

CLIF MOCK™

True Cut™ "C" Series Samplers

For more than three decades, the electrically powered C Series inline sampler has been one of the most accurate and reliable methods of extracting a product sample from a pipeline for basic sediment and water (BS&W) analysis.

C-Series Probe

The C-Series isokinetic inline sampling probe (shown assembled with a controller) requires neither air nor hydraulics to capture samples. Rather, the probe is actuated by an electrical pulse from a controller, and uses existing pipeline pressure to fill the sample chamber with product. When the probe is actuated, a sample chamber opens, allowing process fluid to flow through the chamber. As the window rotates, the sample is captured in its natural state and fed by pipeline pressure to a receptacle. By ensuring that the process fluid is well-mixed and homogenous prior to sampling, and using a sampling process that collects the sample directly from the flow stream without changing the linear velocity or direction of flow, the customer is assured of obtaining a representative sample.



The C Series sample probe is available in two models:

- The C21 probe collects one sample (1.5 cc) per each 360° rotation.
- The C22 probe collects two samples (3 cc) per each 360° rotation.

Each model is available in two operating pressure ranges (see Specifications table below). A "V" is used to identify low-operating-pressure probes. All C Series probes are suitable for sampling in 2-in. to 48-in. pipelines.

Tanker loading/
unloading systems

Truck terminals

Pipeline measurement

Refineries/pipelines

LACT units

Loss control

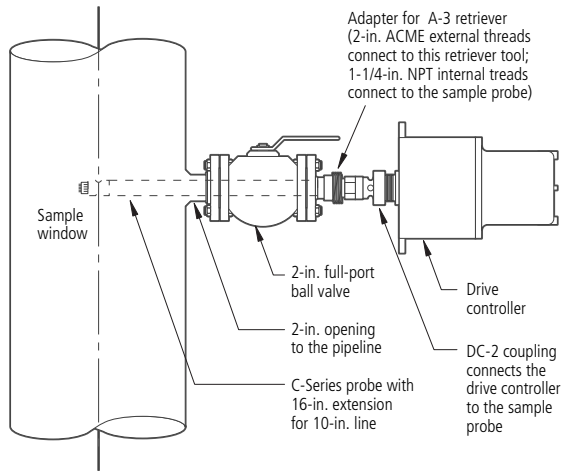
Custody transfer points

Petrochemical plants

Process vessels

Barge facilities

H₂S service



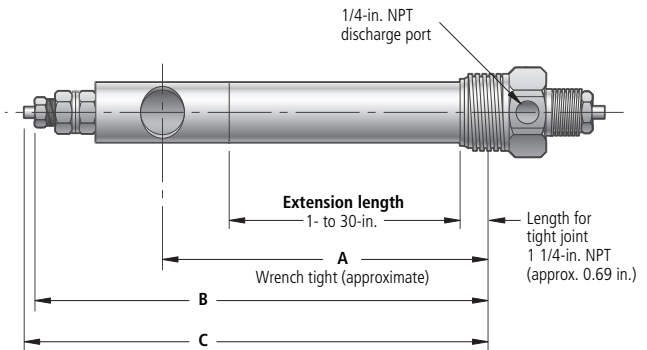
The probe can be easily and safely installed in the pipeline and removed from pressurized pipelines using a customized retriever tool and a pipe connection adaptor. See Installation Accessories for more information.

Specifications

Fluids Suitable for Sampling	Crude oil, refined hydrocarbons and non-corrosive chemicals with some degree of lubricity
Viscosity	12 to 54 API gravity (thicker product may require heating; see Cameron's Measurement Systems division for detailed instruction).
Maximum Operating Pressure	10 to 50 psi (C-21V/C-22V) 50 to 195 psi (C-21/C-22) 195 to 1500 psi (C-21/C-22 with pressure equalizing valve installed)
Actuation Method	Electrical (via controller)
Pipeline Size (in. ID)	2 to 48 in.
Sample Grab Size	1.5 cc
Sample Outlet Connection	1-1/4 in., standard (other sizes available)
Standard Materials	Meter body: 316 Stainless steel Seals: Buna, Viton, Teflon

Sampler Probe Dimensions

Extension Length (in.)	A	B	C
0 (Standard)	2.13	4.88	5.13
1	3.13	5.88	6.13
3	5.13	7.88	8.13
4	6.13	8.88	9.13
5	7.13	9.88	10.13
6	8.13	10.88	11.13
8	10.13	12.88	13.13
10	12.13	14.88	15.13
12	14.12	16.88	17.13
14	16.13	18.88	19.13
16	18.13	20.88	21.13
18	20.13	22.88	23.13
20	22.13	24.88	25.13
22	24.13	26.88	27.13
24	26.13	28.88	29.13
26	28.13	30.88	31.13
28	32.88	33.13	35.44
30	32.13	34.88	35.13



The length of the C Series probe must be carefully calculated to ensure that the window is positioned in the center third of the pipeline. C Series probes are available in lengths ranging from 5.13 in. (standard probe with no extension) to 35.13 in. The "B" measurement in the table above is used to determine the appropriate probe length for a given pipeline diameter.

For very small pipelines (2-in. to 4-in. diameters), an LA-22 adapter may be required for proper probe positioning. See LA-22 Adapter for details.

Receptacles

The C Series Sample Probe is compatible with a wide variety of receptacles, including the True Cut portable receptacles. See the Mixing and Circulation Systems data sheet for details.

Sample Probe Controller

The CD Series Sample Probe Controller controls the sampling frequency of C Series sample probes.

CD Series controllers are equipped with an internal 9-VDC motor that rotates the sample probe 180° between sample “grabs.” This design allows the C Series Sample Probe to take a sample with each 180° rotation. While the controller can be purchased without a sample probe, it is useful only when paired with a C-Series Sample Probe. The controllers are easily attached to the sample probe in the pipeline and require no other mounting hardware.

CD Series controllers are available in four different configurations for controlling the sampling process with pulse counts, timing, or pacing from a computer or PLC. One configuration can be used to trigger an alarm to signal a loss of power, loss of input signal or motor failure.

The control cards in CD-20 A and CD-30 A controllers each have four switches, which can be enabled to “read” flow in terms of pulse counts or time (seconds).

The CD-20 B controller is most often used where PLCs or computers are used to pace the controller. This unit enables one sample per pulse from a pre-scaled source. The CD-20 B also provides an electronic output signal to allow samples to be counted remotely or to verify motor rotation.

The CD-20 SFA has the added feature of a dry contact for a controller failure alarm. An alarm is activated if a sample command is not received within a preset period of time, the motor has not rotated within a preset period of time, and/or power is lost to the unit.



Specifications

CD-20 A

- Pulse input configurable from 1 to 9,999 pulses
- Signal input is provided as a dry contact closure or a current-sinking device
- Preset timer configurable from 3 to 9,999 seconds
- 115 VAC, 230 VAC, 12 VDC, 24 VDC

CD-20 B

- One sample/contact closure from a computer, PLC, or other pacing device
- Electronic output signal for verifying motor rotation or obtaining a sample count
- Preset timer configurable from 3 to 9,999 seconds
- 115 VAC, 230 VAC, 12 VDC, 24 VDC

CD-20 SFA

- Signal input is provided as a dry contact closure or current-sinking device
- Signal outputs include a controller failure alarm that is activated in the event of loss of power, loss of input signal, or motor failure
- 115 VAC, 230 VAC, 24 VDC, 12 VDC

CD-30 A

- CSA certified, Explosion-proof, Class I, Division 1, Group D
- Pulse input configurable from 1 to 9,999 pulses
- Signal input is provided as a dry contact closure or current-sinking device
- Preset timer configurable from 3 to 9,999 seconds
- 115 VAC

Current Draw For CD Series Controllers

Model	Power	Stop Mode	Running Mode	Peak Motor (Turn On) Current
CD-20 A	115 / 230 VAC	70 mA	170 mA	300 mA
CD-20 B	115 / 230 VAC	60 mA	150 mA	300 mA
CD-20 SFA	115 / 230 VAC	70 mA	170 mA	300 mA
CD-30 A	115 VAC	30 mA	130 mA	300 mA
CD-20 A	12 / 24 VDC	30 mA	0.5 Amp	1 Amp
CD-20 B	12 / 24 VDC	30 mA	0.5 Amp	1 Amp
CD-20 SFA	12 / 24 VDC	30 mA	0.5 Amp	1 Amp

CD Series Controller Configurations

Model	Proportional to Volume Sampling	Proportional to Time Sampling	Scaleable Input	Pulse Output
CD-20 A	X	X	X	
CD-20 B	X	X		X
CD-20 SFA	X			X
CD-30 A	X	X	X	

Installation Accessories

When a pipeline is properly fitted with a 2-in. ball valve and a U-22 union adapter, the C Series Sample Probe can be safely installed in a pipeline or removed from a pipeline, even under pressure, with an A-3 sample probe retriever. A pressure equalizing valve (PEV) and/or LA-22 line adapter may also be required in a C-Series probe installation.

A-3 Sample Probe Retriever

The A-3 Sample Probe Retriever allows an operator to install or retrieve a C Series Sample Probe from a pressurized pipeline or vessel (up to 1000 psig) without interrupting service and with minimal loss of product. Sample probes can therefore be removed from lines for repair, inspection, or preparation of scraper runs without depressurizing or interrupting service. Additionally, a C Series Sample Probe can be safely and easily removed from a pipeline for use at different locations. Only one retriever tool is needed to service multiple sample probe locations.



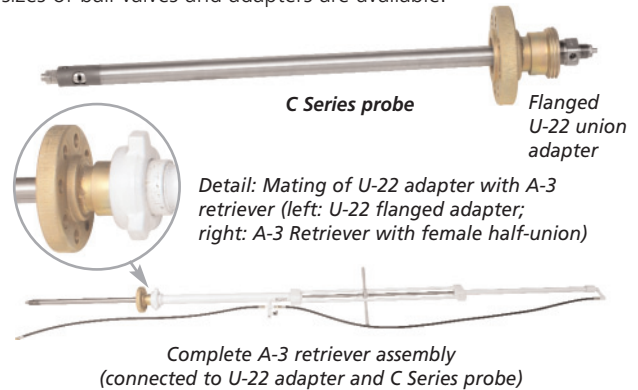
The A-3 retriever equalizes pressure between the pipeline and sample probe, allowing the probe to be installed or retrieved with minimal manual force, even at high line pressure. A specially designed ratchet wrench minimizes the effort required to loosen and tighten connections during probe installation and retrieval operations.

The retriever is made of high-quality carbon steel structural components, and is fitted with rust-proof plated steel rods, bronze rod bushings, Viton® O-ring seals, and Teflon® backup rings. Flexible hoses on the retriever have high-pressure, reinforced construction for durability.

The A-3 Retriever is available in two sizes to accommodate all sizes of C Series Sample Probes—one for probe extension lengths up to 16 in., and one for extension lengths of 18 to 30 in. A female hammer-union half is attached to one end of the retriever for mating with a U-22 adapter during probe installation and retrieval.

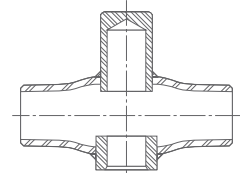
A-3 Retriever Adapter

A 2-in. ball valve and a U-22 union adapter are required for attaching the A-3 Sample Probe Retriever to the product line. Typically, a 2-in. pipe connection is welded to the product line, and a 2-in. ball valve is threaded or flanged into this connection. The U-22 adapter (threaded or flanged) then mounts directly to the ball valve via a 2-in. NPT or flange connection. A 2-in. connection is standard; however, other sizes of ball valves and adapters are available.



LA-22 Line Adapter

The LA-22 Line Adapter may be required to properly position a C Series probe in a small pipeline (2- to 4-in. diameter). The spool-type adapter is welded on the outside of the pipeline to allow the probe to be correctly positioned within the line so that the sample window is in the center one-third of the pipeline.



Pressure Equalizing Valve

The PEV-3C Pressure Equalizer Valve is designed to reduce pressure across the sample probe seal tip, maximizing the life of the probe and minimizing the need for seal tip replacement. PEVs are recommended for any installation where line pressure exceeds 195 psi.



Tubing connects the PEV to the sample probe outlet, to the pipeline, and to the receptacle. Connection points are clearly marked on the PEV for quick and easy installation.

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