

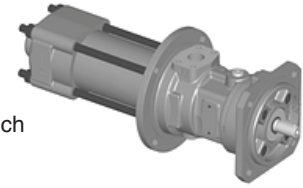
Screw Pumps Series EMTEC®



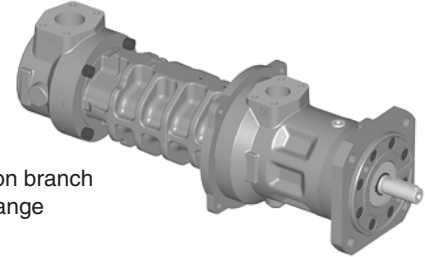
with ALLSPEED Controller

HIGH-TECH FOR EMULSION

20 DQ
axial suction branch
with pipe thread



140 D8.6
radial suction branch
with SAE flange



Applications

For handling liquids with good, limited or poor lubricating properties as well as abrasive liquids in cooling lubricant technology or process technology, e.g. cutting, grinding and deep hole drilling oils, oil-in-water emulsions, cooling lubricant solutions. The pumped liquids may not attack the materials.

Allowable cooling lubricants:

- Solutions (inorganic substances in water; organic and synthetic substances in water)
- Oil-in-water emulsions (oil content 2 % to 20 %)
- Cutting and grinding oils (without additives; with polar, physically effective additives; with mild-effect EP* additives that create a lubricating film; with polar and mild-effect additives; with active chemical EP* additives; with polar and active EP* additives).

* EP = Extreme Pressure (high pressure additives)

Main fields of application

EMTEC® pumps are an essential element of modern metal-working centres, transfer lines and both grinding and deep hole drilling machines.

Design and operating mode

Three-screw, self-priming, flange-mounted pump (DIN ISO 3019-2) with special surface-hardened drive and idler screws. The idler screws are hydraulically driven and the axial thrust is completely neutralised hydrostatically.

The drive screw is fixed in position with external, permanently lubricated groove ball bearing. The large overall length with its many chambers results in little surface pressure, low pressure differences and thus reduced wear.

The rotor housing has been optimised to ensure maximum resistance to wear. The material used is specially hardened grey cast iron (EN-GJL) that is part of a special safety concept. The housing surface in contact area to the screws shows a ceramic-like hardness. Additionally, unlike with other materials - such as SiC - wear, shocks, vibration or aeration cannot lead to sudden failure of the pump unit. ALLSPEED Controller is an optional highly dynamic electronic pump controller that can reduce energy expenditures by up to 75%.

Installation

With pump bracket for in-tank installation, with pump bracket for tank top installation and arrangement of the delivery branch above the tank cover or with pump bracket and mounting foot for dry installation. With the vertical installation "delivery branch above the tank cover" (tank top installation) EMTEC® is especially easy and economical to install.

Submersible design (in-tank installation) saves space, maintenance and costs compared with the dry installation. Any leakage remains in the tank.

At dry installation with mounting foot (well suited for operation with suction pressure and easily accessible for maintenance) a silicon carbide mechanical seal ensures a long service life.

Construction and materials result in little wear, good controllability and high efficiency.

The motor bracket can be equipped at additional cost with an inspection window and protective grid.

Performance data ①

Capacity	Q	10 to 1000	l/min
Liquid temperature	t	to 80	°C
Suction-/inlet pressure	p _s	to 10	bar
Differential pressure	Δp	to 100	bar (emulsion)
		to 120	bar (oil)
Outlet pressure	p _d	to 130	bar ②
Viscosity range	v	1 to 2000	mm ² /s
Dirt load level		to 250	mg/l ③
Filter fineness		to 100	µm ③

① For other performance data further pump series are available.

② Inlet pressure plus differential pressure plus pressure rise caused by the hydraulic system must not exceed the pump outlet pressure.

③ Pressure, dirt load level and filter fineness have to be matched to each other.

The performance data are to be considered as a product and performance abstract only. The exact operating limits can be taken from the quotation or order confirmation.

Shaft sealing/Connections

Design DQ:

Shaft sealing with shaft seal ring. Inlet pressure up to 1 bar. Axial inlet with pipe thread connection (DIN EN ISO 228-1) ④. Radial delivery branch with high-pressure flange according to SAE (SAE J518C, hole pattern 3000 PSI). At sizes 20 to 140 additionally with pipe thread connection (DIN EN ISO 228-1).

Design D8.6

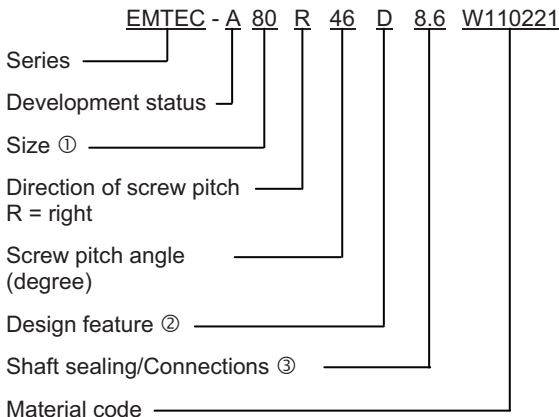
Shaft sealing with maintenance-free highly wear-resistant mechanical seal according to EN 12 756. Radial inlet and delivery branch with high-pressure flange according to SAE (SAE J518C, hole pattern 3000 PSI) ④.

④ As standard, the inlet of the other version can be chosen as an option.

Overload protection

The pump has no pressure relief valve. Thus the overload protection must be provided in the control system or as a pipeline valve.

Abbreviation

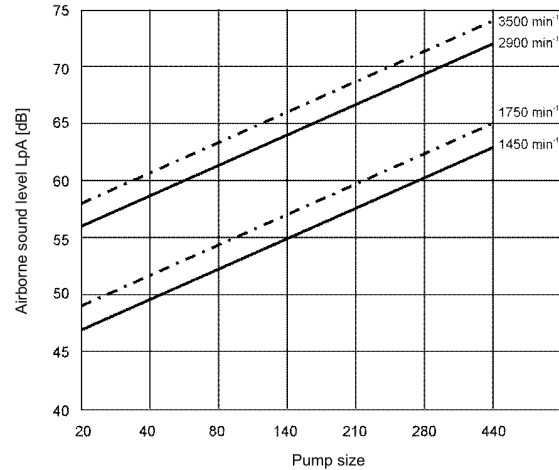


- ① theor. capacity at 1450 1/min and 46° screw pitch angle
- ② D = external antifriction bearing, shaft seal unheated, uncooled
- ③ shaft seal/connections

Abbreviation	Type
Q	shaft seal ring/axial inlet, pipe thread ④
8.6	mechanical seal/radial inlet, SAE ④
④	in standard

Noise/Pulsation

EMTEC® construction design allows gentle, even, virtually pulsation-free and low-noise pumping. The noise emission lies, dependent on speed, pump size and installation, between 48 and 75 dB_A. EMTEC® pumps operate significantly quieter than rotary lobe and centrifugal pumps with comparable performance.



The provided data are reference values.

The actual airborne sound level depends especially on the installation conditions. In normal situations, the motor determines the airborne sound level.

Materials

Denomination	Part No.	Materials W 110221		
Rotor housing (basic material)	2	EN-GJL-250	GG25	cast iron
Rotor housing (active surfaces in the spindle bores)		specialy hardened	basic hardness	62 HRC
			surface hardness	1200 HV
Suction casing	4	EN-GJL-250	GG25	cast iron
Discharge casing	1	EN-GJL-250	GG25	cast iron
Screw set (basic material)	13	1.7139	16MnCrS5	special steel nitrided 62 HRC
Screw set (surface)	13	specialy treated (PVD)		1200 HV
Pump cover	3	EN-GJL-250	GG25	cast iron
Mechanical seal	186	Q1Q1VGG	SiC/SiC, FPM, 1.4571	silicon carbide, fluoroelastomere, stainless steel
Shaft seal ring	183	FPM		Fluoroelastomere
Static gaskets	140	FPM		Fluoroelastomere

Operation limits

The liquid's composition, oil content (ability to provide lubrication), and cooling effect determine the pump maintenance intervals and maximum permissible performance data.

Cooling lubricants according to DIN 51 385 are divided into three groups according to the contents of water and oil. EMTEC® pumps also pump cooling lubricants with a very low lubricating effect but very high cooling performance ("main group L"):

Cooling lubricant main group	Sub group	Effect at the processing spot
L Solutions	Solutions of inorganic materials in water	Higher cooling effect, lower lubricating effect
	Solutions, dispersions of organic (synthetic) materials in water	
E Emulsions	Oil-in-water emulsions (Oil content E 2 % ... E 20 %)	Cooling-lubricating effect
S Petroleum-based cutting and grinding oils (natural and synthetic)	Cutting oils without additives (pure)	Higher lubricating effect, lower cooling effect
	Cutting oils with polar (physically effective) additives	
	Cutting oils with mild-effect (lubricating film forming) EP additives	Better surface adhesion provides protection against corrosion
	Cutting oils with polar and mild-effect EP additives	
	Cutting oils with active (chemical) EP additives	Higher temperature and pressure resistance
Cutting oils with polar and active EP additives		

EP = „Extreme Pressure“

Benefits and usage

When equipped with the ALLSPEED Controller, the EMTEC system can reduce energy costs by up to 75%. This is made possible by a highly dynamic electronic pump controller with adaptive control. This also provides a high-pressure supply of cooling lubricant without the need for valves, which greatly reduces the costs associated with pump, motor, valve, and cooling components. Elimination of valves also helps avoid capacity losses and pressure surges. In addition, the "Smart" concept provides for automatic monitoring of operational limits.

Modes of operation

- Single-spindle mode: One pump system supplies exactly one spindle of the machine tool. Speed and pressure accelerate from 0 to operating level within 500 ms. Pump sizes 20 and 40 are suitable for this mode of operation.
- Multi-spindle mode (all sizes): In this case, one pump system simultaneously supplies several spindle. Pump pressure is fully adjustable and constant. Capacity adapts dynamically to current requirements (pressure control valve not necessary). Pressure pulsation will not exceed 20% assuming that capacity does not fluctuate by more than 30% of overall capacity.

Design, installation, and parameterization

The EMTEC system with ALLSPEED Controller employs a high-output converter with integrated ALLWEILER logic module. The converter is air-cooled and designed for installation in a switch cabinet. The pluggable ALLWEILER logic module contains the software for precise and highly dynamic pump control. It can be easily replaced when operating conditions or pumping tasks change or if program updates are available. A sensor for monitoring pressure is attached directly to the pump unit.

The plug-and-play functionality of the controller eliminates the need to adjust parameters or program the tool during startup. Instead, a one-time identification run at $n = 0 \text{ 1/min}$ is all that is needed.

Converter specifications and operational limits

Rated output [kW]	Size	Rated input current I_{IN} [A] ①	Mains choke type ②	EMC filter type
0,75	A	1,9	CHK-01	JFI-02
1,10		2,6		
1,50		3,3		
2,20		4,6		
3,00		5,8		
4,00	B	7,9	CHK-03	JFI-03
5,50		10		
7,50		14		
11,00	C	20	CHK-05	JFI-05
15,00		27		
18,50		33		
22,00		39		
30,00	D	55	CHK-07	JFI-07
37,00		65		
45,00		78		
55,00	E	107	-	-
75,00		131		
90,00		171		
110,00		205		
160,00③		254		

① Rated input current (eff.) with mains choke at 40 °C (104 °F)

② Mains choke needed due to the high system dynamics

③ Water-cooled version

Mains connection	
Voltage range:	3-phase 380 V to 480 V +10/15%
Frequency:	50 to 60 Hz ± 5%
Distortion (THD):	In accordance with EN 61000-3-2, IEC 61000-3-12, IEC 61000-3-4 with mains choke for compliance with limit values
DC connection	
Voltage level:	485 to 648 V DC ± 10 %
Load control:	Integrated
Bus bar:	Upon request
Motor connection	
Motor types:	All standard asynchronous motors suitable for use with frequency converter
Switching frequency:	2 to 16 kHz, 4 kHz as standard; Output current reduction over 4 kHz
Operating conditions	
Protection type:	IP 20 according to EN 60529; Open type according to UL 508
Temperature:	-10 to +55 °C; performance lower above 40 °C
Altitude range:	0 to 4000 m above sea level, performance lower above 1000 m
Relative humidity:	Max. 95%
Climate:	Class 3K3, 3C2 according to EN 60721-3-3, oil mist, icing, condensed moisture, dripping water, spray water, splash water, and jets of water not permitted (EN 60204, part 1)
Vibration:	Class 3M4 according to EN 60721-3-3
EMC: (according to EN 61800-3)	With mains filter: category C2
Functional stability:	Stable torque support (function: Safe Torque-Off STO according to EN 61800-5-2); IEC 61508 (SIL3); EN 954-1 (category 4); IEC 62061 (SILCL 3); EN ISO 13849-1 (PL e certification from TÜV)
Labeling:	CE, UL, cUL, CSA, C-Tick, GOST R

Controller inputs and outputs

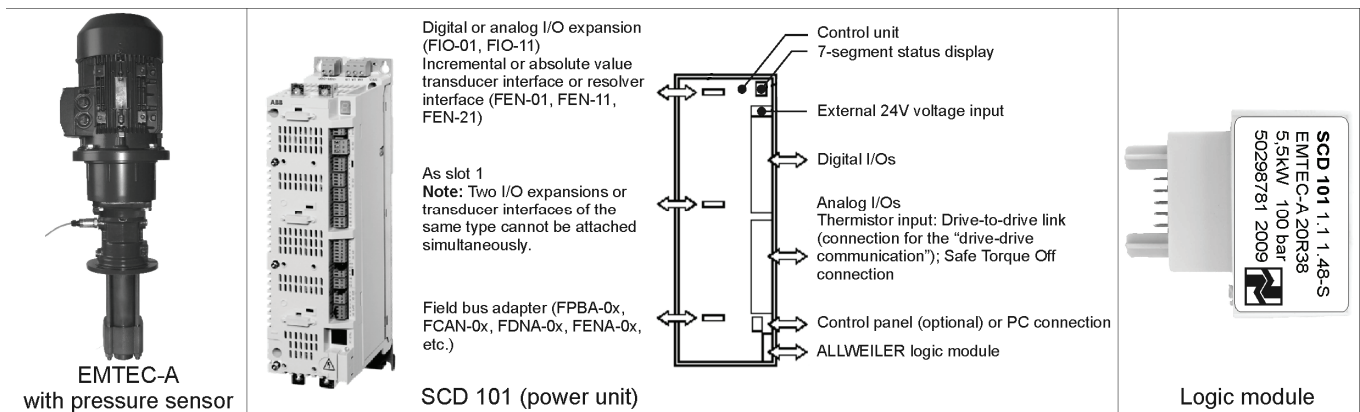
Analog inputs:	AI1	Pressure set point (0 – 10 V)
	AI2	Pressure sensor connection
Digital inputs:	DI1	Standby (magnetization)
	DI2	Hold pressure (10 bar)
	DI3	Acknowledge warning, alarm
	DI4	Vent
	DI5	Initialize
	DI6	Acceleration mode
Digital outputs:	DIO1	Pressure reached
	DIO2	Warning
	DIO3	Special mode
Analog outputs:	AO1	Capacity (4-20 mA)
	AO2	Actual pressure (0-10 V)
Relay output:	RO	Alarm (24 V)

Short designation, parameters

Series	SCD	1	0	1	+	Pump type, size
Hardware version						Rated output of motor
Functional scope						Motor current (nominal operating point)
State of development						cos φ
						Nominal speed
						Max. speed
						Max. pressure
						Viscosity

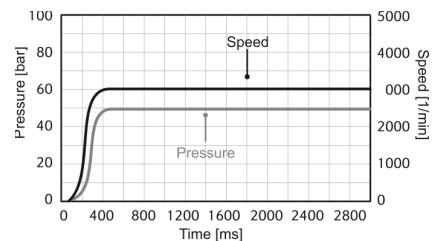
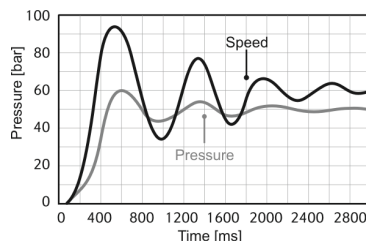
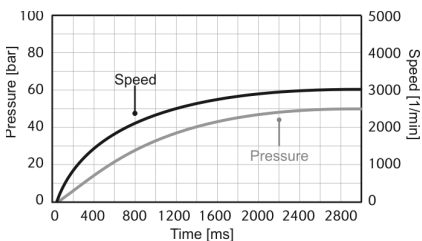
System design

Depiction of individual system components



Control behavior

PID pressure control behavior compared to control with ALLSPEED controller



PID control "too soft". Too much time is needed to achieve the desired equilibrium.

PID control "too hard". Equilibrium is reached faster, but speed comes at the expense of undesirable oscillation.

ALLSPEED: Adaptive control. Oscillation is suppressed. Control automatically adapts to the tool to achieve equilibrium quickly.

Descriptions of controller inputs and outputs

AI1 Pressure set point: If there is a signal in standby mode, the pump will run up to the proper pressure (5% tolerance). During run-up, the pressure corridor will be no more than 20% above and 10% below the set point.

0 – 1 V \cong 0 bar
10 V \cong max. discharge pressure (as specified by customer, max. 100 bar)

AI2 Pressure sensor connection: Connection of pressure sensor.

DI1 Stand-by: Magnetization of motor for rapid run-up when there is a pressure signal.

DI1 Hold pressure: The pump generates 10 bar static pressure, even against a closed piping system, such as for activating a measuring sensor. The operating point is approached softly.

DI3 Acknowledge: Alarm and warning disappear only once acknowledged.

DI4 Vent: Pump vents the piping at limited speed and limited pressure.

DI5 Initialize: The converter adopts the precise motor parameters at speed 0. Takes approximately 30 seconds.

Pump then turns to directional control with a speed of 100 l/min.

DI6 Acceleration mode:

Normal: Adequate for achieving all required pressures within 1000 ms. Capacities of less than 40% of maximal capacity are achieved within 500 ms.

Fast: Capacities of greater than 40% of maximal capacity are achieved within 500 ms. Not permissible for capacities of less than 25% of maximal capacity.

DIO1 Pressure achieved: At least 90% of the required pressure has been achieved.

DIO2 Warning: The system's limits (motor power consumption, speed limit) have been reached.

If an operational point is achieved that is above the permissible limits but within an internal tolerance range, a warning will be emitted. The operating point will be approached with the display "Pressure OK".

If an operating point outside of the internal tolerance range is approached, the pump will independently return to a permissible operating point. The "Pressure OK" display is not shown.

The pump will continue to operate despite warnings.

DIO3 Special operation: The output is activated during special operation "Hold pressure" or "Vent".

AO1 Actual capacity: Estimated capacity is calculated from pump parameters, pressure, and speed. The deviation corresponds to the tolerance of the pump's characteristic curve.

4 mA \cong 0 l/min
20 mA \cong max. capacity (see data sheet)

AO2 Actual pressure: Displays current pressure.

0 – 1 V \cong 0 bar
10 V \cong max. discharge pressure (as specified by customer)

RO Alarm: Converter, pump, or motor fault.

24V rated voltage shut off during alarm. Alarm is also activated during startup.

The pump can be brought back into operation only after acknowledging the alarm. (DI3)

Wide pumping range

Many pump sizes and screw pitch angles; fine adjustment of capacity across the entire output range.

Long service life

Highly wear resistant, PVD-coated spindles extend the pump's service life; long effector system minimizes the surface load.

Tolerant of dirt

External ball bearing, grease lubricated for lifetime. Labyrinth seal protects against wash-out.

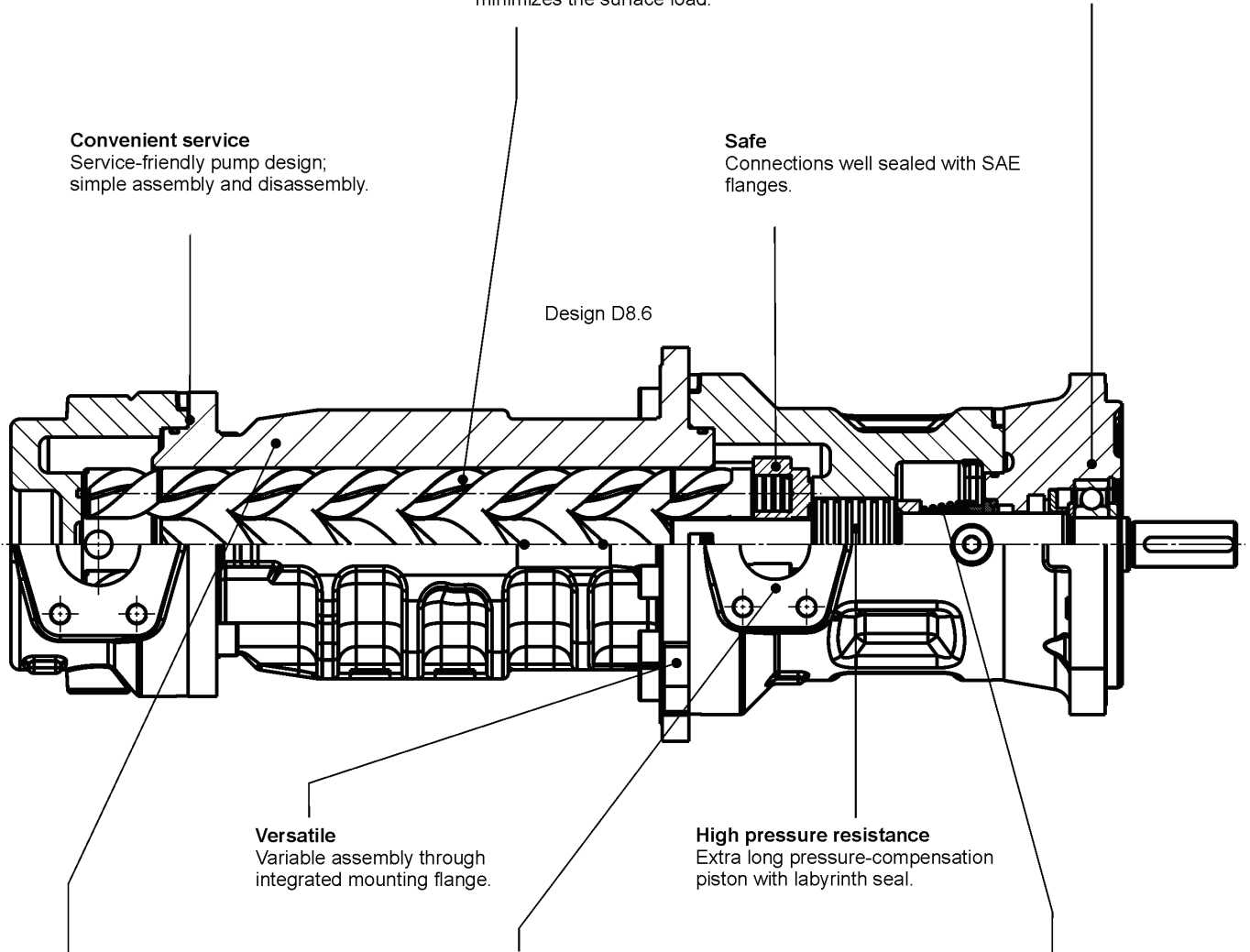
Convenient service

Service-friendly pump design; simple assembly and disassembly.

Safe

Connections well sealed with SAE flanges.

Design D8.6



Versatile

Variable assembly through integrated mounting flange.

High pressure resistance

Extra long pressure-compensation piston with labyrinth seal.

Wear-resistant

Long service life thanks to highly wear-resistant, specially hardened rotor housing.

High load capacity

Complete, vibration-free hydrostatic axial thrust balancing with special pressure-compensation bushings.

Low maintenance

On version D8.6 shaft sealed with maintenance-free silicon carbide mechanical seal according to DIN EN 12 756.

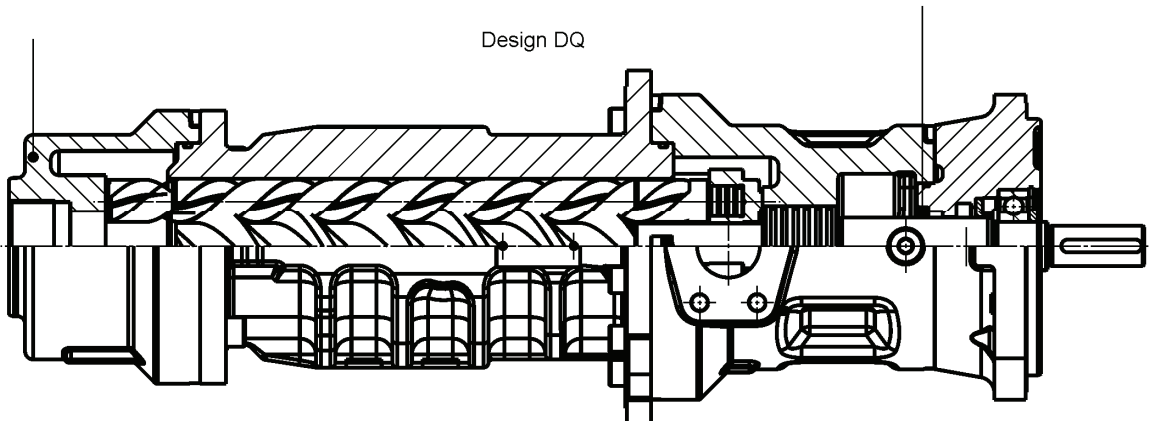
Flexible

On the DQ version, liquid inlet is axial. Extension length can be easily varied as needed.

Affordable

A shaft seal ring is used in place of a mechanical seal.

Design DQ

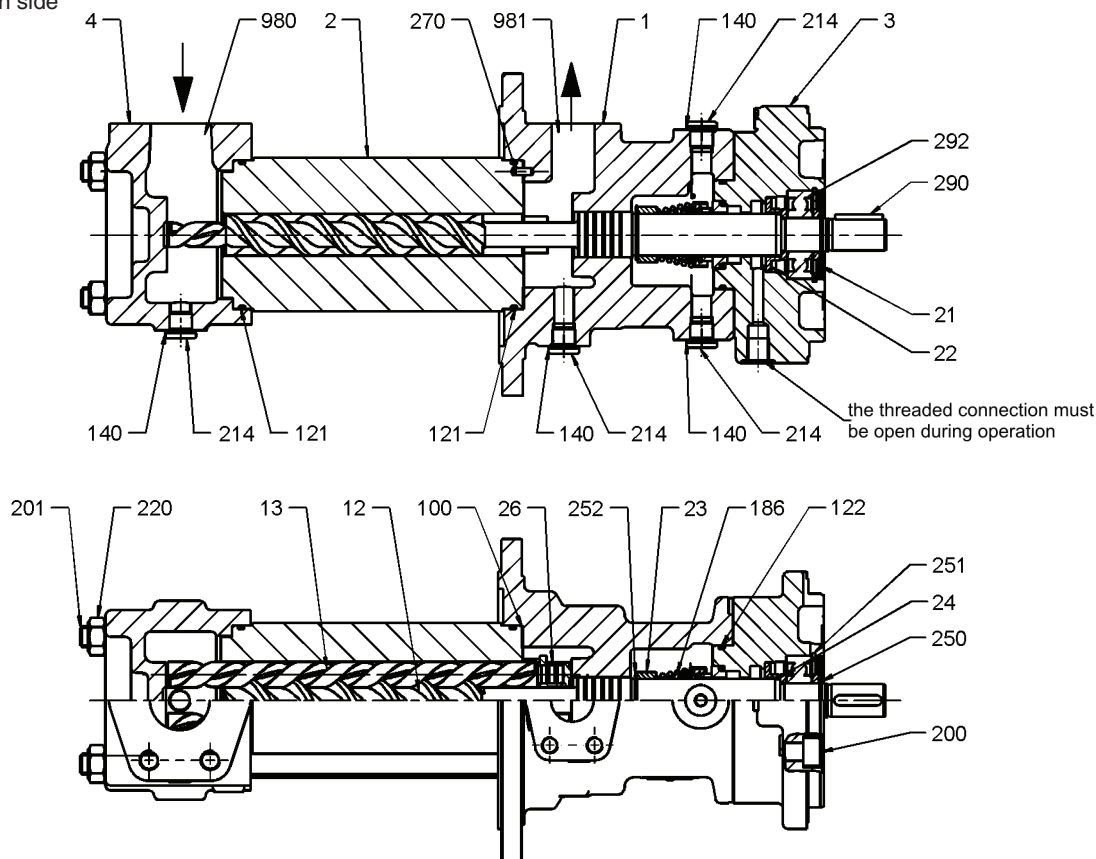


Sectional drawing

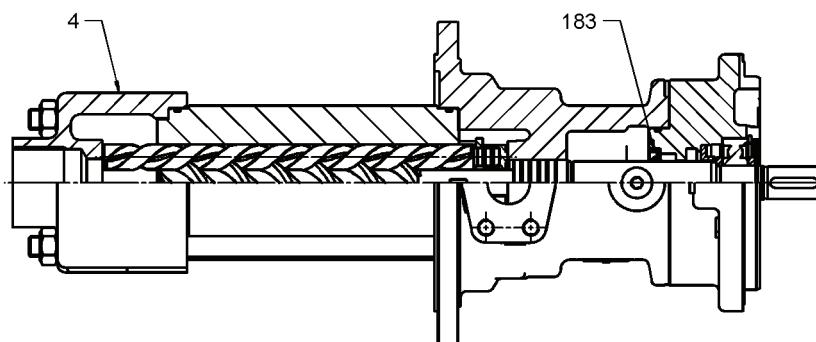
EMTEC-A

D 8.6

SAE flange on suction side



DQ
with axial pipe thread connection on suction side

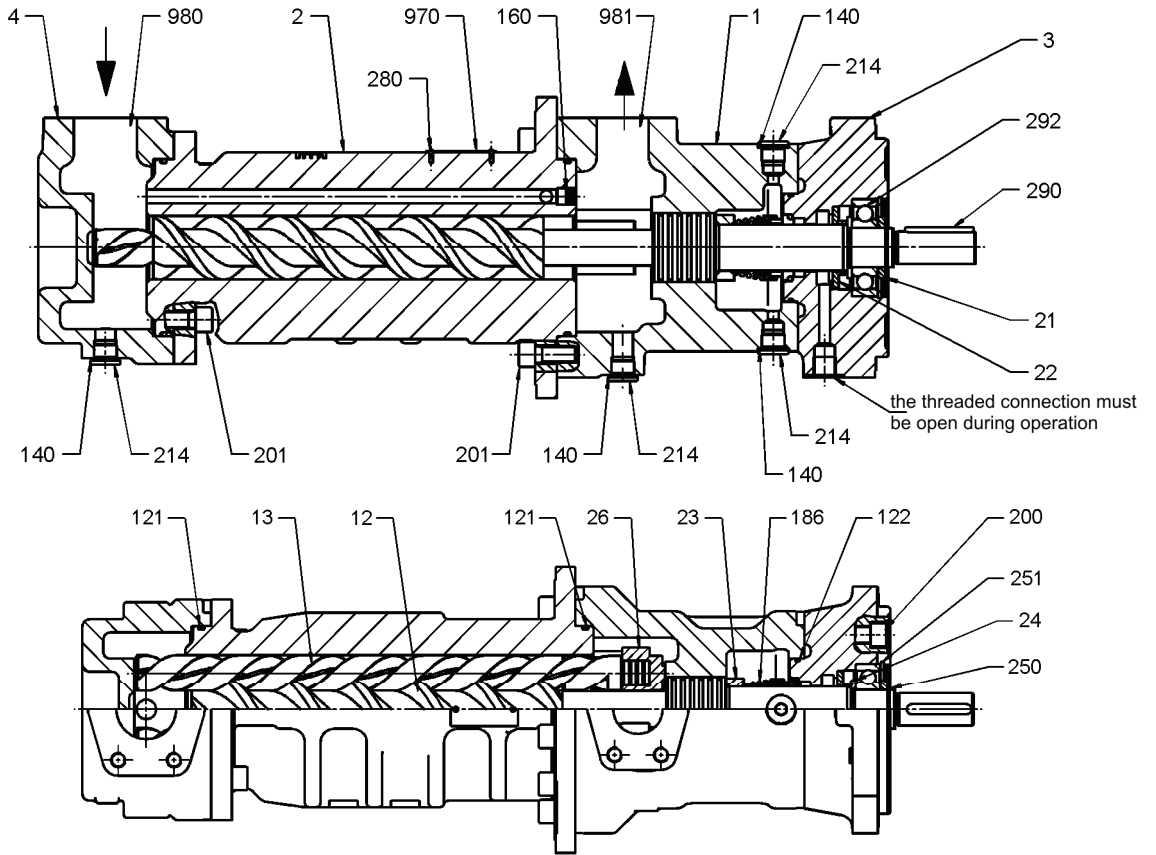


Sizes 20, 40

Denomination	Part No.	Denomination	Part No.	Denomination	Part No.
Discharge casing	1	Gasket	100	Circlip	251
Rotor housing	2	O-ring	121	Circlip	252
Pump cover	3	O-ring	122	Clamping sleeve	270
Suction casing	4	Seal ring	140	Rivet	280
Drive screw	12	Shaft seal ring	183	Key	290
Idler screw	13	Mechanical seal	186	Groove ball bearing	292
Labyrinth ring	21	Socket head cap screw	200	Rating plate	970
Labyrinth ring	22	Stud bolt	201	Plastic cover	980
Spacer ring	23	Screw plug	214	Plastic cover	981
Spacer ring	24	Hexagon nut	220		
Balance bush	26	Circlip	250		

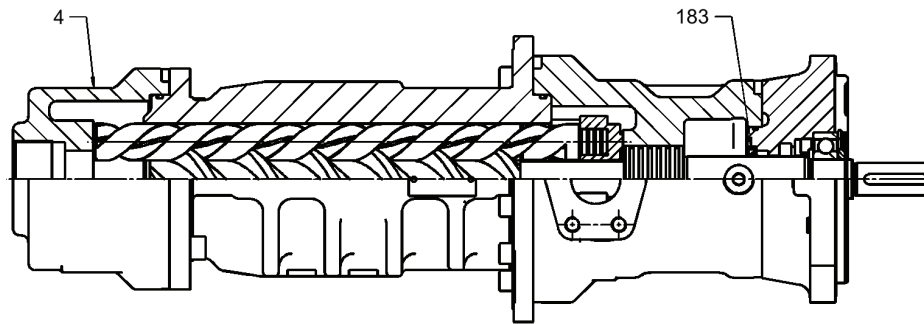
Sectional drawing
EMTEC-A

D 8.6
SAE flange on suction side



Sizes 80, 140, 210, 28

DQ
with axial pipe thread connection on suction side

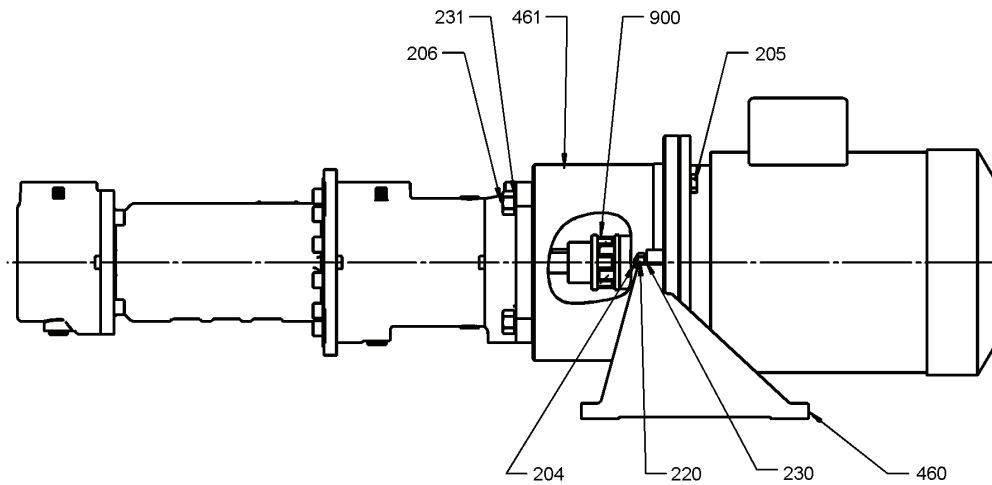


Sizes 80, 140

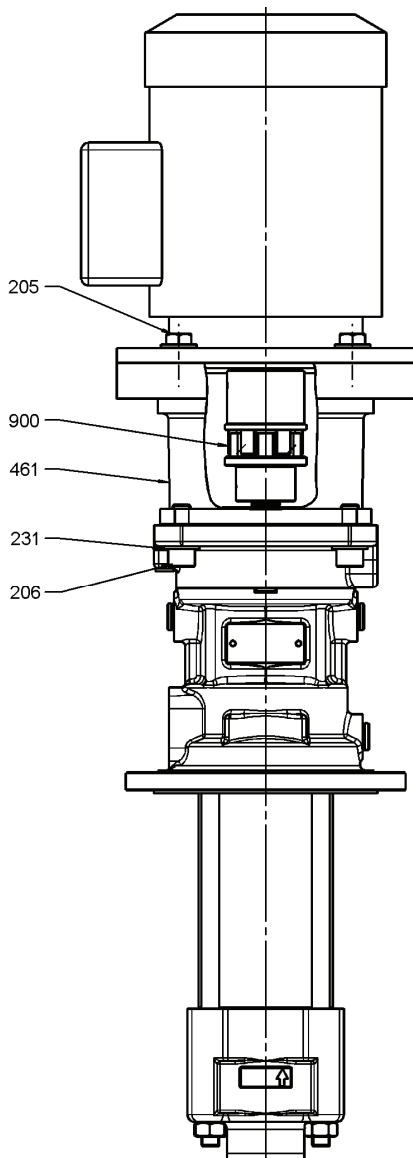
Denomination	Part No.	Denomination	Part No.	Denomination	Part No.
Discharge casing	1	O-ring	121	Circlip	250
Rotor housing	2	O-ring	122	Circlip	251
Pump cover	3	O-ring	129	Inside ring	270
Suction casing	4	Seal ring	140	Rivet	280
Drive screw	12	Joint plug	160	Key	290
Idler screw	13	Joint plug	161	Groove ball bearing	292
Labyrinth ring	21	Shaft seal ring	183	Rating plate	970
Labyrinth ring	22	Mechanical seal	186	Plastic cover	980
Spacer ring	23	Socket head cap screw	200	Plastic cover	981
Ring	24	Socket head cap screw	201		
Balance bush	26	Screw plug	214		

Aggregates
EMTEC-A

Aggregate design with mounting foot



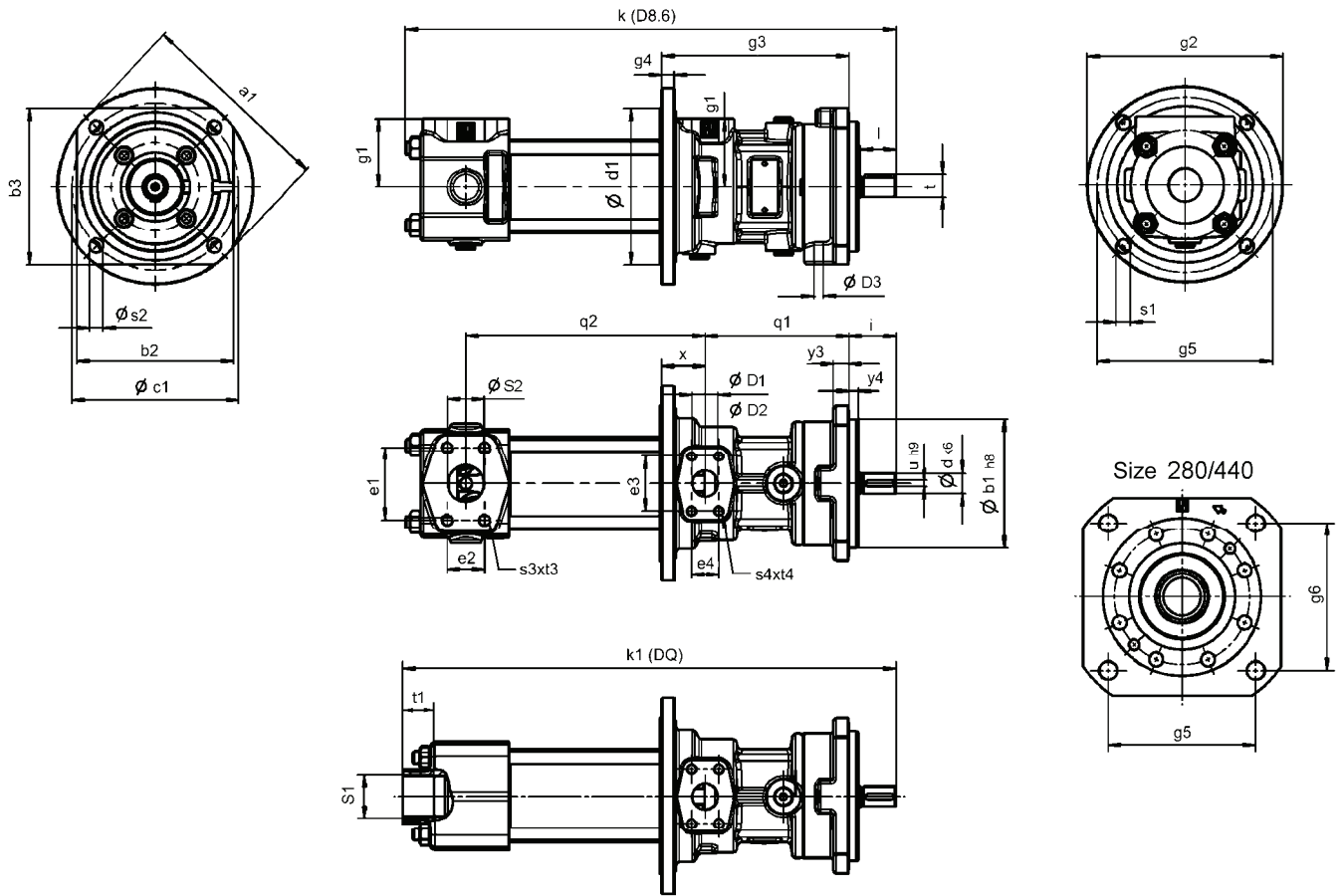
Aggregate design for in-tank installation and tank top installation



Denomination	Part No.
Socket head cap screw	204
Hexagon head bolt	205
Hexagon head bolt	206
Hexagon nut	220
Lock washer	230
Lock washer	231
Pump foot	460
Pump bracket	461
Coupling	900

With some of the sizes, an intermediate ring (part no. 462, not shown) is installed between the pump bracket and motor.

Pump dimensions
EMTEC-A

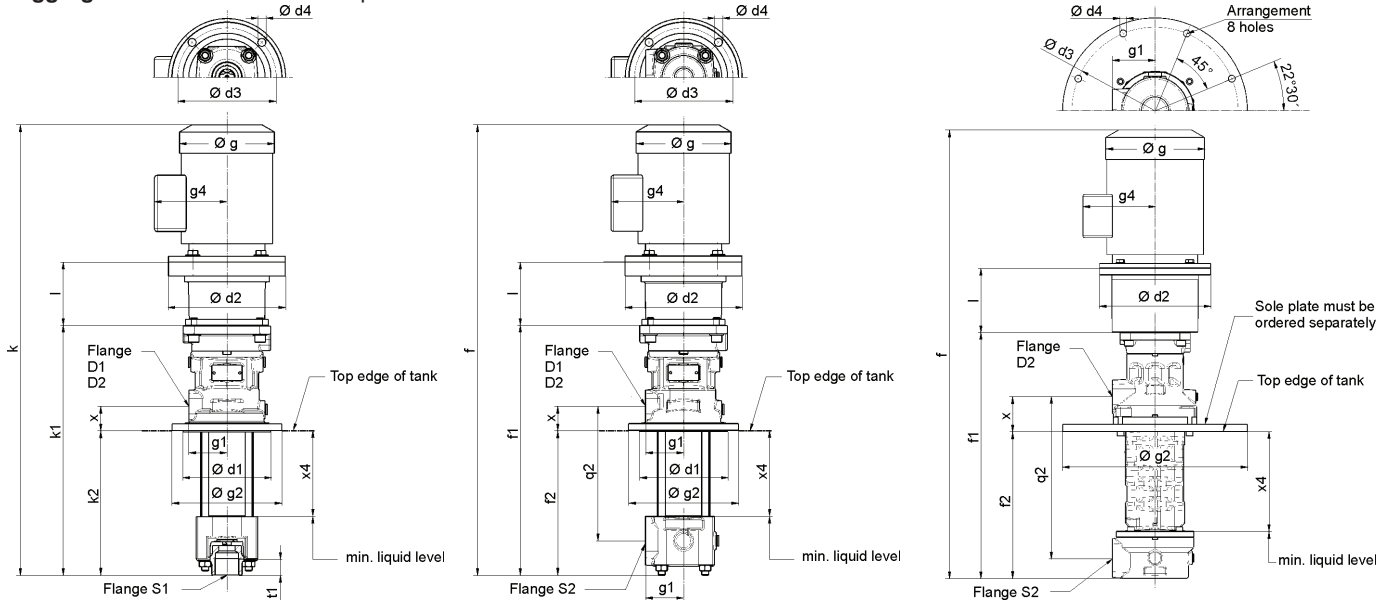


Dimensions in mm.
Subject to alterations

Pump size	Pump dimensions														Shaft end				Flange cover (DIN ISO 3019-2)							
	k	k1	i	q1	q2	x	g1	g2	g3	g4	g5	g6	d1	s1	d	l	u	t	a1	b1	b2	b3	c1	s2	y3	y4
EMT-A 20	471	471	45	138	230	42	65	188	180	12	168	-	150	13,5	19	34	6	21,5	188	125	150	150	160	13,5	15	9
EMT-A 40	523	521	45	150	273	42	65	188	192	12	168	-	150	13,5	19	34	6	21,5	188	125	150	150	160	13,5	15	9
EMT-A 80	589	599	51	159	330	56	95	220	215	13	226	-	200	13,5	19	40	6	21,5	188	125	150	150	160	13,5	15	9
EMT-A 140	685	705	73	185	378	63	95	220	248	15	226	-	200	13,5	25	60	8	28	252	160	190	190	200	17,5	20	9
EMT-A 210	737	-	72	174	436	55	115	-	248	19	244	-	-	M12	28	60	8	31	268	160	190	190	200	17,5	20	9
EMT-A 280	861	-	90	220	485	59	120	-	304	25	180	190	-	M16	32	80	10	35	292	200	236	236	250	22	28	9
EMT-A 440	937	-	88	214	550	64	135	-	302	24	200	210	-	M16	38	72	10	41	329	200	236	236	250	22	28	9

Pump size	Pipe thread suction flange		SAE suction flange					SAE discharge flange D1 = pipe thread connection						Leakage outlet D3
	S1	t1	Inch	s3x3	e1	e2	S2	Inch	s4x4	e3	e4	D1	D2	
EMT-A 20	G1¼	28	1½	M12x18	69,9	35,7	35	1	M10x18	52,4	26,2	G ¾	25	G ¼
EMT-A 40	G1¼	28	1½	M12x18	69,9	35,7	35	1	M10x18	52,4	26,2	G ¾	25	G ¼
EMT-A 80	G2	28	2	M12x18	77,8	42,9	46	1½	M12x18	69,9	35,7	G 1¼	38	G ⅝
EMT-A 140	G2	28	2	M12x18	77,8	42,9	46	1½	M12x18	69,9	35,7	G 1¼	38	G ⅝
EMT-A 210	-	-	2½	M12x18	88,9	50,8	58	2	M12x18	77,8	42,9	-	46	G ⅝
EMT-A 280	-	-	3	M16x24	106,4	61,9	70	2½	M12x18	88,9	50,8	-	58	G ⅝
EMT-A 440	-	-	4	M16x24	130,2	77,8	98	3	M16x24	106,4	61,9	-	70	G ⅝

Aggregate dimensions – Tank top installation



Sizes 20 - 140

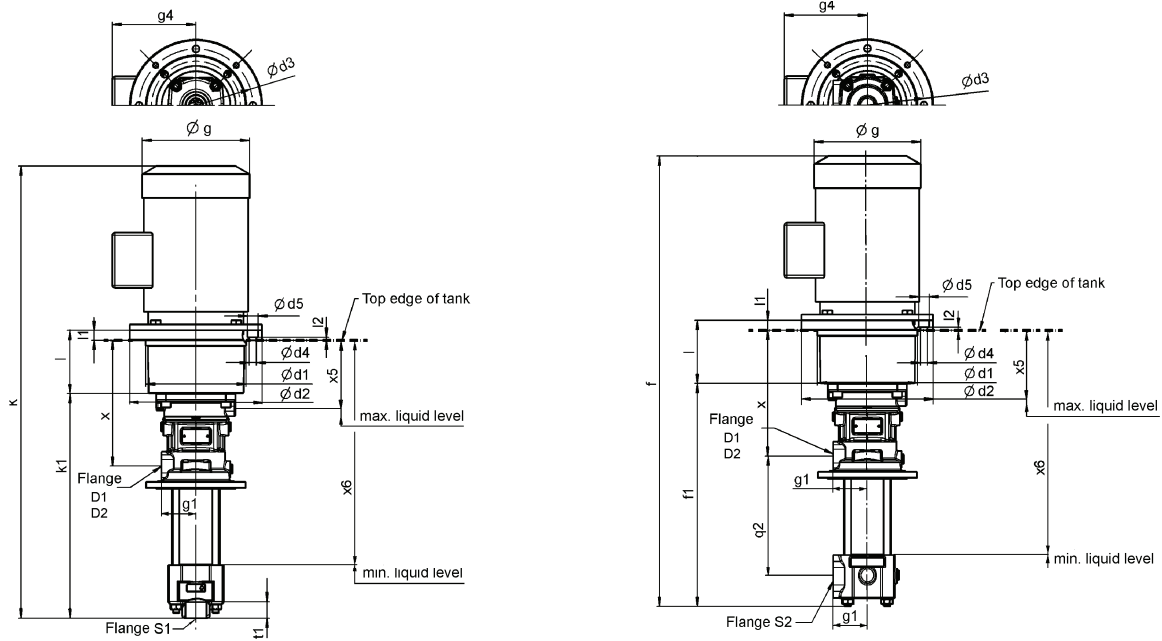
Sizes 210 - 440

Pump size	Size acc. to IEC	Motor power at n =		Flanges				k	k1	k2	f	f1	f2	x	q2	l	g	g1	g2	g4	t1	d1	d2	d3	d4	x4
		3000 min ⁻¹	1500 min ⁻¹	S1	SAE S2	D1	SAE D2																			
EMT-A 20	80	0,75 / 1,1	0,55 /	G1¼	1½"	G¾	1"	768	426	248	768	426	246	42	230	108	162	65	188	124	28	150	200	168	13,5	147
	90 S/L	1,5 / 2,2	1,1 / 1,5					823		823	115					181	130			200						
	100 L	3	3					858		858	120					203	158			250						
	112 M	4	4					894		870	120					228	171			250						
	132 S/M	5,5 / 7,5	5,5 / 7,5					943		943	144					267	195			300						
	160 M/L	11/15 / 18,5	11 / 15					1092		1092	188					320	233			350						
EMT-A 40	80	0,75 / 1,1	0,55 /	G1¼	1½"	G¾	1"	818	476	286	820	478	286	42	273	108	162	65	188	124	28	150	200	168	13,5	190
	90 S/L	1,5 / 2,2	1,1 / 1,5					873		875	115					181	130			200						
	100 L	3	3					908		910	120					203	158			250						
	112 M	4	4					920		922	120					228	171			250						
	132 S/M	5,5 / 7,5	5,5 / 7,5					993		995	144					267	195			300						
	160 M/L	11/15 / 18,5	11 / 15					1142		1144	188					320	233			350						
EMT-A 80	112 M	4	4	G2	2"	G1¼	1½"	1070	548	335	1060	538	323	56	330	128	228	95	220	171	28	200	250	226,3	13,5	224
	132 S/M	5,5 / 7,5	5,5 / 7,5					1119		1109	150					267	195			300						
	160 M/L	11/15 / 18,5	11 / 15					1214		1204	188					320	233			350						
	180 M/L	22	18,5 / 22					1354		1344	204					358	259			350						
	200 L	37	30					1417		1407	204					415	350			400						
	225 M-2	45	-					1561		1541	234					470	335			450						
EMT-A 140	132 S/M	5,5 / 7,5	5,5 / 7,5	G2	2"	G1¼	1½"	1203	632	386	1183	612	364	63	378	175	267	95	220	195	28	200	300	226,3	13,5	265
	160 M/L	11/15 / 18,5	11 / 15					1314			1294					204	320			233			350			
	180 M/L	22	18,5 / 22					1438			1418					204	358			259			350			
	200 L	37	30					1501			1481					204	415			350			400			
	225 M-2	45	-					1561			1541					234	470			335			450			
	225 S/M-4	-	37 / 45					1561			1541					234	470			335			450			
	250 M-2	55	-					1703			1703					248	520			430			550			
	250 M-4	-	55					1720			1720					265	520			430			550			
	280 S/M-2	75 / 90	-					1778			1778					248	575			490			550			
	280 S/M-4	-	75 / 90					1795			1795					265	575			490			550			
EMT-A 210	160 M/L	11/15 / 18,5	11 / 15	-	2½"	-	2"	1478	-	-	1478	665	397	94	436	222	320	115	500	233	-	-	350	450	18,5	286
	180 M/L	22	18,5 / 22					1602			1602					232	358			259			350			
	200 L	37	30					1664			1664					228	415			350			400			
	225 M-2	45	-					1700			1700					234	470			335			450			
	225 S/M-4	-	37 / 45					1728			1728					262	470			335			450			
	250 M-2	55	-					1826			1826					265	520			430			550			
	250 M-4	-	55					1778			1778					265	520			430			550			
	280 S/M-2	75 / 90	-					1901			1901					265	575			490			550			
	280 S/M-4	-	75 / 90					1901			1901					265	575			490			550			
	315 S/ML-2	110 / 132	-					2156			2156					275	645			515			660			
EMT-A 280	160 M/L	11/15 / 18,5	11 / 15	-	3"	-	2½"	1554	-	-	1554	771	467	84	485	222	320	120	550	233	-	-	350	500	18,5	335
	180 M/L	22	18,5 / 22					1678			1678					232	358			259			350			
	200 L	37	30					1741			1741					228	415			350			400			
	225 M-2	45	-					1778			1778					234	470			335			450			
	225 S/M-4	-	37 / 45					1806			1806					262	470			335			450			
	250 M-2	55	-					1904			1904					265	520			430			550			
	250 M-4	-	55					1904			1904					265	520			430			550			
	280 S/M-2	75 / 90	-					1979			1979					265	575			490			550			
	280 S/M-4	-	75 / 90					1979			1979					265	575			490			550			
	315 S/ML-2	110 / 132	-					2269			2269					310	645			515			660			
EMT-A 440	160 M/L	11/15 / 18,5	11 / 15	-	4"	-	3"	1554	-	-	1554	849	546	89	550	222	320	135	650	233	-	-	350	600	18,5	387
	180 M/L	22	18,5 / 22					1678			1678					232	358			259			350			
	200 L	37	30					1741			1741					228	415			350			400			
	225 M-2	45	-					1778			1778					234	470			335			450			
	225 S/M-4	-	37 / 45					1806			1806					262	470			335			450			
	250 M-2	55	-					1904			1904					265	520			430			550			
250 M-4	-	55	1904	1904	265	520	430	550																		
280 S/M-2	75 / 90	-	1979	1979	265	575	490	550																		
280 S/M-4	-	75 / 90	1979	1979	265	575	490	550																		
315 S/ML-2	110 / 132	-	2269	2269	310	645	515	660																		
315 S/ML-4	-	110 / 132	2269	2269	310	645	515	660																		

⊙ Approximate dimensions, can vary according to motor make.

Dimensions in mm. Subject to alterations

Aggregate dimensions – In-tank installation



Pump size	Size acc. to IEC	Motor power at n =		Flanges				⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙								
		3000 min ⁻¹	1500 min ⁻¹	S1	SAE S2	D1	SAE D2																														
EMT-A 20	100 L	3	3	G1½	1½"	G¾	1"	858	426	28	858	239	120	19	6,4	203	158	190	250	215	13,5	24	131	427													
	112 M	4	4					894																	870	239	120	19	6,4	228	171	190	250	215	13,5	24	
	132 S / M	5,5 / 7,5	5,5 / 7,5					943																	262	144	20	7,4	267	195	234	300	265	13,5	24	154	450
	160 M / L	11/15 / 18,5	11 / 15					1092																	300	188	26	9,4	320	233	260	350	300	17,5	30	192	488
EMT-A 40	100 L	3	3	G1½	1½"	G¾	1"	908	476	28	910	251	120	19	6,4	203	158	190	250	215	13,5	24	131	482													
	112 M	4	4					920			922														251	120	19	6,4	228	171	190	250	215	13,5	24		
	132 S / M	5,5 / 7,5	5,5 / 7,5					993			274														144	20	7,4	267	195	234	300	265	13,5	24	154	506	
	160 M / L	11/15 / 18,5	11 / 15					1142			312														188	26	9,4	320	233	260	350	300	17,5	30	192	543	
EMT-A 80	112 M	4	4	G2	2"	G1½	1½"	1095	548	28	1085	321	213	51	9,4	228	171	260	350	300	17,5	30	192	601													
	132 S / M	5,5 / 7,5	5,5 / 7,5					1134			1124														321	213	51	9,4	267	195	260	350	300	17,5	30		
	160 M / L	11/15 / 18,5	11 / 15					1214			1204														321	188	26	9,4	320	233	260	350	300	17,5	30	192	601
	180 M / L	22	18,5 / 22					1354			1344														337	204	26	9,4	358	259	260	350	300	17,5	30	208	617
EMT-A 140	200 L	37	30	G2	2"	G1½	1½"	1417	632	28	1407	337	204	26	9,4	415	350	300	400	350	17,5	30	208	617													
	132 S/M	5,5 / 7,5	5,5 / 7,5					1218			1198														347	213	51	9,4	267	195	260	350	300	17,5	30		
	160 M/L	11/15 / 18,5	11 / 15					1314			1294														363	204	26	9,4	320	233	260	350	300	17,5	30	216	691
	180 M/L	22	18,5 / 22					1438			1418														363	204	26	9,4	358	259	260	350	300	17,5	30	216	691
	225 M-2	45	-					1501			1481														363	204	26	9,4	415	335	300	400	350	17,5	30	216	691
	225 M-4	-	37 / 45					1561			1541														393	234	26	9,4	470	335	350	450	400	17,5	30	246	721
EMT-A 210	132 S/M	5,5 / 7,5	5,5 / 7,5	-	2½"	-	2"	-	-	-	1267	352	229	51	9,4	267	195	300	400	350	17,5	30	215,5	732													
	160 M/L	11/15 / 18,5	11 / 15								1372														1352	229	51	9,4	320	233	300	400	350	17,5	30		
	180 M/L	22	18,5 / 22								1496														1476	352	229	51	9,4	358	259	300	400	350	17,5	30	
	200 L	37	30								1534														1514	352	204	26	9,4	415	350	300	400	350	17,5	30	
	225 M-2	45	-								1594														1574	382	234	26	9,4	470	335	350	450	400	17,5	30	
	225 S/M-4	-	37 / 45								1594														1574	382	234	26	9,4	470	335	350	450	400	17,5	30	
	250 M-2	55	-								1703														1683	396	248	26	9,4	520	430	450	550	500	17,5	30	
	250 M-4	-	55								1720														1700	413	265	26	9,4	520	430	450	550	500	17,5	30	
	280 S/M-2	75 / 90	-								1778														1758	396	248	26	9,4	575	490	450	550	500	17,5	30	
	280 S/M-4	-	75 / 90								1795														1775	413	265	26	9,4	575	490	450	550	500	17,5	30	
EMT-A 280	160 M/L	11/15 / 18,5	11 / 15	-	3"	-	2½"	-	-	-	1478	397	228	51	9,4	320	233	300	400	350	17,5	30	220,5	817													
	180 M/L	22	18,5 / 22								1602														1582	397	228	51	9,4	358	259	300	400	350	17,5	30	
	200 L	37	30								1664														1644	422	228	26	9,4	415	350	300	400	350	17,5	30	
	225 M-2	45	-								1700														1680	428	234	26	9,4	470	335	350	450	400	17,5	30	
	225 S/M-4	-	37 / 45								1728														1708	456	262	26	9,4	470	335	350	450	400	17,5	30	
	250 M-2	55	-								1826														1806	459	265	26	9,4	520	430	450	550	500	17,5	30	
	250 M-4	-	55								1826														1806	459	265	26	9,4	520	430	450	550	500	17,5	30	
	280 S/M-2	75 / 90	-								1901														1881	459	265	26	9,4	575	490	450	550	500	17,5	30	
	280 S/M-4	-	75 / 90								1901														1881	459	265	26	9,4	575	490	450	550	500	17,5	30	
	315 S/M/L-2	110 / 132	160 / 200								-														2156	2136	445	275	50	11,4	645	515	550	660	600	22	36
EMT-A 440	160 M/L	11/15 / 18,5	11 / 15	-	4"	-	3"	-	-	-	1554	390	227	51	9,4	320	233	350	450	400	17,5	30	229	866													
	180 M/L	22	18,5 / 22								1678														1658	390	227	51	9,4	358	259	350	450	400	17,5	30	
	200 L	37	30								1741														1721	390	227	51	9,4	415	350	350	450	400	17,5	30	
	225 M-2	45	-								1778														1758	422	234	26	9,4	470	335	350	450	400	17,5	30	
	225 S/M-4	-	37 / 45								1806														1786	450	262	26	9,4	470	335	350	450	400	17,5	30	
	250 M-2	55	-								1904														1884	453	265	26	9,4	520	430	450	550	500	17,5	30	
	250 M-4	-	55								1904														1884	453	265	26	9,4	520	430	450	550	500	17,5	30	
	280 S/M-2	75 / 90	-								1979														1959	453	265	26	9,4	575	490	450	550	500	17,5	30	
	280 S/M-4	-	75 / 90								1979														1959	453	265	26	9,4	575	490	450	550	500	17,5	30	
	315 S/M/L-2	110 / 132	160 / 200								-														2269	2249	492	310	32	11,4	645	515	550	660	600	22	36

⊙ Approximate dimensions, can vary according to motor make.

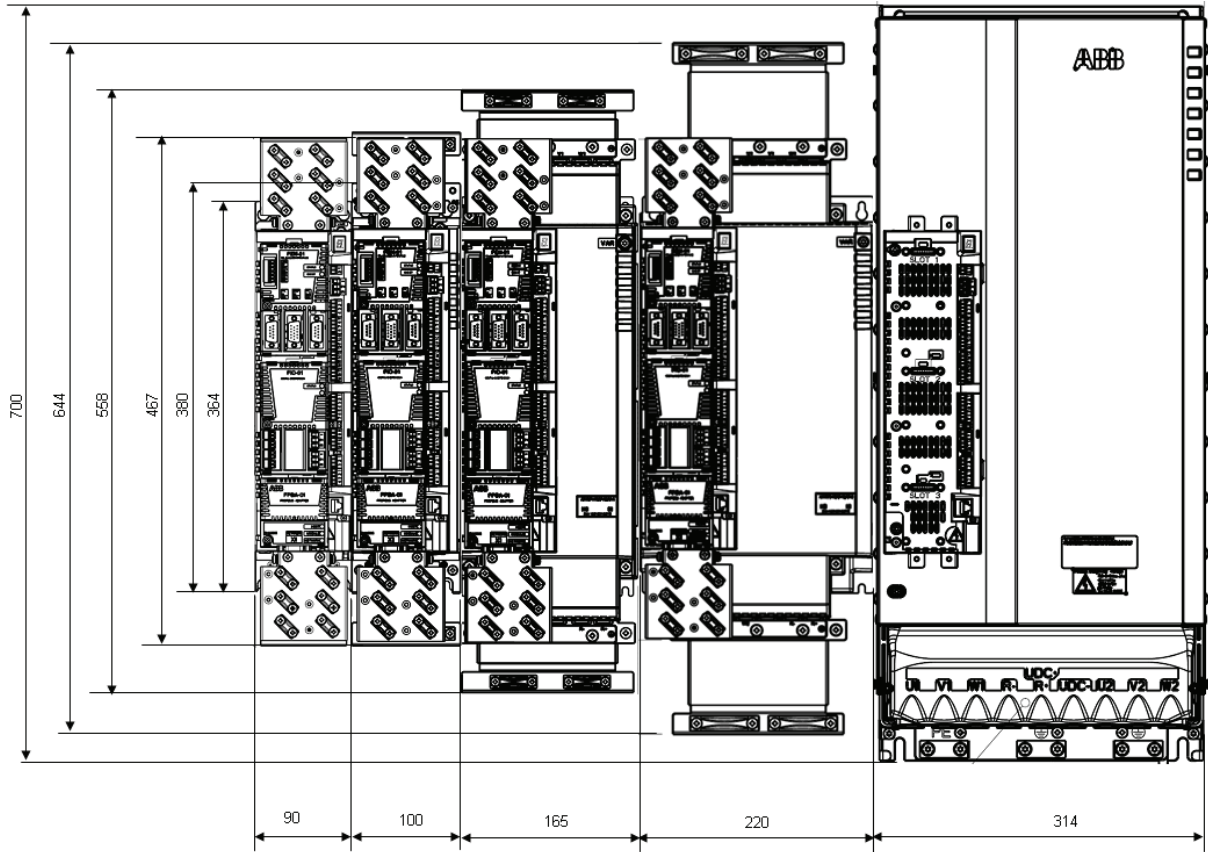
Dimensions in mm. Subject to alterations.

Main dimensions – Converter, mains filter, and mains choke

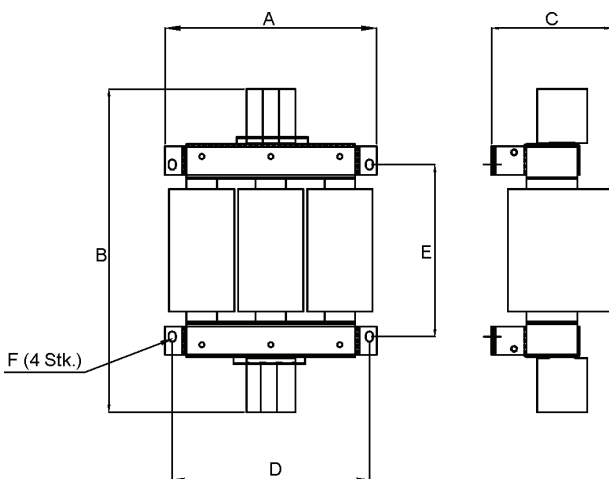
The modules can be installed directly next to each other. The following image depicts the major dimensions of the frequency converter modules and the required distances.

Converter

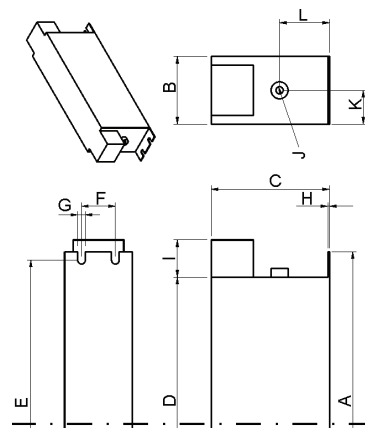
	Size A	Size B	Size C	Size D	Size E
Depth:	146 mm	223 mm	223 mm	223 mm	398 mm



Mains choke



Mains filter



Dimensions in mm

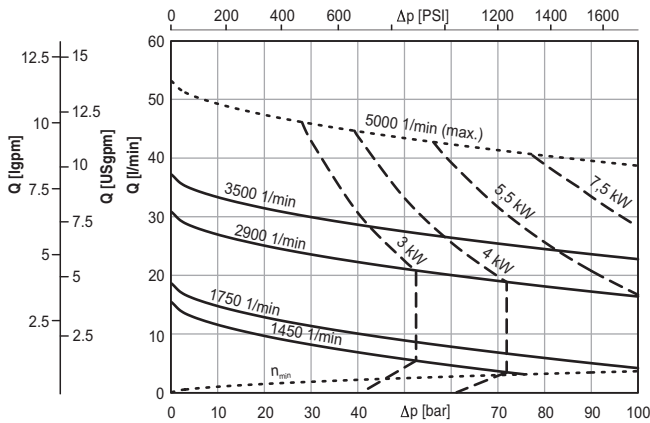
Parameter	Dimensions for each throttle type							
	CHK-01	CHK-02	CHK-03	CHK-04	CHK-05	CHK-06	CHK-07	CHK-08
A	120	150	150	150	207	207	249	249
B	146	175	175	175	272	326	326	346
C	79	86	100	100	154	154	167	167
D	77	105	105	105	193	193	235	235
E	114	148	148	148	118	169	125	147
F (Schraube)	M5	M5	M5	M5	M6	M6	M6	M8

Parameter	EMC filter for each filter type			
	JFI-02	JFI-03	JFI-05	JFI-07
A	250	250	250	270
B	45	50	85	90
C	70	85	90	150
D	220	240	220	240
E	235	255	235	255
F	25	30	60	65
G	5,4	5,4	5,4	6,5
H	1	1	1	1,5
I	22	25	39	45
J	M5	M5	M6	M10
K	22,5	25	42,5	45
L	29,5	39,5	26,5	64

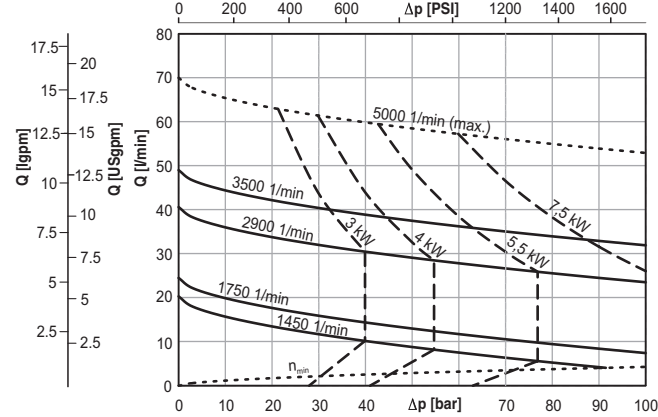
Performance graphs (see note on page 17 below)

Performance data at 1 mm²/s = emulsion

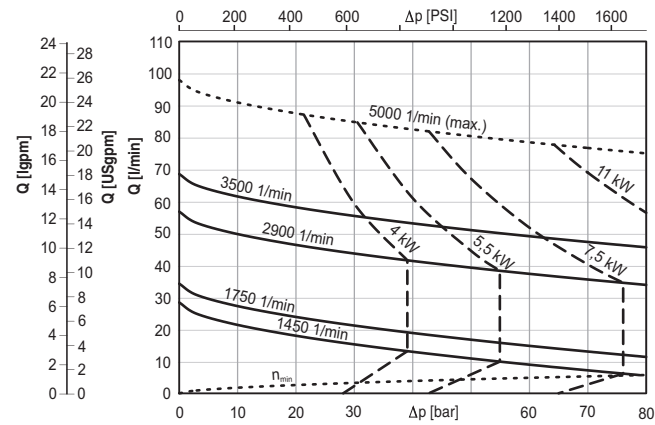
EMT 20-38



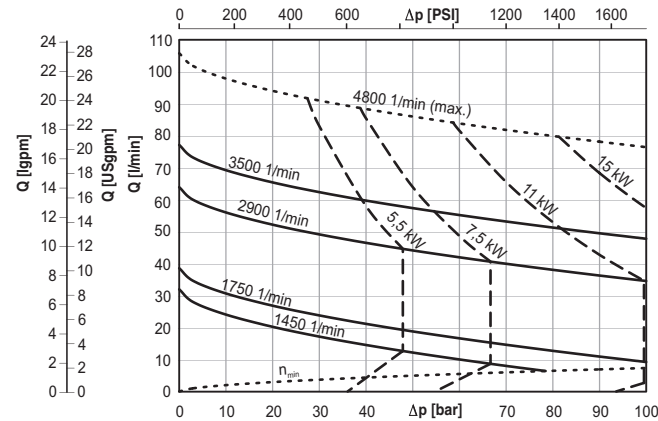
EMT 20-46



EMT 20-56

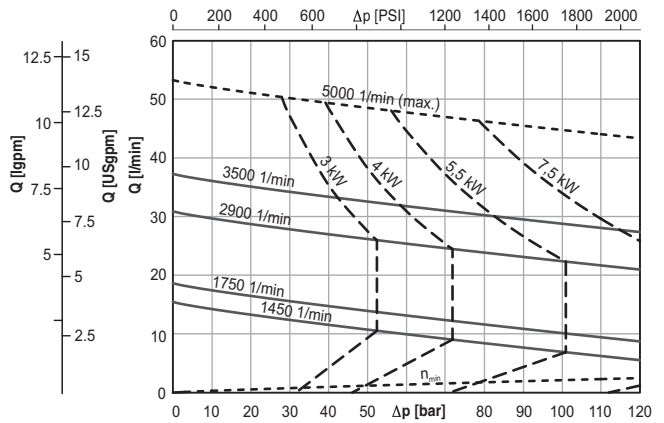


EMT 40-38

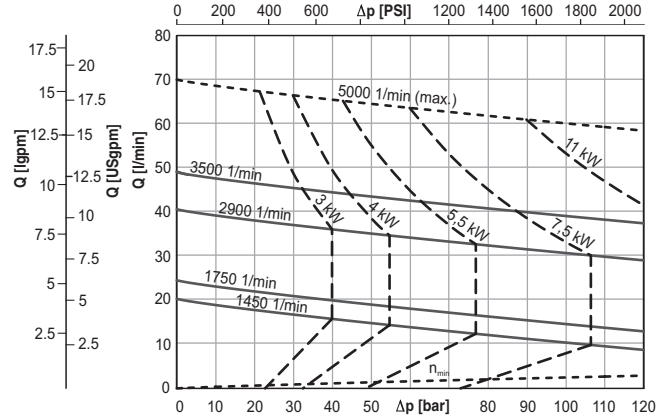


Performance data at 20 mm²/s = cutting oil with EP-additive

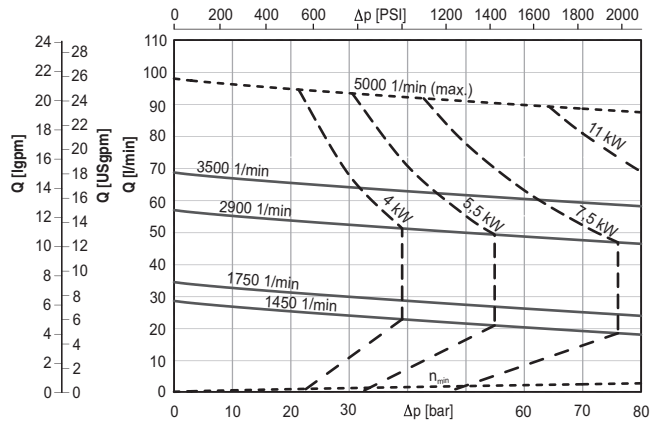
EMT 20-38



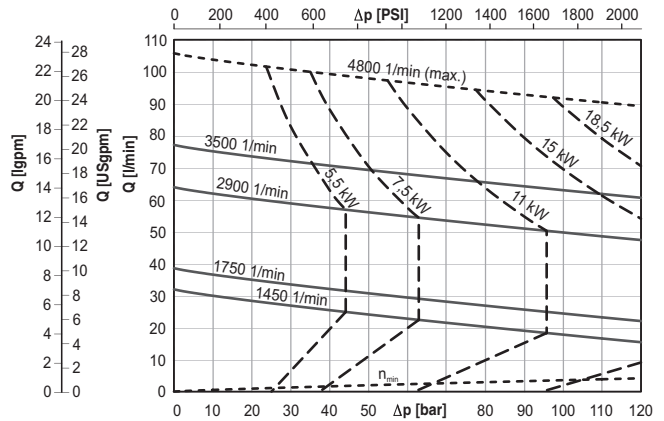
EMT 20-46



EMT 20-56



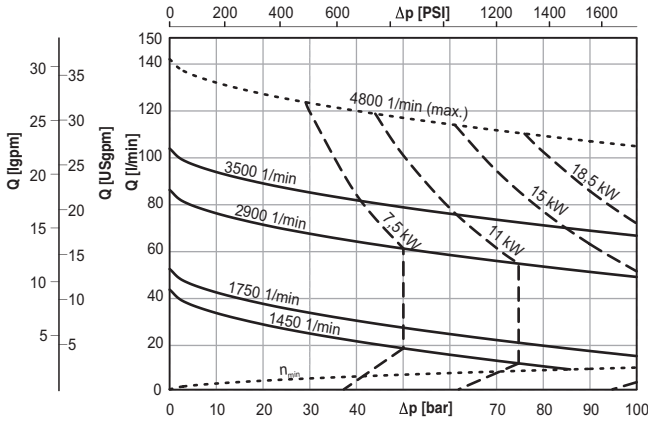
EMT 40-38



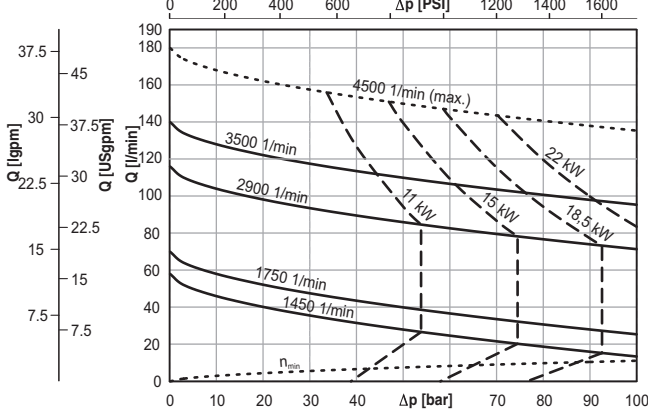
Performance graphs (see note on page 17 below)

Performance data at 1 mm²/s = emulsion

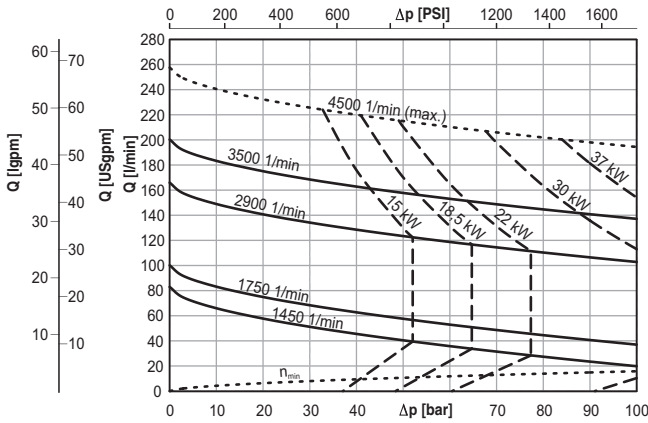
EMT 40-46



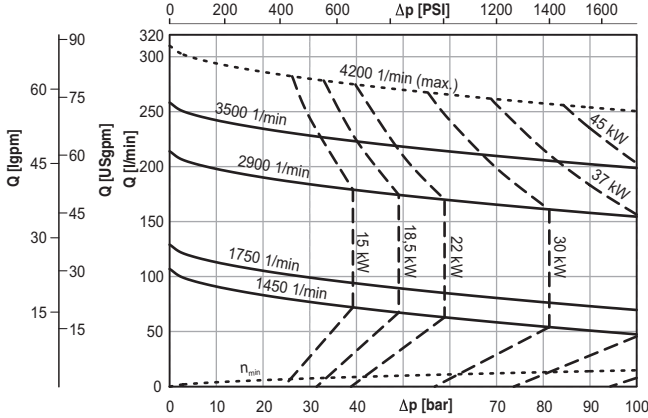
EMT 80-36



EMT 80-46

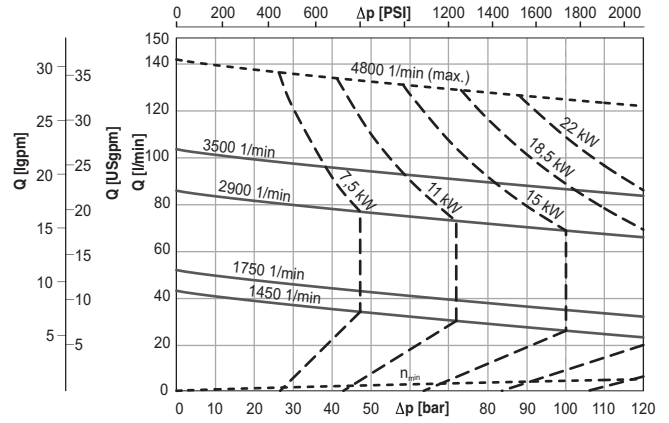


EMT 140-39

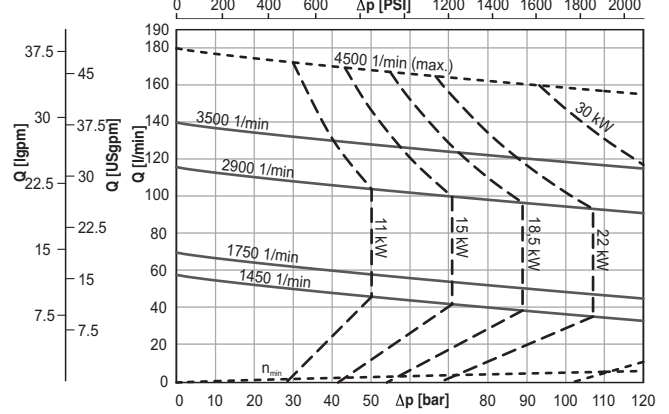


Performance data at 20 mm²/s = cutting oil with EP-additive

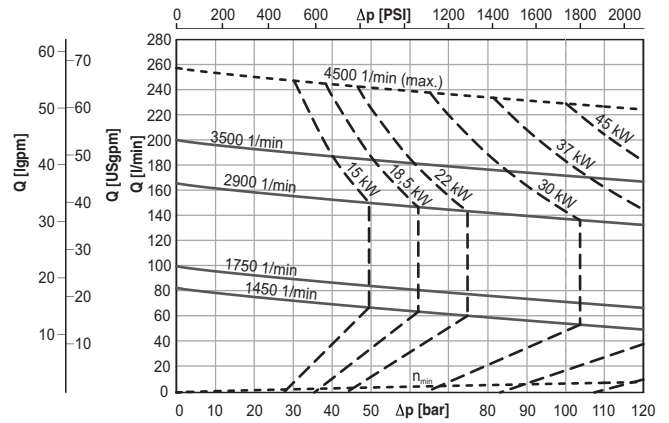
EMT 40-46



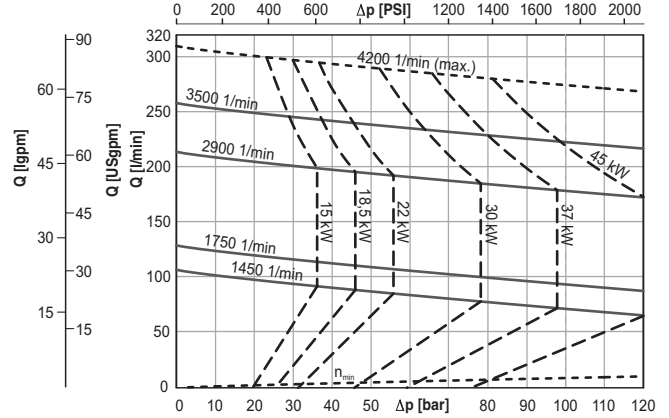
EMT 80-36



EMT 80-46



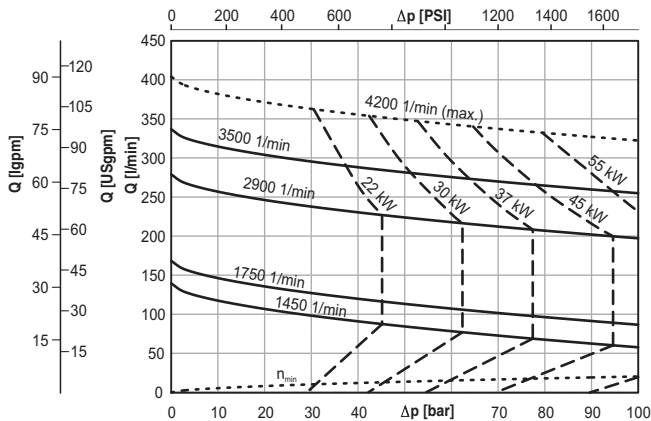
EMT 140-39



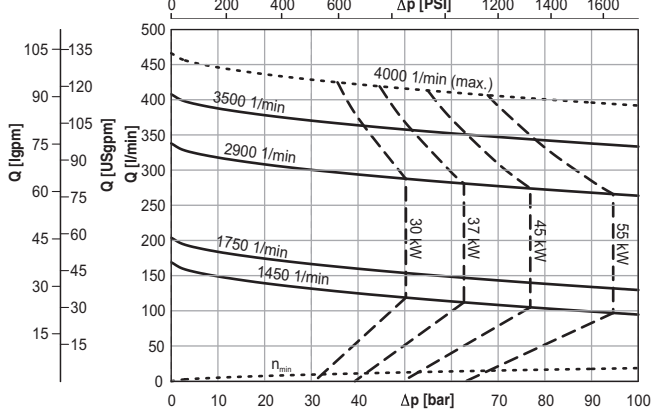
Performance graphs (see note on page 17 below)

Performance data at 1 mm²/s = emulsion

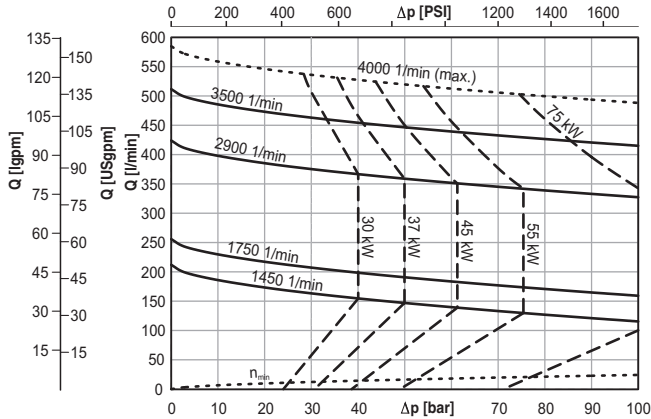
EMT 140-46



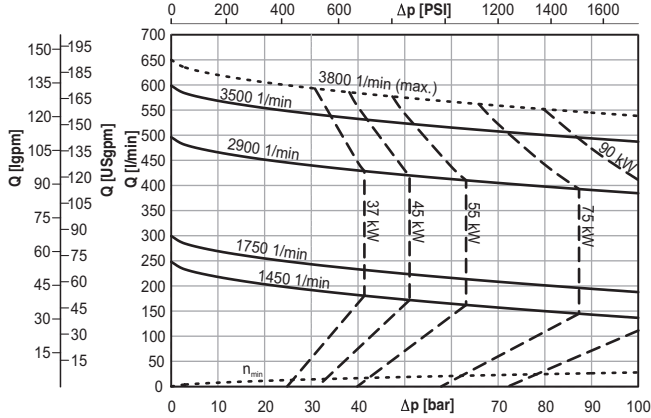
EMT 210-40



EMT 210-46

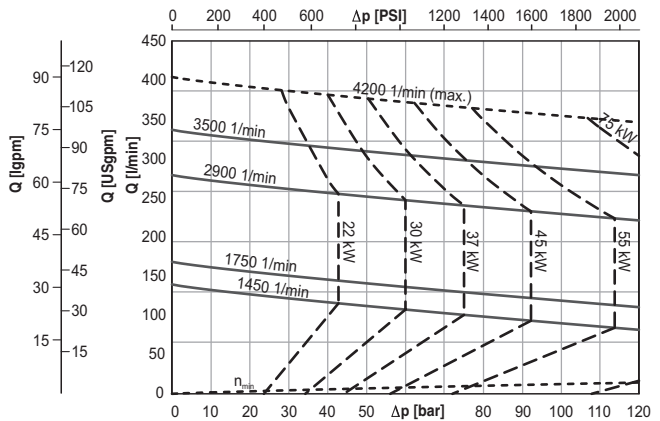


EMT 280-43

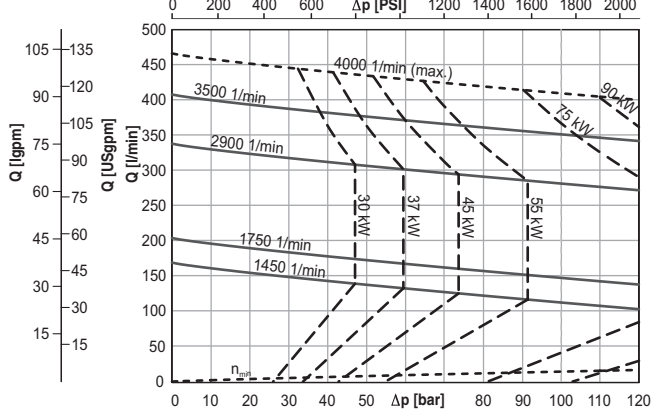


Performance data at 20 mm²/s = cutting oil with EP-additive

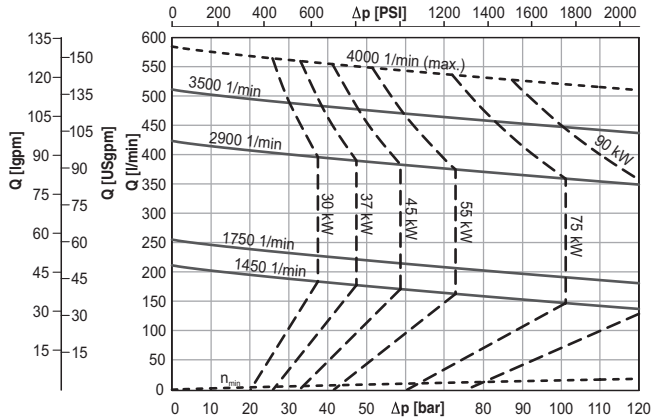
EMT 140-46



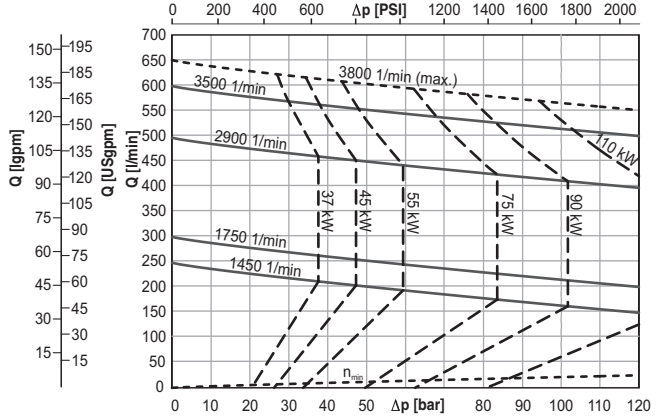
EMT 210-40



EMT 210-46



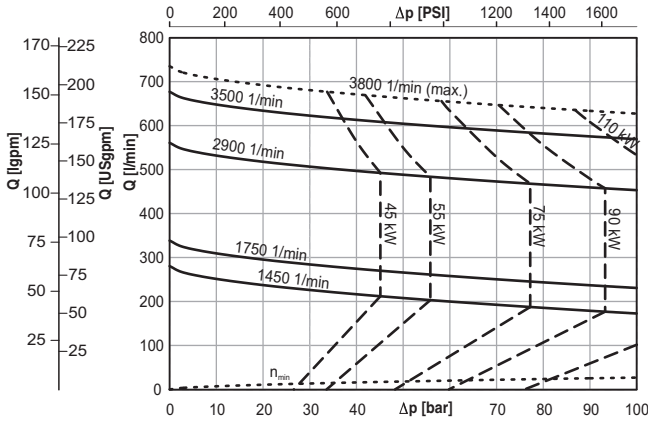
EMT 280-43



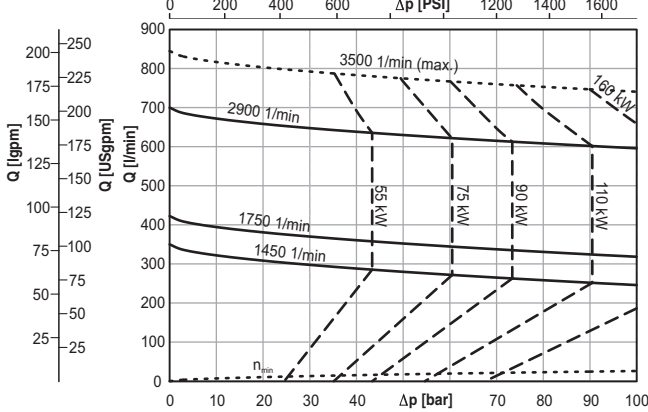
Performance graphs (see note below)

Performance data at 1 mm²/s = emulsion

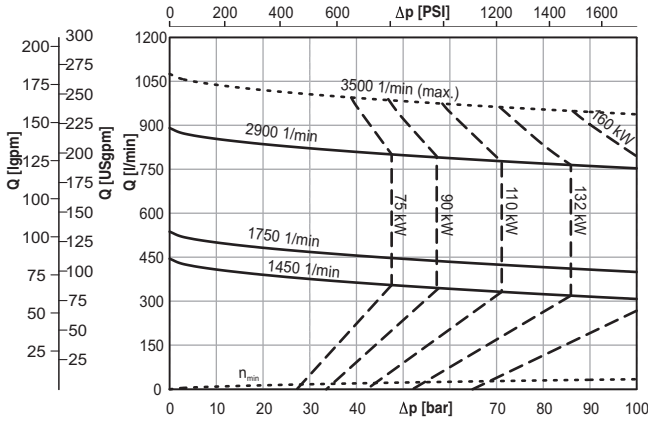
EMT 280-46



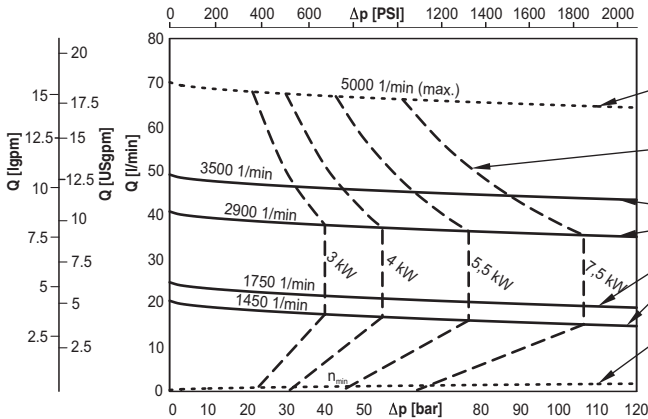
EMT 440-40



EMT 440-46

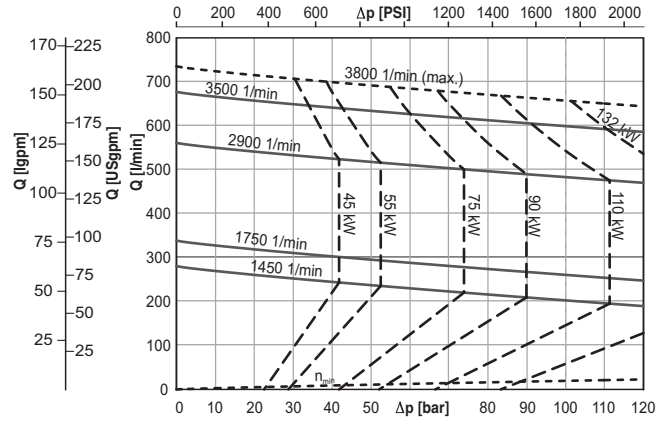


Note:

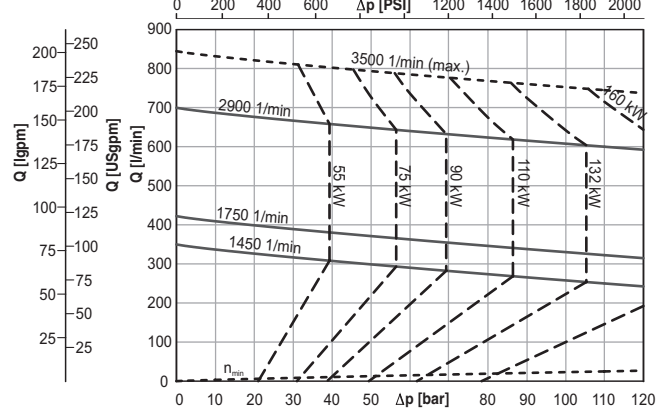


Performance data at 20 mm²/s = cutting oil with EP-additive

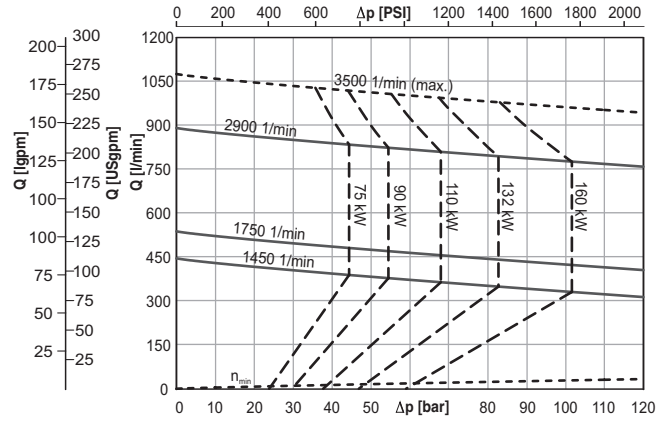
EMT 280-46



EMT 440-40



EMT 440-46



Pump characteristic curve at maximum speed.

Characteristic curve for standard motors power limit in continuous operation (50 Hz, 2-poles).

Characteristic curves for specified speeds.

Characteristic curve for the minimum capacity at the lowest possible speed in continuous operation.

Motor power limits can be exceeded and speed can be below minimum speed under certain conditions. Consultation with factory required.

Performance table

EMTEC-A

2900 1/min

Speed of rotation: 2900 1/min

Capacity : Q [l/min]

Frequency: 50 Hz

Power required: P [kW]

Viskosität [mm²/s]	1 mm²/s = Emulsion											20 mm²/s = Schneidöl mit EP-Zusatz													
	0	10	20	30	40	50	60	70	80	90	100	0	10	20	30	40	50	60	70	80	90	100	110	120	
20-38	Q	30,9	27,0	25,1	23,6	22,3	21,1	20,0	19,0	18,1	17,2	16,4	30,9	29,7	28,8	27,9	27,1	26,3	25,5	24,8	24,1	23,4	22,6	22,0	21,3
	P	0,3	0,8	1,3	1,9	2,4	2,9	3,4	3,9	4,4	4,9	5,5	0,3	0,8	1,3	1,9	2,4	2,9	3,4	3,9	4,4	4,9	5,5	6,0	6,5
20-46	Q	40,6	36,0	33,8	32,0	30,5	29,1	27,8	26,7	25,6	24,5	23,5	40,6	39,2	38,1	37,0	36,0	35,1	34,1	33,2	32,3	31,5	30,6	29,8	29,0
	P	0,3	1,0	1,7	2,3	3,0	3,7	4,4	5,0	5,7	6,4	7,1	0,3	1,0	1,7	2,3	3,0	3,7	4,4	5,0	5,7	6,4	7,1	7,8	8,4
20-56	Q	56,8	49,8	46,4	43,7	41,4	39,3	37,4	35,6	33,9	-	-	56,8	55,0	53,6	52,2	50,9	49,7	48,5	47,3	46,2	-	-	-	-
	P	0,3	1,3	2,2	3,2	4,1	5,0	6,0	6,9	7,9	-	-	0,3	1,3	2,2	3,2	4,1	5,0	6,0	6,9	7,9	-	-	-	-
40-38	Q	63,9	56,0	52,1	49,1	46,5	44,1	41,9	39,9	38,0	36,2	34,5	63,9	61,9	60,2	58,7	57,3	56,0	54,6	53,4	52,1	50,9	49,6	48,4	47,2
	P	0,4	1,5	2,5	3,6	4,7	5,7	6,8	7,8	8,9	10,0	11,0	0,8	1,9	3,0	4,0	5,1	6,2	7,2	8,3	9,4	10,4	11,5	12,6	13,6
40-46	Q	85,1	75,1	70,3	66,4	63,1	60,1	57,4	54,8	52,4	50,2	48,0	85,1	82,7	80,7	78,9	77,2	75,6	74,0	72,4	70,9	69,3	67,9	66,4	65,3
	P	0,4	1,8	3,2	4,7	6,1	7,5	8,9	10,3	11,7	13,2	14,6	0,8	2,3	3,7	5,1	6,5	7,9	9,4	10,8	12,2	13,6	15,0	16,5	17,8
80-36	Q	116	104	97,4	92,5	88,2	84,4	80,9	77,6	74,5	71,6	68,8	116	113	109	107	104	101	98,5	96,0	93,6	91,2	88,8	86,5	84,2
	P	0,6	2,6	4,5	6,4	8,4	10,3	12,3	14,2	16,1	18,1	20,0	1,3	3,3	5,2	7,1	9,1	11,0	13,0	14,9	16,8	18,8	20,7	22,7	24,6
80-46	Q	166	149	141	135	129	124	119	115	111	107	104	166	162	158	154	151	147	144	141	138	135	132	129	126
	P	0,6	3,4	6,2	8,9	11,7	14,5	17,3	20,0	22,8	25,6	28,3	1,3	4,1	6,9	9,6	12,4	15,2	18,0	20,7	23,5	26,3	29,0	31,7	34,5
140-39	Q	214	198	190	184	178	173	169	166	161	157	153	214	209	204	200	197	193	190	186	183	179	176	173	170
	P	1,0	4,6	8,1	11,7	15,3	18,8	22,4	26,0	29,5	33,1	36,7	2,1	5,6	9,2	12,8	16,3	19,9	23,5	27,0	30,6	34,2	37,7	41,3	44,9
140-46	Q	279	257	247	238	231	225	219	213	208	203	199	279	272	266	261	256	251	247	242	238	233	229	225	221
	P	1,0	5,6	10,3	14,9	19,6	24,2	28,8	33,5	38,1	42,8	47,4	2,1	6,7	11,3	16,0	20,6	25,3	29,9	34,6	39,2	43,8	48,5	53,3	57,9
210-40	Q	338	318	308	301	294	288	282	277	273	268	264	338	330	324	318	312	307	302	297	292	287	282	277	273
	P	1,7	7,3	13,0	18,6	24,2	29,9	35,5	41,1	46,8	52,4	58,0	3,5	9,2	14,8	20,4	26,1	31,7	37,3	43,0	48,6	54,2	59,9	65,5	71,1
210-46	Q	424	398	385	375	366	358	351	344	338	332	326	424	415	407	400	393	387	380	374	368	362	357	355	350
	P	1,7	8,8	15,8	22,9	30,0	37,1	44,1	51,2	58,3	65,4	72,4	3,5	10,6	17,7	24,8	31,8	38,9	46,0	53,1	60,1	67,2	74,3	81,2	88,3
280-43	Q	496	466	452	440	430	421	413	405	398	392	385	496	484	475	466	458	450	443	435	428	421	414	404	397
	P	2,8	11,1	19,4	27,6	35,9	44,1	52,4	60,7	68,9	77,2	85,5	5,9	14,1	22,4	30,7	38,9	47,2	55,5	63,7	72,0	80,2	88,5	96,8	105
280-46	Q	561	532	517	506	496	487	479	471	464	457	451	561	550	540	532	524	516	508	501	493	486	479	477	470
	P	2,8	12,2	21,5	30,9	40,2	49,6	59,0	68,3	77,7	87,0	96,4	5,9	15,2	24,6	33,9	43,3	52,7	62,0	71,4	80,7	90,1	99,4	109	118
440-40	Q	700	672	659	648	639	630	623	615	609	602	596	700	687	676	666	657	648	639	631	622	614	606	598	590
	P	4,4	16,0	27,7	39,4	51,0	62,7	74,4	86,1	97,7	109	121	9,1	20,8	32,5	44,1	55,8	67,5	79,2	90,8	103	114	126	138	149
440-46	Q	891	854	836	822	810	799	789	779	770	762	754	891	875	862	850	839	828	817	807	796	786	777	768	758
	P	4,4	19,2	34,1	48,9	63,8	78,6	93,5	108	123	138	153	9,1	24,0	38,8	53,7	68,6	83,4	98,3	113	128	143	158	173	187

Performance table

EMTEC-A

3500 1/min

Speed of rotation: 3500 1/min

Capacity: Q [l/min]

Frequency: 60 Hz

Power required: P [kW]

Viskosität [mm²/s]	1 mm²/s = Emulsion											20 mm²/s = Schneidöl mit EP-Zusatz													
	0	10	20	30	40	50	60	70	80	90	100	0	10	20	30	40	50	60	70	80	90	100	110	120	
20-38	Q	37,2	33,3	31,5	29,9	28,6	27,5	26,4	25,4	24,5	23,6	22,8	37,2	36,1	35,2	34,3	33,5	32,7	31,9	31,2	30,5	29,7	29,0	28,3	27,7
	P	0,4	1,0	1,7	2,3	2,9	3,5	4,1	4,8	5,4	6,0	6,6	0,4	1,0	1,7	2,3	2,9	3,5	4,1	4,8	5,4	6,0	6,6	7,2	7,9
20-46	Q	49,0	44,4	42,2	40,4	38,9	37,5	36,2	35,1	34,0	32,9	31,9	49,0	47,6	46,5	45,4	44,4	43,5	42,5	41,6	40,7	39,9	39,0	38,2	37,3
	P	0,4	1,2	2,0	2,9	3,7	4,5	5,3	6,1	6,9	7,8	8,6	0,4	1,2	2,0	2,9	3,7	4,5	5,3	6,1	6,9	7,8	8,6	9,4	10,2
20-56	Q	68,6	61,6	58,2	55,5	53,2	51,1	49,2	47,4	45,7	-	-	68,6	66,8	65,3	64,0	62,7	61,5	60,3	59,1	57,9	56,8	-	-	-
	P	0,4	1,6	2,7	3,8	5,0	6,1	7,3	8,4	9,5	-	-	0,4	1,6	2,7	3,8	5,0	6,1	7,3	8,4	9,6	10,7	-	-	-
40-38	Q	77,1	69,2	65,3	62,3	59,7	57,3	55,1	53,1	51,2	49,4	47,7	77,1	75,1	73,5	72,0	70,5	69,2	67,9	66,6	65,3	64,1	62,8	61,6	60,5
	P	0,5	1,8	3,1	4,4	5,7	6,9	8,2	9,5	10,8	12,1	13,4	1,1	2,4	3,7	5,0	6,3	7,5	8,8	10,1	11,4	12,7	14,0	15,3	16,5
40-46	Q	103	92,8	87,9	84,1	80,7	77,7	75,0	72,4	70,0	67,8	65,6	102,8	100,3	98,4	96,5	94,8	93,2	91,6	90,0	88,5	87,0	85,5	84,0	82,6
	P	0,5	2,2	4,0	5,7	7,4	9,1	10,8	12,5	14,2	15,9	17,7	1,1	2,8	4,6	6,3	8,0	9,7	11,4	13,1	14,8	16,5	18,3	20,0	21,7
80-36	Q	141	128	122	117	112	108	105	102	98,6	95,7	92,9	141	137	134	131	128	125	123	120	118	115	113	111	108
	P	0,8	3,2	5,5	7,8	10,2	12,5	14,9	17,2	19,6	21,9	24,2	1,8	4,1	6,4	8,8	11,1	13,5	15,8	18,2	20,5	22,8	25,2	27,5	29,9
80-46	Q	201	184	176	161	164	158	154	150	145	142	138	201	196	192	189	185	182	179	176	173	170	167	164	161
	P	0,8	4,2	7,5	10,9	14,2	17,6	20,9	24,2	27,6	30,9	34,3	1,8	5,1	8,5	11,8	15,1	18,5	21,8	25,2	28,5	31,9	35,2	38,5	41,8
140-39	Q	258	242	234	228	222	218	213	209	205	201	198	258	253	249	245	241	237	234	230	227	224	220	217	214
	P	1,3	5,6	9,9	14,2	18,5	22,8	27,1	31,4	35,7	40,1	44,4	2,7	7,0	11,3	15,7	20,0	24,3	28,6	32,9	37,2	41,5	45,8	50,1	54,4
140-46	Q	336	315	304	296	289	282	276	271	266	261	256	336	329	324	318	313	309	304	300	295	291	287	283	279
	P	1,3	6,9	12,5	18,12	23,7	29,3	34,9	40,5	46,1	51,7	57,3	2,7	8,3	13,9	19,5	25,1	30,7	36,3	41,9	47,6	53,2	58,8	64,5	70,1
210-40	Q	408	388	378	371	364	358	352	347	343	338	334	408	400	394	388	382	377	372	367	362	357	352	347	343
	P	2,3	9,0	15,8	22,6	29,4	36,2	43,0	49,8	56,6	63,4	70,2	4,7	11,5	18,3	25,1	31,9	38,7	45,5	52,3	59,1	65,9	72,7	79,5	86,3
210-46	Q	512	486	473	463	454	446	439	432	426	420	414	512	503	495	488	481	475	468	462	456	450	444	443	437
	P	2,3	10,8	19,3	27,9	36,4	44,9	53,5	62,0	70,6	79,1	87,6	4,7	13,2	21,8	30,3	38,8	47,4	55,9	64,5	73,0	81,5	90,1	98,5	107
280-43	Q	598	569	554	543	533	524	516	508	501	494	488	598	587	577	569	561	553	545	538	530	523	516	507	499
	P	3,8	13,7	23,7	33,7	43,6	53,6	63,6	73,6	83,5	93,5	104	7,8	17,8	27,7	37,7	47,7	57,7	67,6	77,6	87,6	97,6	108	118	128
280-46	Q	677	648	633	622	612	603	595	587	580	573	567	677	666	657	648	640	632	624	617	609	602	595	593	586
	P	3,8	15,0	26,3	37,6	48,9	60,2	71,5	82,8	94,1	105	117	7,8	19,1	30,4	41,7	53,0	64,2	75,5	86,8	98,1	109	121	132	143
440-40	Q	845	817	804	793	783	775	767	760	754	747	741	845	832	822	811	802	793	784	776	767	759	751	743	735
	P	5,8	19,9	33,9	48	62,1	76,2	90,3	104	119	133	147	12,1	26,2	40,3	54,4	68,5	82,5	96,6	111	125	139	153	167	181
440-46	Q	1076	1039	1021	1006	994	983	973	964	955	946	938	1076	1059	1046	1034	1023	1012	1001	991	981	971	961	953	943
	P	5,8	23,7	41,6	59,6	77,5	95,4	113	131	149	167	185	12,1	30,0	48,0	65,9	83,8	102	120	138	156	174	191	209	227

Performance table

EMTEC-A

1450 1/min

Speed of rotation: 1450 1/min

Frequency: 50 Hz

Capacity: Q [l/min]

Power required: P [kW]

Viskosität [mm²/s]	1 mm²/s = Emulsion											20 mm²/s = Schneidöl mit EP-Zusatz													
	Druck: [bar]	0	10	20	30	40	50	60	70	80	90	100	0	10	20	30	40	50	60	70	80	90	100	110	120
20-38	Q	15,4	11,5	9,6	8,1	6,8	5,7	4,6	3,6	-	-	-	15,4	14,3	13,3	12,5	11,7	10,9	10,1	9,4	8,6	7,9	7,2	6,5	5,5
	P	0,1	0,4	0,6	0,9	1,1	1,4	1,7	1,9	-	-	-	0,1	0,4	0,6	0,9	1,1	1,4	1,7	1,9	2,2	2,4	2,7	2,9	3,2
20-46	Q	20,3	15,7	13,5	11,7	10,2	8,8	7,5	6,4	5,3	4,2	-	20,3	18,9	17,8	16,7	15,7	14,8	13,8	12,9	12,0	11,2	10,4	9,6	8,7
	P	0,1	0,4	0,8	1,1	1,5	1,8	2,1	2,5	2,8	3,2	-	0,1	0,4	0,8	1,1	1,5	1,8	2,1	2,5	2,8	3,2	3,5	3,8	4,2
20-56	Q	28,4	21,4	18,0	15,3	13,0	10,9	9,0	7,2	-	-	-	28,4	26,6	25,1	23,8	22,5	21,3	20,1	19	17,9	-	-	-	-
	P	0,1	0,6	1,1	1,5	2,0	2,5	3,0	3,4	-	-	-	0,1	0,6	1,1	1,5	2,0	2,5	2,9	3,4	3,9	-	-	-	-
40-38	Q	31,9	24,0	20,2	17,2	14,5	12,2	10,0	8,0	-	-	-	31,9	29,9	28,3	26,8	25,4	24,0	22,7	21,4	20,2	18,9	17,7	16,5	15,4
	P	0,1	0,7	1,2	1,7	2,3	2,8	3,3	3,9	-	-	-	0,3	0,8	1,4	1,9	2,4	3,0	3,5	4,0	4,6	5,1	5,6	6,2	6,7
40-46	Q	42,6	32,6	27,7	23,9	20,5	17,5	14,8	12,3	9,9	-	-	42,6	40,1	38,2	36,4	34,6	33,0	31,4	29,8	28,2	27,0	25,6	24,1	22,7
	P	0,1	0,8	1,6	2,3	3,0	3,7	4,4	5,1	5,8	-	-	0,3	1,0	1,7	2,4	3,1	3,8	4,6	5,3	6,0	6,7	7,4	8,1	8,8
80-36	Q	58,2	45,4	39,2	34,3	30,0	26,2	22,7	19,4	16,3	13,4	10,6	58,2	54,3	51,2	48,3	45,5	42,9	40,3	37,8	35,4	33,0	30,6	28,3	33,2
	P	0,2	1,2	2,2	3,1	4,1	5,1	6,0	7,0	8,0	9,0	9,9	0,5	1,4	2,4	3,4	4,4	5,3	6,3	7,3	8,2	9,2	10,2	11,1	12,1
80-46	Q	83,2	66,3	58,1	51,5	45,9	40,9	36,2	31,9	27,9	24,0	20,4	83,2	78,4	74,5	70,9	67,6	64,3	61,1	58,1	55,0	52,1	49,2	46,3	43,5
	P	0,2	1,6	3,0	4,4	5,8	7,1	8,5	9,9	11,3	12,7	14,1	0,5	1,9	3,2	4,6	6,0	7,4	8,8	10,2	11,6	12,9	14,3	15,7	17,1
140-39	Q	107,0	90,7	82,8	76,5	712,1	66,2	61,7	57,6	53,7	50,0	46,4	107	102	97,4	93,4	89,6	86,0	82,5	79,1	75,7	72,4	69,2	68,6	65,7
	P	0,3	2,1	3,9	5,7	7,5	9,3	11,0	12,8	14,6	16,4	18,2	0,7	2,5	4,3	6,1	7,9	9,6	11,4	13,2	15,0	16,8	18,6	20,4	22,1
140-46	Q	193	118	107	99,0	91,9	85,4	79,5	74,1	68,9	64,0	59,4	139	132	127	122	117	112	107	103	98,4	94,2	89,9	85,8	81,6
	P	0,3	2,7	5,0	7,3	9,6	12,0	14,3	16,6	18,9	21,2	23,6	0,7	3,1	5,4	7,7	10,0	12,3	14,7	17,0	19,3	21,7	24	26,3	28,6
210-40	Q	169	149	139	132	125	119	114	108	104	99,0	94,7	169	161	155	149	143	138	133	128	123	118	112	108	103
	P	0,6	3,4	6,2	9,0	11,9	14,7	17,5	20,3	23,1	25,9	28,8	1,3	4,1	6,9	9,7	12,5	15,3	18,1	21,0	23,8	26,6	29,4	32,2	35,0
210-46	Q	212	186	173	163	154	146	139	132	126	120	114	212	203	195	188	181	175	168	162	156	154	148	143	138
	P	0,6	4,1	7,7	11,2	14,7	18,3	21,8	25,4	28,9	32,4	36,0	1,3	4,8	8,3	11,9	15,4	18,9	22,5	26,0	29,5	33,0	36,6	40,1	43,6
280-43	Q	248	218	204	192	182	173	165	158	154	144	137	248	236	227	218	210	202	195	187	180	170	163	156	149
	P	1,0	5,1	9,3	13,4	17,5	21,7	25,8	29,9	34,1	38,2	42,3	2,1	6,2	10,3	14,5	18,6	22,7	26,9	31,0	35,1	39,3	43,4	47,6	51,7
280-46	Q	281	251	236	225	215	206	198	190	183	176	170	281	269	260	251	243	235	227	220	213	209	203	196	190
	P	1,0	5,7	10,4	15,0	19,7	24,4	29,1	33,7	38,4	43,1	47,8	2,1	6,8	11,7	16,1	20,8	25,5	30,1	34,8	39,5	44,2	48,8	53,5	58,2
440-40	Q	350	322	309	298	288	280	272	265	259	252	246	350	337	326	316	307	298	289	281	272	264	258	250	243
	P	1,5	7,4	13,2	19,0	24,9	30,7	36,6	42,4	48,2	54,1	59,9	3,2	9,1	14,9	20,7	26,6	32,4	38,2	44,1	49,9	55,8	61,6	67,4	73,2
440-46	Q	446	409	391	376	364	353	343	333	325	316	308	446	429	416,4	404	393	382	371	361	351	342	332	323	313
	P	1,5	9,0	16,4	23,8	31,2	38,7	46,1	53,5	61,0	68,4	75,8	3,2	10,7	18,1	25,5	32,9	40,4	47,8	55,2	62,6	70,0	77,5	84,9	92,3

Performance table

EMTEC-A

1750 1/min

Speed of rotation: 1750 1/min

Frequency: 60 Hz

Capacity: Q [l/min]

Power required: P [kW]

Viskosität [mm ² /s]	1 mm ² /s = Emulsion											20 mm ² /s = Schneidöl mit EP-Zusatz													
	Druck: [bar]	0	10	20	30	40	50	60	70	80	90	100	0	10	20	30	40	50	60	70	80	90	100	110	120
20-38	Q	18,6	14,7	12,8	11,3	10,0	8,9	7,8	6,8	5,9	5,0	4,1	18,6	17,5	16,5	15,7	14,9	14,1	13,3	12,6	11,8	11,1	10,4	9,7	9,0
	P	0,1	0,5	0,8	1,1	1,4	1,7	2,0	2,3	2,6	2,9	3,2	0,1	0,5	0,8	1,1	1,4	1,7	2,0	2,3	2,6	2,9	3,2	3,6	3,9
20-46	Q	24,5	19,9	17,7	15,9	14,4	13,0	11,7	10,6	9,5	8,4	7,4	24,5	23,1	22,0	20,9	19,9	19,0	18,0	17,1	16,2	15,4	14,6	13,8	12,9
	P	0,1	0,6	1,0	1,4	1,8	2,2	2,6	3,0	3,4	3,8	4,2	0,1	0,6	1,0	1,4	1,8	2,2	2,6	3,0	3,4	3,8	4,2	4,6	5,0
20-56	Q	34,3	27,3	23,9	21,2	18,9	16,8	14,9	13,1	11,4	-	-	34,3	32,5	31,0	29,7	28,4	27,2	26,0	24,9	23,7	-	-	-	-
	P	0,1	0,7	1,3	1,9	2,4	3,0	3,6	4,1	4,7	-	-	0,1	0,7	1,3	1,9	2,4	3,0	3,6	4,1	4,7	-	-	-	-
40-38	Q	38,5	30,6	26,8	23,8	21,1	18,8	16,6	14,6	12,7	10,9	9,2	38,5	36,5	34,9	33,4	32,0	30,6	29,3	28,0	26,8	25,5	24,3	23,1	21,9
	P	0,2	0,8	1,5	2,1	2,8	3,4	4,0	4,7	5,3	6,0	6,6	0,4	1,0	1,7	2,3	3,0	3,6	4,3	4,9	5,5	6,2	6,8	7,5	8,1
40-46	Q	51,4	41,4	36,5	32,7	29,3	26,4	23,6	21,1	18,7	16,4	14,2	51,4	48,9	47,0	45,2	43,5	41,8	40,2	38,6	37,1	35,8	34,4	32,9	31,5
	P	0,2	1,0	1,9	2,8	3,6	4,5	5,3	6,2	7,0	7,9	8,7	0,4	1,3	2,1	3,0	3,8	4,7	5,5	6,4	7,2	8,1	8,9	9,8	10,6
80-36	Q	70,2	57,4	51,2	46,3	42,0	38,2	34,7	31,4	28,4	25,5	22,7	70,2	66,3	63,2	60,3	57,6	54,9	52,4	49,9	47,4	45,0	42,6	40,3	38,0
	P	0,3	1,5	2,6	3,8	5,0	6,1	7,3	8,5	9,7	10,8	12,0	0,6	1,8	3,0	4,1	5,3	6,5	7,6	8,8	10,0	11,2	12,3	13,5	14,7
80-46	Q	100	83,5	75,3	68,7	63,1	58,1	53,4	49,1	45,1	41,2	37,6	100	95,6	91,7	88,1	84,8	81,5	78,3	75,3	72,2	69,3	66,4	63,5	60,7
	P	0,3	2,0	3,6	5,3	7,0	8,7	10,3	12,0	13,7	15,3	17,0	0,6	2,3	4,0	5,6	7,3	9,0	10,7	12,3	14,0	15,6	17,3	19,0	20,6
140-39	Q	129	113	105	98,6	93,2	88,3	83,9	79,7	75,8	72,1	68,6	129	124	120	116	112	108	105	101	97,9	94,6	91,3	87,8	
	P	0,5	2,6	4,8	6,9	9,1	11,2	13,4	15,5	17,7	19,8	22,0	1,0	3,1	5,3	7,4	9,6	11,7	13,9	16,0	18,2	20,3	22,5	24,7	26,8
140-46	Q	168	147	136	128	121	114	108	103	97,7	92,8	88,2	168	161	156	150	145	141	136	132	127	123	119	115	111
	P	0,5	3,3	6,1	8,9	11,7	14,5	17,3	20,1	22,9	25,7	28,5	1,0	3,8	6,6	9,4	12,2	15,0	17,8	20,6	23,4	26,2	29,0	31,9	34,7
210-40	Q	204	184	174	167	160	154	148	143	139	134	130	204	196	190	184	178	173	168	163	158	153	148	143	138
	P	0,8	4,2	7,6	11,0	14,4	17,8	21,2	24,6	28	31,4	34,8	1,7	5,1	8,5	11,9	15,3	18,7	22,1	25,5	28,9	32,3	35,6	39,0	42,4
210-46	Q	256	230	217	207	198	190	183	176	170	164	158	256	247	239	232	225	218	212	206	200	198	192	187	182
	P	0,8	5,1	9,3	13,6	17,9	22,1	26,4	30,7	34,9	39,2	43,5	1,7	5,9	10,2	14,5	18,7	23,0	27,3	31,5	35,8	40,0	44,3	48,5	52,8
280-43	Q	299	269	255	243	234	225	216	209	202	195	189	299	288	278	270	262	254	246	239	231	224	214	207	200
	P	1,3	6,3	11,3	16,3	21,3	26,3	31,2	36,2	41,2	46,2	51,2	2,8	7,7	12,7	17,7	22,7	27,7	32,7	37,7	42,6	47,6	52,7	57,6	62,6
280-46	Q	339	309	295	283	273	264	256	248	241	234	228	339	327	318	309	301	293	286	278	271	267	261	254	248
	P	1,3	7,0	12,6	18,3	23,9	29,5	35,2	40,8	46,5	52,1	57,8	2,8	8,4	14,0	19,7	25,3	31,0	36,6	42,3	47,9	53,5	59,2	64,8	70,5
440-40	Q	423	395	381	370	361	353	345	338	331	325	319	423	410	399	389	379	370	362	353	345	337	328	323	315
	P	2,0	9,1	16,1	23,2	30,2	37,3	44,3	51,3	58,4	65,4	72,5	4,3	11,3	18,4	25,4	32,5	39,5	46,5	53,6	60,6	67,7	74,7	81,7	88,7
440-46	Q	538	501	483	469	456	445	435	426	417	408	400	538	522	509	497	485	474	463	453	443	434	424	415	405
	P	2,0	11,0	20,0	28,9	37,9	46,9	55,8	64,8	73,8	82,7	91,7	4,3	13,2	22,2	31,2	40,1	49,1	58,1	67,0	76,0	84,9	93,9	102,8	111,8

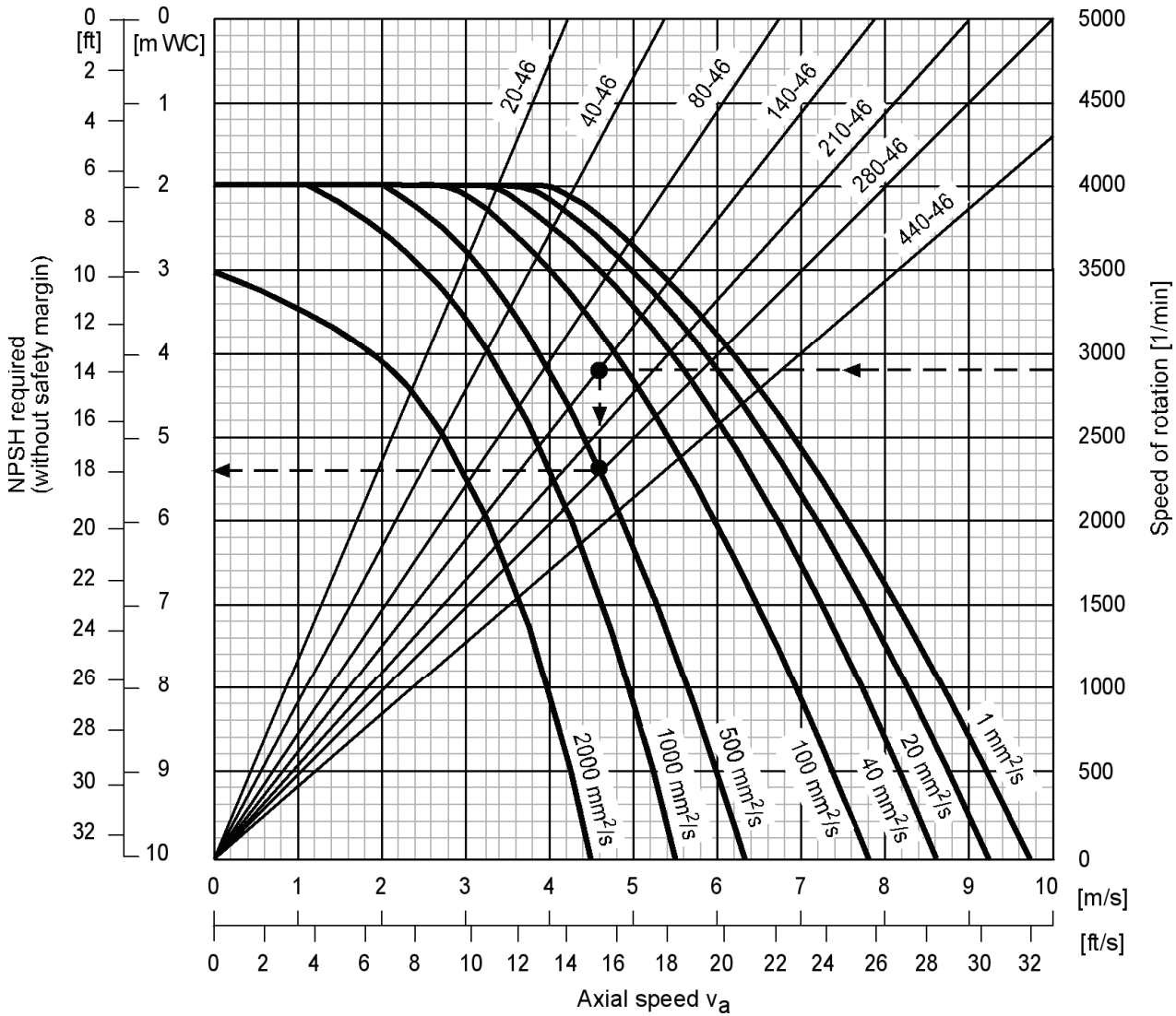
NPSH graphs of series EMTEC®

The data of the performance graphs refer to liquids without any air enclosed and show the beginning of aeration. For this reason, a safety margin of 0.5 m must be added to the NPSH value taken from the curve. An additional value must be added to the derived NPSH value at liquids with air inclusions (undissolved air). When dealing with critical conditions in your plant, always consult the factory.

Maximum allowable air content:

Emulsion/cooling lubricant solutions: 10%
 Oil: 7%

Screw pitch angle 46°



Example:

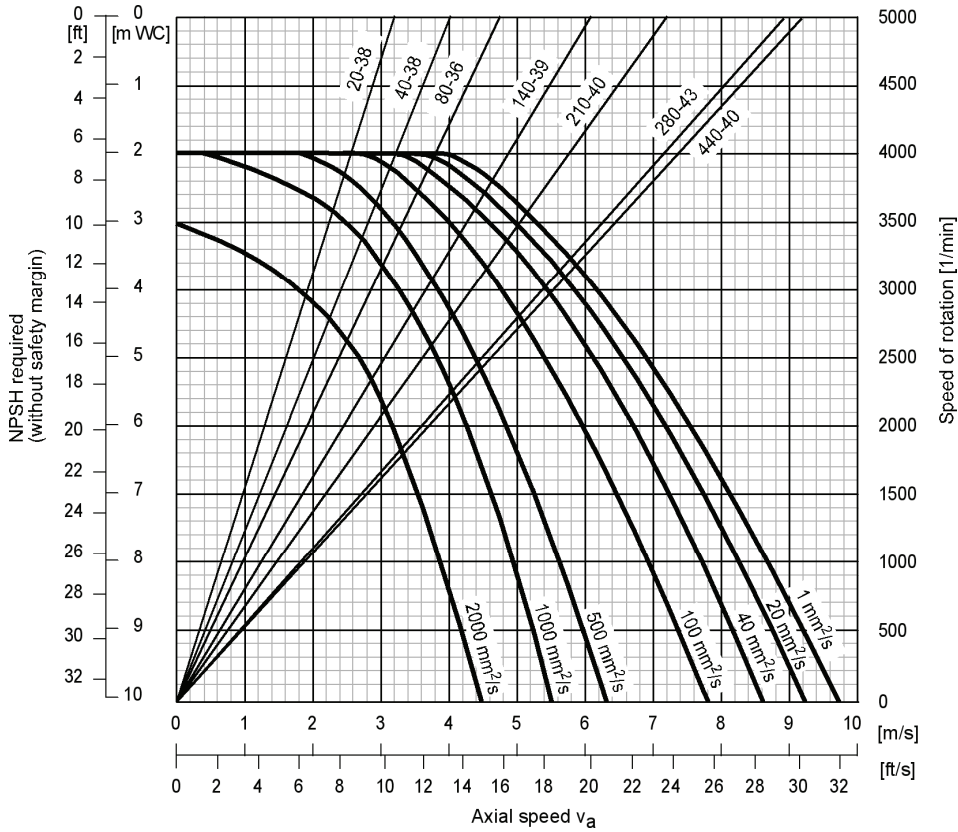
Given:
 Size 140-46
 Speed $n = 2900$ 1/min
 Viscosity $\nu = 500$ mm²/s

Wanted:
 NPSH required

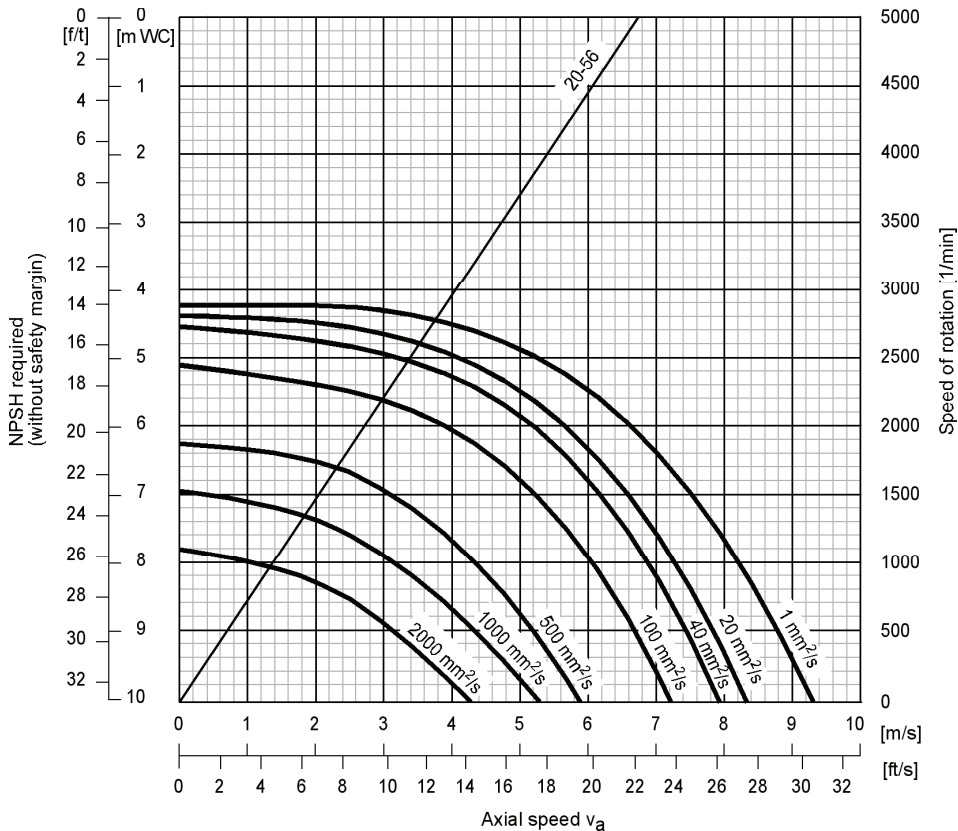
Solution:
 NPSH taken from 5,4 m WC
 + safety margin 0,5
 = 5.9 m WC

NPSH graphs of series EMTEC®

Screw pitch angle 46°



Screw pitch angle 56°



Subject to technical alterations.



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