI-5B35C-02	0°C (32°F) to +120°C (+248°F) (10Ω at 25°C)	0V to +5V	±0.23°C
DI-5B35C-03	0°C (32°F) to +160°C (+320°F) (10Ω at 0°C)	0V to +5V	±0.32°C
<b>120Ω Ni, α = 0.00672</b>			
DI-5B35N-01	0°C (32°F) to +300°C (+572°F)	0V to +5V	±0.40°C

\*Includes conformity, hysteresis, and repeatability.



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