NEW

CFPP
COLD FILTER PLUGGING POINT
PROCESS ANALYZER

BARTEC BENKE

PROCESS ANALYZERS

CFPP PROCESS ANALYZER

Norms and standards

- DIN EN 116 (former DIN 51428)
- EN 116 / BS 6188 (former IP 309)
- ASTM D 6371

Application

When paraffinic hydrocarbons, which may form part of distillate fuels, are cooled, n-paraffines come out of solution by forming wax crystals due to limited solubility of the fluid. The highest temperature at which the fuel, when cooled under defined conditions, will not flow through a filter of a defined wire mesh within a certain time, is called cold filter plugging point (CFPP). It indicates the low temperature operability of fuels with / without flow improver additives when cooled below the cloud point (CP) temperature.

Blending of middle distillate fuels with flow improver additives changes the crystalline structure and the coalescence (size) of the n-paraffines. This effect cannot be measured by determining the CP (extinction in a light path resulting from the amount of crystallized paraffines). The CFPP is a measurement more directed to “end use” applications (filter clogging), than to measure the pour point as a characteristic of the low temperature behavior of fuel oils.
CFPP – between CP and solidification point (pour point) – is not a directly measurable physical quality / performance characteristic. The method is based on reference values obtained from a defined identical test procedure. The CFPP measurement is often combined with the determination of the CP, giving a better control of the base blend. Knowledge of CP temperature permits a reduction of the measurement cycle time by starting the measurement at temperatures that are a few degree above CP.

Special features

- visible function cycles by using a measuring cell made of plexiglass / glass
- no paraffin – adhesions on test sieve by flushing with preheated sample
- no correlative measurement, but exact reconstruction of cycles as described in DIN EN 116
- identical test sieve as used in laboratory method

Procedure

The sample is filled into a standard measuring cell, where it is cooled to a pre-set temperature. By means of a vacuum, the sample is then sucked through a filter of defined dimensions and filter mesh. It has to reach a light barrier within 60 seconds. If the sample has reached the light barrier, the measurement cycle ends. The sample then flows back to the measurement cell where it is cooled further by 1 °C before the next cycle starts. After each signal generated by the light barrier, it is checked whether the entire sample volume flows back to the cell or not. In case not, the paraffin crystals have already started to block the sieve. At this stage the temperature in the cell is measured. This temperature is defined as CFPP. The explosion protected mechanical cooler (two-stages) reaches temperatures as low as – 67°C. Reproducibility and repeatability are equal to or better than the limits indicated in the standards.

The complete analysis procedure is controlled, monitored and visualized by the PACS (Process Analyzer Control System) software. It offers a user interface for local analyzer operation.

At the end of the analysis cycle, in addition to the standard analog 4 - 20 mA CFPP signal, a digital output signal can be generated (programmable). During the analysis, an optional, galvanically separated 4 - 20 mA signal can also be used. As an alternative, a MODBUS interface is available as an option, which also allows a direct control of the anlalyzer from the DCS.

In case remote access to the CFPP analyzer is demanded, it can be equipped with a remote access interface (e.g. Modem, ISDN) for service and maintenance purposes.

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CFPP Process Analyzer	
Analyzer type	CFPP-4
Method	DIN EN 116; ASTM - D 6371
Measurement range	Please specify
Reproducibility	≤ DIN EN 116; ASTM - D 6371
Repeatability	≤ DIN EN 116; ASTM - D 6371
Measurement cycle	Discontinuous 25 .. 90 min (according to standard procedure)
Ambient temperature	5 .. 40°C
Ambient humidity	Max. 70%, non – corrosive
Sample at analyzer inlet	
General conditions	Filtered (≤ 10 micron), dry (humidity max. 2000 ppm)
Flow rate	20 .. 40 l/h
Pressure	1 .. 3 bar
Inlet temperature	According DIN EN 116 and ASTM - D 6371
Outlet / vent	Open to atmosphere
Utilities	
Instrument air (inlet)	See *Specification of purged electronic housing*
Power supply	See *Specification of purged electronic housing*
Electrical signals	
Output signals	1 x 4 – 20 mA, 800 Ω; additional outputs on request
System alarm	Digital output / potential-free
Ready contact	Digital output / potential-free

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Options	
Automatic validation request	Digital input
Analyzer reset	Digital input
MODBUS	RS485 / RS422 or fibre optical interface
Remote access interface	Modem (V 90 analog) or ISDN
Product selection (summer / winter)	Digital input
Out of range	Digital output
Chiller alarm	Digital output / potential-free
Communication	
Display	Colour LC Display 800 x 600 Pixel:
Keyboard	Virtual keyboard, operated via mouse in the front door panel
Software	MS Windows 2000, Process Software, optional Remote Control Software
Explosion protection	
Protection type	II 2 G EEx pdem [ib] IIB T3 (Option II 2 G EEx pdem [ib] IIB + H2 T3)
Test certification number	TÜV 02 ATEX 1794
Standard connections	
Tube fittings	6 / 12 / 18 mm metric SWAGELOK
Cable entries	M20 x 1,5 / M25 x 1,5
Weight	Approx. 300 kg
Dimensions (L x D x H)	1120 x 800 x 2020 mm (see dimensional drawing)

Important Notice: Analyzer is subject to continuous product improvement, specifications may be subject to change without notice.

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Specification of the air purged electronic housing	
System type	PAGS 96-1 (Process Analyzer Housing System)
Version number	96 0200
Protection type	II 2 G EEx p II T4
Test certification number	TÜV 96 ATEX 1132X
EC – identification number	0032
Housing volume	Approx. 200 dm^3
Dimensions (L x D x H)	515 x 470 x 800 mm
Protection class	IP65 (with a Vortex chiller IP54)
Power supply	230 VAC/50Hz and 400 VAC/3phs (standard); or to be specified by user
Power consumption	Approx. 2 kW (analyzer approx. 600 W / chiller approx. 1000W)
Maximum power loss	515 W
Ignition prevention gas	Instrument air (free of water, oilfree)
Instrument air (inlet)	2 .. 5 bar (for EEx p system) 4 .. 5 bar (for valves) Dewpoint ≤ - 40°C (humidity class 2 or better acc. to ISO8573.1)
Housing overpressure	3 .. 4 mbar (operating pressure inside)
Shut down pressure	0,8 mbar (lower limit of operating pressure inside)
Instrument air consumption	Min.1,4 Nm^3 per flushing cycle (7 x housing volume) in operating mode only leak-compensation

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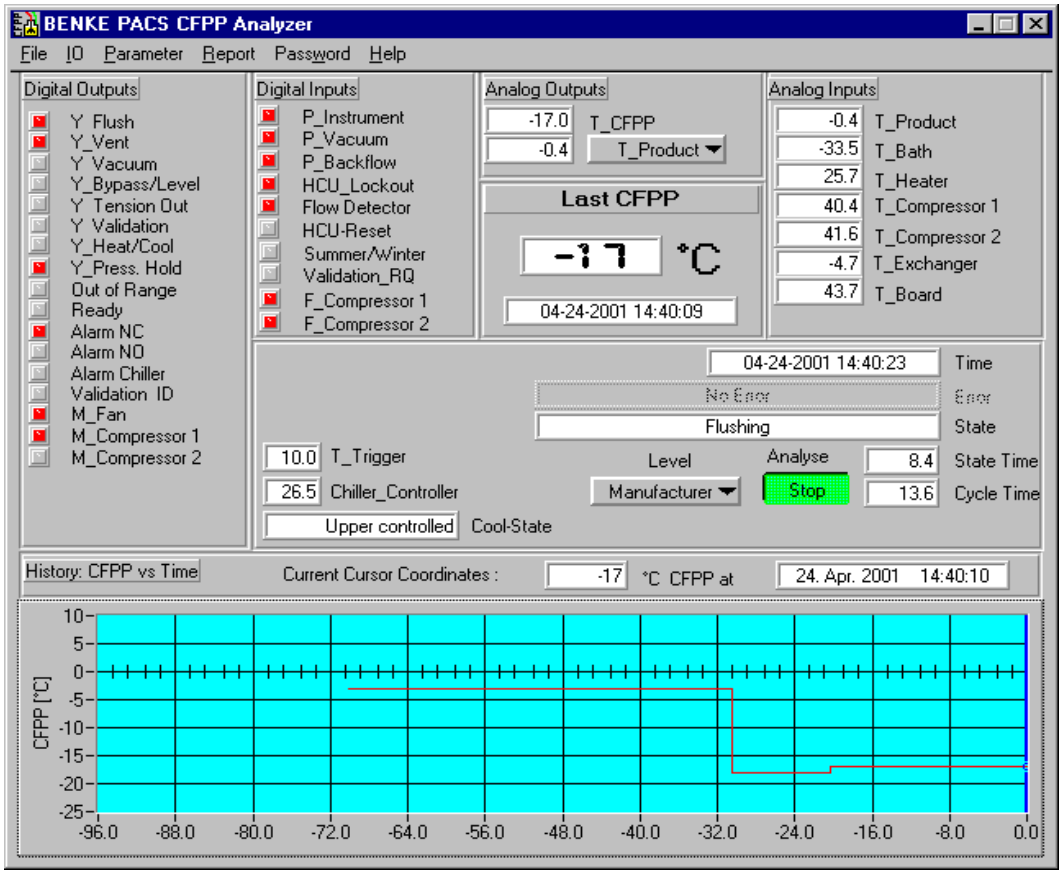

Figure 1: Main panel of process software

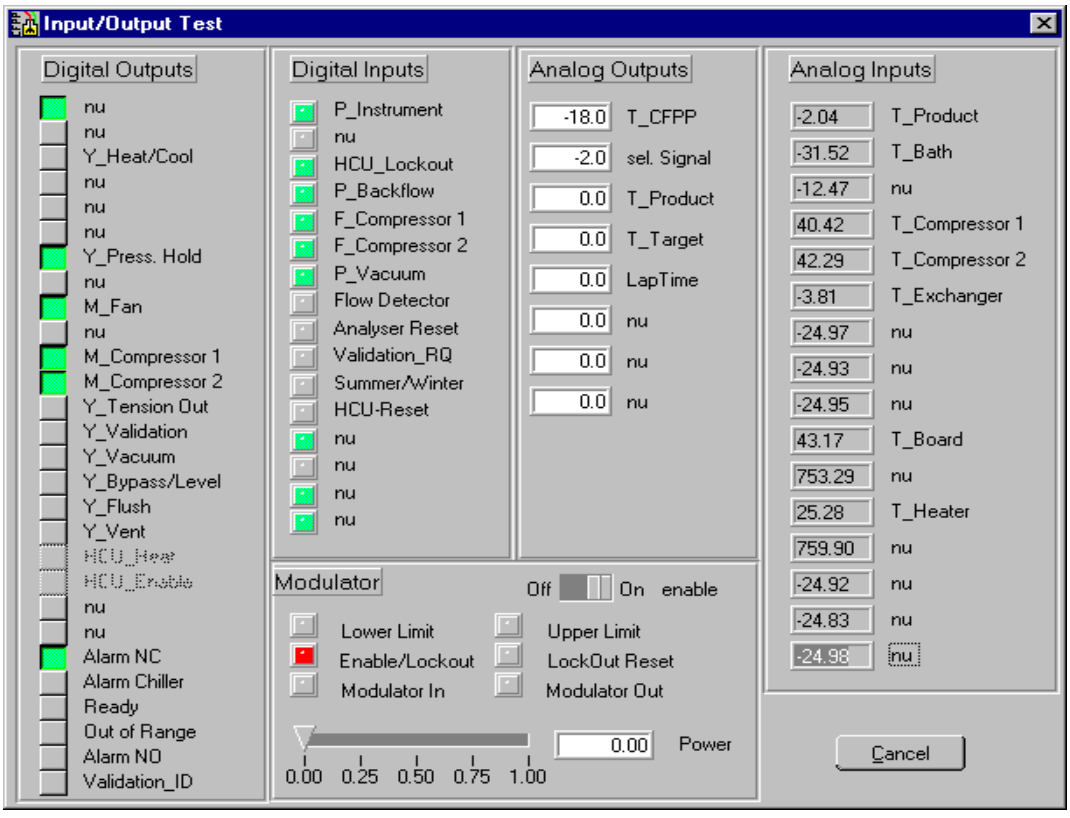

Figure 2: Status of analog and digital In- and Outputs

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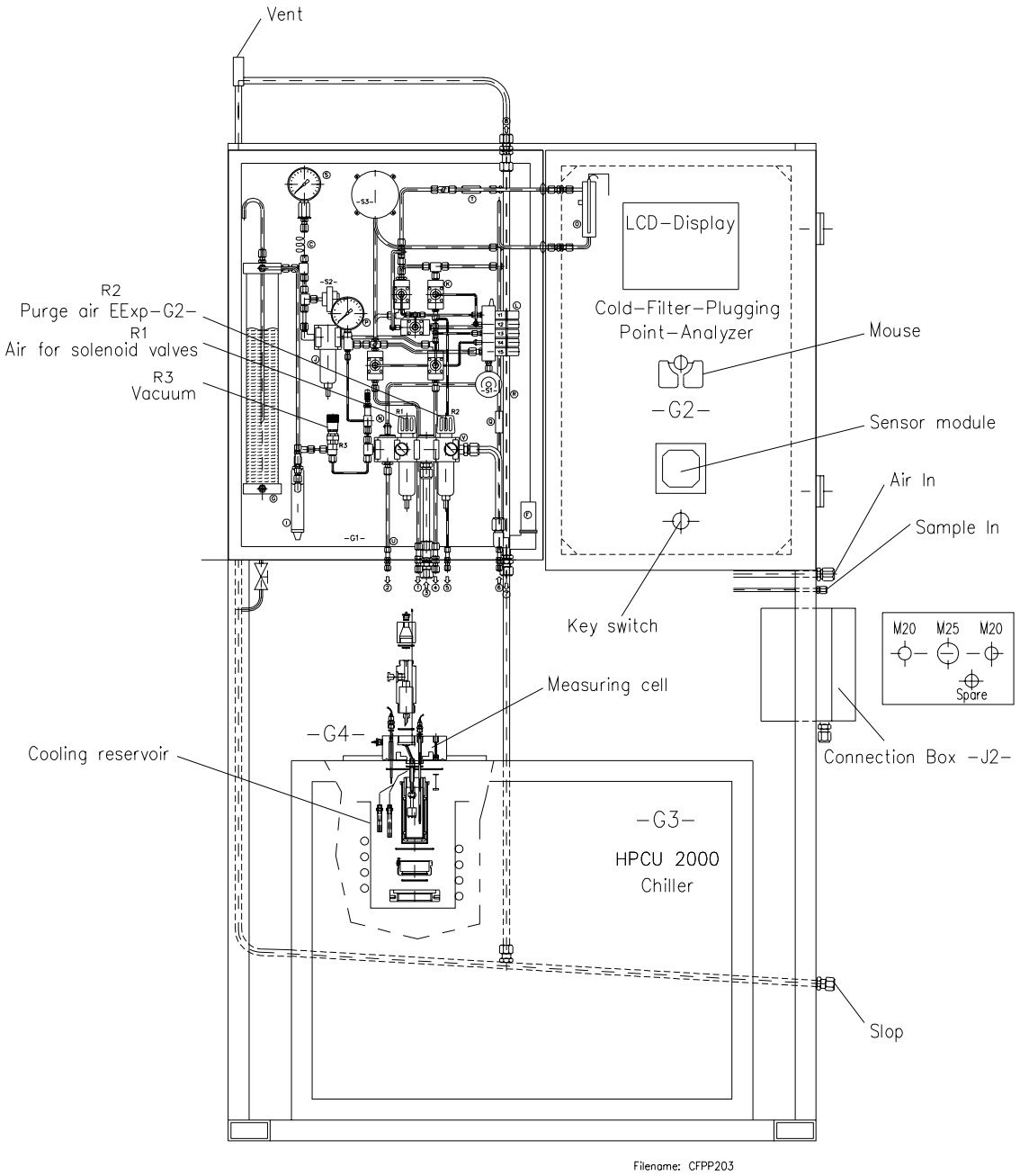

Figure 3: Examplary layout drawing of the analyzer

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