



**Fz** Freeze Point  
Powered by Icon

**Cp** Cloud Pour Point  
Powered by Icon

All Icon products are...

**Easy to use:** with an intuitive multilingual graphic user interface on a large armoured-glass wipe-clean touch-screen display.

**Certified to global standards:** ATEX, IECEx, UKEx, TIIS, EACEx, and ETL approved to give absolute confidence and peace of mind in hazardous areas and manufactured under an ISO9001:2015 certified Quality Management System.

**Robust and fully explosion proof:** with no air or inert gas purging required for safe operation in explosion hazard areas.

**Highly efficient:** with low sample consumption, sample flow monitoring, and minimal or no utility requirements.

**Safety assured:** with configurable general fault alarms, and a dedicated alarm for internal sample leakage.

**Flexible:** with auto validation or calibration options and standard Modbus, 4-20mA, and digital contact outputs.



## What does it do?

The Icon Freeze Point analyser provides an indicator of the lowest ambient temperature at which an aviation jet fuel may be used. The analyser uses advanced cryo-cooling technology and optical detection to measure freeze points, can be configured to measure very low cloud points and pour points, and is adjustable for ranges down to  $-100^{\circ}\text{C}$  without the need for chilled water.

Like the Icon Cloud Point Analyser, it features a low-mass measuring cell and a vacuum insulated cell housing. This patented sealed containment system helps to improve reliability and cooling performance, and to eliminate condensation, ice formation, and the effects of stray light. The vessel features detection systems to monitor the vacuum and to alert on any internal sample leakage. The optical detector arrangement also provides excellent immunity to dissolved water in the sample and to any changes in sample opacity and colour, giving outstanding repeatability. The obtained results are compatible with those of standard freeze point test methods such as ASTM D2386, D5972 and ASTM D7153.

Alternatively, the analyser can perform very low cloud point and pour point measurements without the external chiller units required by peltier-based analysers for these applications. The obtained results are compatible with those of standard cloud point test methods such as ASTM D2500, D5771/2/3, and pour point test methods such as ASTM D97, D5853, D5949, D5985, and ASTM D7346.

## How does it work?

The low-mass measuring cell traps a small amount of the sample that is then cooled at a controlled rate by the cryo-cooler. The cooling process continues until the optical detector picks up sufficient light-scatter from precipitating wax crystals to indicate that a cloud has formed. At this point the cloud point is reported (if in cloud point only mode). In freeze point mode, the cell is allowed to warm up and the temperature at which the cloud disappears is reported as the freeze point. The measuring cell is then flushed with a new sample and the cycle is repeated.

For pour point measurements, the low mass measuring cell traps a small amount of the sample that is then cooled at a controlled rate by the cryo-cooler. At pre-set temperature intervals, the sample is pressure pulsed by a stepper motor driven piston cylinder. Sample movement is then detected by a differential pressure sensor connected across the cell. The cooling is continued until the applied differential pressure pulse has been attenuated sufficiently to indicate that the sample is no longer moving. This temperature is taken as the pour point. The measuring cell is then flushed with a new sample and the cycle is repeated.

## Why choose the Icon Scientific Freeze / Cloud Pour Point Analyser?

**Excellent repeatability:** with advanced detection algorithms, high signal-to-noise ratios, efficient cryo-cooling technology, and a thermally insulated measuring cell, the analyser achieves better repeatability than the standard test methods.

**High signal-to-noise ratio:** the specific optical detector arrangement provides excellent immunity to dissolved water in the sample and ensures that the measurement is unaffected by changes in sample opacity and colour.

**Minimised thermal losses:** the cell's LED light source and photodiode detector are equipped with air-gapped light guides to eliminate physical and thermal contact between the light source, detector and the cell, thereby reducing thermal losses.

**Best in class cooling performance:** with reduced thermal losses thanks to the low-mass measuring cell, patented vacuum insulation system, and non-contacting light source and detector, the analyser's maintenance-free cryo-cooler can rapidly cool to  $-100^{\circ}\text{C}$  without the need for chilled water or any external chiller system.

**Versatility:** a single proven hardware base that is capable of multiple cold property measurements allows for reduced installation complexity and increased reliability.



## Sample Requirements

<b>Inlet Temperature</b>	At least 30°C (54°F) above the highest expected measurement point. Maximum 50°C (122°F)
<b>Inlet Pressure</b>	Maximum 5 bar (72.5 psi)
<b>Outlet Pressure</b>	Can be returned to pressure, provided minimum flow requirement is achieved. Typically requires a minimum 1-bar differential across the analyser.
<b>Sample Flow (continuous)</b>	Minimum 12 L/H Recommended 18 L/H
<b>Sample Quality</b>	Filtered to 10 microns (µm). Sample should be 'clear and bright' at room temperature and contain no free water.

## Utility Requirements

<b>Instrument Air</b>	Required.
<b>Pressure</b>	0.2 bar (3 psi) for cell enclosure cooling (included) and optional electronics enclosure cooling.
<b>Consumption</b>	Typically 5-10 L/H
<b>Quality</b>	ISO 8573.1 Class 3 ANSI / ISA-7.0.0
<b>Coolant</b>	Potable water or antifreeze mixture. (Do not use sea water)
<b>Inlet Temperature</b>	Minimum 10°C (50°F) Maximum 45°C (113°F)
<b>Inlet Pressure</b>	Maximum 10 bar (145 psi)
<b>Outlet Pressure</b>	Can be returned to pressure, provided minimum flow requirement is achieved.
<b>Flow Rate</b>	Minimum 20 L/H Recommended 25 L/H
<b>Filtration</b>	100 microns (µm)
<b>Viscosity</b>	Maximum 10 cSt
<b>Breather</b>	Must be to atmospheric pressure.
<b>Power</b>	115-230VAC 50-60Hz, Max 500VA

## Installation Requirements

<b>Location</b>	Unit must be located out of direct wind sun and rain.
<b>Ambient Temperature</b>	+5 to +40 °C
<b>Ambient Humidity</b>	0-95% RH, non-condensing.

## Control System

<b>Control System</b>	Based on fan-less industrial PC with solid state hard drive.
<b>Graphical User Interface (GUI)</b>	17" armoured glass touch-screen. The GUI is used to program the unit and display current and historical analyser results and alarm status.
<b>Language</b>	User-selectable multilingual display.

## Certification

<b>Hazardous Area Certification</b>	Exd certified to ATEX, IECEx, UKEx, TIIS, and EACEx standards, suitable for zone 1 or zone 2 use in gas groups IIA, IIB, or IIB+H2, with a variable T-rating depending upon application. It is also ETL listed for the USA and Canada Class 1, Div 1, groups B,C,D.
<b>IP Ratings</b>	Tested and certified to IP66/IP67 (dust tight and protected from temporary total immersion in water).

## Specification

<b>Measuring Range</b>	Adjustable down to -100°C (-148°F)
<b>Repeatability</b>	Equal to or better than repeatability criteria of the relevant test method.
<b>Cycle Time</b>	Typically 5-10 minutes.

## Inputs/Outputs

<b>Analog Outputs</b>	2 x 4-20mA (active) isolated outputs provided as standard for:  <b>Freeze point</b> or <b>cloud point</b> result (analysis mode dependant), and optionally also <b>pour point</b> result.
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<b>Digital (Contact) Inputs</b>	<b>Run / Standby:</b> reads a customer supplied latching switch to toggle between run and standby modes.
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**Remote Cal:** reads a customer supplied momentary switch to remotely initiate a calibration cycle.

**Remote Val:** reads a customer supplied momentary switch to remotely initiate a validation cycle.

<b>General Fault Alarms</b>	Alarm limits can be configured for monitored conditions, and set to be Fatal, Warning, or Inactive. Active alarms are notified on screen and stored in the alarm history table.
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<b>Digital (Contact) Outputs</b>	<b>Fatal Alarm (NC):</b> a general fault alarm that causes the analyser to suspend its operation when triggered.  <b>Warning Alarm (NC):</b> a general fault alarm for notification only.  <b>New Result (NO):</b> a variable-length momentary contact to notify that a new analyser result is available.  <b>Data Valid (NO):</b> indicates that the analyser is currently running on a process stream, and that data is valid. As opposed to when in standby, or when in Cal. or Val. modes.
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**Cal/Val (NO):** indicates that the analyser is currently in Cal/Val mode.

**Spill Alarm (NC):** an alarm contact that triggers if a leak is detected in the analyser enclosure.

All contact ratings are 24VDC 0.5A, 230VAC 1A

<b>Digital (Signal) Outputs</b>	<b>Calibration Valve:</b> provides a 24VDC signal to an external solenoid valve to switch between process and calibration samples.
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<b>Analog Inputs</b> Set of 4x inputs (optional)	The analyser can optionally read up to four 0-10V or 4-20mA active signals. These input values can each have high/low alarm levels associated with them to trigger either of the analyser's general fault alarms.
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<b>Digital (Contact) Inputs</b> Set of 4x inputs (optional)	The analyser can optionally monitor up to four volt-free external contacts or customer alarms. These contacts may also be included in the analyser alarm table to trigger the general fault alarms.
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<b>Communications</b>	Modbus RTU or OPC over RS485 or Ethernet (TCP/IP), with optional fiber optics. Optional OPC server software.
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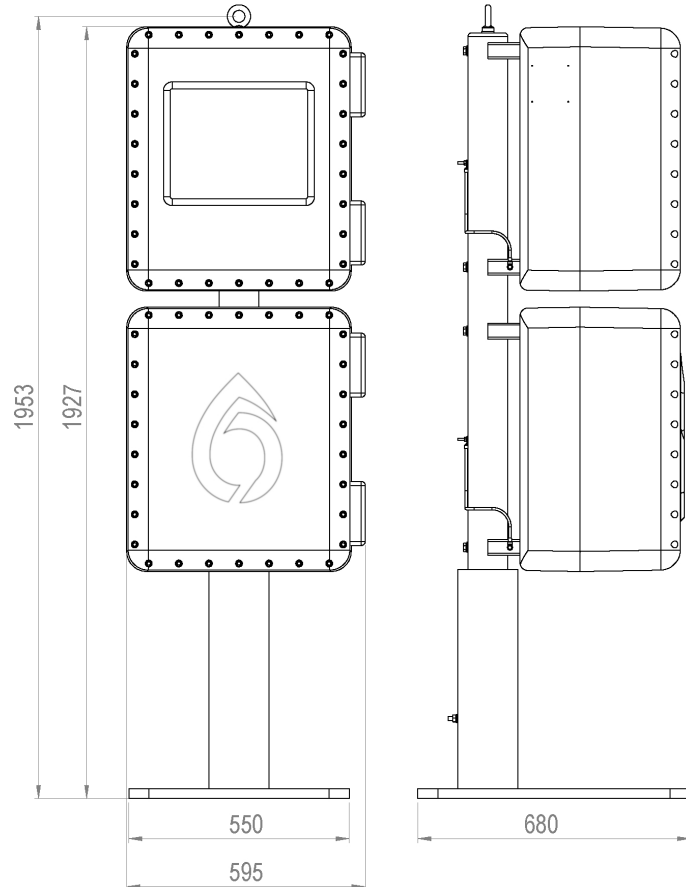
# Dimensions & Weights

## Notes:

All dimensions in mm

Unpacked weight approx. 420kg

Packed weight approx. 527kg



*Note: Icon Scientific products are subject to a program of continuous development and improvement and specifications are liable to change without notice. Please check that you have the latest information available before relying on any specification.*