



**ASTM compliance**

**Capillary type viscometer**

**Kinematic viscosity directly measured**

**Calculation of dynamic viscosity**

**Hagenbach correction not necessary**

**ATEX certified**

**Customized solutions**

**Network and Fieldbus communication**



*Process Analyzer*  
**Viscosity Process Analyzer VISC-4**

# Viscosity Process Analyzer **VISC-4**

## Application

The BARTEC BENKE Viscosity Process Analyzer (VISC-4) is a **continuously** kinematic viscosity measuring capillary analyzer suited to measure the viscosity of a product. The VISC-4 operates online. It serves to monitor/maintain product quality for the in-spec production of mineral oil products.

Three basic variants are available:

measuring temperature 20 to 60°C (68 to 140°F)

measuring temperature 41 to 60°C (106 to 140°F)

measuring temperature 61 to 100°C (142 to 212°F)

Each variant available with following measuring ranges:

viscosity 0.7 to 30 cSt

viscosity 10 to 500 cSt

**BARTEC BENKE**

YOUR competent  
partner for  
safe plants



The specialists  
from BARTEC  
BENKE have  
many years  
of experience in  
plant safety.  
They create  
solutions which  
you can rely on:  
economical,  
reliable and  
for the future.

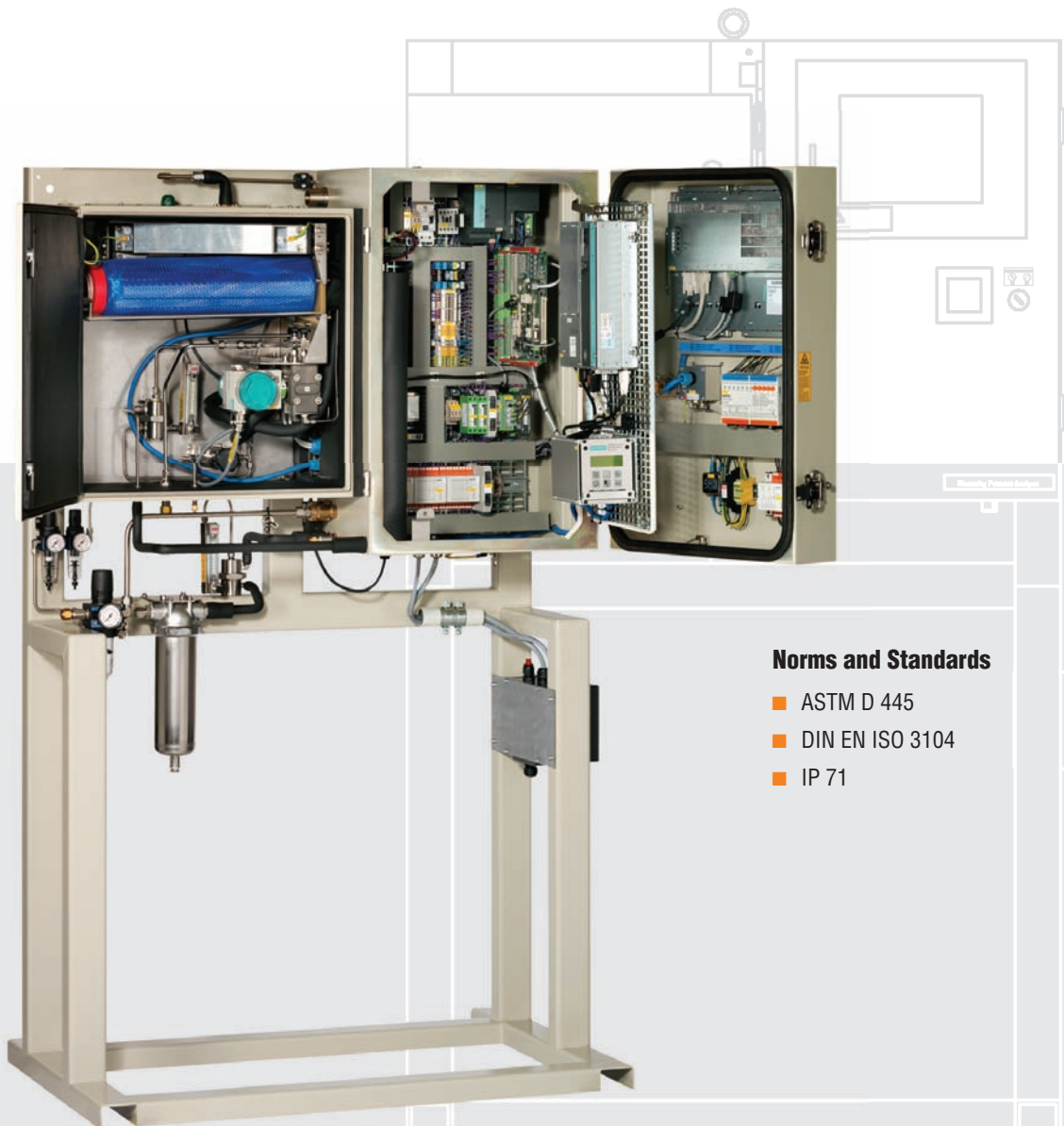
## Special Features

- Direct and continuous measurement of kinematic viscosity
- Direct comparison with laboratory results without any need for conversion
- Integral measurement of the density
- Calculation and display of the dynamic viscosity
- Temperature control and insulating system without oil bath/pumps
- Minimized maintenance requirements
- Compliance of the temperature stability (0.02 K) as defined in standard ASTM D 445
- Necessity of Hagenbach correction is eliminated
- Multi-stream capability
- Automatic rinsing and draining facility
- Integrated failure diagnosis and self monitoring
- No atmospheric drain required, backpressure at analyzer outlet permitted
- Single-Phase Power Supply
- Wide range of acceptable sample- and coolant temperature at analyzer inlet
- Available communication interfaces:
  - Modbus/RTU, Modbus/TCP (bidirectional)
  - Remote Access via modem, ISDN, LAN, VPN

Make your decision for a strong partner!

**Choose BARTEC BENKE** also for

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



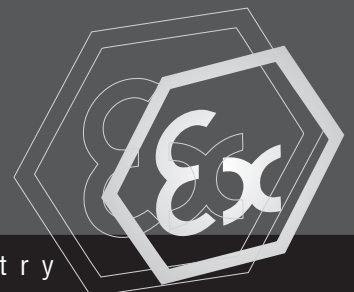
#### Norms and Standards

- ASTM D 445
- DIN EN ISO 3104
- IP 71

#### Method

The value of kinematic viscosity results from the product of the measured passage time and the device constant of the capillary:  $v = C * t$ . As viscosity is highly dependent on the temperature, the temperature of the liquid during the measurement has to be regulated precisely with minimum variation (0.02 K in accordance with ASTM D 445). For a continuous determination of the viscosity of a liquid during the production process the liquid is controlled in viscometers through a capillary. From the mass flow rate through the capillary and from the pressure drop over the length of the capillary, the current value of the kinematic viscosity of the liquid is ascertained by applying the law of Hagen-Poiseuille.

Note: Illustrations of this brochure show an exemplary VISC-4 analyzer.



## Viscosity Process Analyzer VISC-4

### Explosion protection

<b>Ex protection type</b>	II 2G IIC T3 or T4 depending on $T_M^*$
<b>Certification</b>	TÜV 09 ATEX 554794
<b>CSA certificate no.</b>	pending

### Technical data

<b>Type and method</b>	continuously analyzing kinematic viscosity, capillary-type according to ASTM D 445, DIN EN ISO 3104, IP 71
<b>Measuring temperatures and ranges (variants)</b>	L $T_M$ : 20 to 60 °C (68 to 140 °F) M $T_M$ : 41 to 60 °C (106 to 140 °F) H $T_M$ : 61 to 100 °C (142 to 212 °F) t viscosity 0.7 to 30 cSt v viscosity 10 to 500 cSt
<b>Repeatability</b>	formulated oils: typ. 0.03 cSt at 100 °C
<b>Reproducibility</b>	≤ DIN EN/ASTM
<b>Product streams</b>	2 x sample, 1 x validation (additional hardware required)
<b>Electrical data</b>	
<b>Nominal voltage</b>	AC 230 V ± 10 %, 1 phase; 50 Hz other ratings on request
<b>Maximum power consumption</b>	approx. 500 W
<b>Protection class</b>	IP 54, (NEMA 12)
<b>Ambient conditions</b>	
<b>Ambient temperature</b>	operation 5 to 40 °C (41 to 104 °F)
<b>Ambient humidity</b>	operation 5 to 80 % relative humidity, non-corrosive
<b>Sample</b>	
<b>Quality</b>	filtered 10 µm, bubble-free
<b>Consumption/flow rate</b>	3.8 to 10 l/h (depending on variant)
<b>Pressure at inlet</b>	min. 3 to max. 14 bar (depending on variant)
<b>Temperature at inlet</b>	typically above $T_M - 40K$ below $T_M + 10K$ depending on application
<b>Utilities</b>	
<b>Instrument air</b>	
<b>Consumption</b>	min. 1.4 Nm <sup>3</sup> per flushing cycle during start-up (7x housing volume) ≈ 1 Nm <sup>3</sup> /h in normal operating mode
<b>Pressure at inlet</b>	3 to 6 bar
<b>Quality</b>	class 2 or better according to ISO 8573-1

\* $T_M$  = measuring temperature

**Important notice** VISC-4 is subject to continuous product improvement, specifications are preliminary and may be subject to change without notice.

### Signal outputs and inputs/harwired interface

various analog and digital signals available;  
to be specified, see options

### Electrical data of signal outputs and inputs

<b>Analog outputs</b>	2 x 4 to 20 mA 800 Ω out; active isolated on request
<b>Digital outputs</b>	DC 24 V; max. 0.5 A
<b>Digital inputs</b>	high DC 15 to 28 V low DC 0 to 4 V
<b>Auxiliary power supply output</b>	DC 24 V, max. 0.8 A

### Control unit

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

### User interfaces

<b>Display</b>	TFT display with touch function 800 x 600 pixels
<b>Keyboard</b>	virtual keyboard, controlled via TFT display with touch function

### Connections

<b>Pipe fittings</b>	Swagelok® 6 mm/12 mm other fittings on request
----------------------	--

### Weight and dimensions

<b>Weight</b>	approx. 250 kg (without options)
<b>Dimensions (W x H x D)</b>	approx. 1190 x 1930 x 710 mm
<b>Space requirement</b>	right: 150mm/left: 100mm

### Optional signal outputs and inputs

<b>Digital outputs</b>	alarm, ready, indication of active stream, indication of validation cycle, indication of rinsing/draining cycle
<b>Digital inputs</b>	activation of a stream, activation of a validation cycle, analyzer reset
<b>Analog outputs</b>	max. 3 of the following process variables can be selected: kinematic viscosity, dynamic viscosity, density, measuring temperature, mass flow rate, differential pressure
<b>MODBUS interface</b>	MODBUS/RTU via RS485 or RS422  or fiber optic cable MODBUS/TCP via fiber optic cable
<b>Remote access</b>	via modem, ISDN, Ethernet via fiber optical or VPN