

Description

A unique digital/analog hybrid, the RIY Programmable RTD Transmitter combines smart digital technology with advanced analog operation to deliver superior reliability, accuracy, and ease of use.

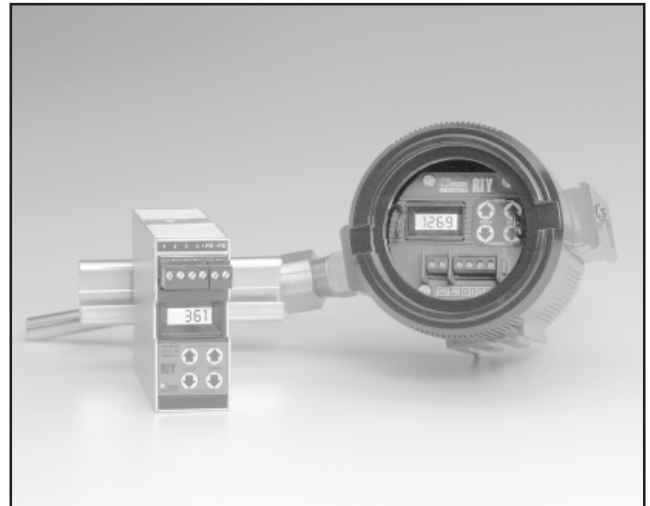
Microprocessor-based, the 2-wire RIY accepts a non-linear temperature input from any standard 2-, 3-, or 4-wire RTD. It provides a highly accurate 4-20mA output that is linear with temperature or with the ohm input. Output can be either direct or reverse.

No Hand-Held Configurator Required—The RIY is fast and simple to configure. RTD type, range, and upscale/downscale drive can be quickly selected in the field using tactile push buttons and easily-accessible switches.

No Calibrator Needed—The RIY features Moore Industries' revolutionary Quick Ranging calibration method. Using the push buttons and the integral indicator, precise zero and span adjustments can be made in seconds without a calibrator. The zero or span is displayed on the indicator while push buttons are used to scroll up or down to the desired value. The value is then instantly stored in the unit's microprocessor via the push buttons. The RIY retains the configured values even if power to the unit is lost.

Display Shows Current Temperature—The RIY's integral digital indicator is independent of the calibrated temperature range. During start-up, and even if the output goes overrange or underrange, the RIY continuously shows the current process temperature within the limits of the range code.

Superior Protection Available—Protect your RIY and other DIN instruments with our rugged new enclosure for rail-mounted instruments, the R-BOX. The R-BOX comes in a variety of widths with customizable conduit entries, and protects your RIY against harsh environments. For explosion-proof protection at an affordable price, purchase a hockey-puck style RIY in our new BH housing. Contact the nearest Moore Industries' center for more information.



For field-mounting, the RIY can be ordered in a rugged, explosion-proof enclosure. The DIN-style housing is perfect for high-density, control room applications.

Features

- **Universal input type and range.** Ideal as a plant standard, the RIY configures to accept any 2-, 3-, or 4-wire RTD and temperature range.
- **Fast and simple to calibrate.** Unique Quick Ranging calibration eliminates the need for hand-held terminals, calibrators, and tools.
- **Integral digital indicator.** Input in °C, °F or ohms, as well as span and zero adjustments, can be viewed on the display.
- **Diagnoses RTD Failure.** If a break in any of the RTD wires is detected upon start-up or during operation, the RIY indicates which wire is broken on its integral display.
- **True differential temperature input.** The RIY accepts two separate inputs and provides an output reflecting their true temperature difference.
- **Complete isolation.** Input/output isolation prevents false signals due to ground loops.
- **Complete temperature assemblies.** Moore Industries offers a complete line of sensors, thermowells and fittings. For information, refer to the Temperature Systems data sheet (#3.99).

Certifications (Check the listing on page 3 for full certification details)



Specifications

Performance Accuracy of Output: See Table 1 for accuracy within each range code
Stability: $\pm 0.1\%$ or better of calibrated span for 6 months
Ripple: Less than 10mV peak-to-peak max. (up to frequencies of 120 Hz) measured across a 250 ohm resistor
Sensor Excitation Current: 250 μ A, nominal
Burnout Protection: Upscale drive is standard; Downscale drive is user-selectable
Output Protection: Transient protection on output, reverse polarity on output
Output Current Limiting: 125% of span, typical; 130% of span, maximum.
Load Capability: (Vs - 12V)/ 0.024A = ohms
Isolation (input/output terminals): 1000Vdc

Performance (continued) Over Voltage Protection: No damage up to ± 5 Vdc on input; ± 60 Vdc on output
RFI/EMI Protection: When tested according to SAMA Standard PMC 33.1, all housings rate 20V/m - ABC 0.1% of ohms reading.

Ambient Temperature Operation: -40°C to +82°C (-40°F to +180°F)
Effect: $\pm 0.006\%$ of span/ $^{\circ}$ C change ± 10 ppm of ohm reading/ $^{\circ}$ C ($\pm 0.003\%$ of span/ $^{\circ}$ F change, ± 5.6 ppm of ohm reading/ $^{\circ}$ F)
 See note below

Adjustments Zero and Span: Front panel tactile push buttons are used to scroll to the desired values
Input Range: Span changes within an input range (see Range Codes in Table 1) are made with the front panel push buttons; input range (Range Code) is selected via a rotary switch

Adjustments (continued) Additional Parameters: LCD display in $^{\circ}$ F, $^{\circ}$ C, or ohms, number of input wires, upscale or downscale on fault, and ranging method (quick ranging or standard) are selected via a single in-line package (SIP) switch

Indicators Type: 4-digit LCD indicates input value in $^{\circ}$ C, $^{\circ}$ F, or ohms (user-selectable); also indicates zero and full scale values, problem codes (including which RTD wire has failed), and high or low table limit warnings
Display Accuracy: $\pm 0.1\%$ of maximum span for range code, ± 1 digit

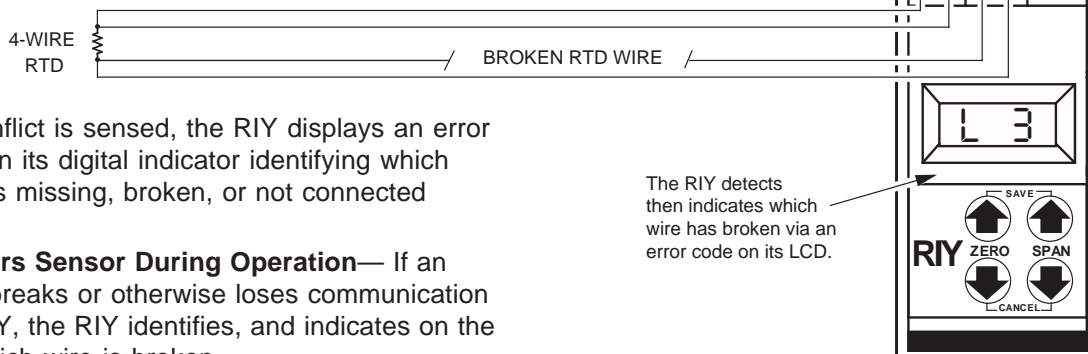
Weight DIN Housing: 141 grams (5 ounces)
HP and FL Housings: 184 grams (6.5 ounces)

NOTE: Temporary, recoverable dimming of display may occur at temperatures below rated range

Total Sensor Diagnostics

A first-of-its-kind feature is the RIY's ability to perform continuous RTD diagnostics to speed troubleshooting.

Identifies Sensor at Start-Up — The RIY verifies that the connected RTD matches the type (2-, 3-, or 4-wire) that it is configured to accept.



If a conflict is sensed, the RIY displays an error message on its digital indicator identifying which RTD wire is missing, broken, or not connected properly.

Monitors Sensor During Operation— If an RTD wire breaks or otherwise loses communication with the RIY, the RIY identifies, and indicates on the display, which wire is broken.

Ordering Information

Unit	Input	Output	Power	Options	Housing
RIY Program- mable, Isolated, RTD Trans- mitter	See Range Codes in Table 1 (Special ranges also available, consult the factory for pricing and availability)	4-20MA into 600Ω with 24Vdc power supply	12-42DC 12-30DC (required for Intrinsic Safety and Type N options)	<p>-DD Downscale drive (open input sends output downscale; user activated)</p> <p>-ISA SAA approved Intrinsically Safe (requires 12-30DC power)</p> <p>-ISC CSA approved Intrinsically Safe (requires HP housing with 12-30DC power)</p> <p>-ISCN NEPSI approved Intrinsically Safe</p> <p>-ISE SIRA (CENELEC) approved Intrinsically Safe (requires HP housing with 12-30DC power)</p> <p>-ISF Factory Mutual approved Intrinsically Safe (available with DIN or HP housing, requires 12-30DC power)</p> <p>-ND No display (no indicator provided)</p> <p>-NE SIRA (CENELEC) approved Type N (requires HP with 12-30DC power)</p> <p>-CE EMC conformant (available with DIN or HP housing)</p> <p>Refer to the options section below for more detailed descriptions of the available certifications for the RIY.</p>	<p>BH2NG 2-Hub, Explosion-Proof enclosure with two, ½-inch NPT ports, and a glass cover</p> <p>BH2TG 2-Hub, Explosion-Proof enclosure with two, ¾-inch NPT ports, and a glass cover</p> <p>BH2MG 2-Hub, Explosion-Proof enclosure with two, M20 x 1.5 metric ports, and a glass cover</p> <p>BH3NG 3-Hub, Explosion-Proof enclosure with two, ½-inch NPT side-entry ports, one ½-inch NPT bottom-entry port, and a glass cover</p> <p>BH3TG 3-Hub, Explosion-Proof enclosure with two, ¾-inch NPT side-entry ports, one ½-inch NPT bottom-entry port, and a glass cover</p> <p>BH3MG 3-Hub, Explosion-Proof enclosure with two, M20 x 1.5 metric side-entry ports, one ½-inch NPT bottom-entry port, and a glass cover</p> <p>D2LC 2-Hub, low base, clear cover, NEMA 4X (IP 66) enclosure</p> <p>D2LS 2-Hub, low base, solid metal cover, NEMA 4X (IP 66) enclosure</p> <p>HP Hockey-puck housing (only) includes spring clips for mounting in the above enclosures</p> <p>FL Hockey-puck housing with flanges for surface or relay track mounting</p> <p>DIN DIN housing mounts on "G" or Top Hat Rail</p> <p>*F prefix on explosion-proof enclosures (i.e. FBH2NG) indicates SIRA (CENELEC) approved Flameproof</p> <p>*S prefix on explosion-proof enclosures (i.e. SBH2NG) indicates SAA approved Explosion-proof</p> <p>*P suffix on Explosion-Proof enclosures (i.e. BH2NGP) indicates that unit comes equipped with base plate and U-bolts for mounting a 2-inch pipe.</p>

When Ordering, specify: Unit / Range code, temperature or ohm range and scale (°C, °F, or ohm) / Output / Power / Options [Housing]
Model Number Examples: RIY / R1-0-400°C / 4-20MA / 12-42DC [BH2NG]

Certifications



Factory Mutual Research Corporation (FMRC)

Intrinsically Safe –
Class I, II, III; Division 1, Groups A, B, C, D

Non-Incendive –
Class I, Division 2, Groups A, B, C, D

Suitable For –
Class II, Division 2; Class III, Divisions 1, 2

Explosion-Proof – [HP in BH Housing]:
Class I, Division 1, Groups A*, B, C, D

Dust-Ignition-Proof – [HP in BH Housing]:
Class II, III, Division 1, Groups E, F, G;



European (CENELEC) Approvals By:

SIRA – [HP]
Intrinsically Safe – EEx ia IIC; T4/T5
Type N: Ex N IIC; T6

ISSEP/INIEX – [HP in 2/3, H/L, S/G]:
Explosion-Proof/Flame-Proof – EEx d IIC; T6



NEPSI – China

Intrinsically Safe – Ex ia IIC; T4/T5



Canadian Standards Association (CSA)

General (Ordinary) Locations – [DIN]
Intrinsically Safe – [HP]:
Class I, II, III; Division 1, Groups A, B, C, D

Non-Incendive – [HP]:
Class I, Division 2, Groups A, B, C, D

Suitable For –
Class II, Division 2; Class III, Divisions 1, 2

Explosion-Proof/Flame-Proof –
[HP in 2/3, H/L, S/G]: Class I, Groups A, B, C, D;
Class II, Groups E, F, G; Class III; Enclosure 4.



Standards Association of Australia (SAA)

Intrinsically Safe –
Exia IIC (Class I, Zone 0); T6, IP66

Explosion-Proof/Flame-Proof – [HP in metric or ½" NPT, 2/3, H/L, S/G]: Exd IIC; T6; IP66



CE Conformant – EMC Directive 89/336/EEC

EN 50081-1, 1992; EN 50082-1, 1992

*For Group A only, seal conduits within 18".

NOTE: Factory Mutual (FM) certifications only apply to the RIY and its connection head. Sensor, thermowell, or fixed immersion sensor components are not included in the certifications.



Programmable, Isolated RTD Transmitter

Table 1. Range Codes and Accuracy for RTD and Ohm Input Ranges

Range Code	Input Type	Description	Range	Accuracy
R0	100 ohm Platinum 385 RTD	100 ohms @ 0°C $\alpha = 0.003850$ ohms/ohm/°C	-200°C to +850°C (-328°F to +1562°F)	±0.05% of Span, ±0.20°C (±0.05% of Span, ±0.36°F)
R1	100 ohm Platinum 3923 RTD	98.129 ohms @ 0°C $\alpha = 0.003923$ ohms/ohm/°C	-200°C to +600°C (-328°F to +1112°F)	±0.05% of Span, ±0.20°C (±0.05% of Span, ±0.36°F)
R2	100 ohm Platinum 3916 RTD	100 ohms @ 0°C $\alpha = 0.003916$ ohms/ohm/°C	-200°C to +510°C (-328°F to +950°F)	±0.05% of Span, ±0.20°C (±0.05% of Span, ±0.36°F)
R3	100 ohm Platinum 3902 RTD	100 ohms @ 0°C $\alpha = 0.003902$ ohms/ohm/°C	-200°C to +650°C (328°F to +1202°F)	±0.05% of Span, ±0.20°C (±0.05% of Span, ±0.36°F)
R4	200 ohm Platinum 385 RTD	200 ohms @ 0°C $\alpha = 0.003850$ ohms/ohm/°C	-200°C to +630°C (-328°F to +1166°F)	±0.05% of Span, ±0.13°C (±0.05% of Span, ±0.23°F)
R5	500 ohm Platinum 385 RTD	500 ohms @ 0°C $\alpha = 0.003850$ ohms/ohm/°C	-200°C to +630°C (-328°F to +1166°F)	±0.05% of Span, ±0.10°C (±0.05% of Span, ±0.18°F)
R6	1000 ohm Platinum 385 RTD	1000 ohms @ 0°C $\alpha = 0.003850$ ohms/ohm/°C	-200°C to +630°C (-328°F to +1166°F)	±0.05% of Span, ±0.10°C (±0.05% of Span, ±0.18°F)
R7	1000 ohm Platinum 375 RTD	1000 ohms @ 0°C $\alpha = 0.003750$ ohms/ohm/°C	-185°C to +540°C (-301°F to +1004°F)	±0.05% of Span, ±0.10°C (±0.05% of Span, ±0.18°F)
R8	2 or 3, 100 ohm Platinum 385 RTDs Avg.	Average of 2 or 3 Range Code R0 Inputs	-200°C to +850°C (-328°F to +1562°F)	±0.05% of Span, ±0.20°C (±0.05% of Span, ±0.36°F)
R9	2, 100 ohm Platinum 3923 RTDs Diff.	Differential of 2 Range Code R1 Inputs	-550°C to +800°C (-958°F to +1472°F)	±0.05% of Span, ±0.40°C (±0.05% of Span, ±0.72°F)
R10	2, 100 ohm Platinum 385 RTDs Diff.	Differential of 2 Range Code R0 Inputs	-550°C to +1050°C (-958°F to +1922°F)	±0.05% of Span, ±0.40°C (±0.05% of Span, ±0.72°F)
R11	2, 500 ohm Platinum 385 RTDs Diff.	Differential of 2 Range Code R5 Inputs	-550°C to +830°C (-958°F to +1526°F)	±0.05% of Span, ±0.20°C (±0.05% of Span, ±0.36°F)
R12	120 ohm Nickel RTD	120 ohms @ 0°C $\alpha = 0.00672$	-80°C to +320°C (-112°F to +608°F)	±0.05% of Span, ±0.14°C (±0.05% of Span, ±0.25°F)
R13	10 ohm Copper RTD	9.035 ohms @ 0°C $\alpha = 0.00427$	-50°C to +250°C (-58°F to +482°F)	±0.05% of Span, ±1.6°C (±0.05% of Span, ±2.88°F)
R14	Ohms	0-4000 ohms	0-4000 ohms	±0.05% of Span, ±0.2 ohm
R15	FLEX-SOR™ Sensor	1000 ohms @ 0°C $\alpha = 0.00285$	-90°C to +175°C (-130°F to +347°F)	±0.05% of Span, ±0.08°C (±0.05% of Span, ±0.14°F)
PRG	No Code	Programmable input. Unspecified at time of order. Specify this when input type and range are undetermined, or when the unit is to be stocked as a universal spare (PRG default is R0, -300 to 267°F).		

Computer Testing

Advanced, computerized calibration and testing ensures that each RIY will perform to specifications. During automated testing, each unit is first calibrated to NIST (National Institute of Standards and Technology) traceable standards.

Next, power-up current, line voltage, load effect, and linearity are thoroughly tested. After testing, each unit is subjected to an extended, cyclical power, burn-in test to expose any components that may be prone to failure during actual operation.

A computerized, test report print-out is available for each RIY ordered. Consult your Moore Industries Sales Engineer for details.

Figure 1. RIY Computerized Test Report.

MOORE INDUSTRIES-INTERNATIONAL, INC.
RIY Final Acceptance Test Report

Model Number: RIY / R1-0-100°C / 4-20MA / 12-42DC / [HP]
Serial Number: 11423
AM

Date: 01 / 07 / 98
Time: 11:54

Calibration Instrumentation:

Instrument	Serial #	Cal Date	Due Date
H.P 3478A	2301A17420		
H.P. 6633A	3004A-02293		

Initial Power-Up Test
Drawing 0.004100 Amps -- Within Spec.
Power-Up Complete.

**Quick Ranging
Display Button Test**

BUTTON TEST RESULTS
PASS
Button Test Complete.

Integral Display Test

LCD TEST RESULTS
PASS
LCD Test Complete.

FINAL LINE/START-UP VOLTAGE TEST
Normal Line (24V)
High line (42V) -- Output is 0.0004V from desired value -- Within Spec.
Low Line (12V -- Output is 0.0004V from desired value -- Within Spec.
Lo-Start (11.5V) -- Output is -0.0000V from desired value -- Within Spec.
PASS
Line/Start-Up Voltage Test Complete.


Linearity Test

OVERALL LINEARITY TEST, 100 OHM RTD RANGE
0.0000% Point (25.000000Ohms) = 1.000800 V OK
18.9380% Point = (50.000000Ohms) = 1.758100 V -0.000292% Linearity Error -- OK
38.5420% Point = (75.000000Ohms) = 2.540700 V -0.033910% Linearity Error-- OK
58.6240% Point = (100.000000Ohms) = 3.343800 V -0.032887% Linearity Error -- OK
100.0000% Point = (150.000000Ohms) = 4.999700 V OK
PASS
RIY Unit Linearity Test Complete.

Test Certification Stamp

**PASS
TEST COMPLETE**

Tech: *Ronald Cooper*

Stamp: 



Programmable, Isolated RTD Transmitter

Figure 2. Outline Dimensions for DIN-Style Housing.

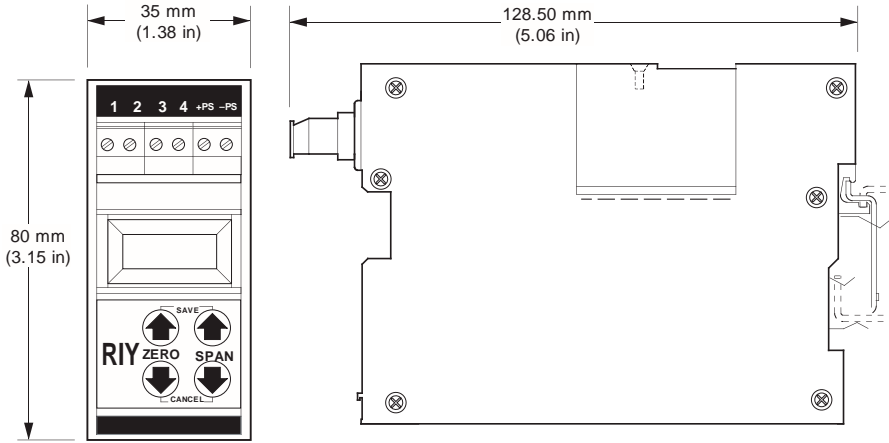


Figure 3. Outline Dimensions for FL and HP Housings.

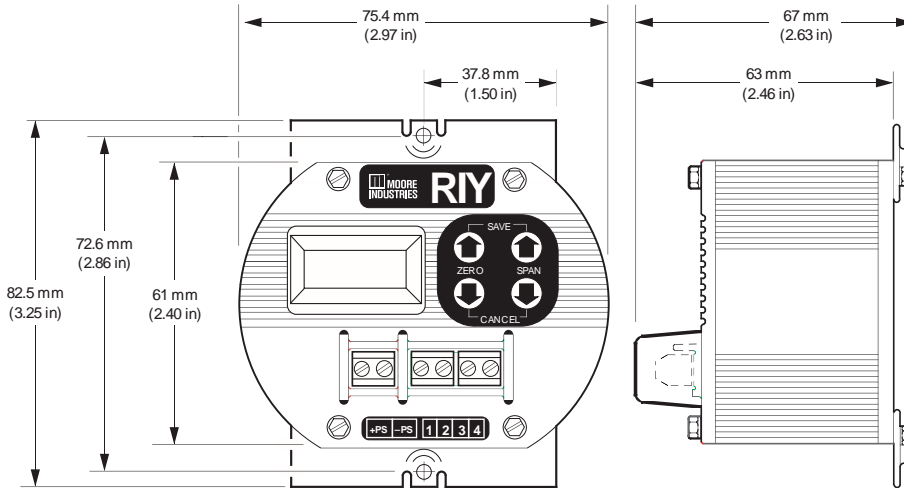
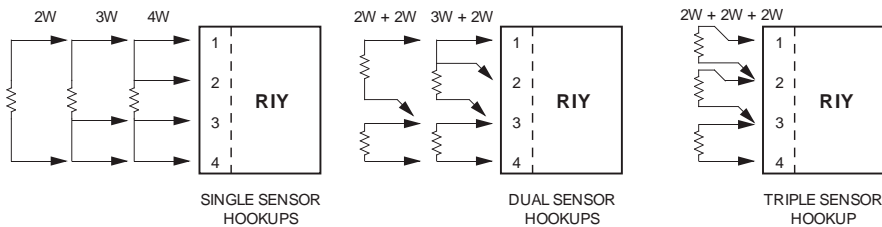


Figure 4. Sensor Hookup Diagrams



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