DREXELBROOK®

A Leader In Level Measurement Solutions

AMETEK®

CM6 Cut Monitor

Water-In-Oil Analyzer

Applications

B.S. & W
Automatic Well Testing (AWT)
Separation Vessels
Truck Unloading
Lease Automatic Custody Transfer (LACT)
Pipeline Slug Detection
Pump Protection
Dielectric Analysis
Machinery Lube Oil Monitoring

Use the Best

For over 50 years, Drexelbrook has established itself as the world's leader in capacitive based water cut measurements. We have done this by providing reliable and accurate products at a reasonable cost. We offer the highest pressure and temperature ratings in the industry. Our probes can handle pressures up to 1500 PSI and temperatures up to 450°F.

Eliminate Routine Maintenance

The CM6 Cut Monitor is built upon the Drexelbrook expertise in RF Admittance that allows the electronics to ignore paraffin buildup on the pipe and probe. When maintenance does become necessary, simply pull the probe, wipe down, and re-insert. No need to take apart spool pieces and tie-off large pipelines. The CM6 can be configured for any size NPT or flanged mounting and can be installed in any pipe diameter.

Easiest Calibration Ever- Now with Local Display and Keypad

All CM6 products come from the factory pre-calibrated and require only one point calibration trim. Field calibration can be done from anywhere along the two-wire loop with our HART® software. Or... calibrate via local display / keypad without the need for laptop or handheld communicators.

Durability

Our Perm-A-Seal sensing element does not require epoxy coatings that wear out and require expensive servicing. There are no gaskets that require servicing and the sensing element will not wear in well fluids that include large amounts of sand.

0-50% in Light Oil & 0-80% in Heavy Oil

The CM6 comes factory pre-calibrated to one of 11 pre-set ranges that have been repeatedly demonstrated around the world.

Cote Shield

The patented Cote-Shield™ is designed into the CM6 series and enables the instrument to ignore a pre-determined length of the sensing element. The ability to ignore a pre-determined length allows the sensing element to extend into the fluid beyond the nozzle mounting, and possible pipe elbows, which can affect the measurement. The Cote-Shield™ puts the sensing area of the insertion probe directly into the process stream and guarantees a more representative sample of the emulsion.

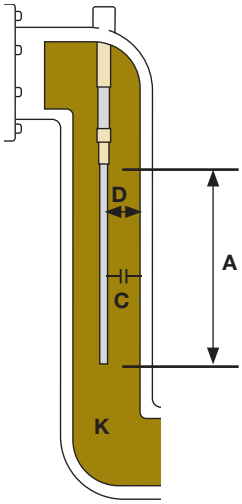
Analytical Products

Operating Principle

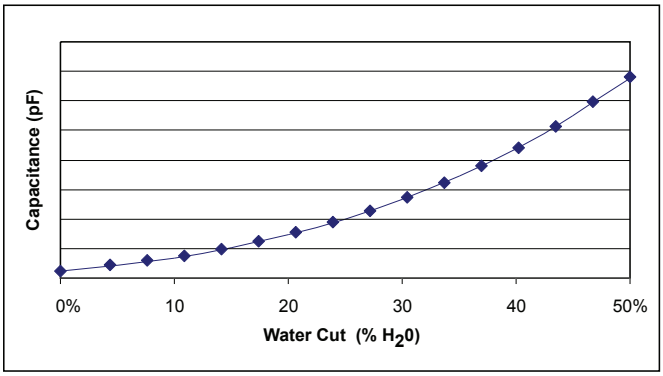
The method of using RF Admittance to measure water cut is widely successful because of the large difference between the dielectric constants of oil (k≈2.3) and water (k≈80). The sensing element and the pipe wall form the necessary two surfaces of the concentric capacitor. The system electronics transmit a radio frequency voltage to the sensing element that measures changes in capacitance. As the amount of water in the flowing oil increases, the net dielectric of the fluid increases which causes the capacitance to increase. The onboard electronics will compute the relationship between capacitance change and water cut. Straightforward, Reliable, Proven.

Typical Arrangement

$$\text{Capacitance} = \frac{\text{Dielectric (Area)}}{\text{Distance}} = \frac{KA}{D}$$

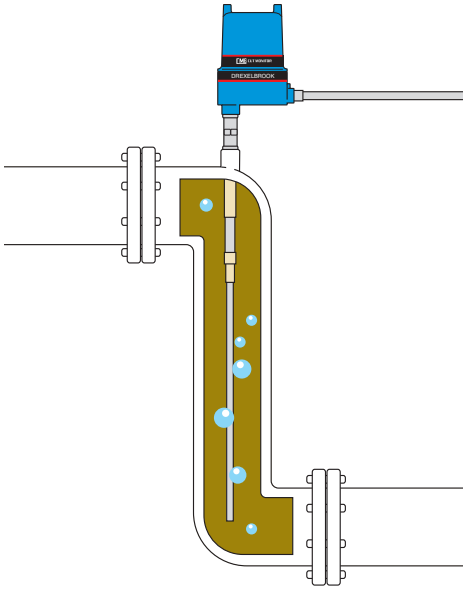


Capacitance Change with Water Content



Drexelbrook Sampling Advantage

The Drexelbrook insertion probe design enables it to analyze a large representative sample of the fluid that other manufacturers can not. The CM6 utilizes a sensing element that is unique in its ability to be installed directly into the process without requiring spool pieces, side-arms or slipstreams. The grey colored sensing element shown will extend directly into the main process line for a minimum of 15 inches. The advantage of this is the capacitance of the fluid is taken over the entire length of the probe to create an averaging effect. The measurement is now taking a better sample of the fluid over a larger range to produces a smoother, more accurate, response.



Specifications

Electronics- Two Wire Transmitter

Power Requirement
17 to 30 Vdc

Output
4-20 mA

Measurement Range- Heavy and Light Oils

0-1% water	0-5% water
0-10% water	0-30% water
0-50% water	0-80% water

Housing Rating
NEMA 4X

Ambient Temperature
-30° to +140°F

Accuracy

Range	Accuracy
0-1%	0.03% Water
0-5%	0.04% Water
0-10%	0.17% Water
0-30%	0.11% Water
0-50%	0.32% Water
0-80%	0.27% Water

Step Response
Less than 1 second to 90% of final value when damping = 0 sec.

Damping Time Constant
0 to 90 seconds, 1 second steps.

Repeatability
±0.5% of span

Resolution
0.2% span

Hysteresis
0.2% span

Ambient Temp Error
±0.01% span/°F

Process Temperature Error
±0.02% Water/°F (uncompensated)

Spark Protection (4-20 mA output)
10 Amperes

Spark Protection (Sensor)
10 Amperes
(Center Wire to Shield or Shield to ground)

Load Resistance
750 Ohms 24 Vdc

Sensing Element

Class
Perm-A-Seal

Model #	Pressure and Temperatures
700-1202-001	200 psi@ 450 F
700-1202-041	1000 psi @ 250 F, 300 psi @ 450 F
700-1202-001	(M0303) 1500 psi @ 250 F, 500 psi @ 450 F
700-1202-061	700-1202-041 with Concentric Shield for larger pipe sizes
700-1202-081	700-1202-001 (M0303) with Concentric Shield for larger pipe Sizes

Cote Shield Lengths (CSL)
2”, 3.5”, 10”

Insertion Length (IL)

Pipe Size	Insertion Length (10" CSL)
1"	20.4
2"	27.8
3'	32.1
4"	35.1
6"	39.4
8' or Larger	24.7 - Requires Concentric Shield

Mountings
¾” NPT Standard
ANSI and DIN flange
Tri-Clamp mountings available

Wetted Parts
316 S.S. and PEEK (Poly Ether Ether Keytone)*

** PEEK is a high temperature thermoplastic with characteristics similar to TFE but with far better abrasion resistance. PEEK is compatible with the same materials as 316 SS; except for sulfuric acid, methyl ethyl ketone, concentrated phenol, or nitric acid. Consult the factory for questions on additional material compatibility.*

Hazard Classification and Approvals

The CM6 has been approved for the followings installations, integral and remote, when powered from an Intrinsically Safe power supply.

FM APPROVED

Explosion Proof / Class I, Div 1, Groups A, B, C, D (Integral)
Intrinsically Safe / Class I, II, III, Div 1, Groups A, B, C, D, E, F, G
Non-Incendive / Class 1, Div 2, Groups A, B, C, D, IP66, Type 4X
Dust Ignition Proof / Class II, III, Div 1, Groups E, F, G

Class I, Zone 2: Ex nA IIC
Class I, Div 2, Groups A, B, C, & D;
Class II, Div 2, Groups E, F, & G; Class III
Class I, Zone 0: Ex ia IIC
Class I, Div 1, Groups A, B, C, and D;
Class II, Div 1, Groups E, F, & G; Class III

How To Order

To order a CM-6, users must specify the following items:

1. Percentage of Water-In-Oil
2. Approvals Required
3. Integral or Remote Electronics with Cable Length
4. Pipe Size
5. Cote Shield Length
6. Probe Mounting- NPT of Flanged
7. Installation Services
8. Cut Monitor Accessories
9. Pressure & Temperature of Process
10. API Gravity

(Note: The actual insertion length of the probe is calculated at the factory)

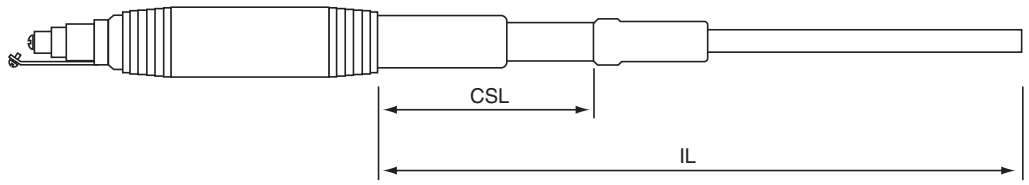
The Model Maps (next page) show how to place your specifications into our part numbering system. There are two model maps, one for the electronics and one for the probe. Please provide both numbers when ordering.

Service

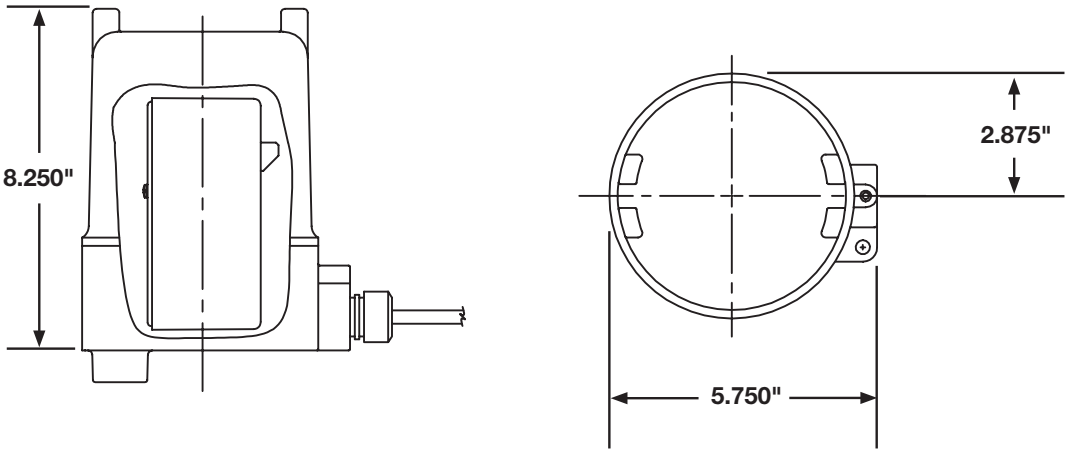
Thousands of cut monitor installations have shown us that the initial start-up of any analytical device is critical. Applications that use the cut monitor for process control and custody transfer demand the most from these devices and can not afford to sacrifice accuracy or reliability.

AMETEK Drexelbrook offers installation and start-up service on all of our cut monitor products. Factory trained service engineers can assist you with the installation, start-up, and calibration of your device.

Sensing Element Dimensions



Electronics Enclosure Dimensions



Model Numbering

Technology

RCT-161 CM6 Cut Monitor

Calibration

0	No Pre-Calibration	**D**	0 to 30% Light Oil	**H**	0 to 10% Heavy Oil
A	0 to 1% Light Oil	**E**	0 to 50% Light Oil	**I**	0 to 30% Heavy Oil
B	0 to 5% Light Oil	**F**	0 to 1% Heavy Oil	**J**	0 to 50% Heavy Oil
C	0 to 10% Light Oil	**G**	0 to 5% Heavy Oil	**M**	0 to 80% Heavy Oil

Approvals

C	CSA Intrinsically Safe Approval	**F**	FM Intrinsically Safe Approval
D	CSA Explosion Proof with IS Barriers	**G**	FM Explosion Proof with IS barriers

Filters

0	No Filters
1	RFI Filter
4	Loop Surge Filter
7	Loop Filter and Surge Filter

Mounting

0	Integral	**6**	Remote - 75 feet cable GP	**C**	Remote (10 feet) high temp cable
1	Remote - no cable	**7**	Remote - 100 feet cable GP	**D**	Remote (25 feet) high temp cable
2	Remote - 10 feet cable GP	**8**	Remote (25 feet) tri-ax cable	**E**	Remote (35 feet) high temp cable
3	Remote - 25 feet cable GP	**9**	Remote (50 feet) tri-ax cable	**F**	Remote (50 feet) high temp cable
4	Remote - 35 feet cable GP	**A**	Remote (75 feet) tri-ax cable	**G**	Remote (75 feet) high temp cable
5	Remote - 50 feet cable GP	**B**	Remote (100 feet) tri-ax cable	**H**	Remote (100 feet) high temp cable

Sensing Element

0	700-1202-001
4	700-1202-041
5	700-1202-081 (M0303)
A	700-1202-061
B	700-1202-081

Pipe Size

1	1" Pipe	**6**	6" Pipe
2	2" Pipe	**8**	8" or Larger Pipe
3	3" Pipe	**T**	In Tank Sensor
4	4" Pipe		

Cote-Shield Length

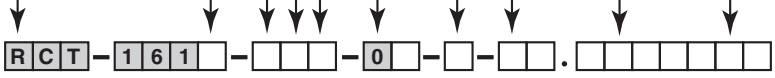
02.0	2" CSL
03.5	3.5" CSL
10.0	10" CSL

Insertion Length

XXXXX Determined By Factory

Mounting

AO	.75" 316 SS NPT	**GB**	2" 300# RF 316/316L SS
BA	1" 150# RF CS	**IA**	3" 150# RF CS
BB	1" 150# RF 316/316L SS	**IB**	3" 150# RF 316/316L SS
CB	1" 300# 316/316L SS	**KB**	4" 150# RF 316/316L SS
DA	1.5" 150# RF CS	**LA**	4" 150# RF CS
DB	1.5" 150# RF 316/316L SS	**LB**	4" 150# RF 316/316L SS
EA	1.5" 300# CS	**MA**	6" 150# RF CS
EB	1.5" 300# RF 316/316L SS	**MB**	6" 150# RF 316/316L SS
FA	2" 150# RF CS	**NA**	6" 300# RF CS
FB	2" 150# RF 316/316L SS	**NB**	6" 300# RF 316/316L SS
GA	2" 300# RF CS	**XX**	Mounting Not Listed



Accessories

Intrinsic Safety Barriers

Model: 409-9100-045

Closed couple single channel 24 VDC intrinsic safety barrier for FM and CSA Explosion-Proof, Class 1, Div. 1 installations.

Wireless Interface Solutions

Wireless Analog / Digital Link, Tube Mount NEMA 4X Transmitter DIN-Rail / Receiver Set.

Integrated radio & I/O module designed to eliminate cable and conduit for multiple analog and digital signals in harsh industrial environments.

Sidearm Assembly

Model: CM6-Sidearm

Prefabricated NACE MR-01-75 and ASME Section 8 compliant piping that is custom engineered for optimal Cut Monitor performance.

Slipstream Assembly

Model: CM6-Slipstream

The Slipstream is ideal for non-invasive applications where the sensing element can not be put directly into the main process flow. A very simple hose arrangement can be run from an existing sampling port, through the sliipstream and then back to the main flow.

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