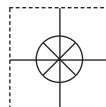


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WARNING: These products are not designed for use in, and should not be used for, human applications.

Isolated DIN Rail Mount 2-Wire Transmitters

Features

- $\pm 0.03\%$ Accuracy (Typical)
- $\pm 0.01\%$ Linearity
- 1500Vrms Transformer Isolation & 240Vrms Field-side Protection
- ANSI/IEEE C37.90.1 Transient Protection
- Wide Loop Supply Voltage, 10.8V to 60V
- 5-Pole Low-Pass Filtering
- Up to 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- Protected Against Reverse Connection of Loop Voltage
- -40°C to $+80^{\circ}\text{C}$ Operating Temperature
- Mounts on DIN Rail EN 50022, 35x7.5 or 35x15
- CSA C/US Certified (Class I, Division 2, Groups A, B, C, D)
- CE Compliant
- Manufactured per RoHS Directive 2002/95/EC

Instrument Class® Performance

“Best of Breed” accuracy, linearity, stability and noise specifications. Outstanding protection and isolation performance for Input, Output and Power connections. Capable of operating on the widest of loop supply power and over the broadest operating temperature range!

Description

Omega's new DRLP series of loop powered 2-wire transmitters consists of seven family groups with a total of 48 transmitter models that interface to a wide variety of voltage, current, temperature and position measuring devices. The DRLP is the latest introduction of products available from Omega, which provide superior specifications such as $\pm 0.03\%$ accuracy, five poles of filtering, 1500Vrms continuous isolation, low output noise, and much more.

The DRLP 2-wire transmitter conditions and sends analog signals from sensors located in the “field” to monitoring and control equipment, usually computers, located thousands of feet away in central control areas. The DRLP accepts a wide range of inputs, including millivolt, volt, milliamp, thermocouple, RTD, potentiometer, and slide wire. It operates on power from a 2-wire signal loop and modulates the supply current to represent the input signal within a 4 to 20-milliamp range.

Two-wire transmission loops are very economical methods for connecting sensors to distant control rooms. Since the DRLP operates from the signal loop current, no additional, expensive power and wiring are required. Only low cost, twisted pair wiring is needed.

DRLP Selection Guide

ANALOG VOLTAGE INPUT TRANSMITTERS

MODEL	INPUT RANGE	MODEL	INPUT RANGE
DRLP-MV1	±10mV	DRLP31-01	±1V
DRLP-MV2	±50mV	DRLP31-02	±5V
DRLP-MV3	±100mV	DRLP31-03	±10V
DRLP-MV4	0 - 10mV	DRLP31-04	0 - 1V
DRLP-MV5	0 - 50mV	DRLP31-05	0 - 5V
DRLP-MV6	0 - 100mV	DRLP31-06	0 - 10V
		DRLP31-07	±20V
		DRLP31-08	0 - 20V

ANALOG CURRENT INPUT TRANSMITTERS

MODEL	INPUT RANGE
DRLP-C1	4 to 20mA
DRLP-C2	0 to 20mA

LINEARIZED 2- OR 3-WIRE RTD INPUT TRANSMITTERS

MODEL	TYPE**	INPUT RANGE
DRLP-RTD1	100ΩPt	-100°C to +100°C (-148°F to +212°F)
DRLP-RTD2	100ΩPt	0°C to +100°C (+32°F to +212°F)
DRLP-RTD3	100ΩPt	0°C to +200°C (+32°F to +392°F)
DRLP-RTD4	100ΩPt	0°C to +600°C (+32°F to +1112°F)
DRLP-RTD5	100ΩPt	0°C to +400°C (+32°F to +752°F)
DRLP-RTD6	120ΩNi	0°C to +300°C (+32°F to +572°F)

POTENTIOMETER INPUT TRANSMITTERS

MODEL	INPUT RANGE
DRLP-P1	0 to 100Ω
DRLP-P2	0 to 500Ω
DRLP-P3	0 to 1kΩ
DRLP-P4	0 to 10kΩ

THERMOCOUPLE INPUT TRANSMITTERS

MODEL	TYPE‡	INPUT RANGE
DRLP-ITC-J	J	-100°C to +760°C (-148°F to +1400°F)
DRLP-ITC-K	K	-100°C to +1350°C (-148°F to +2462°F)
DRLP-ITC-T	T	-100°C to +400°C (-148°F to +752°F)
DRLP-ITC-E	E	0°C to +900°C (+32°F to +1652°F)
DRLP-ITC-R	R	0°C to +1750°C (+32°F to +3182°F)
DRLP-ITC-S	S	0°C to +1750°C (+32°F to +3182°F)
DRLP-ITC-B	B	0°C to +1800°C (+32°F to +3272°F)
DRLP-ITC-N	N	-100°C to +1300°C (-148°F to +2372°F)

LINEARIZED THERMOCOUPLE INPUT TRANSMITTERS

MODEL	TYPE‡	INPUT RANGE
DRLP-LTC-J1	J	0°C to +760°C (+32°F to +1400°F)
DRLP-LTC-J2	J	-100°C to +300°C (-148°F to +572°F)
DRLP-LTC-J3	J	0°C to +500°C (+32°F to +932°F)
DRLP-LTC-K1	K	0°C to +1000°C (+32°F to +1832°F)
DRLP-LTC-K2	K	0°C to +500°C (+32°F to +932°F)
DRLP-LTC-K3	K	-100°C to +1350°C (-148°F to +2462°F)
DRLP-LTC-K4	K	0°C to +1200°C (+32°F to +2192°F)
DRLP-LTC-T1	T	-100°C to +400°C (-148°F to +752°F)
DRLP-LTC-T2	T	0°C to +200°C (+32°F to +392°F)
DRLP-LTC-E	E	0°C to +1000°C (+32°F to +1832°F)
DRLP-LTC-R	R	+500°C to +1750°C (+932°F to +3182°F)
DRLP-LTC-S	S	+500°C to +1750°C (+932°F to +3182°F)
DRLP-LTC-B	B	+500°C to +1800°C (+932°F to +3272°F)
DRLP-LTC-N	N	-100°C to +1300°C (-148°F to +2372°F)

*THERMOCOUPLE ALLOY COMBINATIONS

Standards: DIN IEC 584, ANSI MC96-1-82, JIS C 1602-1981

TYPE	MATERIAL
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
E	Nickel-Chromium vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum
B	Platinum-30% Rhodium vs. Platinum-6% Rhodium
N	Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4% Silicon-0.1% Magnesium

**RTD STANDARDS

TYPE	ALPHA COEFFICIENT	DIN	JIS
100Ω Pt	0.00385	DIN 43760	JIS C 1604-1989
120Ω Ni	0.00672		

DRLP-MV/DRLP-V



Analog Voltage Input Transmitters

Features

- Accepts Millivolt and Voltage Level Signals
- Process Current Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input and Output Protected to 240VAC Continuous
- Up to 60V Loop Voltage
- 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- $\pm 0.03\%$ Accuracy
- $\pm 0.01\%$ Linearity
- Easily Mounts on Standard DIN Rail
- CSA C/US Certified
- CE Compliant

Description

Each DRLP-MV and DRLP-V voltage input transmitter provides a single channel of analog input which is filtered, isolated, amplified, and converted to a process current output (Figure 1). Signal filtering is accomplished with a five-pole filter, which provides 85dB of normal-mode rejection at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four are on the process loop 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.

Special input and output circuits on the DRLP-MV and DRLP-V transmitters provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Signal and loop power lines are secured to the module using screw terminals, which are in pluggable terminal blocks for ease of system assembly and reconfiguration.

The modules have excellent stability over time and do not require recalibration, however, zero and span settings are adjustable up to $\pm 10\%$ to accommodate situations where fine-tuning is desired. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

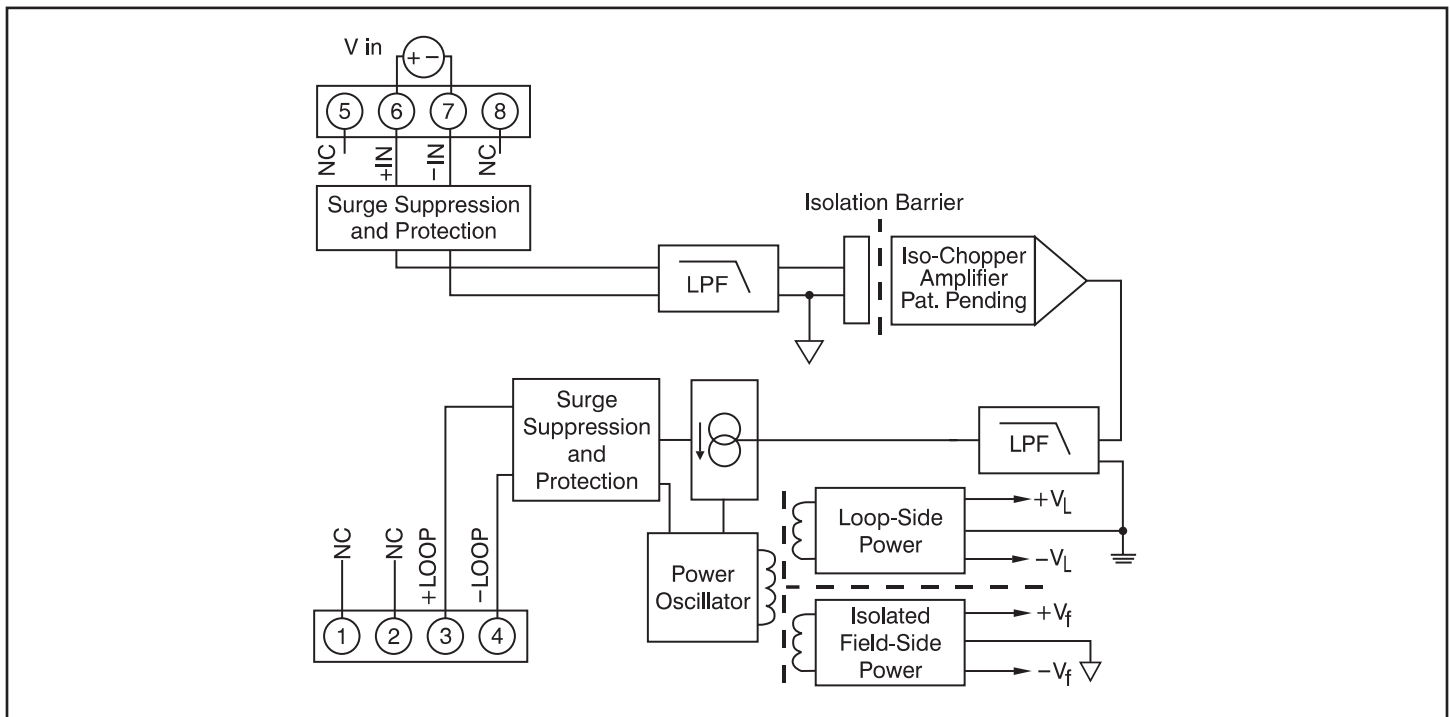


Figure 1: DRLP-MV/DRLP-V Block Diagram

Specifications Typical at $T_A=+25^{\circ}\text{C}$ and +24V loop voltage

Module	DRLP-MV	DRLP-V
Input Range	$\pm 10\text{mV}$ to $\pm 100\text{mV}$	$\pm 1\text{V}$ to $\pm 20\text{V}$
Input Bias Current	$\pm 0.5\text{nA}$	$\pm 0.05\text{nA}$
Input Resistance		
Normal	$50\text{M}\Omega$	$2\text{M}\Omega$
Power Off	$66\text{k}\Omega$	$2\text{M}\Omega$
Overload	$66\text{k}\Omega$	$2\text{M}\Omega$
Input Protection		
Continuous	240Vrms max	*
Transient	ANSI/IEEE C37.90.1	*
CMV, Input to Output		
Continuous	1500Vrms max	*
Transient	ANSI/IEEE C37.90.1	*
CMR (50Hz or 60Hz)	160dB	*
NMR	85dB at 60Hz, 80dB at 50Hz	*
Adjustability	$\pm 10\%$ Zero and Span	*
Accuracy ⁽¹⁾	$\pm 0.03\%$	*
Conformity	$\pm 0.01\%$	*
Stability		
Offset	$\pm 20\text{ppm}/^{\circ}\text{C}$	*
Gain	$\pm 80\text{ppm}/^{\circ}\text{C}$	*
Noise		
Output, 100kHz	$3\mu\text{Arms}$	*
Bandwidth, -3dB	3Hz	*
Response Time, 90% Span	165ms	*
Output Range	4mA to 20mA	*
Output Limits		
Under-range	2.8mA	*
Over-range	29mA	*
Output Protection		
Reverse Polarity	Continuous	*
Over-voltage	240Vrms continuous	*
Transient	ANSI/IEEE C37.90.1	*
Loop Supply Voltage	10.8V to 60V	*
Loop Supply Sensitivity	$\pm 0.0005\%/V$	*
Turn-On Delay	400ms	*
Environmental		*
Operating Temp. Range	-40°C to $+80^{\circ}\text{C}$	*
Storage Temp. Range	-40°C to $+80^{\circ}\text{C}$	*
Relative Humidity	0 to 95% Noncondensing	
Emissions EN61000-6-4	ISM, Group 1	
Radiated, Conducted	Class A	
Immunity EN61000-6-2	ISM, Group 1	
RF	Performance A $\pm 0.5\%$ Span Error	
ESD, EFT	Performance B	
Mechanical Dimensions	$2.95" \times 0.89" \times 4.13"$	*
(h)(w)(d)	$(75\text{mm} \times 22.5\text{mm} \times 105\text{mm})$	*
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail	*

Ordering Information

Module	Input Range
DRLP-MV1	-10mV to $+10\text{mV}$
DRLP-MV2	-50mV to $+50\text{mV}$
DRLP-MV3	-100mV to $+100\text{mV}$
DRLP-MV4	0mV to $+10\text{mV}$
DRLP-MV5	0mV to $+50\text{mV}$
DRLP-MV6	0mV to $+100\text{mV}$
DRLP-V1	-1V to $+1\text{V}$
DRLP-V2	-5V to $+5\text{V}$
DRLP-V3	-10V to $+10\text{V}$
DRLP-V4	0V to $+1\text{V}$
DRLP-V5	0V to $+5\text{V}$
DRLP-V6	0V to $+10\text{V}$
DRLP-V7	-20V to $+20\text{V}$
DRLP-V8	0V to $+20\text{V}$

NOTES:

* Same specification as DRLP-MV. (1) Includes linearity, hysteresis and repeatability.

Analog Current Input Transmitters

Features

- Accepts Milliamp Level Signals
- Process Current Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input and Output Protected to 240VAC Continuous
- Up to 60V Loop Voltage
- 105dB CMR
- $\pm 0.03\%$ Accuracy
- $\pm 0.01\%$ Linearity
- Easily Mounts on Standard DIN Rail
- CSA C/US Certified
- CE Compliant

Description

Each DRLP-C current input transmitter provides a single channel of analog input which is filtered, isolated, amplified, and converted to a process current output (Figure 1). Signal filtering is accomplished with a five-pole filter, which provides 80dB per decade of normal-mode rejection above 100Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four are on the process loop 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.

Special input and output circuits on the DRLP-C transmitters provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Signal and loop power lines are secured to the module using screw terminals, which are in pluggable terminal blocks for ease of system assembly and reconfiguration.

The modules have excellent stability over time and do not require recalibration, however, zero and span settings are adjustable up to $\pm 10\%$ to accommodate situations where fine-tuning is desired. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

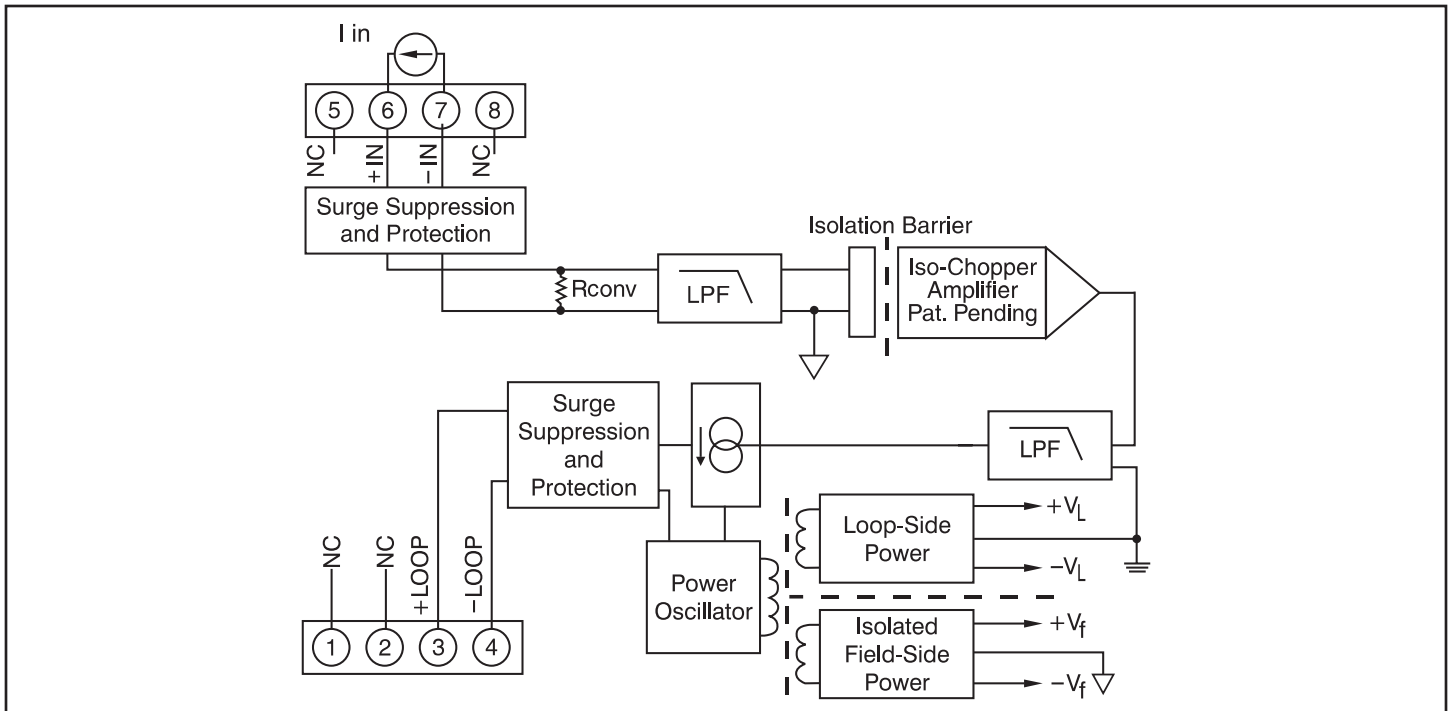


Figure 1: DRLP-C Block Diagram

Specifications Typical at $T_A=+25^\circ\text{C}$ and +24V loop voltage

Module	DRLP-C
Input Range	0-20mA or 4-20mA
Current Conversion Resistor	50.00 Ω
Input Protection	
Continuous	240Vrms max
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	
Continuous	1500Vrms max
Transient	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	105dB
NMR (-3dB at 100Hz)	80dB/decade Above 100Hz
Adjustability	$\pm 10\%$ Zero and Span
Accuracy ⁽¹⁾	$\pm 0.03\%$
Conformity	$\pm 0.01\%$
Stability	
Offset	$\pm 30\text{ppm}/^\circ\text{C}$
Gain	$\pm 90\text{ppm}/^\circ\text{C}$
Noise	
Output, 100kHz	3 μArms
Bandwidth, -3dB	100Hz
Response Time, 90% Span	5ms
Output Range	4mA to 20mA
Output Limits	
Under-range	2.8mA
Over-range	29mA
Output Protection	
Reverse Polarity	Continuous
Over-voltage	240Vrms Continuous
Transient	ANSI/IEEE C37.90.1
Loop Supply Voltage	10.8V to 60V
Loop Supply Sensitivity	$\pm 0.0005\%/V$
Turn-On Delay	400ms
Environmental	
Operating Temp. Range	-40°C to $+80^\circ\text{C}$
Storage Temp. Range	-40°C to $+80^\circ\text{C}$
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A $\pm 0.5\%$ Span Error
ESD, EFT	Performance B
Mechanical Dimensions	2.95" x 0.89" x 4.13"
(h)(w)(d)	(75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail

Ordering Information

Module	Input Range
DRLP-C1	4-20mA
DRLP-C2	0-20mA

Linearized 2- or 3-Wire RTD Input Transmitters

Features

- Interfaces to 100Ω Platinum or 120Ω Nickel RTDs
- Linearizes RTD Signal
- Process Current Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input and Output Protected to 240VAC Continuous
- Up to 60V Loop Voltage
- 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- ±0.1% Accuracy
- ±0.025% Conformity
- Easily Mounts on Standard DIN Rail
- CSA C/US Certified
- CE Compliant

Description

Each DRLP RTD input transmitter provides a single channel of RTD input which is filtered, isolated, amplified, linearized, and converted to a process current output (Figure 1). Signal filtering is accomplished with a five-pole filter, which provides 85dB of normal-mode rejection at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the

other four are on the process loop 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.

RTD excitation is provided from the transmitter using a precision current source. The excitation currents are very small (0.26mA max for 100Ω Pt and 120Ω Ni) which minimizes self-heating of the RTD. Linearization is achieved by creating a non-linear transfer function through the module itself. This non-linear transfer function is configured at the factory and is designed to be equal and opposite to the specific RTD non-linearity. Lead compensation is achieved by matching two current paths thus canceling the effects of lead resistance.

The specifications listed are for a 3-wire connection. A 2-wire connection of the RTD to the module is also possible and is achieved by adding a jumper between pin 5 (+EXC) and pin 6 (+IN) on the terminal block and connecting the RTD leads between pin 6 (+IN) and pin 7 (-IN). The 2-wire connection nullifies the lead resistance compensation feature of the module.

Special input and output circuits on the DRLP transmitters provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Signal and loop power lines are secured to the module using screw terminals, which are in pluggable terminal blocks for ease of system assembly and reconfiguration.

The modules have excellent stability over time and do not require recalibration, however, zero and span settings are adjustable up to ±3% to accommodate situations where fine-tuning is desired. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

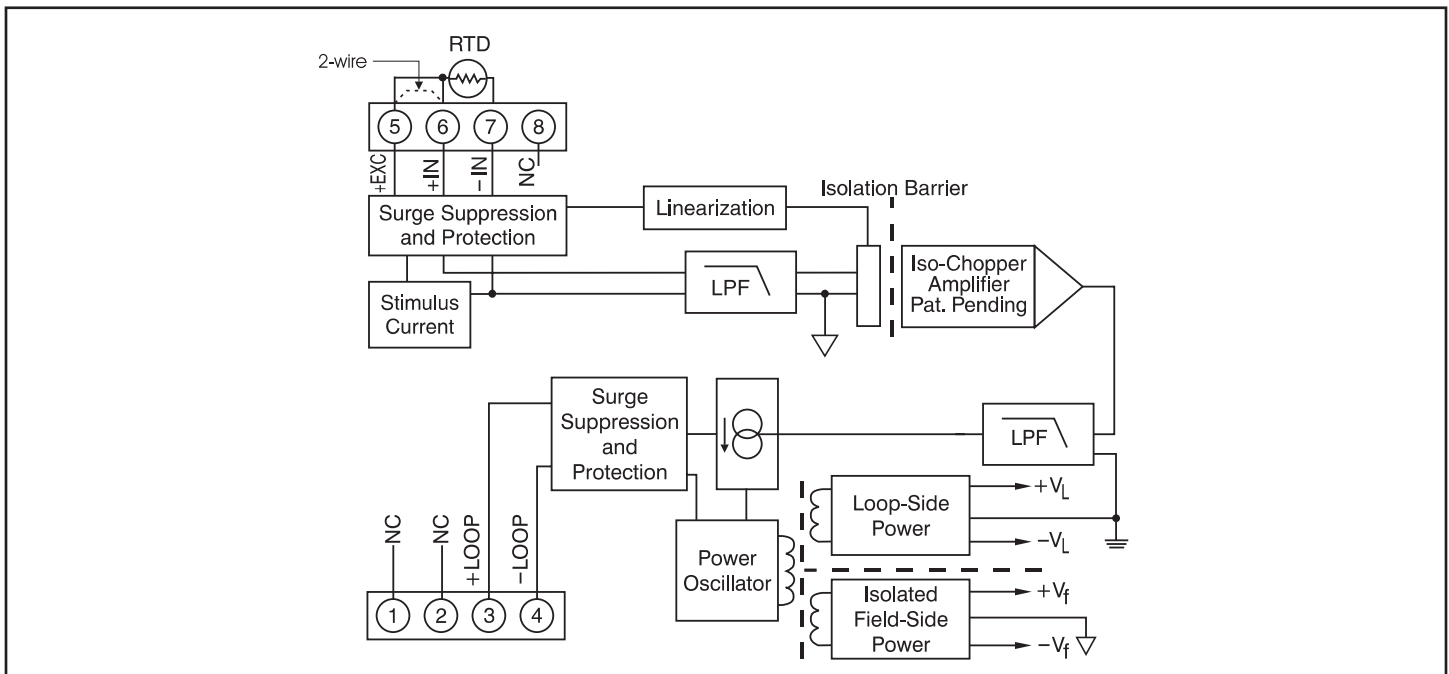


Figure 1: DRLP-RTD Block Diagram

Specifications Typical at $T_A=+25^{\circ}\text{C}$ and +24V loop voltage

Module	DRLP-RTD
Input Range	-200°C to +850°C (100Ω Pt) -80°C to +320°C (120Ω Ni)
Input Resistance	
Normal	50MΩ
Power Off	66kΩ
Overload	66kΩ
Input Protection	
Continuous	240Vrms max
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	
Continuous	1500Vrms max
Transient	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	160dB
NMR	85dB at 60Hz, 80dB at 50Hz
Adjustability	±3% Zero and Span
Accuracy ⁽¹⁾	See Ordering Information
Conformity	±0.025%
Stability	
Offset	±50ppm/°C
Gain	±100ppm/°C
Sensor Excitation Current	0.260mA
Lead Resistance Effect	±0.02°C/Ω
Noise	
Output, 100kHz	3μArms
Bandwidth, -3dB	3Hz
Response Time, 90% Span	165ms
Output Range	4mA to 20mA
Output Limits	
Under-range	3mA
Over-range	29mA
Output Protection	
Reverse Polarity	Continuous
Over-voltage	240Vrms Continuous
Transient	ANSI/IEEE C37.90.1
Loop Supply Voltage	10.8V to 60V
Loop Supply Sensitivity	±0.0005%/V
Turn-On Delay	400ms
Environmental	
Operating Temp. Range	-40°C to +80°C
Storage Temp. Range	-40°C to +80°C
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A ±0.5% Span Error
ESD, EFT	Performance B
Mechanical Dimensions	2.95" x 0.89" x 4.13"
(h)(w)(d)	(75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail

Ordering Information

Module	Input Range	Accuracy ⁽¹⁾	
100Ω Pt ** DRLP-RTD1	-100°C to +100°C (-148°F to +212°F)	±0.1%	±0.2°C
DRLP-RTD2	0°C to +100°C (+32°F to +212°F)	±0.1%	±0.1°C
DRLP-RTD3	0°C to +200°C (+32°F to +392°F)	±0.1%	±0.2°C
DRLP-RTD4	0°C to +600°C (+32°F to +1112°F)	±0.1%	±0.6°C
DRLP-RTD5	0°C to +400°C (+32°F to +752°F)	±0.1%	±0.4°C
120Ω Ni ** DRLP-RTD6	0°C to +300°C (+32°F to +572°F)	±0.1%	±0.3°C

**RTD Standards

Type	Alpha Coefficient	DIN	JIS	IEC
100Ω Pt	0.00385	DIN 43760	JIS C 1604-1989	IEC 751
120Ω Ni	0.00672			

NOTES:

(1) Includes conformity, hysteresis and repeatability.

Potentiometer Input Transmitters

Features

- Interfaces to Potentiometers up to 10kΩ
- Process Current Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input and Output Protected to 240VAC Continuous
- Up to 60V Loop Voltage
- 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- ±0.03% Accuracy
- ±0.01% Linearity
- Easily Mounts on Standard DIN Rail
- CSA C/US Certified
- CE Compliant

Description

Each DRLP-P potentiometer input transmitter provides a single channel of potentiometer input which is filtered, isolated, amplified, and converted to a process current output (Figure 1). Signal filtering is accomplished with a five-pole filter, which provides 85dB of normal-mode rejection at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four are on the process loop 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.

Potentiometer excitation is provided from the transmitter using a precision current source. The excitation current is small (less than 0.26mA) which minimizes self-heating of the potentiometer. Lead compensation is achieved by matching two current paths which cancels the effects of lead resistance.

Special input and output circuits on the DRLP-P transmitters provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Signal and loop power lines are secured to the module using screw terminals, which are in pluggable terminal blocks for ease of system assembly and reconfiguration.

The modules have excellent stability over time and do not require recalibration, however, zero and span settings are adjustable up to ±10% to accommodate situations where fine-tuning is desired. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

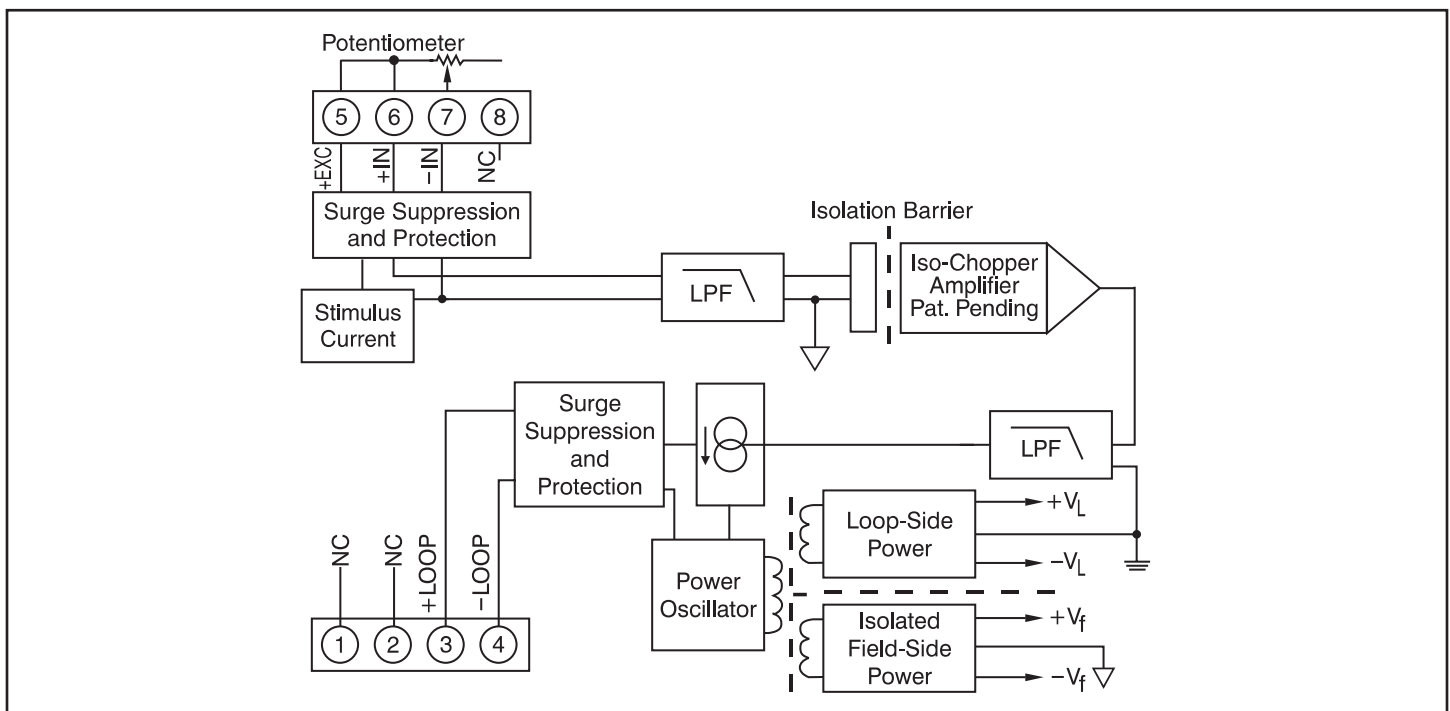


Figure 1: DRLP-P Block Diagram

Specifications Typical at $T_A=+25^{\circ}\text{C}$ and +24V loop voltage

Module	DRLP-P
Input Range	0 Ω to 10k Ω
Input Resistance	
Normal	50M Ω
Power Off	66k Ω
Overload	66k Ω
Input Protection	
Continuous	240Vrms max
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	
Continuous	1500Vrms max
Transient	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	160dB
NMR	85dB at 60Hz, 80dB at 50Hz
Adjustability	$\pm 10\%$ Zero and Span
Accuracy ⁽¹⁾	$\pm 0.03\%$
Conformity	$\pm 0.01\%$
Stability	
Offset	$\pm 50\text{ppm}/^{\circ}\text{C}$
Gain	$\pm 100\text{ppm}/^{\circ}\text{C}$
Sensor Excitation Current	0.26mA; 100 Ω , 500 Ω Sensor 0.13mA; 1k Ω Sensor 0.065mA; 10k Ω Sensor
Lead Resistance Effect	$\pm 0.01\Omega/\Omega$; 100 Ω , 500 Ω , 1k Ω Sensor $\pm 0.02\Omega/\Omega$; 10k Ω Sensor
Noise	
Output, 100kHz	3 μArms
Bandwidth, -3dB	3Hz
Response Time, 90% Span	165ms
Output Range	4mA to 20mA
Output Limits	
Under-range	3mA
Over-range	29mA
Output Protection	
Reverse Polarity	Continuous
Over-voltage	240Vrms Continuous
Transient	ANSI/IEEE C37.90.1
Loop Supply Voltage	10.8V to 60V
Loop Supply Sensitivity	$\pm 0.0005\%/V$
Turn-On Delay	400ms
Environmental	
Operating Temp. Range	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Storage Temp. Range	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A $\pm 0.5\%$ Span Error
ESD, EFT	Performance B
Mechanical Dimensions	2.95" x 0.89" x 4.13"
(h)(w)(d)	(75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail

Ordering Information

Module	Input Range
DRLP-P1	0 to 100 Ω
DRLP-P2	0 to 500 Ω
DRLP-P3	0 to 1k Ω
DRLP-P4	0 to 10k Ω

NOTES:

(1) Includes linearity, hysteresis and repeatability.

Non-Linearized Thermocouple Input Transmitters

Features

- Interfaces to Types J, K, T, E, R, S, B, and N Thermocouples
- Process Current Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input and Output Protected to 240VAC Continuous
- Up to 60V Loop Voltage
- 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- $\pm 0.05\%$ Accuracy
- $\pm 0.01\%$ Linearity
- Easily Mounts on Standard DIN Rail
- CSA C/US Certified
- CE Compliant

Description

Each DRLP-ITC non-linearized thermocouple input transmitter provides a single channel of thermocouple input which is filtered, isolated, amplified, and converted to a process current output (Figure 1). Signal filtering is accomplished with a five-pole filter, which provides 85dB of normal-mode rejection at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four are on the process loop 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 DRLP-ITC can interface to eight industry standard thermocouple types: J, K, T, E, R, S, B and N. Each transmitter is cold-junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and screw terminals on the transmitter. Upscale open thermocouple detection is provided by circuitry. Downscale indication can be implemented by installing a $47M\Omega$, $\pm 20\%$ resistor between screw terminals 6 (+IN) and 8 (-EXC) on the input terminal block.

Special input and output circuits on the DRLP-ITC transmitters provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Loop power lines are secured to the module using screw terminals, which are in pluggable terminal blocks for ease of system assembly and reconfiguration. Transmitter zero and span settings are adjustable up to $\pm 10\%$. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

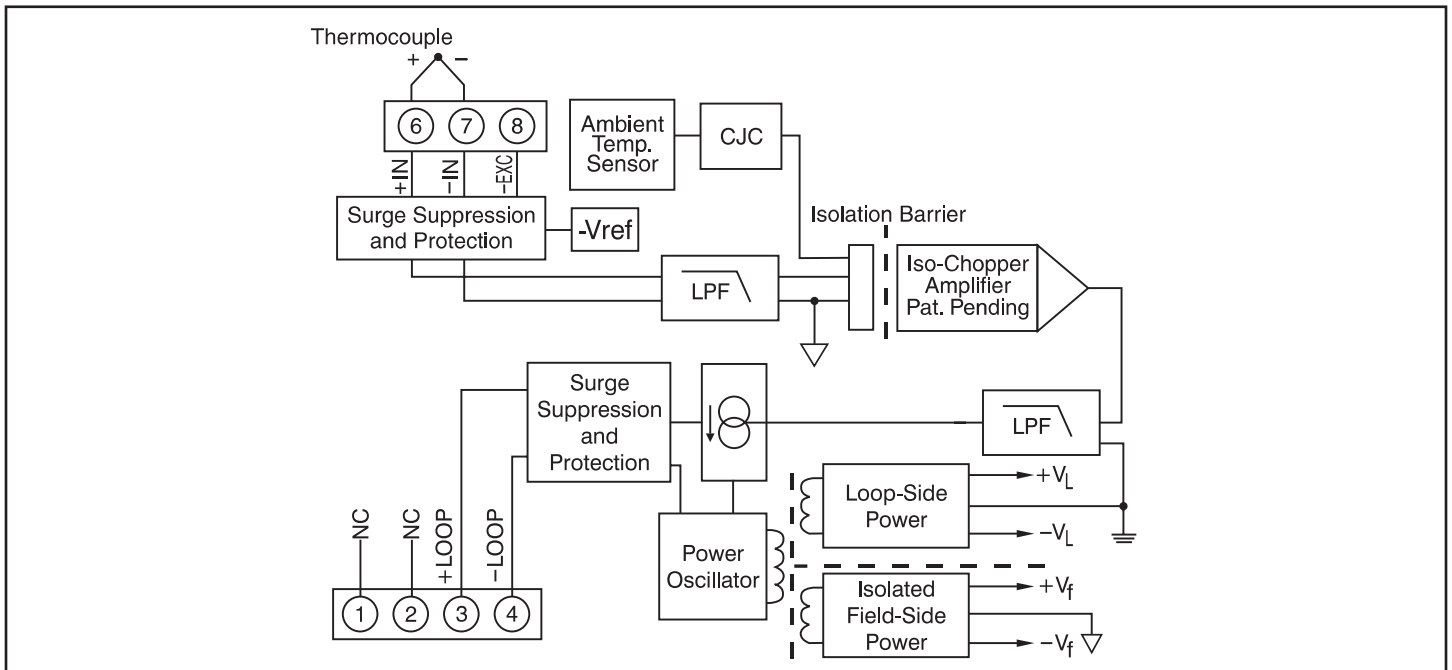


Figure 1: DRLP-ITC Block Diagram

Specifications Typical at T_A=+25°C and +24V loop voltage

Module	DRLP-ITC
Input Range	Standard thermocouple temperature limits as per NIST monograph 175, ITS-90
Input Bias Current	-25nA
Input Resistance	
Normal	50MΩ
Power Off	66kΩ
Overload	66kΩ
Input Protection	
Continuous	240Vrms max
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	
Continuous	1500Vrms max
Transient	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	160dB
NMR	85dB at 60Hz, 80dB at 50Hz
Adjustability	±10% Zero and Span
Accuracy ⁽¹⁾	See Ordering Information
Stability	
Offset	±40ppm/°C
Gain	±60ppm/°C
Cold Junction Compensation	
Accuracy, +25°C	±0.25°C
Accuracy, 0°C to +50°C	±0.50°C
Accuracy, -40°C to +80°C	±1.25°C
Open Input Response	Upscale
Open Input Detection Time	< 5s
Noise	
Output, 100kHz	3μArms
Bandwidth, -3dB	3Hz
Response Time, 90% Span	165ms
Output Range	4mA to 20mA
Output Limits	
Under-range	2.8mA
Over-range	29mA
Output Protection	
Reverse Polarity	Continuous
Over-voltage	240Vrms Continuous
Transient	ANSI/IEEE C37.90.1
Loop Supply Voltage	10.8V to 60V
Loop Supply Sensitivity	±0.0005%/V
Turn-On Delay	400ms
Environmental	
Operating Temp. Range	-40°C to +80°C
Storage Temp. Range	-40°C to +80°C
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A ±0.5% Span Error
ESD, EFT	Performance B
Mechanical Dimensions (h)(w)(d)	2.95" x 0.89" x 4.13" (75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail

Ordering Information

Module	TC Type [‡]	Input Range	Accuracy ⁽¹⁾	
DRLP-ITC-J	J	-100°C to +760°C (-148°F to +1400°F)	±0.05%	±0.43°C
DRLP-ITC-K	K	-100°C to +1350°C (-148°F to +2462°F)	±0.05%	±0.73°C
DRLP-ITC-T	T	-100°C to +400°C (-148°F to +752°F)	±0.05%	±0.25°C
DRLP-ITC-E	E	0°C to +900°C (+32°F to +1652°F)	±0.05%	±0.45°C
DRLP-ITC-R	R	0°C to +1750°C (+32°F to +3182°F)	±0.05%	±0.88°C
DRLP-ITC-S	S	0°C to +1750°C (+32°F to +3182°F)	±0.05%	±0.88°C
DRLP-ITC-B	B	0°C to +1800°C (+32°F to +3272°F)	±0.05%	±0.90°C
DRLP-ITC-N	N	-100°C to +1300°C (-148°F to +2372°F)	±0.05%	±0.70°C

‡Thermocouple Alloy Combinations

Standards: DIN IEC 584, ANSI MC96-1-82, JIS C 1602-1981

Type	Material
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
E	Nickel-Chromium vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum
B	Platinum-30% Rhodium vs. Platinum-6% Rhodium
N	Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4% Silicon-0.1% Magnesium

NOTES:

(1) Includes conformity, hysteresis, repeatability and CJC error.

Linearized Thermocouple Input Transmitters

Features

- Interfaces to Types J, K, T, E, R, S, B, and N Thermocouples
- Linearizes Thermocouple Signal
- Process Current Output
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input and Output Protected to 240VAC Continuous
- Up to 60V Loop Voltage
- 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- $\pm 0.10\%$ Accuracy
- Easily Mounts on Standard DIN Rail
- CSA C/US Certified
- CE Compliant

Description

Each DRLP-LTC thermocouple input transmitter provides a single channel of thermocouple input which is filtered, isolated, amplified, linearized, and converted to a process current output (Figure 1). Signal filtering is accomplished with a five-pole filter, which provides 85dB of normal-mode rejection

at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four are on the process loop 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.

Linearization is achieved by creating a non-linear transfer function through the module itself. This non-linear transfer function is configured at the factory and is designed to be equal and opposite to the thermocouple non-linearity.

The DRLP-LTC can interface to eight industry standard thermocouple types: J, K, T, E, R, S, B and N. Each transmitter is cold-junction compensated to correct for parasitic thermocouples formed by the thermocouple wire and screw terminals on the transmitter. Upscale open thermocouple detection is provided by circuitry. Downscale indication can be implemented by installing a $47M\Omega$, $\pm 20\%$ resistor between screw terminals 6 (+IN) and 8 (-EXC) on the input terminal block.

Special input and output circuits on the DRLP-LTC transmitters provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Loop power lines are secured to the module using screw terminals, which are in pluggable terminal blocks for ease of system assembly and reconfiguration. Transmitter zero and span settings are adjustable up to $\pm 3\%$. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use.

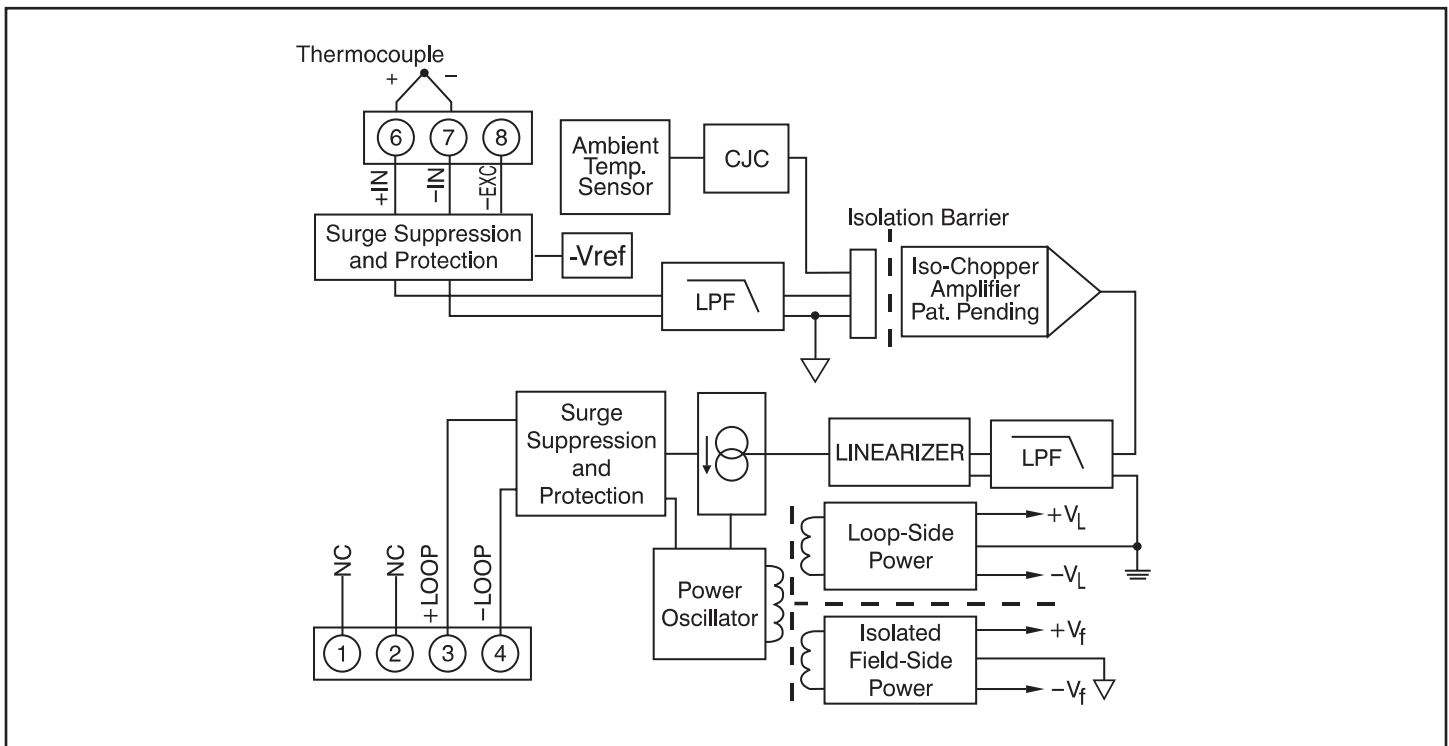


Figure 1: DRLP-LTC Block Diagram

Specifications Typical at $T_A=+25^{\circ}\text{C}$ and +24V loop voltage

Module	DRLP-LTC
Input Range	Standard thermocouple temperature limits as per NIST monograph 175, ITS-90
Input Bias Current	-25nA
Input Resistance	
Normal	50M Ω
Power Off	66k Ω
Overload	66k Ω
Input Protection	
Continuous	240Vrms max
Transient	ANSI/IEEE C37.90.1
CMV, Input to Output	
Continuous	1500Vrms max
Transient	ANSI/IEEE C37.90.1
CMR (50Hz or 60Hz)	160dB
NMR	85dB at 60Hz, 80dB at 50Hz
Adjustability	$\pm 3\%$ Zero and Span
Accuracy ⁽¹⁾	See Ordering Information
Stability	
Offset	$\pm 60\text{ppm}/^{\circ}\text{C}$
Gain	$\pm 80\text{ppm}/^{\circ}\text{C}$
Cold Junction Compensation	
Accuracy, +25 $^{\circ}\text{C}$	$\pm 0.25^{\circ}\text{C}$
Accuracy, 0 $^{\circ}\text{C}$ to +50 $^{\circ}\text{C}$	$\pm 0.50^{\circ}\text{C}$
Accuracy, -40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$	$\pm 1.25^{\circ}\text{C}$
Open Input Response	Upscale
Open Input Detection Time	< 5s
Noise	
Output, 100kHz	3 μArms
Bandwidth, -3dB	3Hz
Response Time, 90% Span	165ms
Output Range	4mA to 20mA
Output Limits	
Under-range	2.8mA
Over-range	29mA
Output Protection	
Reverse Polarity	Continuous
Over-voltage	240Vrms Continuous
Transient	ANSI/IEEE C37.90.1
Loop Supply Voltage	10.8V to 60V
Loop Supply Sensitivity	$\pm 0.0005\%/V$
Turn-On Delay	400ms
Environmental	
Operating Temp. Range	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Storage Temp. Range	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$
Relative Humidity	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1
Radiated, Conducted	Class A
Immunity EN61000-6-2	ISM, Group 1
RF	Performance A $\pm 0.5\%$ Span Error
ESD, EFT	Performance B
Mechanical Dimensions (h)(w)(d)	2.95" x 0.89" x 4.13" (75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail

Ordering Information

Module	TC Type [‡]	Input Range	Accuracy ⁽¹⁾	
			$\pm 0.1\%$ span	\pm Temp
DRLP-LTC-J1	J	0 $^{\circ}\text{C}$ to +760 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +1400 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 0.76^{\circ}\text{C}$
DRLP-LTC-J2	J	-100 $^{\circ}\text{C}$ to +300 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +572 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 0.40^{\circ}\text{C}$
DRLP-LTC-J3	J	0 $^{\circ}\text{C}$ to +500 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +932 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 0.50^{\circ}\text{C}$
DRLP-LTC-K1	K	0 $^{\circ}\text{C}$ to +1000 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +1832 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.00^{\circ}\text{C}$
DRLP-LTC-K2	K	0 $^{\circ}\text{C}$ to +500 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +932 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 0.50^{\circ}\text{C}$
DRLP-LTC-K3	K	-100 $^{\circ}\text{C}$ to +1350 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +2462 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.45^{\circ}\text{C}$
DRLP-LTC-K4	K	0 $^{\circ}\text{C}$ to +1200 $^{\circ}\text{C}$ (32 $^{\circ}\text{F}$ to +2192 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.20^{\circ}\text{C}$
DRLP-LTC-T1	T	-100 $^{\circ}\text{C}$ to +400 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +752 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 0.50^{\circ}\text{C}$
DRLP-LTC-T2	T	0 $^{\circ}\text{C}$ to +200 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +392 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 0.20^{\circ}\text{C}$
DRLP-LTC-E	E	0 $^{\circ}\text{C}$ to +1000 $^{\circ}\text{C}$ (+32 $^{\circ}\text{F}$ to +1832 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.00^{\circ}\text{C}$
DRLP-LTC-R	R	+500 $^{\circ}\text{C}$ to +1750 $^{\circ}\text{C}$ (+932 $^{\circ}\text{F}$ to +3182 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.25^{\circ}\text{C}$
DRLP-LTC-S	S	+500 $^{\circ}\text{C}$ to +1750 $^{\circ}\text{C}$ (+932 $^{\circ}\text{F}$ to +3182 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.25^{\circ}\text{C}$
DRLP-LTC-B	B	+500 $^{\circ}\text{C}$ to +1800 $^{\circ}\text{C}$ (+932 $^{\circ}\text{F}$ to +3272 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.30^{\circ}\text{C}$
DRLP-LTC-N	N	-100 $^{\circ}\text{C}$ to +1300 $^{\circ}\text{C}$ (-148 $^{\circ}\text{F}$ to +2372 $^{\circ}\text{F}$)	$\pm 0.1\%$ span	$\pm 1.40^{\circ}\text{C}$

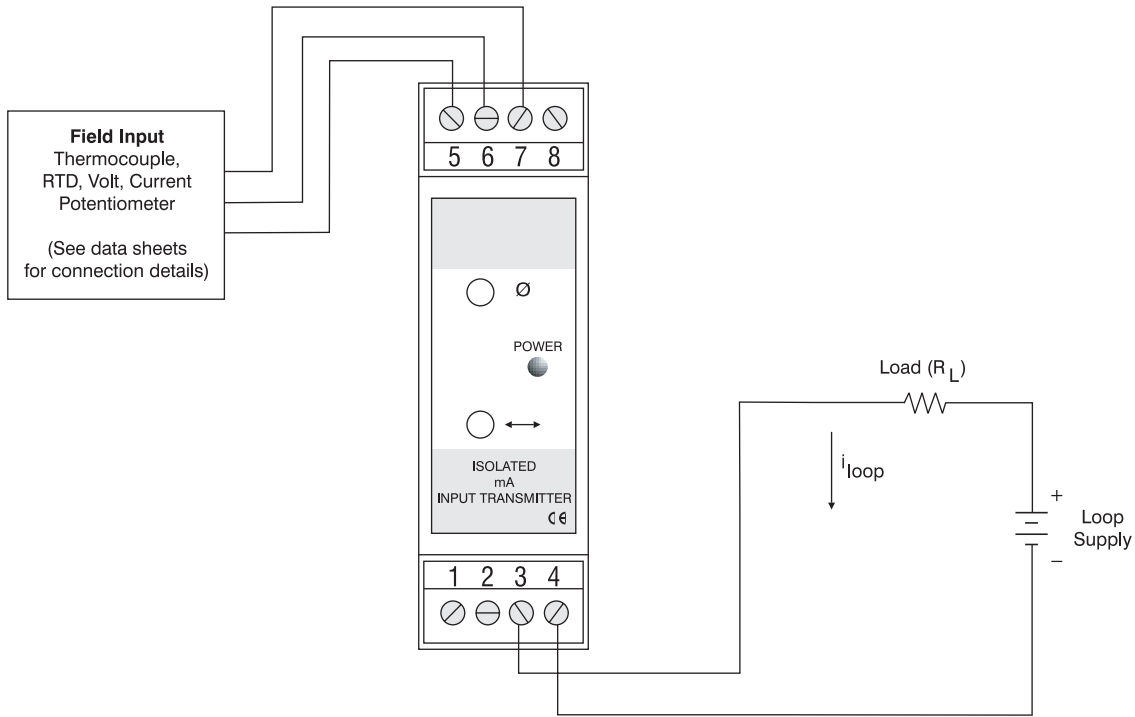
‡Thermocouple Alloy Combinations

Standards: DIN IEC 584, ANSI MC96-1-82, JIS C 1602-1981

Type	Material
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
E	Nickel-Chromium vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum
B	Platinum-30% Rhodium vs. Platinum-6% Rhodium
N	Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4% Silicon-0.1% Magnesium

NOTES: (1) Includes conformity, hysteresis, repeatability and CJC error.

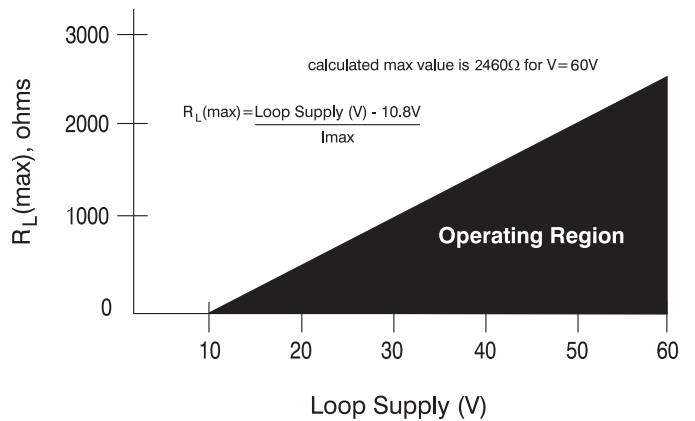
DRLP Wiring Diagram



DRLP Loop Drive Capability

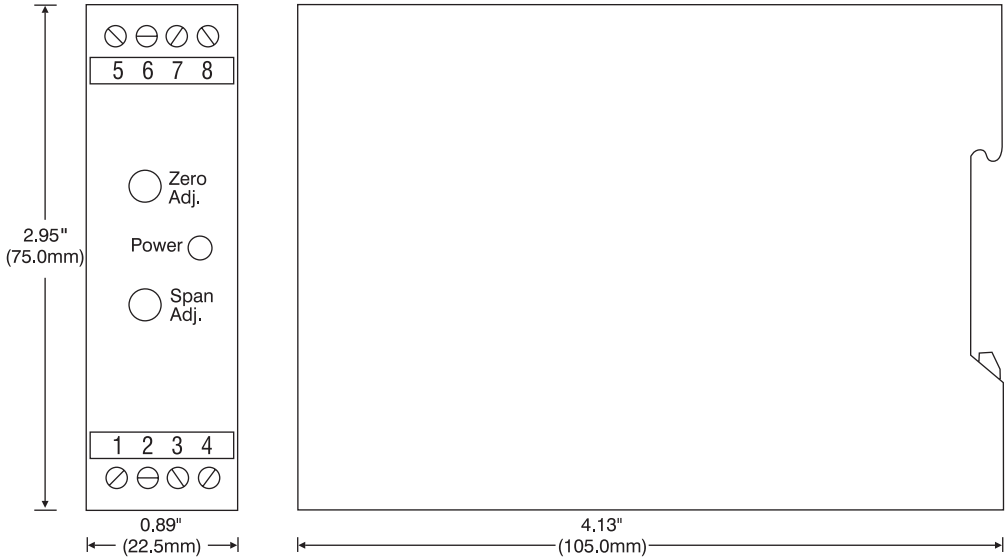
The DRLP Transmitter's wide range of Loop Supply Voltage (10.8V to 60V) makes it a versatile device which can be used in most any current loop. The maximum loop resistance is determined by subtracting the transmitter's minimum loop supply voltage from the total loop supply voltage and dividing the result by the maximum loop current (see graph).

The low Loop Supply Voltage of 10.8V allows the DRLP to be used in applications with low output power supplies and the high Loop Supply Voltage of 60V allows use in applications with long distance current loops.





DRLP Module Dimensions



- NOTES:
- 1) Pluggable terminal blocks accept wire sizes AWG 22-12. Strip wire insulation 0.27 in. (7mm) prior to insertion in terminal block.





WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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