VF-21

COMPACT HELICAL GEAR PUMP — B5 FLANGE MOUNTED

PUMP PROPERTIES

Q — Flow	1.8 m³/h at 1450 rpm (≤ 165 cSt)	T — Temperature	0 ~ 230 °C
q — Displacement	0.021 l/rev	Visc. — Viscosity	10 ~ 1,650 cSt
Δp — Differential pressure	1 ~ 20 bar	DN — Suction / Discharge	DN25 / DN25
n — Speed	480 ~ 1450 rpm	Connection	Threaded — ISO 228 G 1" (standard) · NPT optional
Port arrangement	180° — opposed — in-line	Weight, bare pump	≈ 15 kg

OPERATING PRINCIPLE AND CONSTRUCTION

VF-21 is a compact helical gear pump whose IEC B5 motor is flange-mounted to the pump and drives it through an elastomer jaw coupling. The flange centring aligns the drive; the unit is supplied on a steel baseplate and delivers up to 20 bar from a very small envelope. The mechanical seal and the integrated by-pass valve are standard. Flow is proportional to speed and independent of pressure. Typical duties are thermal oil circulation, burner and dosing supply and small transfer circuits.

- B5 flange-mounted motor with elastomer jaw coupling — aligned by the flange centring; supplied on a steel baseplate
- Up to 20 bar in a small envelope
- High temperature mechanical seal — standard
- Integrated by-pass valve — standard
- Vertical or horizontal mounting
- Uni-directional — rotation as marked on the pump
- Low part count — quick maintenance

APPLICATIONS

- Thermal oil circulation and auxiliary circuits
- Burner fuel supply — diesel, light fuel oil
- Additive and dosing injection
- Lubrication circuits
- Small volume transfer in plants and on machines



Representative photo — a VF series pump. This is not an exact image of VF-21.

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MODEL CODE

VF21	DN25	T	1K5	1450
family + size	port size	heating	motor kW	pump rpm

Fields are separated by a hyphen and always appear in this order. A field is written only where VF-21 offers a choice; an omitted field means the standard of that field. A bare shaft pump carries no drive, motor or speed field.

FIELD	VALUES FOR VF-21	MEANING
FAMILY + SIZE	VF21	VF-21 — fixed
PORT SIZE	DN25	Suction and discharge DN25 (1") — fixed
HEATING	T · E · omitted	T — thermal oil jacket E — electric heating cartridges with thermostat and PT100 omitted — unheated casing (standard)
BY-PASS	not coded	The integrated by-pass valve on the cover is standard on VF-21 and is not written in the code.
SEALING	not coded	Mechanical seal is the only sealing on VF-21 and is not written in the code.
DRIVE	not coded	The motor is flange-mounted on the pump (IEC B5) with an elastomer jaw coupling; there is no belt option, so no drive field is written.
MOTOR kW	IEC notation	Installed motor rating: 0K55 = 0.55 kW · 0K75 · 1K1 · 1K5 · 2K2 · 3. The decimal separator is written as K.
PUMP rpm	speed	Pump speed — equal to the motor speed on flange-mounted units.

EXAMPLE	READS AS
`VF21-DN25-1K5-1450`	Complete unit, unheated, mechanical seal, integrated by-pass, motor 1.5 kW, 1450 rpm — standard unit
`VF21-DN25-T-1K5-1450`	As above with thermal oil jacket (code T)
`VF21-DN25-E-1K5-1450`	As above with electric heating (code E)
`VF21-DN25`	Bare pump without motor — for mounting on a customer's B5 motor; no kW or rpm field

DIMENSIONS

Dimensional drawing

Dimensions in mm. Baseplate and motor dimensions depend on the selected drive and are issued with the order acknowledgement.

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CAPACITY AND POWER TABLE

CAPACITY m³/h	SPEED rpm	4 bar	8 bar	12 bar	16 bar	20 bar	VISCOSITY
1.0	800	0.75 kW	1.1 kW	1.1 kW	1.5 kW	1.5 kW	22 cSt
1.8	1450 ★	1.5 kW	2.2 kW	2.2 kW	2.2 kW	3 kW	22 cSt
1.0	800	1.1 kW	1.1 kW	1.1 kW	1.5 kW	1.5 kW	165 cSt
1.8	1450 ★	1.5 kW	2.2 kW	2.2 kW	2.2 kW	3 kW	165 cSt
0.8	600	0.75 kW	0.75 kW	1.1 kW	1.1 kW	1.1 kW	550 cSt
1.4	1100	1.5 kW	1.5 kW	2.2 kW	2.2 kW	2.2 kW	550 cSt
0.6	480	0.55 kW	0.75 kW	0.75 kW	1.1 kW	1.1 kW	1,650 cSt
1.1	870	1.1 kW	1.5 kW	1.5 kW	1.5 kW	2.2 kW	1,650 cSt

Power figures are the recommended IEC motor rating for the duty point: shaft power is the sum of hydraulic power, viscous drag and bearing/seal friction, rounded up to the next standard motor step. ★ rows are the standard drive speeds; standard motors: 1.5 kW at 1450 rpm (standard unit). In each viscosity band the upper row is the maximum permitted speed for that band and the lower row a reduced speed; maximum speed falls as viscosity rises because filling of the pump becomes the limit. Viscosities above 1,650 cSt are outside the range of this model. Cold start: one motor step above the table value. Duty points outside the table are quoted on request.

OPERATING CONDITIONS

Suction lift	Maximum 3 m at sea level, decreasing 10 cm per 100 m of altitude. At the upper end of the viscosity range flooded suction is recommended.
NPSHr	Stated for the given speed, viscosity and temperature on request.
Direction of rotation	Uni-directional — as marked by the arrow on the pump.
Dry running	Not permitted. Bearings are lubricated by the fluid; a dry start damages bearings and gears.
Drive	IEC motor flange-mounted to the pump (B5), driving through an elastomer jaw coupling — aligned by the flange centring · supplied on a steel baseplate · variable frequency drive.
Solid particles	≤ 0.05 mm · suction filter required.
Casing pressure	20 bar + suction pressure · hydrostatic test 1.5 × casing pressure (EN 12162).

MATERIAL OPTIONS

Casing, covers	Cast iron GG25 (standard) · ductile iron · cast steel · stainless AISI 316/316L
Gears	Ductile iron GGG49 (standard) · cast steel · stainless AISI 316/316L
Shaft	42CrMo4 / AISI 4140 tempered steel (standard) · stainless AISI 316/316L
Bearings	Casing: SNBZ 12 bronze (standard) · carbon graphite · silicon carbide · tungsten carbide.
Gaskets	Klingerite / graphite (standard) · PTFE · Viton
Elastomers	FKM (Viton) −20 / +200 °C (standard) · PTFE −15 / +170 °C · EPDM −40 / +120 °C · FFKM (Kalrez) −20 / +300 °C · NBR −30 / +90 °C. The elastomer limits the fluid temperature.

SEALING — MECHANICAL SEAL, STANDARD

Mechanical seal	Single, fluid cooled mechanical seal is the only sealing on this model; no gland packing version. High temperature faces and elastomers for thermal oil service.
Elastomers	FKM (standard) · PTFE · FFKM for solvents and aggressive fluids.

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HEATING — CODE FIELD T / E

T — Thermal oil jacket	Option on this model. Jacketed casing and cover including the seal area · max. 250 °C / 10 bar · 1/2" connections.
E — Electric heating	Casing mounted heating cartridges with thermostat and PT100 temperature sensor, for plants without a thermal oil circuit · option (code E) · 400 V, heating power stated with the order.
Steam heating	The thermal oil jacket is also suitable for steam. With cast iron and ductile iron casings the corrosion risk from steam and condensate is assessed case by case; steam service is stated with the order and confirmed by Vimpo engineering. Coded T.
Unheated	Standard on this model. Casing without jacket for fluids that need no heating — heating field omitted in the code.

BY-PASS / PRESSURE RELIEF — STANDARD

A positive displacement pump will pump against a closed valve. If the discharge line can be closed, a pressure relief device is mandatory.

- The by-pass (relief) valve integrated on the cover is standard on VF-21 and is not written in the code. It returns flow internally from discharge to suction; no external pipework. Set pressure 1–2 bar above working pressure.
- The integrated valve is for short term protection. Continuous by-pass requires a separate line valve.
- At high viscosity a line mounted relief valve is preferred over the integrated one.

SCOPE OF SUPPLY AND OPTIONS

Standard unit	Pump flange-mounted on an IEC B5 motor with elastomer jaw coupling, on a steel baseplate — complete unit
Bare shaft pump	Pump only, without motor — for mounting on a customer's IEC B5 motor. Code without kW and rpm fields.
Options	thermal oil jacket (T) · electric heating (E) · NPT threads · ATEX motor · variable frequency drive · stainless casing
Paint	Epoxy primer 60 µm + polyurethane top coat 60 µm, total ≥ 120 µm. Hot service above 150 °C: silicone based heat resistant system. Casing RAL 5005 (Vimpo blue); other RAL with the order.
ATEX	Available in ATEX version — II ½G Ex h IIB T4 Ga/Gb, zones 0 and 1 (2014/34/EU · EN ISO 80079-36/-37); EU-type examination certificate IEP 24 ATEX 1315X Suppl. 01, notified body 2284. Liquid temperature max. 130 °C. The motor is of Ex d or Ex e type to EN 60079-0/-1/-7. Any temperature or pressure sensor fitted must itself be Ex protected (zone 1, IIB, min. T4). Installation and periodic maintenance by authorised personnel to the operating instructions; replacement of a part requires re-approval. Zone, gas group and temperature class stated with the order.
Documents	CE declaration of conformity · material certificate EN 10204 3.1 · hydrostatic test report · performance test report · operating and maintenance manual · spare parts list

APPLICABLE STANDARDS

API 676	Positive displacement rotary pumps — design basis (reference)
EN 809	Pumps and pump units — safety requirements
2006/42/EC	Machinery Directive — CE declaration of conformity
EN ISO 12100	Safety of machinery — risk assessment
2014/34/EU	ATEX — equipment for explosive atmospheres (optional version)
EN 12162	Hydrostatic test — casing pressure test
EN 10204 3.1	Material inspection certificate
API 682 · ISO 21049	Mechanical seal arrangement and piping plans (MS version)
EN 1092-2	Flange dimensions and pressure rating

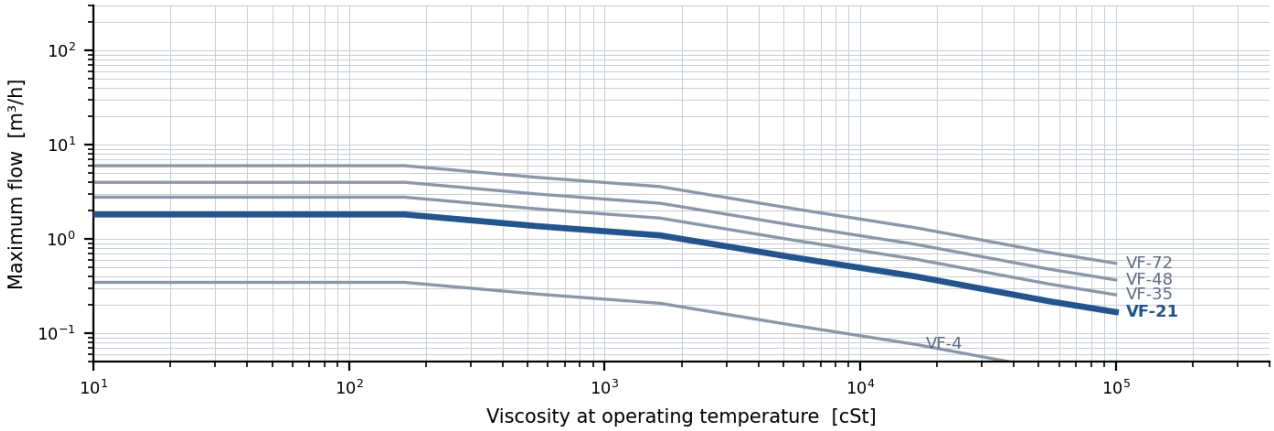
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TYPICAL VISCOSITY OF COMMON FLUIDS AT PUMPING TEMPERATURE

PRODUCT	PUMPING TEMPERATURE	VISCOSITY [cSt = mm²/s]	CAPACITY TABLE COLUMN
BITUMEN			
Paving grade bitumen 50/70	150 · 180 °C	≈ 300 · ≈ 90	165
Paving grade bitumen 35/50	150 · 180 °C	≈ 450 · ≈ 130	165 · 1,650
Polymer modified bitumen (SBS)	160 · 180 °C	≈ 2,000 · ≈ 500	1,650
Oxidised bitumen 85/25	170 · 200 °C	≈ 4,000 · ≈ 800	5,500 · 1,650
Cut-back bitumen (MC / RC)	60 · 100 °C	≈ 1,000 · ≈ 100	1,650 · 165
Bitumen emulsion 60–65 %	20–60 °C	≈ 20 – 100	165 (low lubricity)
FUELS AND OILS			
Heavy fuel oil HFO 380	50 · 80 °C	≈ 380 · ≈ 90	1,650 · 165
Light fuel oil, kerosene, diesel	20 °C	≈ 2 – 6	165 (thin — flow reduced)
Lube oil ISO VG 46	20 · 40 °C	≈ 120 · ≈ 46	165
Lube oil ISO VG 320 · gear oil	20 · 40 °C	≈ 1,500 · ≈ 320	1,650 · 165
Thermal oil (heat transfer fluid)	20 · 200 °C	≈ 40 · ≈ 1	165
CHEMICAL AND PROCESS			
Glycerine 99 %	20 · 40 °C	≈ 1,200 · ≈ 280	1,650 · 165
Polyol, plasticiser (DOP)	25 °C	≈ 300 – 3,000	1,650 · 5,500
Alkyd / epoxy resin, liquid	20–25 °C	≈ 5,000 – 15,000	5,500 · 16,500
Hot-melt adhesive (EVA)	160–180 °C	≈ 2,000 – 20,000	5,500 · 16,500
Solvent-based paint · printing ink	20 °C	≈ 100 – 500 · 10,000 – 50,000	165 · 16,500 – 55,000
FOOD			
Vegetable oil (sunflower, soybean)	20 · 60 °C	≈ 65 · ≈ 15	165
Molasses (cane)	20 · 40 °C	≈ 5,000–10,000 · ≈ 1,000–2,000	5,500 · 1,650
Glucose syrup 80 % DS	20 · 50 °C	≈ 20,000–50,000 · ≈ 2,000–5,000	16,500 – 55,000 · 5,500
Honey	20 · 40 °C	≈ 5,000–10,000 · ≈ 500–1,000	5,500 · 1,650
Chocolate mass	40–45 °C	≈ 2,000 – 10,000 (non-Newtonian)	5,500 · 16,500
Melted animal fat, tallow, palm oil	50–60 °C	≈ 25 – 50	165

Indicative values; the fluid supplier's data sheet governs the selection. Where two temperatures are given the two viscosities correspond in the same order (e.g. 150 · 180 °C → ≈ 300 · ≈ 90 cSt). Conversion: mPa·s (cP) ÷ density (kg/dm³) = cSt. Oils roughly halve their viscosity every 10–15 °C; bitumen falls about tenfold between 120 °C and 180 °C. Select the capacity table column equal to or above the viscosity at the lowest pumping temperature (cold start).

VF SERIES — PUMP SELECTION DIAGRAM



Maximum flow of each model at the maximum permitted speed for the viscosity at operating temperature. The smallest model whose curve lies above the duty point is the selection. Duty point values are confirmed with the order acknowledgement. Technical data subject to change without notice.

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