



*Process Analyzer*  
**Viscosity Index Process Analyzer VI-4**

Credible Solutions for the Oil and Gas Industry

# Viscosity Index Process Analyzer VI-4

# Process Analyzer

To remain competitive, today's refiners must employ all optimization and product control techniques available. The use of online physical property analyzers is one of the key features to reach those objectives because they measure important quality properties in the process directly.

All fluids that fulfil the conditions of Newton's friction law are referred to as Newtonian fluids. Their viscosity is a material constant, which is only dependent on pressure and temperature. The viscosity index is a widely used and accepted measure of the variation in kinematic viscosity due to changes in the temperature of a petroleum product between 40 and 100°C. A higher viscosity index indicates a smaller decrease in kinematic viscosity with increasing temperature of the product.

**BARTEC BENKE**

Your partner  
for innovative  
system solutions.



The BARTEC BENKE specialists have many years of experience. They create system solutions that you can rely on: efficient and dependable for decades to come.

**The only ASTM compliant viscosity index analyzer**

**Kinematic viscosities directly and continuously measured**

**Integral measurement of density**

**Integral calculation of viscosity index**

**Unparalleled temperature stability of  $\pm 0.02$  K**

**Hagenbach correction not necessary**

**No maintenance approach (no oil baths, no pumps)**

**Network and fieldbus communication**

## **APPLICATION**

The BARTEC BENKE Viscosity Index Process Analyzer VI-4 consists of two viscosity process analyzer units. One analyzer unit measures the kinematic viscosity at a temperature of 40°C and the other at a temperature of typically 100°C. These two values are used to calculate the VI according to ASTM D2270.

Due to the outstanding performance and sample temperature stability of  $\pm 0.02$  K the VI-4 is the best choice for highly accurate viscosity index measurements e.g. lube oil production and fuel oil blending. This high level of accuracy results in cost reduction while improving product quality. The VI-4 is suitable to handle samples with a viscosity of up to 800 cSt at measurement temperatures of up to 100°C.

**Special Features:**

- **Direct and continuous measurement of kinematic viscosity** therefore direct comparison with laboratory results without any need for conversion
- **Integral measurement of the density** therefore calculation and display of the dynamic viscosity
- **Minimized maintenance requirements** due to temperature control and insulating system without oil bath/pumps
- **Compliance of the temperature stability ( $\pm 0.02$  K)** as defined in standard ASTM D445
- **Necessity of Hagenbach correction is eliminated**
- **Multi-stream capability**
- **Automatic rinsing and draining option**
- **Integrated failure diagnosis and self monitoring**
- **No atmospheric drain required,** backpressure at analyzer outlet permitted (depends on application)
- **Available communication interfaces:**
  - Modbus/RTU, Modbus/TCP (bidirectional)
  - Remote access via Ethernet (VDSL or FOC is)
- **Validation report for quality assurance**
- **Freely programmable digital and analog inputs**

**Norms and Standards:****Compliant with:**

- **ASTM D2270**
- **ASTM D341**

Make your decision for a strong partner!

Choose **BARTEC GROUP** also for:

- **Fast Loop Systems**
- **Sample Conditioning Systems**
- **Validation Systems**
- **Recovery Systems**
- **Chillers**
- **Air Conditioning Systems/HVAC**
- **Pre Commissioned Analyzer Shelters/  
Turn-Key Solutions**



## EXPLOSION PROTECTION

<b>Marking</b>	ATEX: II 2 G IIC T4 or T3 Gb NEC 500: Class I, Div. 2, Groups B, C, D, T4 or T3 NEC 505: Class I, Zone 1, AEx IIB+H2 T4 or T3 CEC Sec. 18: Class I, Zone 1, Ex IIB+H2 T4 or T3 TR CU Certification available
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## TECHNICAL DATA

<b>Technology</b>	continuously analyzing kinematic viscosities at 40°C and 100°C, capillary-type
<b>Method</b>	compliant with: ASTM D445, ASTM D2270, ASTM D341, DIN EN ISO 3104, IP 71
<b>Measuring range</b>	viscosity index 80 to 120 (other temperatures on request)
<b>Measuring cycle</b>	continuous
<b>Product streams</b>	2 x sample, 1 x validation (additional hardware required)
<b>Electrical data</b>	
<b>Nominal voltage</b>	230 VAC ± 10 %, 1 phase; 50 Hz; other ratings on request
<b>Maximum power consumption</b>	approx. 1000 W
<b>Protection class</b>	IP 54 (NEMA 13)
<b>Ambient conditions</b>	
<b>Ambient temperature</b>	operation 5 to 40°C (41 to 104°F) storage 0 to 60°C (32 to 140°F)
<b>Ambient humidity</b>	operation 5 to 80 % relative humidity, non-corrosive storage 5 to 85 % relative humidity, non-corrosive
<b>Sample Quality</b>	t filtered 10 µm, bubble-free v filtered 50 µm, bubble-free max. viscosity 800 cSt at the lowest temperature (technical clarification required) (sample as coolant ≤ 10 cSt)
<b>Consumption</b>	3.8 to 10 l/h (depends on variant)
<b>Pressure at inlet</b>	3 to 14 bar (43.5 to 203 psi)
<b>Temperature at inlet</b>	50 to 60°C; changes ≤ 0,1 K/min
<b>Utilities</b>	
<b>Instrument air Consumption</b>	
Purge	11 Nm <sup>3</sup> /h while purging (~16 min)
Operation	approx. 1 Nm <sup>3</sup> /h
<b>Pressure at inlet</b>	3 to 7 bar (43.5 to 101.5 psi)
<b>Quality</b>	humidity class 2 or better acc. to ISO 8573.1

<b>Coolant Consumption</b>	sample as coolant: 20 to 40 l/h or plant cooling water: 10 to 30 l/h for re-cooling of peltier device
<b>Temperature</b>	5 to 50°C (41 to 122°F)
<b>Pressure at inlet</b>	2 to 7 bar (29 to 101.5 psi)
<b>Quality</b>	filtered 50 µm

## Signal outputs and inputs

<b>Analog outputs</b>	viscosity index (others on request)
<b>Digital outputs</b>	Alarm, Ready/Valid
<b>Digital inputs</b>	Validation Request, Reset

## Electrical data of signal outputs and inputs

<b>Analog outputs</b>	max. 8 (4 to 20 mA; 1000 Ω) active isolated on request
<b>Digital outputs</b>	24 VDC; max. 0.5 A
<b>Digital inputs</b>	high: 15 to 28 VDC / low: 0 to 4 VDC
<b>Auxiliary power supply output</b>	24 VDC; max. 0.8 A

## Control unit

<b>Central control unit</b>	Industrial PC
<b>Operating system</b>	Windows Embedded Standard 7®
<b>Control software</b>	PACS

## User interfaces

<b>Display</b>	TFT display with touch function 1024 x 768 pixel
<b>Keyboard</b>	virtual keyboard, controlled via TFT display with touch function

## Connections

<b>Tube fittings</b>	Swagelok® 6 mm/12 mm/18 mm other fittings on request
<b>Vent/Drain</b>	open to atmosphere backpressure on request

## Weight and dimensions

<b>Weight</b>	approx. 250 kg
<b>Dimensions (W x H x D)</b>	approx. 1190 x 1930 x 710 mm
<b>Space requirements</b>	right: 150 mm / left: 100 mm

## Optional interfaces

<b>Analog outputs</b>	on request
<b>MODBUS interface</b>	MODBUS/RTU via RS485 or RS422 or FOC is, MODBUS/TCP via FOC is
<b>Remote access</b>	via Ethernet (VDSL or FOC is)

**Important notice** VI-4 is subject to continuous product improvement, specifications are preliminary and may be subject to change without notice. If your technical data do not comply with existing data, please contact us for technical clarification.