



Practical Instrument Electronics

## Model 535

# 4-20/10-50 Milliamp/Voltage Dual Range Loop Calibrator

### Features

#### 4 to 20 mA Loop Functions

Source and Read 0.000-24.000 mA

Simulate 2-Wire Transmitters

Power 2-Wire Transmitters and Read 0.000-24.000 mA

Display current in mA or -25.00 - 125.00 % of 4-20 mA

#### 10 to 50 mA Loop Functions

Source and Read 0.000-50.000 mA

Simulate 2-Wire Transmitters

Power 2-Wire Transmitters and Read 0.000-50.000 mA

Display current in mA or -25.00 - 105.00 % of 10-50 mA

#### Read Voltage Function

Read 0.00 to  $\pm 30.00$  VDC with 4X over range ability

#### Source Voltage Function

Source 0.000 to 24.000 VDC

#### High Accuracy

$\pm 0.025\%$  of reading

#### Full 5 Digit Display

Bar graph for quick reference of input and output levels

High contrast graphic display viewable in all lighting conditions and angles

#### EZ-Dial<sup>®</sup> Knob

Change the speed of dialing your test point by just pushing down on the knob

Easily adjust output by 0.001 mA (0.01 %) or 0.100 mA (1.00 %)

#### EZ-Check<sup>®</sup> Switch with EZ-Step<sup>®</sup> Button

3-position tactile switch with push button for true one-handed calibrations

Push button for stepping through calibration points

16 different step sizes

Hands-free auto step and auto ramp modes

Selectable soak and step time for working with valves

#### Industry Standard Input/Output Connections

Conveniently located banana jacks on top panel

#### Optional Analog Output

Model 535A includes a 10 mV/mA proportional output provided on bottom panel banana jacks for connection to chart recorders and data loggers

#### Uses 4 AA Alkaline Batteries

Superior battery life of 10 hours in source mode

>40 hours battery life in read mode

Easy access to battery compartment

#### 240 VAC Tolerant

Fuse-less protection from accidental misuse

#### Lightweight and rugged with a solid feel

Convenient Velcro<sup>®</sup> hand strap allows for a firm confident grip or attachment to pipes and ladders.





# Model 535 Datasheet

## Description

The Practical Instrument Electronics Model 535 Dual Range Loop Calibrator makes testing, troubleshooting, and calibrating your 4-20 and 10-50 milliamp process loops easy as pie. Change ranges in seconds - the Model 535 is two calibrators in one convenient package. Easily recall min/max readings with the EZ-Check feature. Powerful manual and automatic stepping and ramping features are found on the dual-action EZ-Step Switch providing one-handed or hands-free operation. Independent step size, step time, and soak time parameters offer the most step and ramp flexibility of any calibrator in its class.

## Specifications

### General Specifications:

(Unless otherwise indicated all specifications are rated from a nominal 23 °C, 70 % RH for 1 year from calibration)

|                             |  |
|-----------------------------|--|
| Operating Temperature Range | -20 to 60 °C (-5 to 140 °F)  |
| Storage Temperature Range   | -30 to 60 °C (-22 to 140 °F)   |
| Relative Humidity Range     | 10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing<br>10 % ≤RH ≤ 70 % (35 to 60 °C), Non-condensing   |
| Size                        | 7.00 X 3.30 X 2.21 inches (177.8 x 83.8 x 56.1mm)  |
| Weight                      | 14.0 oz (397 grams)  |
| Battery                     | 4 AA Alkaline, 120 VAC 50/60 Hz AC adaptor included  |
| Miscellaneous               | Low battery indication with nominal 1 hour of operation left<br>Over-voltage protection to 120 Vrms (rated for 30 seconds) or 240 Vrms (rated for 15 seconds)<br>Bar graph display with 1% resolution of 4-20/10-50 mA signal scale<br>High contrast graphic liquid crystal display with 0.45" (11.4 mm) high digits |
| Model 535A Analog Output    | 10 mV/mA ±(0.1% + 0.04mV), 5 ppm/°C  |

### Common Specifications for all Current Modes:

|                             |   |
|-----------------------------|---|
| Ranges                      | 0.000 to 24.000 mA, -25.00 to 125.00% of 4-20 mA<br>0.000 to 52.000 mA, -25.00 to 105.00% of 10-50 mA |
| Accuracy                    | ≤ ± (0.025 % of reading + 0.004 mA)   |
| Temperature Effect          | ≤ ± 50 ppm/°C of range  |
| Resolution                  | 0.001 mA and 0.01 %   |
| Step/Ramp Timebase Accuracy | 0.01% of 4.9152 MHz   |

### Source/Power and Measure 2-Wire Transmitter Specifications:

|                         |   |
|-------------------------|---|
| Loop Compliance Voltage | ≥ 43 Volts  |
| Loop Drive Capability   | 1200 Ω at 20 mA/800 Ω at 50 mA for entire battery life  |
| Miscellaneous           | Open loop or out of compliance conditions are indicated by appropriate error display<br>Battery life in:<br>Source mode ≥ 18 hrs at 12 mA/≥ 9 hrs at 30 mA nominal (100 W load)<br>Power measure ≥ 10 hrs at 12 mA/≥ 5 hrs at 30 mA nominal (100 W load)<br>Selectable EZ-Step(s) for Source Mode/2-Wire Transmitter Simulation:<br>2 to 16 selectable step settings<br>Step size is determined by the selected high & low ranges<br>Selectable time settings for stepping and soak:<br>STEP: 5 to 900 seconds SOAK: 0 to 900 seconds |



# Model 535 Datasheet

## Read mA Specifications:

|                                   |   |
|-----------------------------------|---|
| Voltage Burden                    | ≤ 2V  |
| Overload/Current Limit Protection | ≤ 24 mA (4-20 range)/ ≤ 52.5 mA (10-50 range) nominal |
| Battery Life                      | ≥ 40 hours typical                                    |

## 2-Wire Transmitter Simulation Specifications:

|                                   |  |
|-----------------------------------|--|
| Overload/Current Limit Protection | ≤ 24 mA (4-20 range)/ ≤ 52.5 mA (10-50 range) nominal  |
| Loop Voltage Limits               | 2-90 VDC   |
| Miscellaneous                     | Open loop or out of compliance conditions are indicated by appropriate error display<br>Battery life ≥ 40 hour typical<br>Selectable EZ-Step(s) for Source Mode/2-Wire Transmitter Simulation:<br>2 to 16 selectable step settings<br><b>Step size is determined by the selected high &amp; low ranges</b><br>Selectable time settings for stepping and soak:<br>STEP: 5 to 900 seconds SOAK: 0 to 900 seconds |

## Read Voltage Specifications:

|                    |   |
|--------------------|---|
| Range:             | 0.00 to 30.00 VDC (with 4X over range)          |
| Resolutions        | 0.01 VDC  |
| Temperature Effect | ≤ ± 200 ppm/°C of range                         |
| Input Resistance   | ≥ 1 MΩ  |
| Accuracy           | 0.00 to 30.00 VDC ≤ ± (0.1 % of reading ±0.1 V) |

## Source Voltage Specifications:

|                   |  |
|-------------------|--|
| Source Range:     | 0.000 to 24.000 VDC                        |
| Output Resistance | ≤0.3 Ω                                     |
| Source Current    | ≥20.000 mA                                 |
| Accuracy          | ≤±(0.025%RDG + 0.004 V) ±50ppm/°C of range |

## Ordering Information:

|  |                                   |
|--|-----------------------------------|
| 4-20/10-50 Milliamp Dual Range Loop Calibrator | Model 535                         |
| Includes:                                      |                                   |
| Calibration Test Data                          |                                   |
| NIST Traceable Certificate                     |                                   |
| Carrying Case                                  | 020-0200 (included)               |
| 60 Hz AC adapter                               | 020-0100 (included)               |
| 50 Hz AC adapter                               | 020-0101 (available upon request) |
| Option:  |                                   |
| 10 mV/mA analog output                         | Model 535A                        |



## Model 535 Datasheet

### Warranty

*Our equipment is guaranteed against defective material and workmanship (excluding batteries) for a period of three years from the date of shipment. Claims under guarantee can be made by returning the equipment prepaid to our factory. The equipment will be repaired, replaced or adjusted at our option. The liability of Practical Instrument Electronics (PIE) is restricted to that given under our guarantee. No responsibility is accepted for damage, loss or other expense incurred through sale or use of our equipment. Under no condition shall Practical Instrument Electronics, Inc. be liable for any special, incidental or consequential damage.*

### Your Local PIE Representative

A large, empty rectangular box with a thin black border, intended for the user to write the name of their local PIE representative.