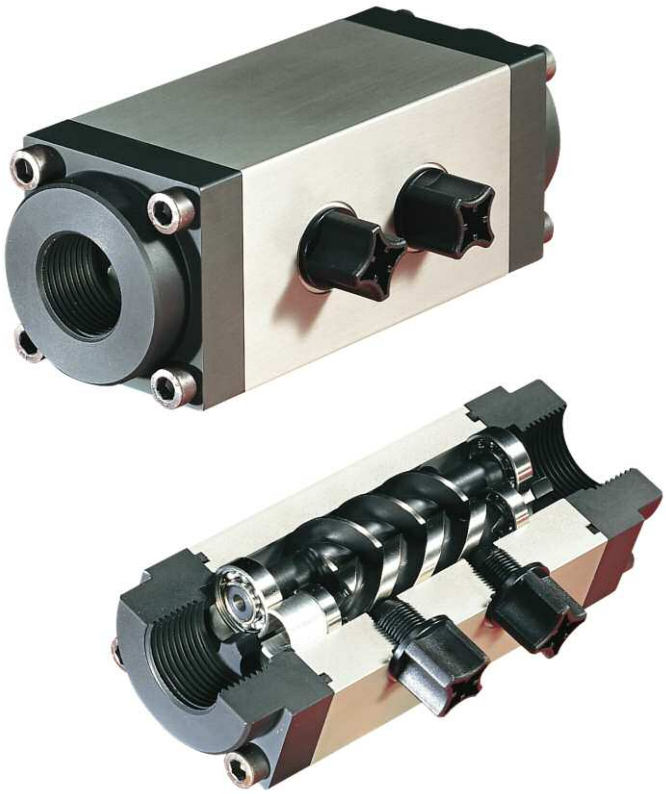
VS-01

Aluminium Screw-Spindle Volume Meter for Viscous Media



- **Cost-effective**
- **Highly accurate**
- **No inflow and outflow lines**
- **Non-sensitive to viscosity**
- **Flange or thread connection**
- **Detection of direction**
- **Optionally with temperature transmitter**

Description: In a robust all-metal housing made of aluminium two steel spindles with a cycloid profile are situated which are set into rotation by the volume of flow being measured. The high precision manufactured spindles are held in a ball-bearing and rotate without noise and pulsations. The pair of spindle forms volumetrically precisely defined measuring chambers which represent a measure for the required volume. The speed of rotation is, therefore, directly proportional to the current value of the flow. A screw-fitted proximity switch located outside the measuring chamber detects the rotational movement of the spindles without contact and transmits it as impulses either in the form of a PNP-3-wire or a NAMUR 2-wire signal. If the VS-01 is equipped with a second proximity switch, the signals from the pick-up are displaced by 90°C to each other, with the result that the direction flow can be detected on the basis of the signal configuration. Thus, forward and reverse flows are identified and, for example, in dosing operations or measurement of consumption the measurements are not falsified. Optionally, the flow body is provided with an additional G1/4" boring which can be used for positioning a factory-mounted temperature sensor. The VS-01 delivers an accurate flow and media temperature of a measuring point and is, therefore, the ideal device for measuring fuel consumption in Otto or Diesel engines.

Range of application: The VS-01 series of screw-spindle volume meters is suitable for accurately measuring media with viscosities of 1 to 1 x10^6 mm^2/s, regardless of their conductivity and their temperature. Also gasoline can be reliably tapped where other flowmeters often pose a problem due to their dependence on viscosity, the hostile properties of the fuel and its low resilience. All versions of the VS-01 have a wide operating range where the smallest flowmeter nearly starts at zero and the largest is capable of handling up to 525 l/min.
The extremely cost-effective material combination of the VS-01 offers a price advantage directly to the user as against gear-wheel volume sensors. With up to processing pressures of 40 bar and media temperatures up to 125°C, the screw-spindle volume meter represents an economical and yet an accurate device to accomplish demanding tasks of measurement safely and with long-term stability.

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Versions:

Size:
The screw-spindle volumeter VS-01 is available in 4 different sizes. the nominal flow rates of these versions are 10 l/min, 30 l/min, 100 l/min and 350 l/min where the connections are DN15, DN20, DN25 and DN40 respectively.

Process connection:
Each size of the VS-01 can be supplied with thread as well as flange connections. Possible thread sizes are G1/2" female, G3/4" female, G1" female and G1 1/2" female. Possible flanges are DN15, DN20, DN25 or DN40, at pressure level PN16 or PN40.

Number and function:
of pick-ups:
The proximity switches that tape the movement of the screw-spindles transmit the measurement either as PNP 3-wire or as NAMUR 2-wire signal. As a standard, the VS-01 are provided with only one such proximity switch. Optionally, a second proximity switch can be mounted that doubles the impulse or detects the direction of flow. The impulse signal of the second sensor is then displaced by 90° as against the first signal with the result that the flow direction is detected on the basis of the sequence of the signals.

Attached temperature sensor:
For measuring the media temperature additionally, a PT100 temperature sensor in 3-wire technologie can also be supplied that can be fixed on the body of the VS-01 through a G1/4" boring.

Ordering codes:

Ordering number:	**VS-01.**	**2.**	**2.**	**11.**	**1.**	**0**

Aluminium Screw Spindle Volume Meter

Size:
1 = nominal flow 10 l/min, DN15
2 = nominal flow 30 l/min, DN20
4 = nominal flow 100 l/min, DN25
5 = nominal flow 350 l/min, DN40

Process connection:
1 = thread connection
2 = flange connection PN16
3 = flange connection PN40

Number and function of pick-ups:
01 = 1 PNP-pick-up
11 = 2 PNP-pick-ups
02 = 1 NAMUR-pick-up
22 = 2 NAMUR-pick-ups
12 = 1 PNP-pick-up and 1 NAMUR-pick-up (on request)

Attached temperature sensor G1/4":
0 = no temperature sensor
1 = with temperature sensor

Special issues:
0 = no special issues
1 = special version, please specify in detailed tex

Technical specifications:

Media: chemically neutral, easily lubricating, non-abrasive

Flow ranges:
VS-01.1: range 0.1 to 15 l/min, nominal flow 10 l/min
VS-01.2: range 0.3 to 45 l/min, nominal flow 30 l/min
VS-01.4: range 1.0 to 150 l/min, nominal flow 100 l/min
VS-01.5: range 3.5 to 525 l/min, nominal flow 350 l/min

Measuring chamber volume:
VS-01.1: 1.65 ml/U
VS-01.2: 6.24 ml/U
VS-01.4: 25.6 ml/U
VS-01.5: 112.8 ml/U

RPM:
VS-01.1: range 61 to 9120 U/min, for nominal flow 6060 U/min
VS-01.2: range 48 to 7260 U/min, for nominal flow 4830 U/min
VS-01.4: range 39 to 5850 U/min, for nominal flow 3900 U/min
VS-01.5: range 31 to 4658 U/min, for nominal flow 3105 U/min

K-Factor:
VS-01.1: 1214 Impulses per litre
VS-01.2: 321 Impulses per litre
VS-01.4: 78 Impulses per litre
VS-01.5: 17.73 Impulses per litre

Millilitre per impulse:
VS-01.1: 0.824 ml/Impulse
VS-01.2: 3.12 ml/Impulse
VS-01.4: 12.8 ml/Impulse
VS-01.5: 56.4 ml/Impulse

Impulse frequency:
VS-01.1: range 2.0 to 304 Hz, nominal flow 202 Hz
VS-01.2: range 1.6 to 242 Hz, nominal flow 161 Hz
VS-01.4: range 1.3 to 195 Hz, nominal flow 130 Hz
VS-01.5: range 1.0 to 155 Hz, nominal flow 104 Hz

Mechanical integration:
Filtration: 0.10 mm mesh width max., VS-01.1
0.10 mm mesh width max., VS-01.2
0.34 mm mesh width max., VS-01.4
0.34 mm mesh width max., VS-01.5
Mounting position: any
Flow direction: bidirectional
Connections: tube thread G
DIN flange
NPT thread (option)
ANSI flange (option)
customer-specific special type connections are possible

Pressure: 40 bar max.

Temperature range: -20°C to +125°C

Viscosity range: 1 to 1×10^6 mm^2/s

Technical specifications:

Materials:
Housing: aluminium, anodized
Spindles: steel nitrified

Bearing: rolling contact bearing (rolling contact bearing steel) with steel cage

Sealing: O-Rings made of Viton

Screws: 8.8

Info:

Operational limits:
The values specified on the rating plate apply. The permissible operational limits of individual values influence each other so that every application is checked individually by the manufacturer when selecting the volumeter. If no operating data are provided by the orderer, standardized substitute operating data are used.

Maximum values:
Specified are the respective maximum values that, however, may not occur simultaneously. In addition, the operational limits of the corresponding end connection, of the sealing material of the pick up and of the temperature sensor are to be observed.

Electrical specifications:

Electrical integration:
Sensor thread: M12x1
Sensors : PNP 3-wire or NAMUR 2-wire
Temp. sensor: PT100, 3-wire, Class B

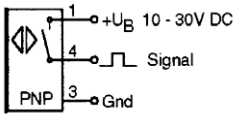
Proximity sensors:
PNP 3-wire: Method of measurement: Hall effect, single
Switching: PNP rectangular signal
Load current: 10 mA max.
Frequency range: 0 to 15 kHz
Voltage: 10 to 30 V DC
Current consumption (without load): ≤ 10 mA
Voltage drop: ≤ 6 V DC
Short circuit- and reverse voltage protection: yes, up to 50°C
Liquid temperature: -40°C to +125°C
Ambient temp.: -25°C to +90°C
Material, housing: 1.4305
Connection type: straight plug with LED (3-pin)
Cable: PUR non halogen (3x0.34 mm²)
Cable length: 3 m
Protection class: IP65

NAMUR 2-wire: Method of measurement: inductive
Switching: NAMUR opener (EN 60947-5-6)
Explosion hazard area
Internal resistance: Ri ≈ 1 kΩ
Nominal voltage: 8.2 V DC
Area with non explosion hazard
Operating voltage: 5 to 25 V DC
Frequency range: 0 to 2000 Hz
Short circuit- and reverse voltage protection: yes

Proximity sensors:
NAMUR 2-wire: Liquid temperature: -25°C to +100°C
Pressure on the front surface: 40 bar max.
Material, housing (dry sleeve): 1.4401 / ceramics
Cable: PVC (2x0.34 mm²)
Cable length: 2 m
Protection class: IP68
Use in explosion hazard area:
EN50014:1997
EN50020:1994
Explosion protection class:
II 1G EEx ia IIc T6
II 2G EEx ia IIc T6

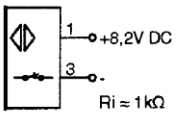
Temperature sensor: Method of measurement: PT100, IEC 751, DIN 43760 Class B, 3-wire
Operating range: -50°C to +200°C
Pressure: 250 bar
Material, housing: 1.4571
Sealing: Viton
Cable: polyolefin; oilresistance acc. VDE (3x0.34 mm²)
Cable length: 3 m
Temp. range cable: -40°C to +150°C
Protection class: IP65
Weight: 165g

Connection circuit diagram – VS-01.x.x.01



1 ... braun / *brown*
4 ... schwarz / *black*
3 ... blau / *blue*

Connection circuit diagram – VS-01.x.x.02



1 ... braun / *brown*
(schwarz / *black)*
3 ... blau / *blue*

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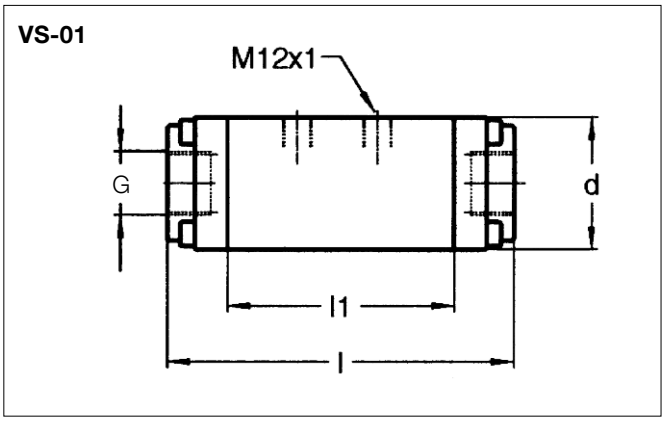
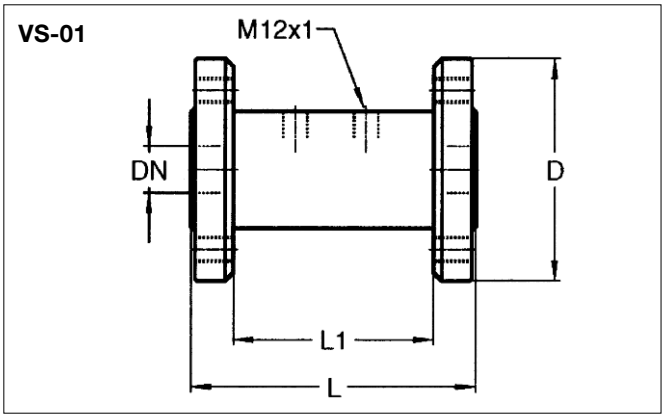
Dimensions:



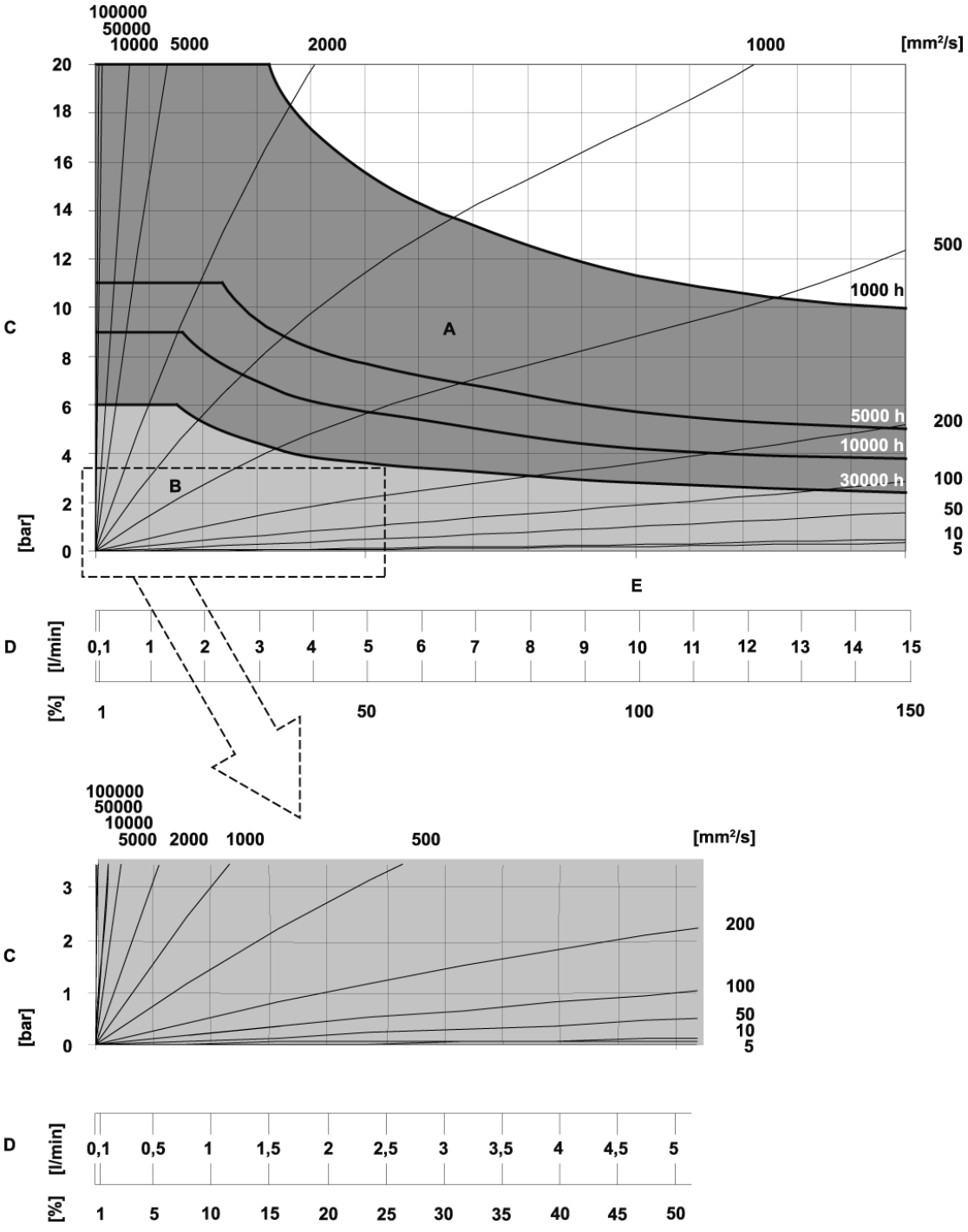
Thread		VS-01.1	VS-01.2	VS-01.4	VS-01.5
G	inch	1/2“	3/4“	1“	1 1/2“
p	bar	40	40	40	40
l	mm	110	145	200	310
d	mm	45x45	55x55	70x70	110x110
l1	mm	65	95	140	225
m	kg	0.6	1.1	2.7	9.0



DIN-flange		VS-01.1	VS-01.2	VS-01.4	VS-01.5
DN	mm	15	20	25	40
p	bar	40	40	40	40
L	mm	105	135	185	325
D	mm	95	105	115	150
L1	mm	65	95	140	225
m	kg	1.1	1.6	3.1	11.4

Choice of model size:

Loading capacity – VS-01.1



A Short-time operation
B Continuous operation
C Pressure loss
D Flow
V Q_{nom}

Life span values are applicable to lubricating media at temperatures up to 120°C.
Abrasive and hostile media can lower the life span.

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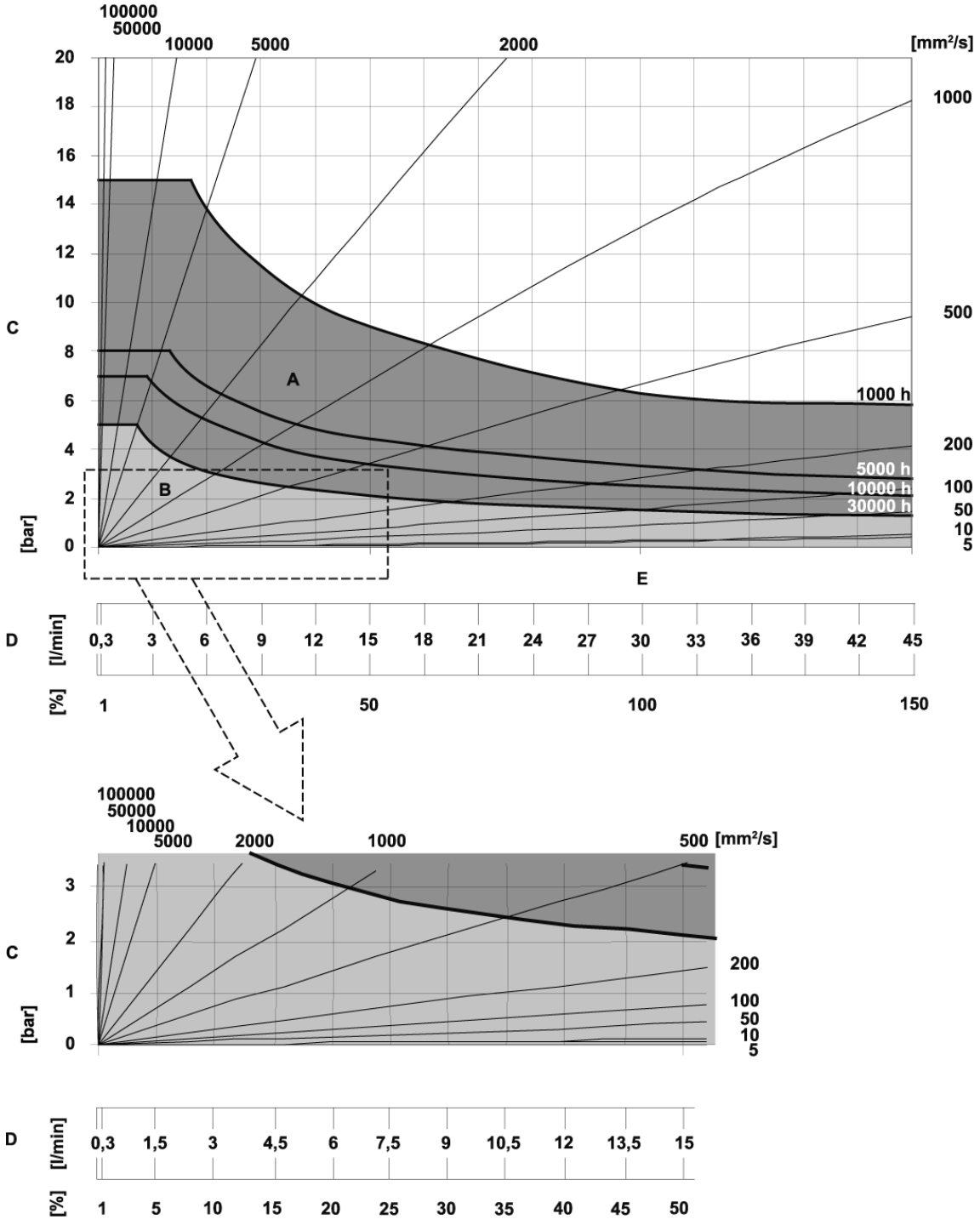
Choice of model size:

Loading capacity -VS-01.2



A Short-time operation
B Continuous operation
C Pressure loss
D Flow
V Q_{nom}

Life span values are applicable to lubricating media at temperatures up to 120°C.
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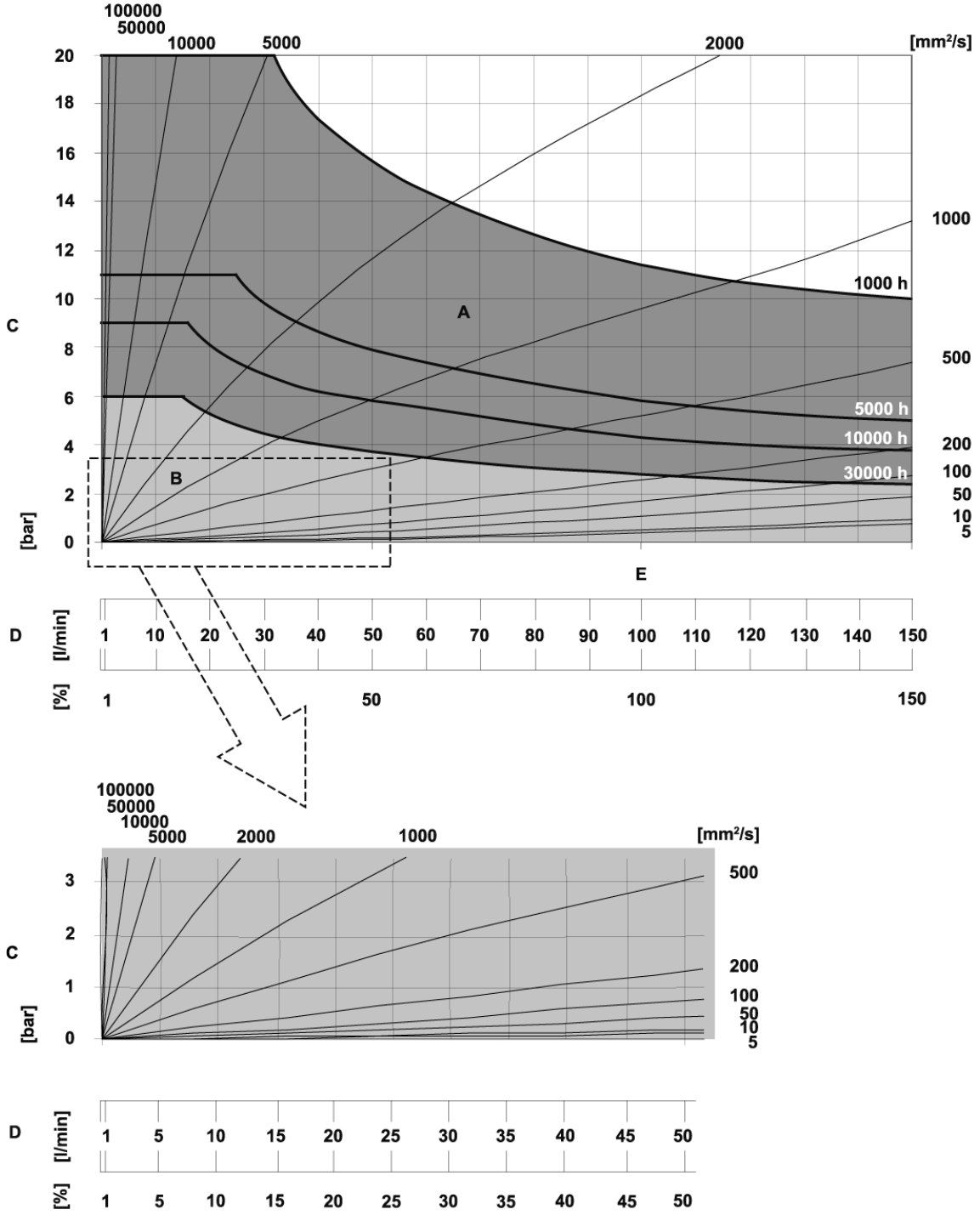
Choice of model size:

Loading capacity – VS-01.4



A Short-time operation
B Continuous operation
C Pressure loss
D Flow
V Q_{nom}

Life span values are applicable to lubricating media at temperatures up to 120°C.
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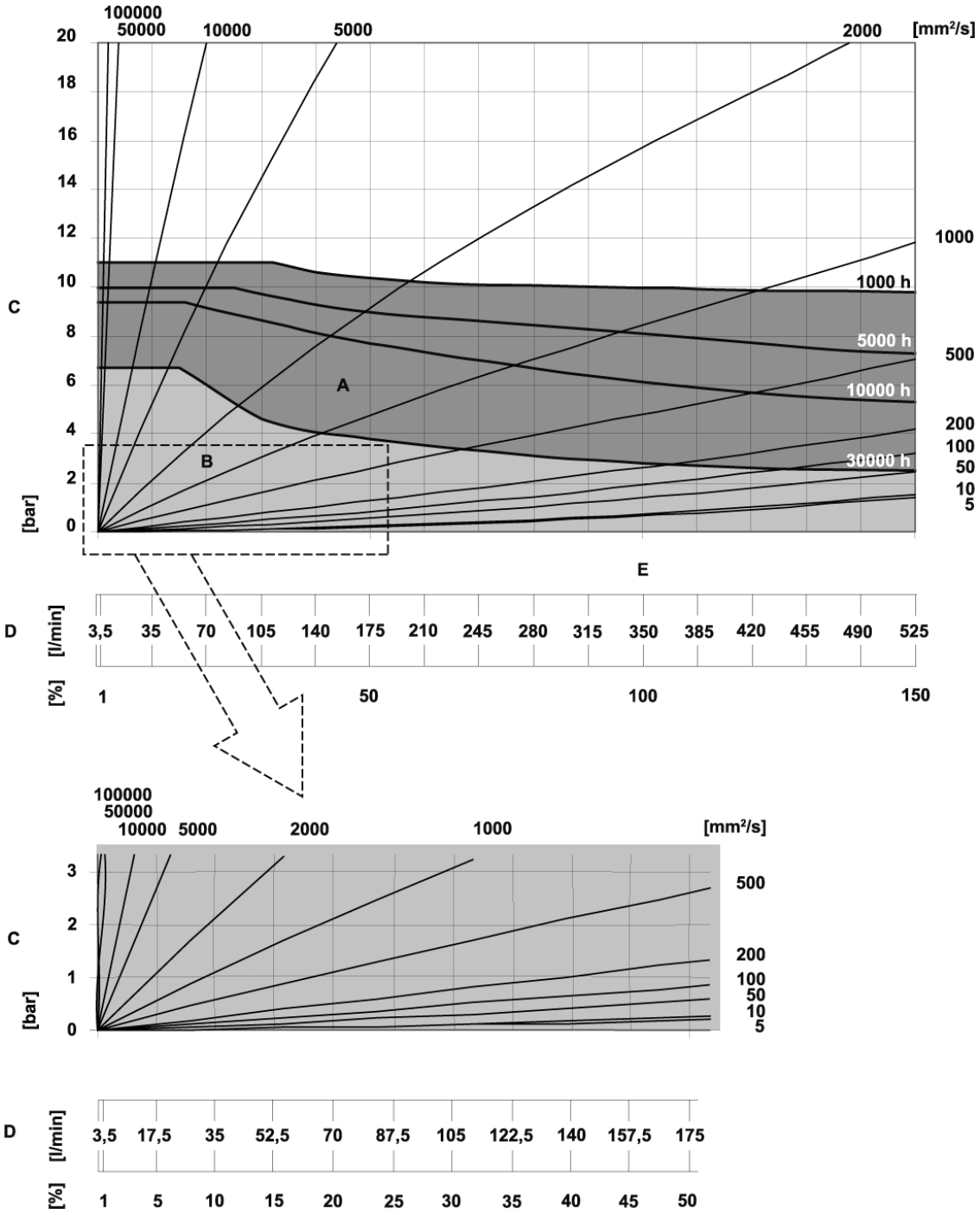
Choice of model size:

Loading capacity – VS-01.5



A Short-time operation
B Continuous operation
C Pressure loss
D Flow
V Q_{nom}

Life span values are applicable to lubricating media at temperatures up to 120°C.
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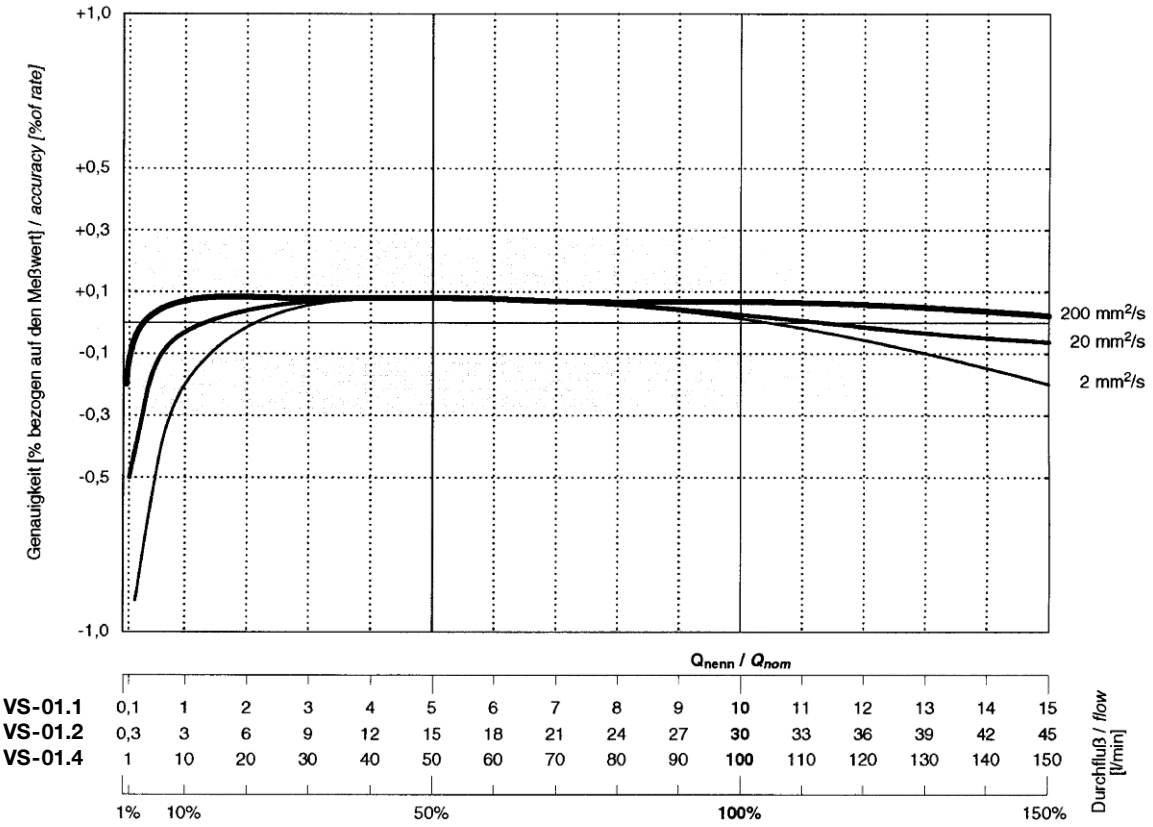
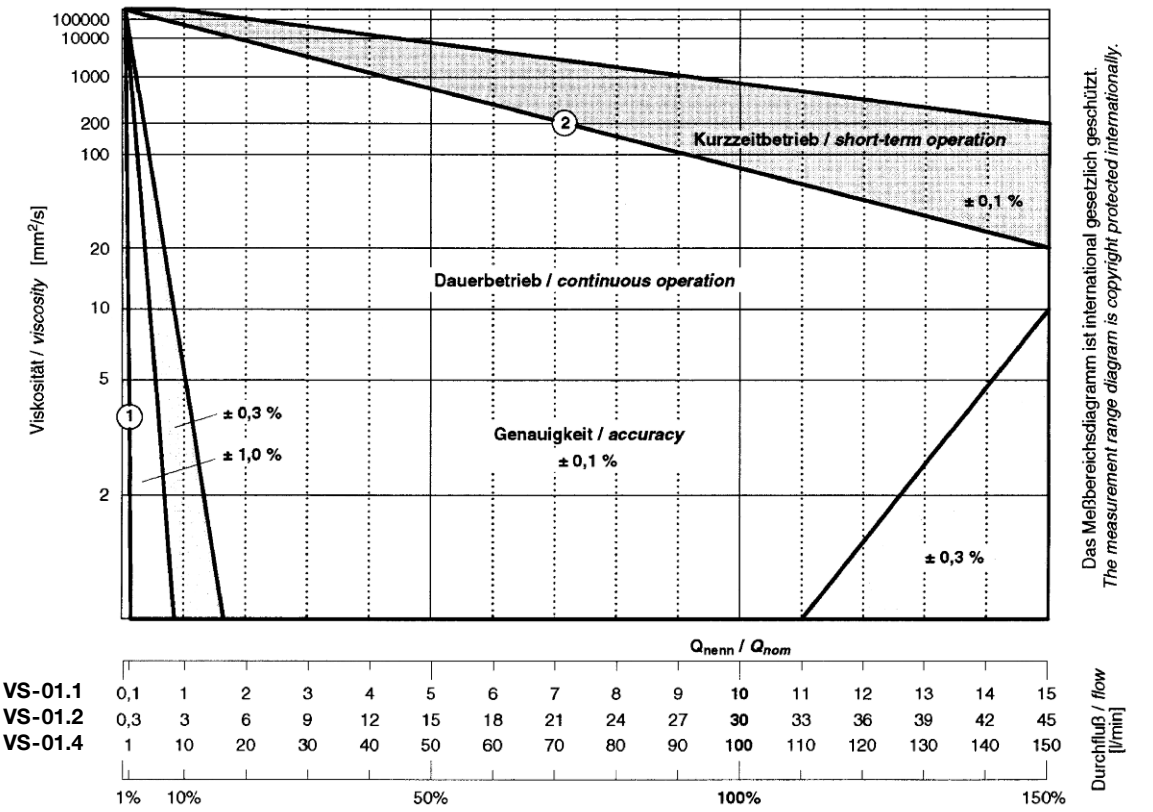
Choice of model size:

Linearity – VS-01



The diagram shows the characteristics of Profimess' volumeter VS-01.
Every volumeter is calibrated to document the device-specific values.

Operating range – VS-01



The operating range is evident from the simultaneous depiction of linearity and loading capacity.

① Accurate functioning of the measuring instrument is ensured.
② The 'Intermittent operation' range shows the instrument's load reserves

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