MOORE INDUSTRIES WORLDWIDE

the WORM®
Flexible Sensors for Thermowell Temperature Assemblies

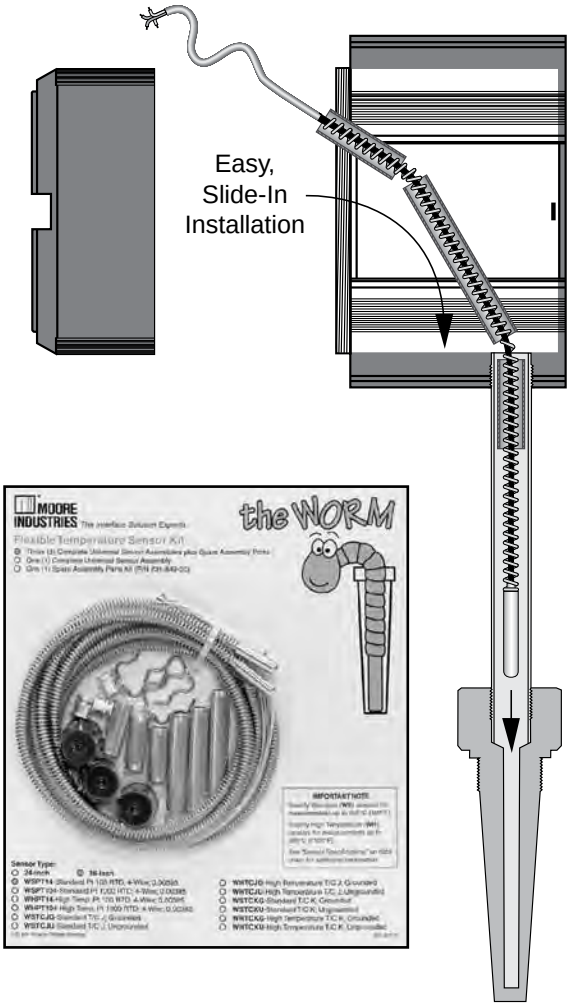
February 2014

In both new and retrofit applications, the WORM® Flexible Sensors for Thermowell Temperature Assemblies replace restrictive straight sensor probes with a universal sensor strategy that will save you time and money.

Unique Flexible Design Installs in Minutes

With straight sensors, you have to remove the connection head, and sometimes thermowell assembly components, to get the sensor into the thermowell. The WORM bends right through the top or face of the enclosure. It slides through the enclosure's conduit port, and into (or out of) the thermowell without having to remove the enclosure or any assembly components (Figure 1).

Figure 1. *The WORM lets you replace a sensor without removing the enclosure or disassembling the thermowell.*



Features

- **Universal, trims to thermowell length.** There's no need to stock an expensive array of different sensor lengths. With a quick measurement and a simple trim-to-length, the WORM handles nearly every thermowell assembly.

- **Ideal for hockey-puck, connection head and dual-sided enclosures.** The innovative WORM provides cost and time advantages for all types of temperature transmitter enclosures.

- **Popular RTD and thermocouples.** Standard sensor types include 100 and 1000 ohm platinum, nickel and copper RTDs; plus J-, K-, T-, E- type thermocouples.

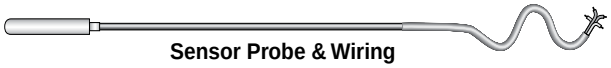
- **Faster response time.** The WORM delivers step response times 13% faster than standard sensors.

Flexible Sensors for Thermowell Temperature Assemblies

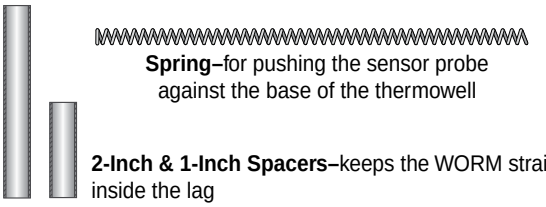
Installs in Minutes

Each of the three installation options uses different parts from the installation kit; expect to have parts left over after installation. Read through all steps for the enclosure type prior to beginning installation.

Figure 2. *The WORM Kit Components*



Sensor Probe & Wiring



Spring–for pushing the sensor probe against the base of the thermowell

2-Inch & 1-Inch Spacers–keeps the WORM straight inside the lag

Cap–for use in Head-Mount and Field Enclosure Installations, holds the WORM assembly inside of the thermowell assembly

Clip–in Field Enclosure Installations, holds the cap in place

Stopper–for use in Generic Installations, holds the WORM assembly inside of the thermowell

Field Enclosure Installation

(Including Moore Industries' DH & BH enclosures)

Installation Components Required: Sensor Probe, Spring, Cap, Clip, and Spacer(s).

1. Determine the length of the thermowell assembly (see the illustration to the right). Cut the WORM Spring to be between 1 and 1½ inches **longer** than the length of the assembly (this is necessary so that the Spring's compression securely holds the sensor probe to the bottom of the thermowell).

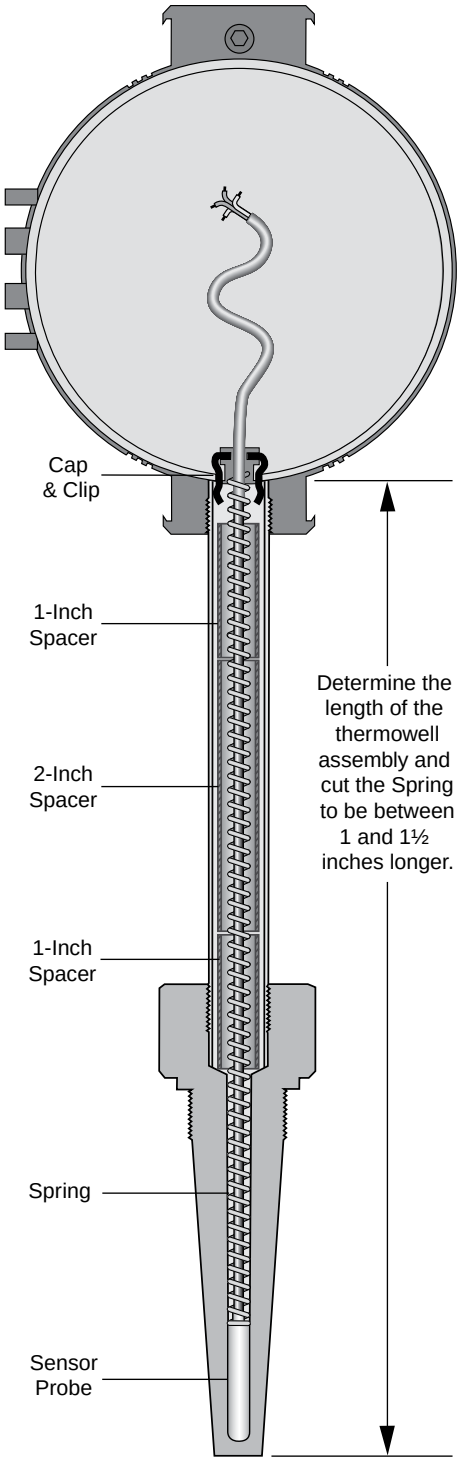
2. Ensuring that the uncut portion of the Spring faces down towards the Sensor Probe, slide the Spring over the sensor wires and onto the end of the Sensor Probe.

3. Snap the Clip onto the Cap. Then slide the Cap/Clip combination over the sensor wires onto the top of the Spring.

4. Remove the instrument from the enclosure (if necessary). Insert the WORM sensor into the thermowell. Slide the appropriate length(s) and number of Spacers to keep the WORM Spring straight inside the thermowell assembly lag (Spacers may not be required).

5. Using pliers, grasp the Cap/Clip combination by the niche at the top of the Cap, and insert it into the enclosure's sensor entry port to compress the WORM Spring into the thermowell. Reinstall the instrument into the enclosure. Connect the sensor wires.

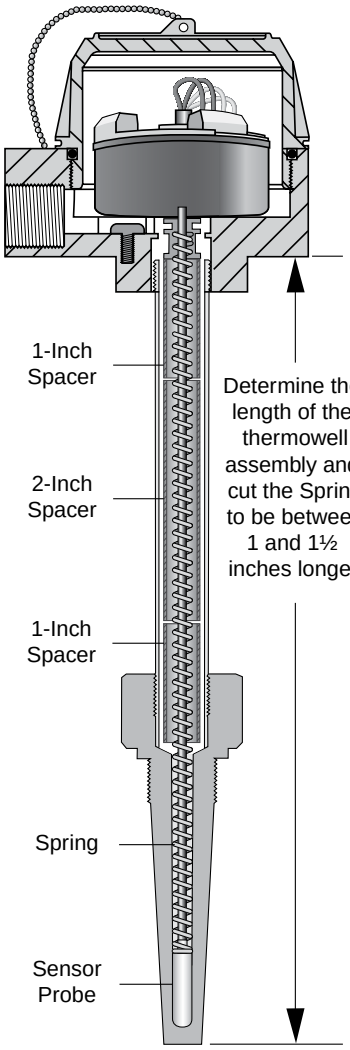
Field Enclosure
(Including Moore Industries' DH & BH)



Head-Mount Enclosure Installation
(Including Moore Industries' LH enclosure)

Installation Components Required: Sensor Probe, Spring, Cap and Spacer(s).

1. Determine the length of the thermowell assembly (see the illustration to the left). Cut the WORM Spring to be between 1 and 1½ inches **longer** than the length of the assembly (this is necessary so that the Spring's compression securely holds the Sensor Probe to the bottom of the thermowell).



2. Ensuring that the uncut portion of the Spring faces down towards the Sensor Probe, slide the Spring over the sensor wires and onto the end of the Sensor Probe.

3. Slide the Cap over the sensor wires onto the top of the Spring.

4. Remove the instrument from the enclosure. Insert the WORM sensor into the thermowell. Slide the appropriate length(s) and number of Spacers to keep the WORM Spring straight inside the thermowell assembly lag (Spacers may not be required).

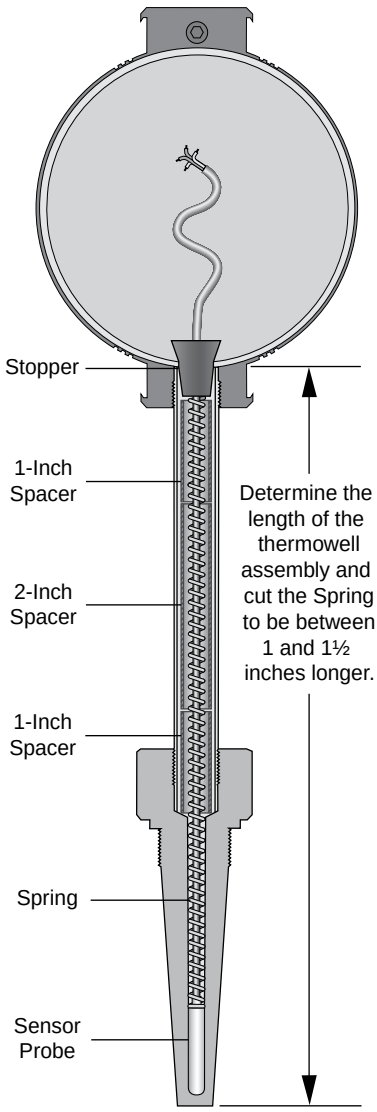
5. Reinstall the instrument into the enclosure, compressing the WORM Spring into the thermowell with the bottom of the instrument. Connect the sensor wires.

Generic Enclosure Installation

Installation Components Required: Sensor Probe, Spring, Stopper and Spacer(s).

1. Determine the length of the thermowell assembly (see the illustration to the right). Cut the WORM Spring to be between 1 and 1½ inches **longer** than the length of the assembly (this is necessary so that the Spring's compression securely holds the Sensor Probe to the bottom of the thermowell).

Generic Enclosure



2. Ensuring that the uncut portion of the Spring faces down towards the Sensor Probe, slide the Spring over the sensor wires and onto the end of the Sensor Probe.

3. Remove the instrument from the enclosure (if necessary). Insert the WORM sensor into the thermowell. Slide the appropriate length(s) and number of Spacers to keep the WORM Spring straight inside the thermowell assembly lag (Spacers may not be required).

4. Slide the Stopper over the sensor wires onto the top of the Spring. Push the Stopper firmly into the thermowell entry port to compress the WORM Spring into the thermowell.

5. Reinstall the instrument into the enclosure. Connect the sensor wires.

Flexible Sensors for Thermowell Temperature Assemblies

Select one from each category to order a Sensor Kit:

The WORM Sensor Kit

SEN3 Sensor Kit includes Three Complete "the WORM" Sensor Assemblies plus Spare Assembly Parts
SEN1 Sensor Kit includes One Complete "the WORM" Sensor Assembly plus Spare Assembly Parts
SEN Sensor Only; with Wire Jacket and Spring

Jacket and Spring Length (See Page 2 to Determine Total Sensor Insertion Length)

CL24 24-Inch Wire Jacket and Spring Length plus 6-8" lead wires (specify for total sensor insertion lengths of 22-inches and under)
CL36 36-Inch Wire Jacket and Spring Length plus 6-8" lead wires (specify for total sensor insertion lengths of 22-inches to 34-inches)
CL? Special Wire Jacket and Spring Length plus 6-8" lead wires - Replace "?" with length up to 120" (Specify in 0.25-inch increments)

Sensor Sheath Diameter

D25 Appropriate for 0.25-inch and 6mm diameter applications
D18 0.18-inch diameter applications for single elements (WS); for (WH), consult the factory

Sensor Sheath Material

S316 Stainless Steel 316; specify for measurements up to 760°C (1400°F)
INC Inconel (WHTCKG or WHTCKU sensor types only) up to 1,093°C (2,000°F) only

Sensor Type (see **Sensor Specifications** on next page; consult factory for special WORM sensors)

RTD SENSORS:

WSPT14	Standard Platinum RTD; 4-Wire; 100 ohm; alpha = 0.00385
WS2PT14	Standard Platinum RTD; 4-Wire; 100 ohm (Dual Sensor); alpha = 0.00385
WSPT104	Standard Platinum RTD; 4-Wire; 1000 ohm; alpha = 0.00385
WHPT14	High Temperature Platinum RTD; 4-Wire; 100 ohm; alpha = 0.00385
WH2PT13	High Temperature Platinum RTD; 3-Wire; 100 ohm (Dual Sensor); alpha = 0.00385
WHPT104	High Temperature Platinum RTD; 4-Wire; 1000 ohm; alpha = 0.00385
WSN4	Nickel RTD; 4-Wire; 120 ohm
WSCU4	Copper RTD; 4-Wire; 10 ohm

THERMOCOUPLE SENSORS:

WSTC?G	Standard, Replace ? with J, K, T or E Thermocouple, Grounded
WS2TC?G	Standard, Replace ? with J, K, T or E Thermocouple, Grounded (Dual Sensor)
WSTC?U	Standard, Replace ? with J, K, T or E Thermocouple, Ungrounded
WS2TC?U	Standard, Replace ? with J, K, T or E Thermocouple, Ungrounded (Dual Sensor)
WHTC?G	High Temperature, Replace ? with J, K, T or E Thermocouple, Grounded
WH2TC?G	High Temperature, Replace ? with J, K, T or E Thermocouple, Grounded (Dual Sensor)
WHTC?U	High Temperature, Replace ? with J, K, T or E Thermocouple, Ungrounded
WH2TC?U	High Temperature, Replace ? with J, K, T or E Thermocouple, Ungrounded (Dual Sensor)

Assembly Options (not required)

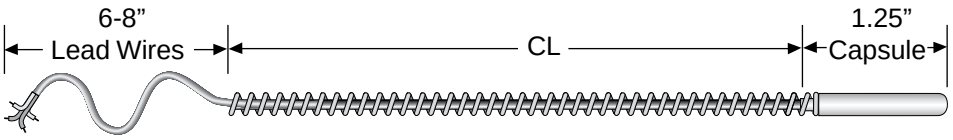
-WW Wire Wound Option for Temperatures below -10°F or above +850°F to +1000°F (For RTDs only)
-.04 1/3 DIN 0.04% High-Accuracy RTD Sensor (Available on any WSPT104/WHPT104 RTD sensor types only)
-.06 Class "A" High-Accuracy RTD Sensor (Available on any WS, WH, PT14 AND PT104 RTD sensor types only)
-10G 10G Low-intensity Vibration Sensor (See Sensor Specifications)
-30G 30G High-intensity Vibration Sensor (See Sensor Specifications)

The WORM Sensor Kit

[SEN]

SEN3 / CL36 / D25 / S316 / WSPT14 -.06 [SEN]

Model Number Example



*Capsule length varies slightly for wire-wound option

Sensor Specifications

Lead Wires:
Standard (WS) Sensors: Teflon insulated, hermetically sealed for measurements up to 204°C (400°F)

High Temperature (WH) Sensors: Braided fiberglass for measurements ranging from 204°C (400°F) up to 760°C (1,400°F).

Inconel (INC) sheathed sensors: special fiberglass insulation withstands temperatures up to 1,093°C (2,000°F)

Wire Size: Wire gauges range from 20 to 28 depending on the element type.

RTD Stability: 0.2°C after 10,000 hrs. at maximum temperature (1 year, 51 days, 16 hrs. continuous)

Response Time (typical to reach a 63.2% temperature change):
RTD: <5 seconds; Grounded Thermocouples 2.0 sec.; ungrounded Thermocouples 4.5 sec.

Vibration Options:
10G: provides protection for sensors that are exposed to higher than normal vibration levels.

30G: sensor is encapsulated in a waterproof epoxy to endure extreme vibration levels and full water immersion.

Spring: 302 stainless steel. Withstands continuous temperatures up to 1093°C (2000°F).

T/C IDENTIFICATION		
Type	**Wire Color**	
	+	–
J	White	Red
K	Yellow	Red
E	Purple	Red
T	Blue	Red

Accessories

Part Number	Description
231-849-00	**Spare Parts Kit includes one each:** Spare Spring; Clip; Cap; 1" Spacer; 2" Spacer
802-179-24	Combination Pliers/Wire Stripper facilitates installation of the WORM components and sensor connection

Temperature Ranges for WORM Elements

Type		Temperature Range	Accuracy*
RTDs	Platinum	0 - 1400°F (-18 - 760°C)	±0.12% at 0°C
	Nickel	0 - 400°F (-18 - 204°C)	
	Copper	0 - 400°F (-18 - 204°C)	
Wire Wound (-WW) RTD	Platinum	-300 - 1000°F (-184 - 538°C)	±0.12% at 0°C
	Nickel	-100 - 400°F (-73 - 204°C)	
	Copper	-50 - 400°F (-45 - 204°C)	
Thermocouple	J	-200 - 1400°F (-129 - 760°C)	2.2°C or .75% of reading, whichever is greater
	K	-200 - 2000°F (-129 - 1093°C)	2.2°C or .75% of reading, whichever is greater
	T	-200 - 750°F (-129 - 399°C)	1.0°C or .75% of reading, whichever is greater
	E	-200 - 1400°F (-129 - 760°C)	1.7°C or .5% of reading, whichever is greater

* See options -.04 and -.06 for higher accuracy RTD WORM sensors

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