HONE *Cloudar*

Analytical Technology & Control Limited

MEASURES THE CLOUD POINT OF PETROLEUM PRODUCTS

The Model 4200 Cloudar is a completely automatic process stream analyser for measuring cloud point The analysis is performed in accordance with ASTM D 2500 / IP219.

TYPICAL APPLICATIONS

- Product blending
- Middle distillate monitoring

The Hone Cloudar is built under licence from Compagnie Française de Raffinage.

PRINCIPLE OF OPERATION

The Cloudar duplicates, on a continuous basis, the standard laboratory test for measuring the cloud point of petroleum oils (IP219, ASTM D 2500).

A test cell is filled with sample and cooled at a controlled rate until an optical detector senses the formation of a wax cloud. The temperature reading is displayed by the microprocessor system which also provides an isolated 4 - 20 mA analogue output.

On completion of each test cycle, the cell is flushed with fresh sample and, after a short settling time, the cloud point analysis is repeated. Typical cycle times for the analyser are 4 to 8 minutes.

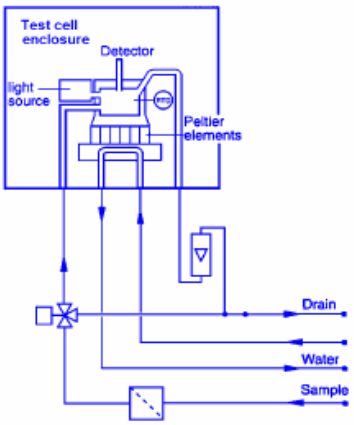
Cloud point test cell
The test cell uses a light source mounted at right angles to a photo detector which responds to light reflected from the forming wax cloud.

The use of a reflective principle offers considerable advantages over directly transmitted light, since it is easier to detect small increases of light against a dark background enabling it to respond more readily to cloud formation. The sensitivity of the optical system allows precise cloud point measurement to be made on samples containing appreciable amounts of dissolved water, as well as on samples that contain additives which depress plug points by altering the characteristics of the wax cloud particles.

Control system
The analyser incorporates a microprocessor based control system which controls the valve sequence timing and cooling rate, as well as implementing cloud point detection, status reports and output scaling.

Sample flush time
The time taken to flush the test cell with fresh sample is variable from 0 - 255 seconds.

Settling time
The time allowed for the sample to settle in the cell before commencement of the cooling sequence is variable from 0 - 255 seconds.



ONE OF THE ATAC RANGE OF PROCESS ANALYSERS

Cooling sequence
The analyser operates two cooling rates to reduce the analysis time. During the first cooling cycle, a cooling rate of 5°C / min is used to establish a rapid approximate cloud point. On subsequent cycles, this rapid rate is used until the temperature is 3°C above the last cloud point. The cooling rate is then changed to 1°C / min until a precise cloud point is established.

Cloud point detection
The cloud point sensor and temperature sensor outputs are both read into the microprocessor system. The cloud point detection is based on the rate of change in the cloud point sensor output. This ensures that the cloud point detected is independent of any initial reflectance.

Output scaling
The microprocessor scales the temperature into an isolated 4 - 20 mA output which is preset to individual requirements within a range - 32°C to + 32°C.

Status reports
At all times, the Cloudar informs the operator of analyser status via an in-built 28 digit alphanumeric display.

Three items of information are continuously displayed:

- The sequence or error status of the analyser.
- The current value of the sequence timer or the cloud point sensor output.
- The current cell temperature and the last cloud point.

An error state is notified by a flashing display.

The sequence states are indicated on the LED display as follows:

FLUSH
SETTLE
COOL
STROBE

The error states are:

STANDBY
BULB FAIL
COOLER FAIL
FLUSH ERROR
RANGE LOW
RANGE HIGH
DELTA LOW
DELTA HIGH
TIME-OUT
EXT. 1
EXT. 2

SPECIFICATION

Analyser performance

Range	-32°C to +32°C.
Span	48°C Max.
Repeatability	± 0.5°C.
Accuracy	Better than or equivalent to laboratory test.
Cycle time	4 - 8 mins typical.

Output signal

Range	4 - 20 mA fully isolated.
Load impedance	700 ohms maximum connected load.

Volt free contacts for alarm condition rated 0.5 amps at 250V AC.

Typical alarms	2 external Cooler fail Low flow Out of range

Sample conditions required at inlet

Pressure	0.5 to 1 bar g.
Temperature	≥ 14°C above maximum expected cloud point 45°C maximum.
Flow	15 to 25 litres/hr free of water and entrained solids.

Sample conditioning
Complete systems can be supplied to pre - condition process sample to the conditions required at analyser inlet. Sample recovery systems can be supplied.

Sample disposal
The analyser sample outlet must be connected to a system which is at atmospheric pressure. Sample recovery systems can be supplied.

Analyser vent
The analyser must be vented to atmosphere.

Utility requirements

Power supply

Voltage	110 / 120V or 220 / 240V ac. Voltage to be ± 10% of specified voltage.
Frequency	50 or 60 Hz
Consumption	400 VA max.

Cooling water

Temperature	25°C Max.
Pressure	0.1 bar g.
Consumption	20 litres/hr.

Local display
A 28 character alphanumeric LED display provides signal and diagnostic information. Standard display is in English language.

Standard connections

Sample in	¼" API (female)
Drain and vent	½" API (female)
Cooling water	½" API (female)
Power and signals	M20

Explosion protection
The analyser is ATEX certified
Ex II 2G EEx d IIB T5 (T_{amb} +55)
for use in zone 1 hazardous areas.
Certificate no. DEMKO 03 ATEX 135888

Environmental protection
Whilst the analyser is weatherproof to IP55 and will operate in ambient temperatures within the range +5°C to +35°C, a weatherproof shelter is strongly recommended.

Dimensions and weight

Height	1750 mm
Width	650 mm
Depth	330 mm
Weight	160 Kg

Options
- Multi-stream applications.
- Automatic calibration sample injection.

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For further information contact :-

ATAC Analytical Technology & Control Limited

Unit 6, Redlands Centre,
Coulsdon, Surrey, CR5 2HT,
England.
Telephone:+44 (0)208 763 9494
Fax:+44 (0)208 763 9540
E-mail:atac@atacuk.com