

# Models 4528, 4528EZ, and 4728 Monitors CX-645 Probe – Water Cut Monitors

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The **INVALCO Model 4728 Water Cut Monitor**, in conjunction with a **Model 4528 Detector** and a **Model CX-645 Capacitance Probe** is a continuous on-line monitor or percent water in a flowing crude oil emulsion stream. This unit displays percent of water in various ranges from 0-5% up to and including 0-20% on a digital LCD indicator. In addition, the Model 4728 provides a 4-20 mA analog output proportional to input range, and a field-adjusted, time-delayed, limit relay for valve control or alarming.

## Features

- **Real-time display and retransmission of water cut monitor:** Allows quick response to upset conditions for downstream controls.
- **Adjustable delay of relay closure:** Prevents nuisance alarms and “actuator overload”.
- **Direct analog output from model 4528 detector:** A 4-20 mA signal is available from the probe without the need to include the Model 4728 monitor.
- **NACE adaptable:** Can be modified for use in NACE applications.

Model 4728 Monitors



Model CX-645  
Capacitance Probe and  
Model 4528 Detector

## Applications

### LACT (Lease Automatic Custody Transfer) Units

Detect and provide relay contact closure that can be used to reroute oil that has excess water cut.

### Pipeline Loading

Monitor transfer of petroleum/condensate products from loading facilities.

### Dehydration Equipment

Determine and enhance equipment efficiencies, by monitoring the product and indicating water content.

### Fuel Oil Monitoring

Determine contamination of fuel oil by condensation, or other external factors, before entry to engine.

### Storage and Treating Facilities

Monitoring and early detection of undesirable conditions as well as interface detection during dewatering of storage tanks.

# Model 4728 Specifications

### Power Supply

- 18-28 Vdc @ 130 mA
- 115/220 Vac

### Water Cut Monitor Full Scale Range

0-5%, 0-10%, and 0-20% range options.

### Display

Four digit LCD with decimal point.

### Analog Outputs

4-20 mA, 2-wire internally powered or 4-20 mA, 3-wire externally powered.

### Relay Output

- SPDT Relay, 10A, 250 Vac.
- 1/2 Hp 250 Vac, 10A - 120 Vac resistive.
- 1/3 Hp 120 Vac, 10A - 30 Vdc resistive.

### Time Delay

- 0 to 90 seconds adjustable in 10 second increments.
- Off-delay approximately 10% of on-delay time.

### Temperature Range

0°F to 160°F (-20°C to 70°C).

### Enclosures

- NEMA 4X, weatherproof.
- NEMA 7, explosion-proof, Class I, Division 1, Groups C and D.

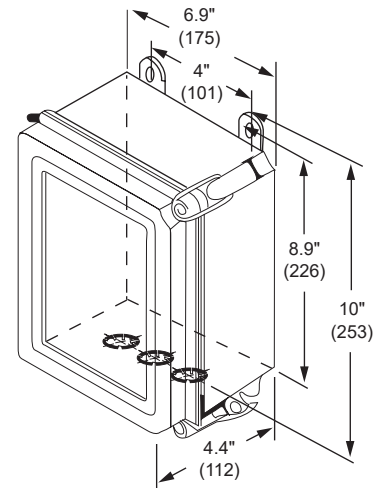
## Model 4728 Dimensional Specifications

The Model 4528 Detector and Model CX-645 Probe provide a direct analog (0-5 Vdc or 4-20 mA) output of percent emulsified water (as Water Cut Monitor) in the process stream. This signal is designed to be used externally by the Model 4728 monitor or other control devices such as PLC's or Remote Terminal Systems.

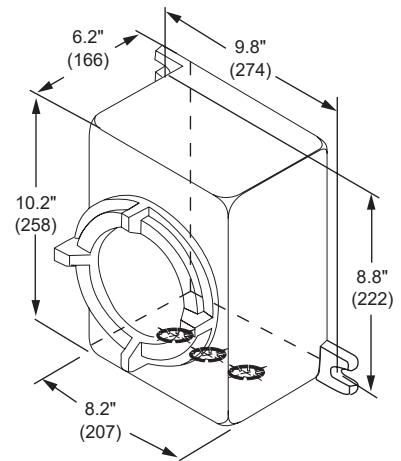
The probe is constructed of two concentric tubes. Wetted surfaces are coated with a baked-on phenolic two-part epoxy. The inner tube is insulated from the outer tube by polytetrafluoroethylene (PTFE) spacers and is electrically connected to a terminal within the sensor housing. The internal element spacers can be fitted with trimmer rods should it be necessary to adjust the base capacitance.

The detector operates from a 12 Vdc regulated power supply from within the associated monitor or customer supplied source. All calibration and adjustments can be accessed through the front panel for ease of use. The Model 4528 detector offers the flexibility of a high and low fail-safe. This fail-safe feature guarantees the quality of the output signal from the detector chassis and will sense over- and under-range conditions as well as an open or shorted probe.

**NEMA 4X**  
Weatherproof  
Housing



**NEMA 7**  
Explosion-  
Proof Housing



Dimensions – Inches to the nearest tenth (millimeters to the nearest whole mm), each independently dimensioned from engineering drawings.

## Model 4728 Ordering Information

Model	Description	Part Number
<b>4728-PM</b>	4728 Oil/Water Monitor, All Ranges, Panel Mount	81001148
<b>4728-5WP</b>	4728 Oil/Water Monitor, 0-5% range, Nema 4X - WP	81001114
<b>4728-5XP</b>	4728 Oil/Water Monitor, 0-5% range, Nema 7 - XP	81001115
<b>4728-10WP</b>	4728 Oil/Water Monitor, 0-10% range, Nema 4X - WP	81001126
<b>4728-10XP</b>	4728 Oil/Water Monitor, 0-10% range, Nema 7 - XP	81001116
<b>4728-20WP</b>	4728 Oil/Water Monitor, 0-20% range, Nema 4X - WP	81001128
<b>4728-20XP</b>	4728 Oil/Water Monitor, 0-20% range, Nema 7 - XP	81001117

# Model 4528 Detector / Probe Specifications

## Power Supply

- 12 Vdc @ 130 mA for 0-5 Vdc output.
- 24 Vdc required for 4-20 mA output.

## Water Cut Monitor Range

0-5%, 0-10%, and 0-20%.

## Measurement Accuracy

±1.0% of full scale.

## Resolution/Sensitivity

±0.5% of full scale.

## Probe Material

A53 GrB Carbon Steel is standard. (Stainless Steel available.)

## Probe Finish

Baked-on phenolic two-part epoxy.

## Probe Material

A53 GrB Carbon Steel is standard. (Stainless Steel available.)

## Probe Sizes/Length

- 2" I.D. is 17" face-to-face.
- 3" to 12" I.D. sizes are 32" face-to-face.

## Process Connections

- ANSI RF or RTJ Flanges to 600# (all sizes) (others by special order).
- Threaded MNPT or Grooved (2" and 3").

## Pressure Ratings

- As per Flange selection, 1440 psig max.
- NPT - 1440 psig max. (Victualic grooved - 350 psig).

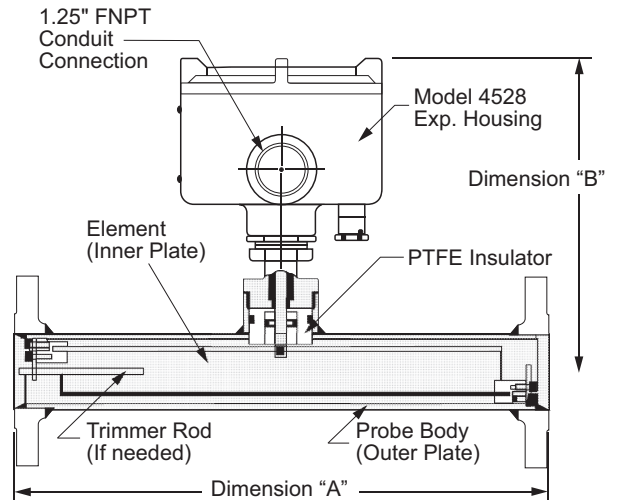
## Temperature Range

0°F to 165°F standard. (-20°F to 375°F optional.)

## Approvals

UL/C-UL Explosion-proof certificate for Class I, Div. 1, Groups C and D or Class II, Groups E, F, and G hazardous locations.

\*0°F to 180°F dimension given. For -20°F to 375°F dimension add 6.4".

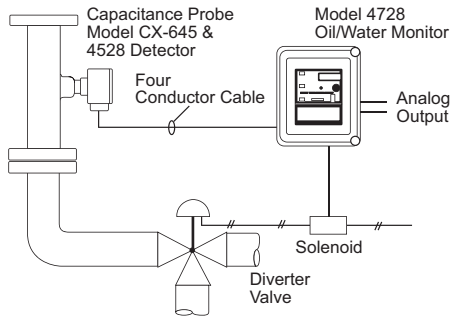


Size	Dim A.	Dim B.	Weight (lb)
2 Inch	17.0" (431)	9.8" (247)	20
3 Inch	32.0" (811)	10.9" (275)	45
4 Inch	32.0" (811)	11.9" (301)	72
6 Inch	32.0" (811)	14.0" (355)	127
8 Inch	32.0" (811)	16.0" (405)	190
10 Inch	32.0" (811)	18.1" (459)	268
12 Inch	Consult Factory.		

## CX-645 Capacitance Probe and Model 4528 Detector

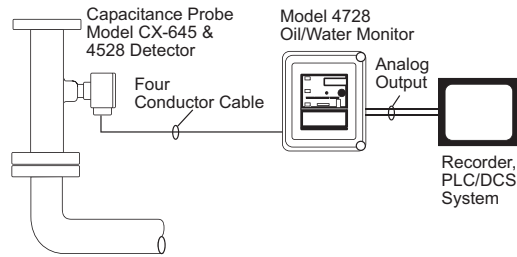
Model	Description	Part Number
4528-5	Water Cut Monitor Detector for CX-645 probe, 0-5% range, 0-5VDC output	81001164
4528-5A	Water Cut Monitor Detector for CX-645 probe, 0-5% range, 4-20mA output	81001295
4528-10	Water Cut Monitor Detector for CX-645 probe, 0-10% range, 0-5VDC output	81001160
4528-10A	Water Cut Monitor Detector for CX-645 probe, 0-10% range, 4-20mA output	81001294
4528-20	Water Cut Monitor Detector for CX-645 probe, 0-20% range, 0-5VDC output	81001161
4528-20A	Water Cut Monitor Detector for CX-645 probe, 0-20% range, 4-20mA output	81001162
4528	Test Kit	81000520
4528EZ	Water Cut Monitor Detector for CX-645 probe, Field Selectable Range 0-5%, 0-10%, 0-20%	P518796

## Typical Applications



### Percent Water Indication and Set-Point Control

In this application the adjustable alarm may be used to operate a diverter valve should the water content exceed a preset percentage. Local indication is provided and an analog output for other indication or control functions is available.



### Percent Water Recording

In this application the Model 4728 provides local reading on an LCD display and provides an analog output (4-20mA) to a standard recorder, PLC, or DCS System. This configuration is used to monitor and control Separator and Heater-Treater efficiencies as well as other oil field and industrial applications.

## CX-645 Capacitance Probe Ordering Information

CX-645		Water Cut Monitor PROBE, Ranges from 0-20% water - to be used with Model 4528 Detector	
PROBE MATERIAL: Carbon Steel			
	CODE	PROBE BODY SIZE	
	2	2 INCH I.D. x 17" FACE TO FACE	
	3	3 INCH I.D. x 32" FACE TO FACE	
	4	4 INCH I.D. x 32" FACE TO FACE	
	6	6 INCH I.D. x 32" FACE TO FACE	
	8	8 INCH I.D. x 32" FACE TO FACE	
	CODE	END CONNECTIONS	
	00	SCREWED ENDS (TO 3" ONLY)	
	00	GROOVED ENDS / VICTAULIC (TO 4" ONLY)	
	00	150 LB ANSI RAISED FACE	
	30	300 LB ANSI RAISED FACE	
	60	600 LB ANSI RAISED FACE (SCH 80) (FOR 8" AND 10")	
	90	900 LB ANSI RAISED FACE (SCH 80)	
	05	150 LB ANSI RTJ	
	35	300 LB ANSI RTJ	
	65	600 LB ANSI RTJ (SCH 80) (FOR 8" AND 10")	
	95	900 LB ANSI RTJ (SCH 80)	
	115	1500 LB ANSI RTJ (SCH 160)	
	CODE	MATERIAL AND TEMPERATURE OPTIONS	
	B	STANDARD MATERIALS, A105 CARBON STEEL, 0-200° F	
	H	STANDARD MATERIALS/HIGH TEMP, 0-375° F	
	S	316 STAINLESS STEEL MATERIALS	
	T	316 STAINLESS STEEL/HIGH TEMP, 0-375° F	
	CODE	CONNECTION STYLE	
	S		
	G		
	F		
	CODE	OPEN	
	P	PHENOLIC COATING (INTERIOR)	
EXAMPLE:			
<b>CX - 645 -</b>	<b>B</b>	<b>F</b>	<b>P</b>
<b>= CX-645-360-BFP</b>			

Choose one code selection from each option group to build model number.

Model 4528 Detector must be ordered separately to complete assembly. Probe sizes through 16" are available, please consult factory.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.



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