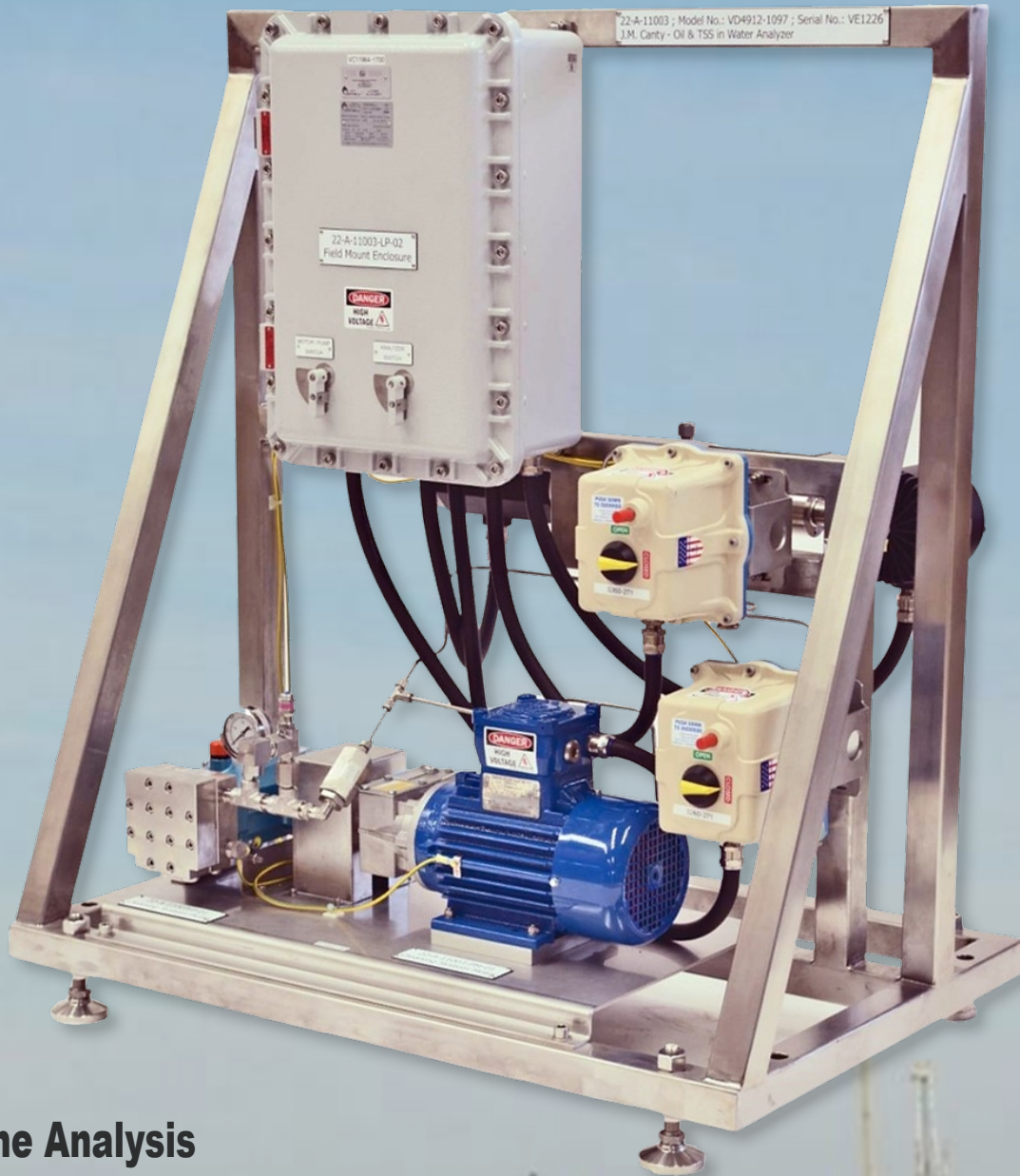


Configuring an **INFLOW™ Skid**

Oil Concentration & Droplet Size - Solids Concentration & Particle Size



Real Time Analysis
Visual Verification
Imaging Based Technology

Field Mount INFLOW™ & Control Room Analysis

This arrangement allows for ease of system configuration and monitoring from the comfort of the control room. Data / video / image extraction from the VCM can be done without having to visit the field, or arrange any site permits that may be required to open system enclosures within a hazardous area. The signals to the user control system are also generated at the VCM itself, which means that connecting with the DCS is easily done, without any long signal cable runs from the field. Perhaps the biggest advantage of this arrangement is that it also allows for the live video stream and real time image analysis to be displayed in the control room, providing operators with greater process understanding and the all important visual verification of measurement outputs.

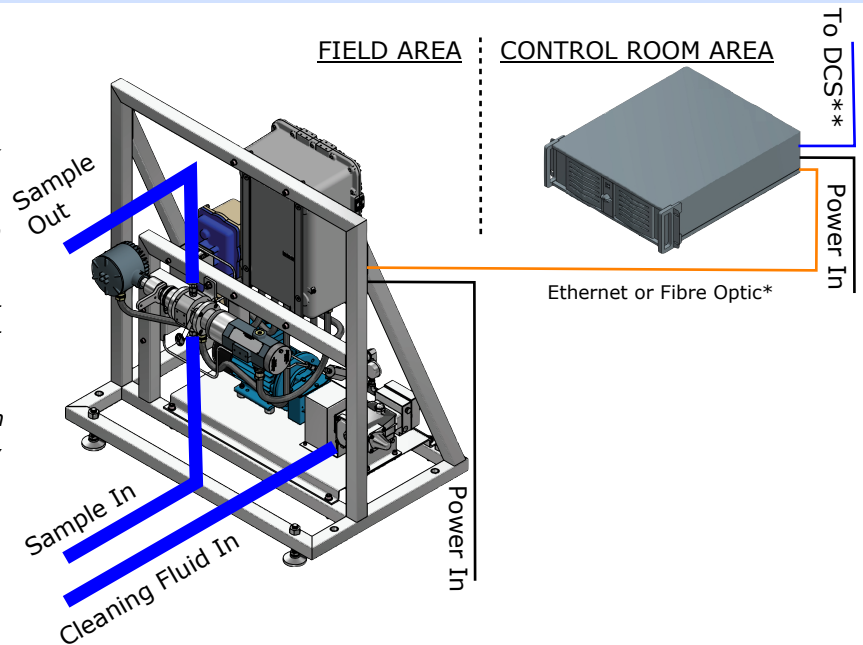
* Ethernet Cable is used for SIF-CE Models. Cable (max 100m) to be minimum Cat6.

Fibre Optic Cable is used for SIF-CF Models. Cable (max 10km) to be 10G SM Duplex 9/125µm LC-LC.

SIF-CF Models include an an additional Din Rail Mount media converter (FO from field, Eth to VCM) not shown above, for installation in the control room area

** DCS signal format dependent on VCM specification selected. Options available for 4-20mA, OPC UA, Modbus TCP/IP, Modbus RTU

Reference TA12100-1012



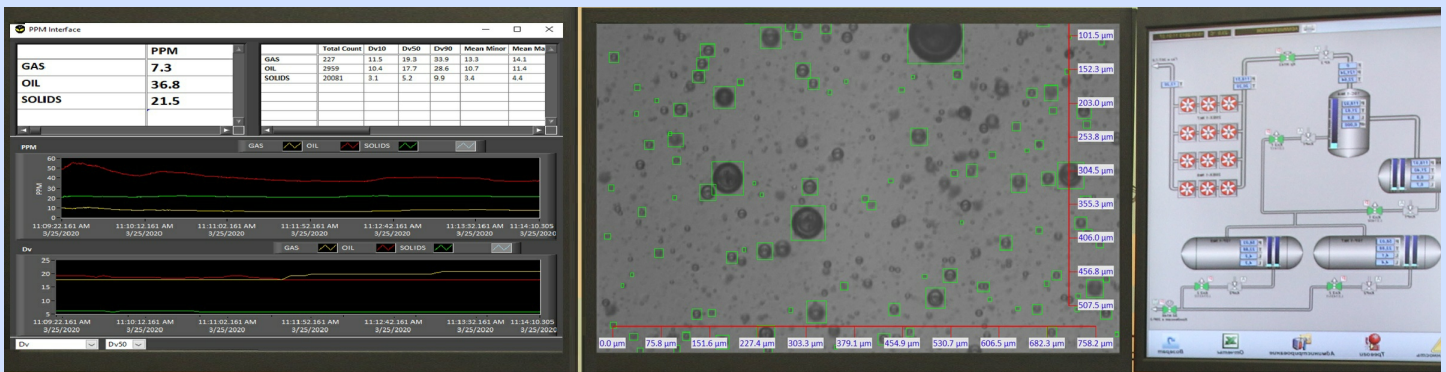
By User:

1. All input power cabling
2. All communication cable between the field equipment and the control room installed VCM
3. All signal output cabling from the VCM to the user's control system
4. All inlet and outlet sample tubing and fittings
5. All cleaning fluid inlet tubing and fittings

By CANTY:

1. The Skid INFLOW™ (SIF-CE or SIF-CF)
2. Interconnecting wiring between skid mount components
3. Easy access terminals for connection of user supplied power, signal and communication cables
4. VCM Image Processor for Control Room installation (ordered separately)

CANTY's recommended system configuration is for the Skid INFLOW™ to be installed in the field, and for the Vector Control Module (VCM) image processor to be installed in the control room area, with a single network connection between them. Depending on distance, this connection can be via Ethernet (SIF-CE Models) or Fibre Optic (SIF-CF Models).



Field Mount INFLOW™ & Analysis

The alternative to having the VCM installed in the control room area, is for it to be installed in the field on the skid frame (SIF-F Models).



Here, it is integrated with a monitor which displays the real time image analysis software interface. The extra enclosure is powered from the standard PSU enclosure, and is pre-wired at the factory, meaning it is still just a single power input that is required.

Initial system configuration is done using a wireless keyboard, which is typically a general purpose unit, meaning a hot permit is required. If data / video / image extraction is needed, it involves opening the VCM enclosure, so that activity would also require a hot permit.

However, this self contained arrangement does allow the user to operate on the philosophy of "power in - control signal out".

By User:

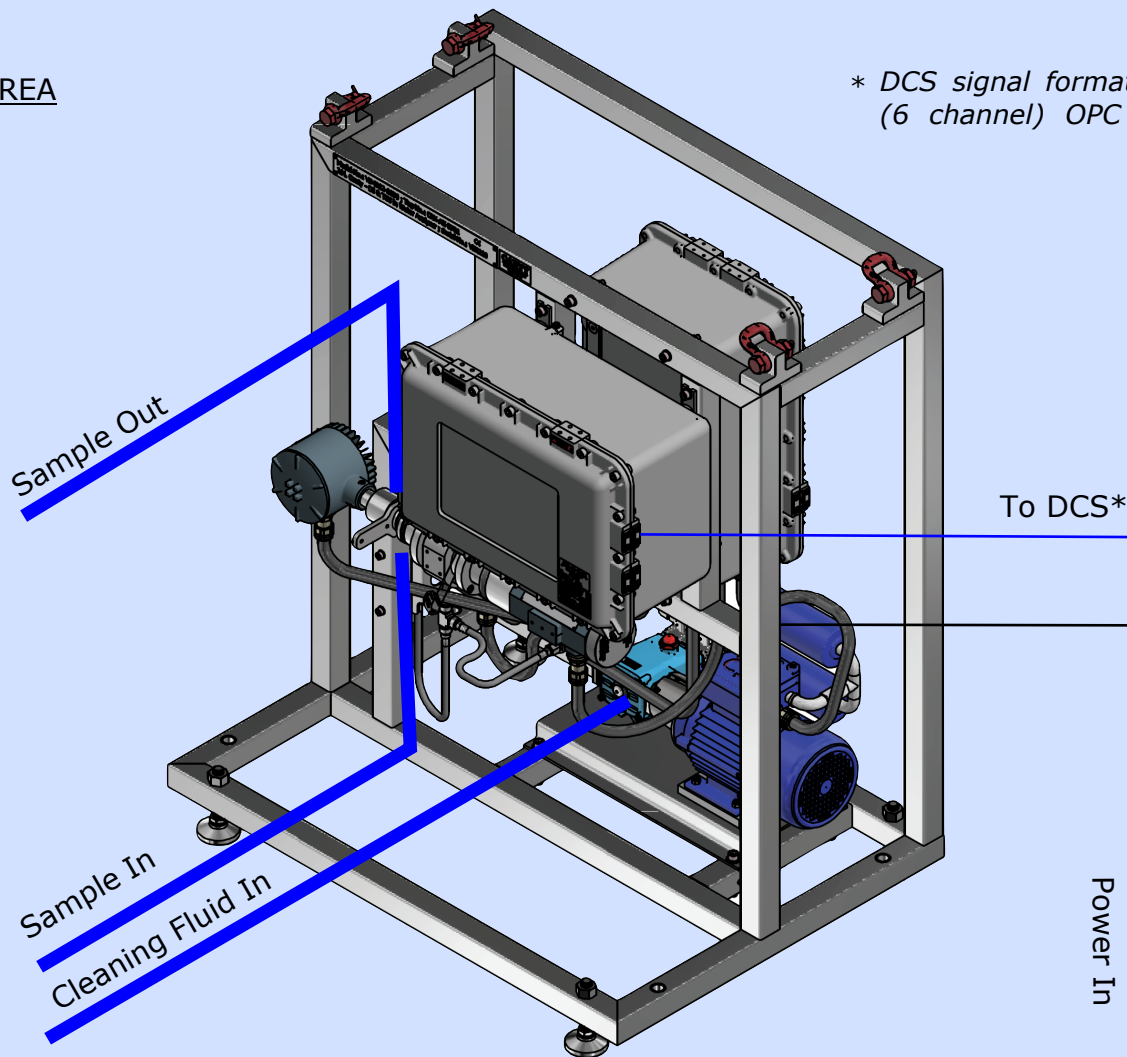
1. All input power cabling
2. All output signal output cabling to the user's control system
3. All inlet and outlet sample tubing and fittings
4. All cleaning system inlet tubing and fittings

By CANTY:

1. The Skid INFLOW™ (SIF-F Model)
2. Interconnecting wiring between skid mount components
3. Easy access terminals for connection of user supplied power, signal and communication cables

FIELD AREA

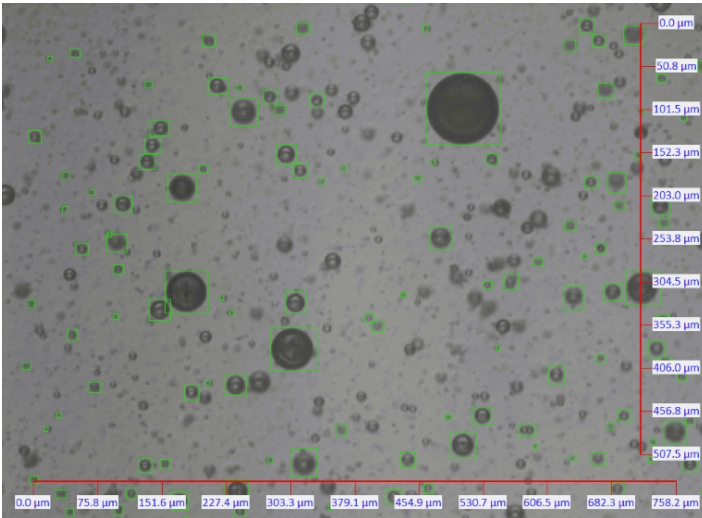
* DCS signal format via 4-20mA
(6 channel) OPC UA, Modbus



INFLOW™ Specification

MEASUREMENT RANGE

Depending on the application the system is to be used on, there are different measurement range options, which are based on the optical properties of the lens used.



The standard system has a concentration measurement range of 0-2500 ppm(v) and a size measurement range of 2-295µm.

There is also an option for a system for higher concentration applications, which has a measurement range of 50-50,000 ppm(v), and a size measurement range of 5-725µm.

The indicated ranges represented dictate the highest degree of accuracy. It may be possible to measure slightly outside of these ranges with reduced accuracy. Consult the factory for details.

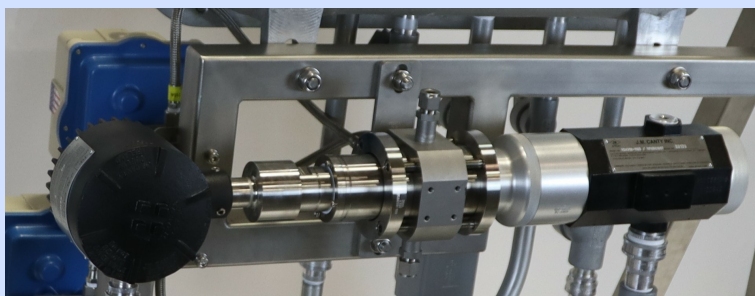
PRESSURE RATING

The standard pressure rating of the INFLOW™ flow cell, is 500 PSI (34.5 Bar). However, if the INFLOW™ is being supplied for use with a Short Loop Sampler, then a matching pressure rating of 150 PSI or 300 PSI should be selected, depending on the specification of the Short Loop Sampler to be used.

CONNECTION TYPE / SIZE

The flow cell of the INFLOW™ can be provided with 1/2" or 1" connections, and as either an NPT(F) or Compression Tube fitting, to suit any standard instrument or analyser tubing which is commonly used in industry.

MATERIALS OF CONSTRUCTION



The flow cell of the standard INFLOW™ is provided with wetted materials in a combination of 316LSS, Hastelloy® / Alloy C276, and Boro Plus Glass. Other options are available, including options for all metallic wetted materials to be in compliance with NACE MR0175 / ISO15156 as may be required for sour service installations.



The internal o-ring seals of the INFLOW™ flow cell, which are process wetted, are provided in Viton as standard. Other materials are available on request, so please consult with CANTY if needed.

The flow cell non wetted material is 300 series stainless steel, while the camera and light component housings are constructed of anodised and painted Aluminium.

Field Equipment Installation

The INFLOW™ is typically provided mounted directly to the skid frame, with the user responsible for the sample take off from the main line, the sample transport tubing to the INFLOW™ inlet, and the sample tubing from the INFLOW™ outlet to the return point.

The pressure differential between the take off and return points, which is required to drive flow through the analyser side stream loop, is typically achieved by one of the shown arrangements.

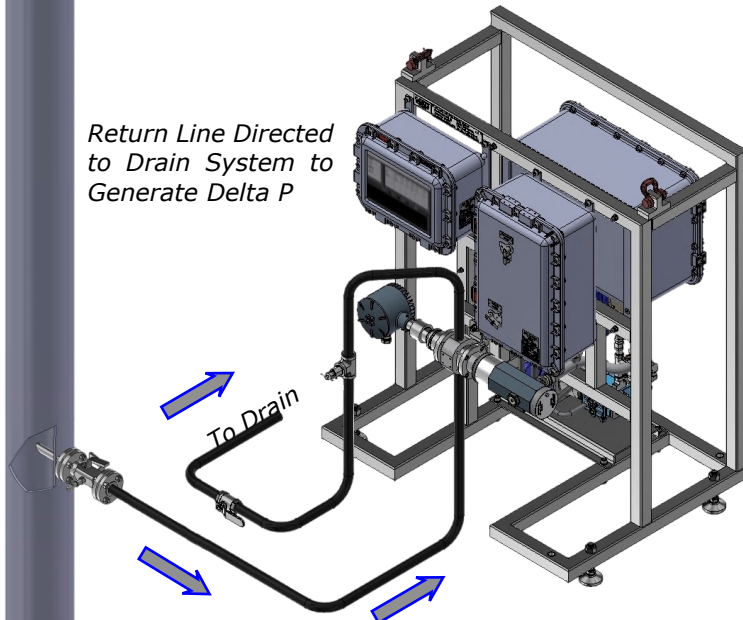
The INFLOW™ does not require any sample conditioning system, which maximizes the representativeness of any readings, but industry guidelines should be followed in relation to the sample line design. In addition to the industry guidelines, CANTY recommends that a flow control valve is installed downstream of the INFLOW™ to regulate the sample line flow, and that a manual sample point is positioned as close as possible to the INFLOW™ outlet, for comparison with the operator's lab analysis.

Sample Line Design

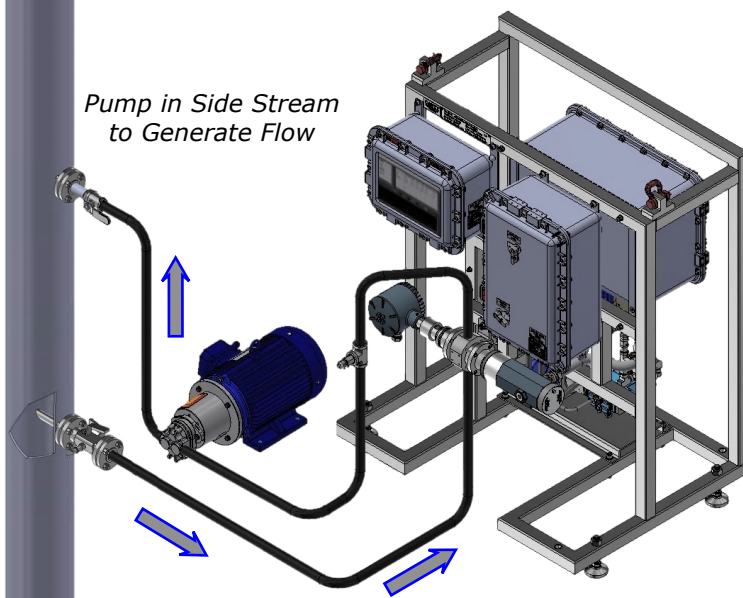
- The distance between the sample point and the analyser should be minimised as far as practically possible.
- Vertical up-flow is the preferred orientation for installation of a produced water sample point.
- Where practicable, a centre line pitot should be used. Where installation of centre line pitots may prove difficult, sidewall sampling may be used.
- For sample points in horizontal pipe work, sample points should be located at a point where the flow velocity is high enough to provide adequate turbulent mixing. If centre line pitots are not available, sidewall sample points should be in the horizontal positions. Sidewall sample points on the top or bottom of horizontal pipe work is not recommended and should be avoided.

Above guidelines from UK Dept. For Business Energy & Industrial Strategy

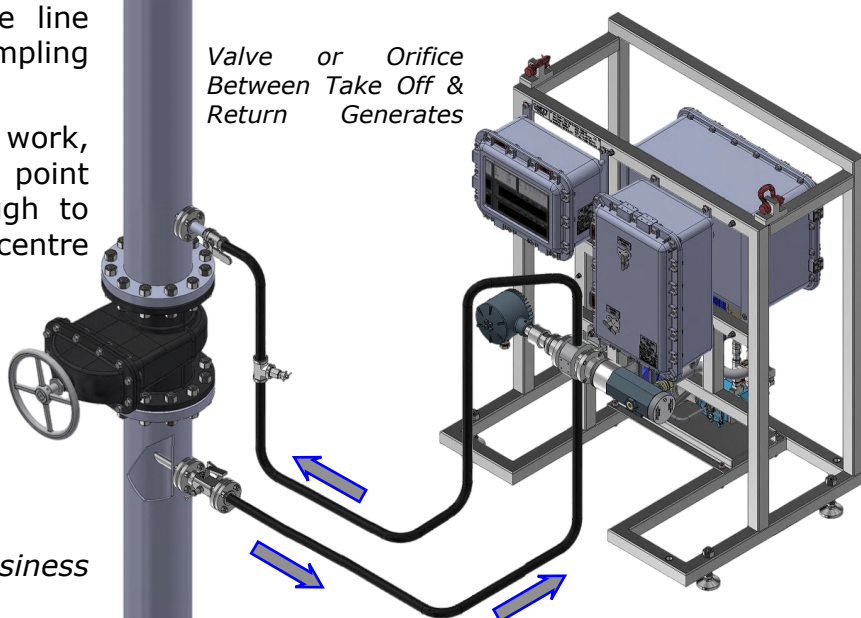
Return Line Directed to Drain System to Generate Delta P



Pump in Side Stream to Generate Flow



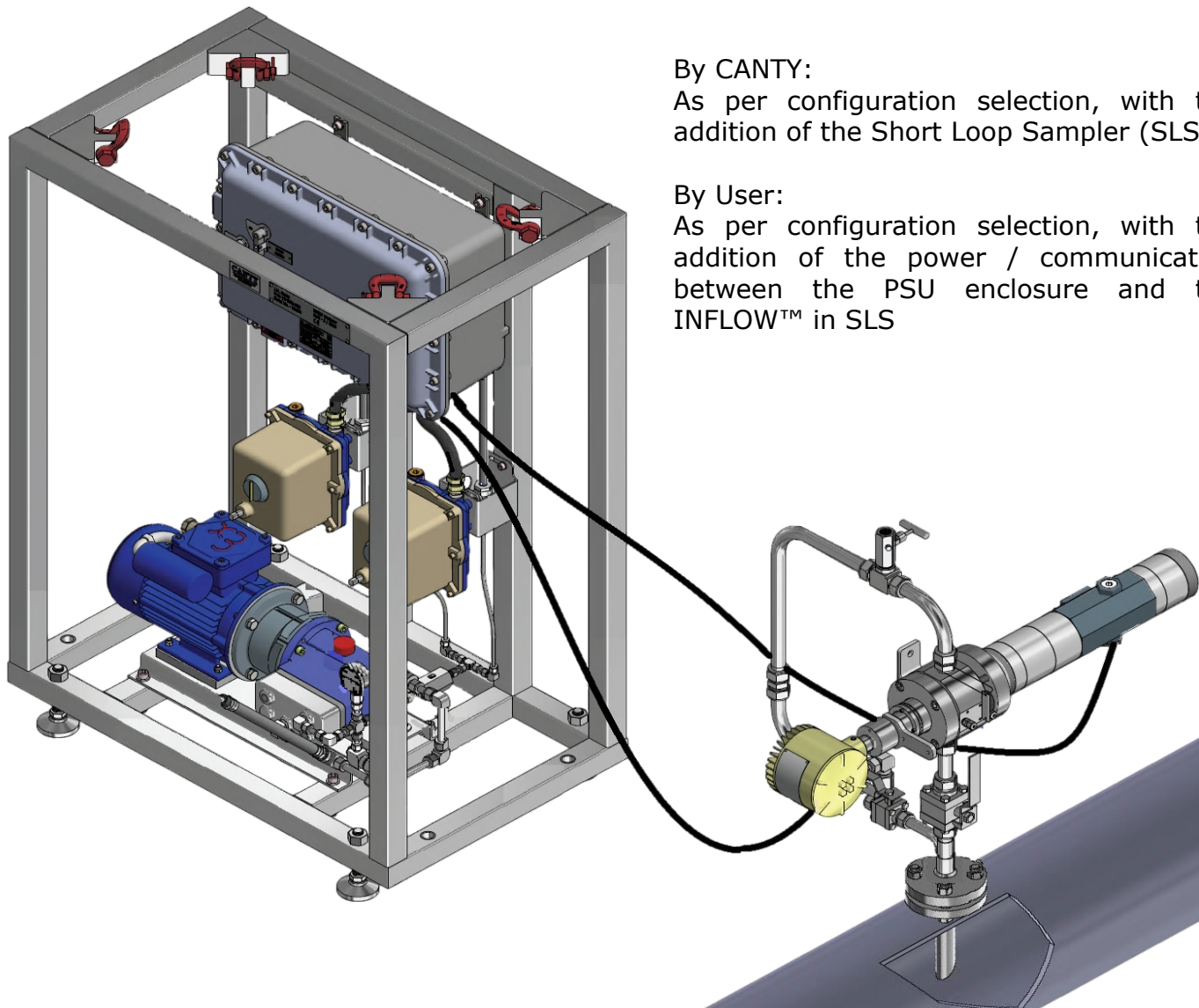
Valve or Orifice Between Take Off & Return Generates



Alternatively, the INFLOW™ is provided with a Short Loop Sampler (SLS). This unit mounts directly to the process pipeline via 3" flanged connection. Flow is extracted from the main pipeline, flows through the analyser loop, and is returned at the same point. Installation of the SLS should follow the industry guidelines outlined for sample point installation.

A skid sits adjacent to the installation point, to which the system PSU and automated cleaning system are mounted. This skid frame is to be positioned so that the cable distance from the skid mount PSU enclosure to the INFLOW™ is a maximum of 3m.

The SLS features isolation valves, and bleed valves, which can also double up as sampling points for comparison with the operator's lab analysis.



By CANTY:

As per configuration selection, with the addition of the Short Loop Sampler (SLS)

By User:

As per configuration selection, with the addition of the power / communication between the PSU enclosure and the INFLOW™ in SLS

Auto Cleaning System

Each INFLOW™ Skid features an automated cleaning system to ensure the flow cell internals stay clean. This allows for reliable image capture, and therefore reliable image analysis and data generation.

The automated cleaning system features a high pressure pump (1200 PSI) and 2 actuated valves to alternately clean the camera and light side glass. Separate cleaning of the 2 sides of the flow cell glass, ensures maximum effectiveness of the high pressure cleaning water.

If available, it is recommended that non process water is used as the cleaning fluid. In cases where only the process water is available, it may also be considered. However, that may have an influence on the allowable wetted materials for the cleaning system, so that should also be considered.

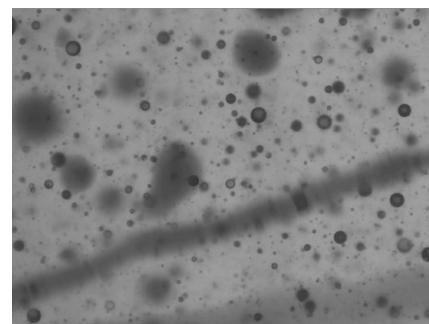
The standard wetted materials for the automated cleaning system are a brass pump head, and 316 / 316L SS fittings.





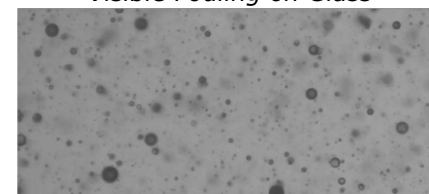
The inlet connection to the cleaning system is 1/2" NPT(F), with the user supplying the tubing up to that point. All fittings from the pump outlet to the INFLOW™ spray ring connections are factory fitted by Canty. As standard this includes a pressure gauge for verification of the cleaning system pressure, and a pressure relief valve (PRV) to release any possible over pressure in the cleaning lines. The outlet connection of the PRV is 1/2" NPT(F), with the user responsible for directing that outlet fluid according to their own requirements.

The cleaning system is fully configured via the CVIA software, with the cleaning sequence pre-programmed at the factory. The default frequency of the cleaning system is 1 time per hour, however that is user adjustable. The duration of the cleaning cycle is approximately 1 minute, and it should be noted that during this time, all process measurements and control signals are paused, so the turbulence created in the flow cell during cleaning does not affect any readings. Once the cleaning cycle is complete, the measurements and related control signals automatically resume.

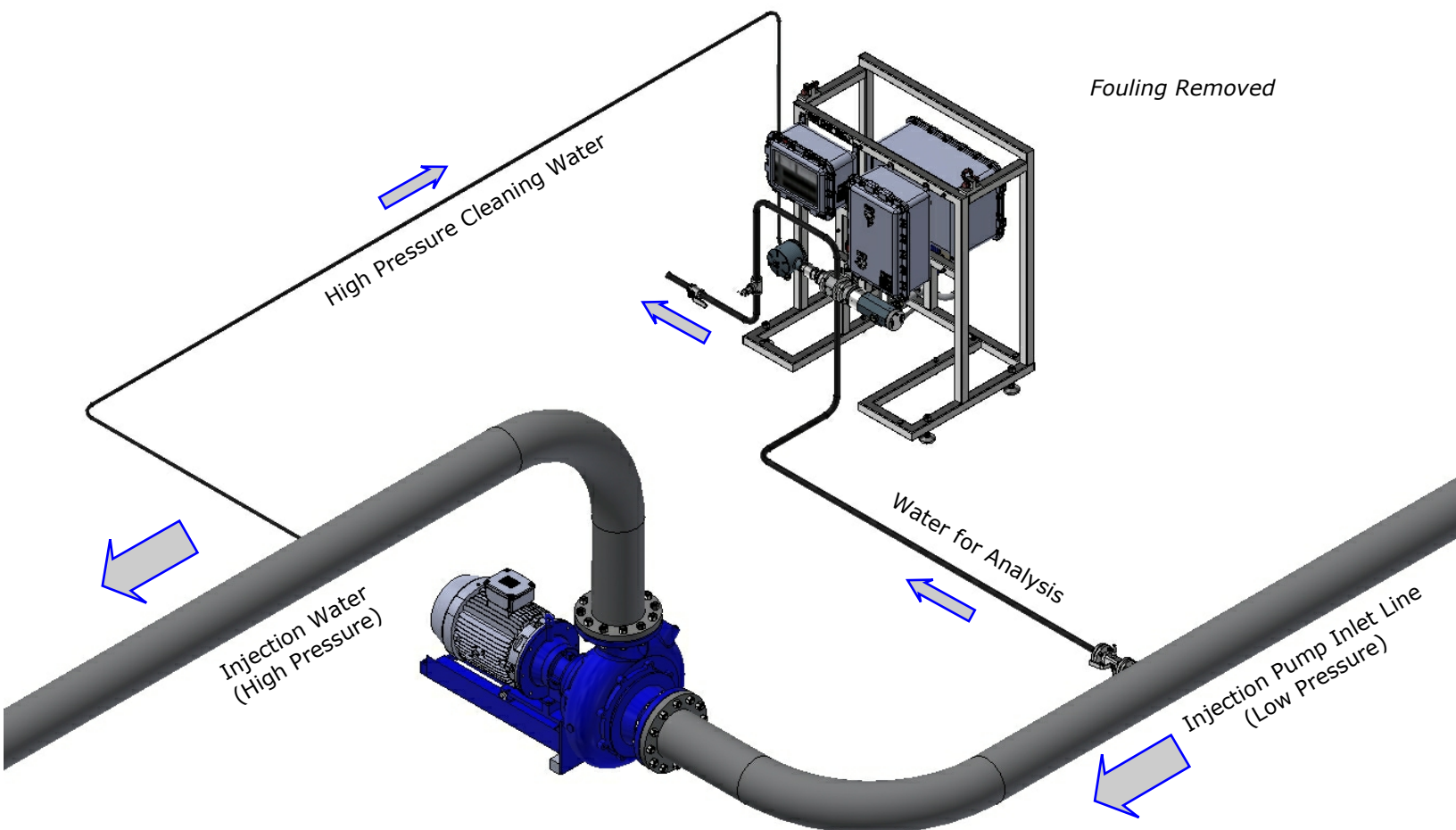


Visible Fouling on Glass

In Water for Injection applications, the system is typically installed upstream of the injection pumps. The high pressure section downstream of the pump can be used to feed the analyser cleaning system, which removes the need for an on skid pump / motor assembly, therefore simplifying the installation and reducing cost.



Fouling Removed



PSU Enclosure

The PSU enclosure (low copper Aluminium, painted in RAL7035) is the electrical tie in point for the user, who supplies either 230V 50Hz or 120V 60Hz - UPS recommended. Power is distributed internally within the enclosure to power the various skid mount components. This distribution is pre-wired by CANTY, with power fed to the various components via suitably rated PVC coated galvanised steel conduit.

The user supplied input cable is fed into the enclosure through the provided M20 cable entry with the user also supplying a suitably rated cable gland.

There is also the option for the user to provide a separate power supply dedicated to the cleaning system motor, if user's UPS supply cannot support it ($\sim 7A$ on a 230V system, and $\sim 19A$ on a 120V system). In cases like this the user may prefer to supply a UPS input to the analyser circuit, and a non UPS supply to the cleaning pump circuit. Switching between each configuration requires only simple rewiring, which can be done in either the factory or the field.



If connecting back to a VCM in the control room area, this enclosure is also the tie in point for the user communication cable - Ethernet on SIF-CE Models and Fibre Optic on SIF-CF Models.

Local Display



If the system configuration selected is for in field analysis, the system is provided with a second enclosure, containing the image processor with integral local display. During operation the software interface including live video stream and graphical display can be viewed here.

Similar to the PSU enclosure, the material of construction is low copper Aluminium, painted in RAL7035. Power to this unit is fed from the PSU enclosure and is pre-wired by CANTY. The enclosure features 3 x M20 cable entries (supplied plugged) which can be used to connect tot the user's DCS or PLC. In this configuration, outputs are available via 4-20mA (6 channel), Modbus TCP/IP, OPC UA.

Ordering Information

SIF-CE-V01BFB1BD4V-01B

SYSTEM ARRANGEMENT

CE - CONTROL ROOM VCM (MAX 100m)
CF- CONTROL ROOM VCM (MAX 10km)
F- ON SKID VCM & MONITOR

OPTICS MEASUREMENT RANGE

1 - 0-2500 ppm(v), 2-295µm*
3 - 50 - 50000 ppm(v) / 5-725µm*

INFLOW CONNECTION TYPE

B - COMPRESSION / TUBE FITTING
E- NPT(F)

INFLOW CONNECTION SIZE

D - ½"
F - 1"

INFLOW WETTED MATERIAL

B - 316L SS**
2 - 316L SS (NACE)**

INPUT POWER

A - 120V 60Hz
B - 230V 50Hz

CLEANING SYSTEM WETTED

B 316 & 316L SS
2 - 316 & 316L SS (NACE)

CLEANING SYSTEM CONFIGURATION

1 - PUMP / VALVES / FITTINGS
2 - VALVES / FITTINGS ONLY - USER
SUPPLIES HIGH PRESSURE WATER

INFLOW MOUNTING

0 - ON SKID
1 - IN SHORT LOOP SAMPLER

INFLOW GASKET MATERIAL

V - VITON

ENVIRONMENTAL RATING

3 - EXP / UL / CSA
4 - ATEX
6 IECEx / ATEX

PRESSURE RATING

B - 150 PSI
C- 300 PSI
D- 500 PSI

* Size ranges detailed are the maximum accuracy ranges. Measurement of particles / droplets outside these ranges is possible, but with a reduced level of accuracy. Consult CANTY for details

** CANTY reserve the right to upgrade to Hastelloy C family of alloys or equal at their own cost

	INFLOW	PSU	ACTUATORS	MOTOR	PUMP
FM/UL/CSA	FM EXP	UL & CSA EXP	CSA EXP	CSA EXP	N/A
ATEX	ATEX ZONE 1	ATEX ZONE 1	ATEX ZONE 1	ATEX ZONE 1	ATEX ZONE 1
IECEx/ATEX	IECEx ZONE 1	IECEx ZONE 1	IECEx ZONE 1	IECEx ZONE 1	ATEX ZONE 1

Notes:

- SIF-CE and SIF-CF Models require a VCM to be ordered separately from datasheet TA12100-1012. Consult with CANTY for suitability of VCM selection.
- Ethernet Cable (max 100m) from SIF-CE Models to VCM in Control Room to be minimum Cat6.
- Fibre Optic Cable (max 10km) from SIF-CF Models to VCM in Control Room to be 10G SM Duplex 9/125µm LC-LC.
- If Short Loop Sampler is selected for INFLOW™ Mounting;
INFLOW™ connection type must be selected as Compression / Tube Fitting
INFLOW™ connection size must be selected as 1"
Short Loop Sampler must be ordered separate from datasheet TA11500-1027

CANTY'S GOAL IS TO PROVIDE EQUIPMENT TO ENHANCE PROCESS UNDERSTANDING AND CONTROL. WE ACCOMPLISH THIS BY DESIGNING, MANUFACTURING AND SERVICING THE FINEST EQUIPMENT IN THE WORLD



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Petronas	Daleel Petroleum	Total
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TUV NEL	Imperial Oil	Oil Plus
SINTEF	MYCELEX	SMS Oilfield
Wintershall	Premier Oil	Siemens Water
SNF	Soiltech	SGS



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