

SEALS

“N” Standard version on NBR the temperature of the fluid should be between -10 °C and +80 °C.

“V” Fluorocarbon version suitable for fluid at high temperatures. Range between -10 °C and +120 °C. In the range between -10 °C and +80 °C pressures P1, P2 e P3 are possible as per product table; besides that P1 should not be exceeded.

FREQUENTLY USED FORMULAS

Fluid velocity

Calculate the velocity [v] of a fluid in a pipe as follows:

$$v = Q / 6 \times A \text{ [m/s]} \quad (1)$$

Q = flow rate [liter/min]

A = inside area of pipe [cm²]

Delivered flow rate

Calculate flow rate [Q] as follows:

$$Q = V \times n \times \eta_{vol} \times 10^{-3} \text{ [liter/min]} \quad (2)$$

V = displacement [cm³/rotation]

n = rotation speed [rpm]

η_{vol} = pump volumetric efficiency (take 0.97 as an indicative value for rotation speeds ranging between 1000 and 2000 rpm)

Absorbed torque

Calculate necessary torque [M] of a pump subject to a pressure differential between inlet and delivery as follows:

$$M = (V \times \Delta P) / (62.8 \times \eta_{hm}) \text{ [Nm]} \quad (3)$$

V = displacement [cm³/rotation]

ΔP = pressure differential [bar]

η_{hm} = hydromechanical efficiency (take 0.80 as indicative value under cold conditions and 0.85 under working conditions)

Absorbed power

Calculate hydraulic power [P] transferred to fluid from a pump subject to pressure differential between inlet and delivery as follows:

$$P = (Q \times \Delta P) / (600 \times \eta_{tot}) \text{ [kW]} \quad (4)$$

Q = flow rate [liter/min]

ΔP = pressure differential [bar]

η_{tot} = total pump efficiency ($\eta_{hm} \times \eta_{vol}$)

Values for η_{vol} and η_{hm} (and consequently η_{tot}) depend on pressure differential between inlet and delivery, rotation speed, fluid features (temperature and viscosity) and filtering degree. Call our Sales and Technical Dept. for further details on efficiency. The proper values for flow rate, torque and power absorbed according to pressure differential, rotation speed and set test conditions, can be found on the pages dedicated to the performance curves.

Pump Type	Displ.	Flow at 1500	Operating pressures			Rotation speed		Noise at 1500 giri/min*	
			P1 Max continuous	P2 Max intermittent	P3 Max peak	Minimum Speed	Maximum speed	On recirculation	at P1
	[cm ³ /rev]	[l/min]	[bar]	[bar]	[bar]	[rpm]	[rpm]	[dBA]	[dBA]
ELI2-7.0	7.0	10.5	280	295	310	300	4000	47	51
ELI2-8.2	8.2	12.3	280	295	310	300	4000	47	52
ELI2-9.6	9.6	14.5	280	295	310	300	4000	48	54
ELI2-11.4	11.4	17.1	280	295	310	300	4000	48	55
ELI2-14.0	14.0	21.0	260	275	290	300	4000	49	55
ELI2-16.1	16.1	24.1	260	275	290	300	4000	49	56
ELI2-17.8	17.8	26.7	260	275	290	300	4000	49	57
ELI2-21.0	21.0	31.5	230	245	260	200	3500	49	57
ELI2-23.7	23.7	35.5	230	245	260	200	3200	50	57
ELI2-25.7	25.7	38.6	210	225	240	200	3000	50	57
ELI2-28.0	28.0	42.1	200	215	230	200	2600	50	58
ELI2-35.0	35.1	52.6	150	165	180	200	2200	50	58

How to order

PD ELI	TYPE	ROTATION	DISPL. FRONT STAGE	DISPL. REAR STAGE	SHAFT	FRONT STAGE PORTS	REAR STAGE PORTS	SEALS	OPTIONS
	2	D - CW	7.0	7.0	T0	D	D	N	-
	2A	S - CCW	8.2	8.2	T1	FA**	FA**	V	AS
	2BK1		9.6	9.6	T2				
	2BK2		11.4	11.4	C0				
	2BK4		14.0	14.0	C1				
	2BK7		16.1	16.1	C2				
			17.8	17.8	S0				
			21.0	21.0	S1				
			23.7	23.7	S2				
			25.7	25.7	S3				
			28.0	28.0	S4				
			35.0	35.0	G0				

Pump standard types:

2	= european flange + shaft T0 + ports D + standard seals
2A	= flange A + shaft C1 + ports FA ** + standard seals
2BK1	= flange BK1 + shaft T1 + ports D + standard seals
2BK2	= flange BK2 + shaft T1 + ports D + standard seals
2BK4	= flange BK4 + shaft T1 + ports D + standard seals
2BK7	= flange BK7 + shaft G0 + port D + standard seals

Examples:

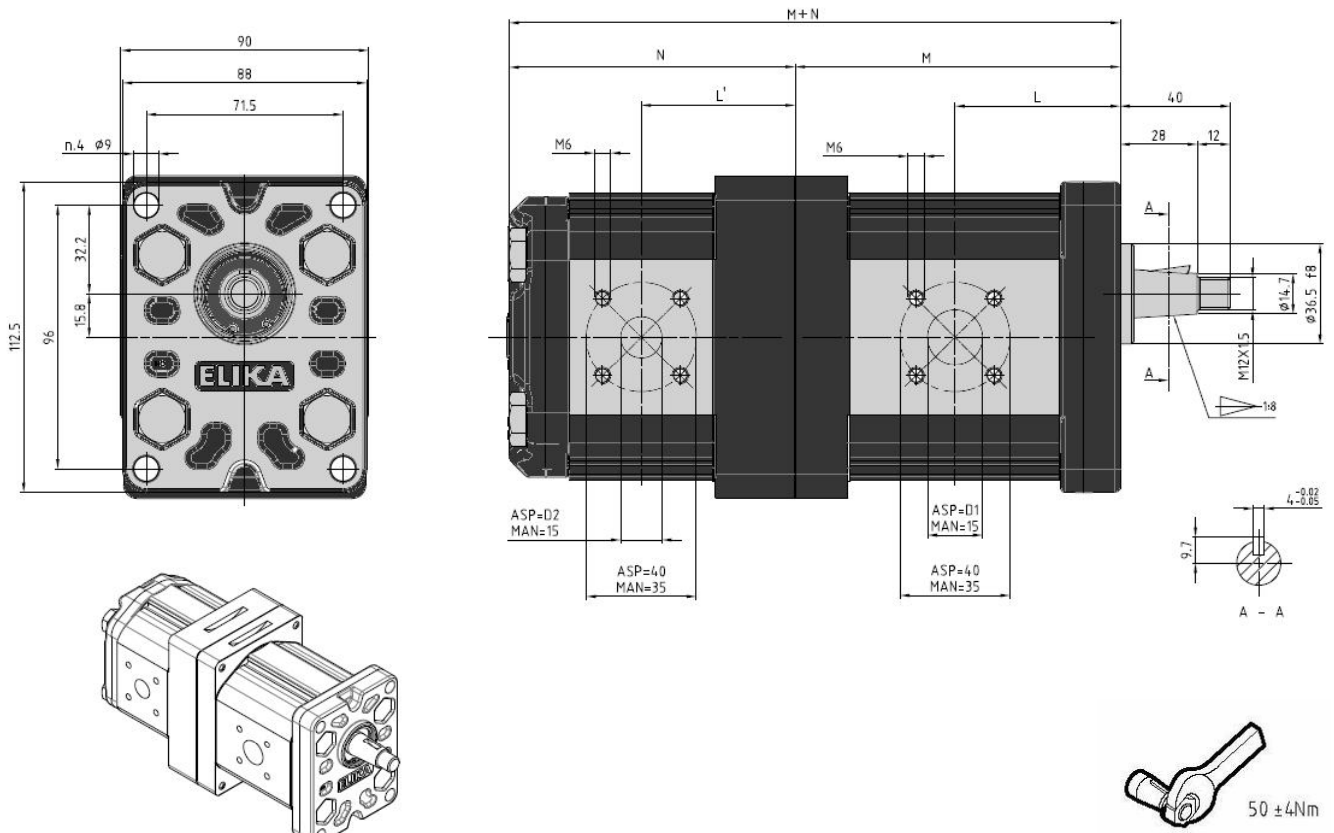
PD ELI2-D-16.1/8.2-T0-D-D-N	= Double pump clockwise rotation, front stage 16.1 cm ³ /rev, rear stage 8.2 cm ³ /rev, European flange, 1:8 tapered shaft, flanged ports D type, standard seals.
PD ELI2A-D-28.0/14.0-S1-FA-FA-N	= Double pump clockwise rotation, front stage 28.0 cm ³ /rev, rear stage 14.0 cm ³ /rev, SAE flange, splined shaft S1, threaded ports FA**, standard seals.
PD ELI2BK1-S-8.2/8.2-T1-D-D-N	= Double pump counterclockwise rotation, front stage 8.2 cm ³ /rev, rear stage 8.2 cm ³ /rev, BK1 flange, 1:5 tapered shaft, flanged ports D type, standard seals.
PD ELI2BK7-D-35.0/7.0-G0-D-D-V-AS	= Double pump clockwise rotation, front stage 35.0 cm ³ /rev, rear stage 7.0 cm ³ /rev, BK7 flange, shaft G0, flanged ports D type, fluorocarbon seals, separate inlets.

The product data sheets show our standard model types. The synoptic tables for flanges, shafts and ports show all the possible configurations. For further details about the availability of each configuration please contact our Sales and Technical Dept.

* Value based on ISO4412 test procedure

** With thread ports on outlet side, a reduction of body fatigue strength may occur if the pump is working at elevated and intermittent pressures. For further details please contact our Sales and Technical Dept. we suggest to provide application specification through our PID form.

ELI2

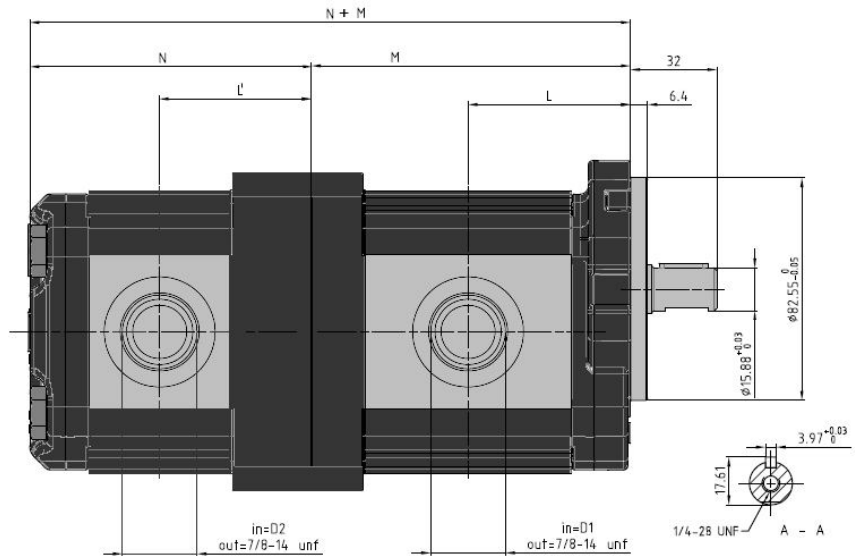
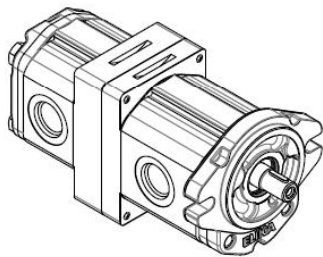
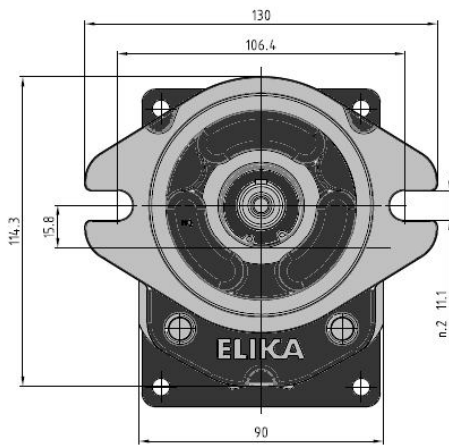


FRONT STAGE			
Pump Type	Displ. [cm ³ /rev]	Dimensions	
		L [mm]	M [mm]
ELI2-7.0	7.0	48.0	94.0
ELI2-8.2	8.2	49.0	96.0
ELI2-9.6	9.6	50.3	98.5
ELI2-11.4	11.4	51.8	101.5
ELI2-14.0	14.0	54.0	106.0
ELI2-16.1	16.1	55.8	109.5
ELI2-17.8	17.8	57.3	112.5
ELI2-21.0	21.0	60.0	118.0
ELI2-23.7	23.7	62.3	122.5
ELI2-25.7	25.7	64.0	126.0
ELI2-28.0	28.0	66.0	130.0
ELI2-35.0	35.1	72.0	142.0

REAR STAGE			
Pump Type	Displ. [cm ³ /rev]	Dimensions	
		L' [mm]	N [mm]
ELI2-7.0	7.0	64.5	112.5
ELI2-8.2	8.2	65.5	114.5
ELI2-9.6	9.6	66.8	117.0
ELI2-11.4	11.4	68.3	120.0
ELI2-14.0	14.0	70.5	124.5
ELI2-16.1	16.1	72.3	128.0
ELI2-17.8	17.8	73.8	131.0
ELI2-21.0	21.0	76.5	136.5
ELI2-23.7	23.7	78.8	141.0
ELI2-25.7	25.7	80.5	144.5
ELI2-28.0	28.0	82.5	148.5
ELI2-35.0	35.1	88.5	160.5

Accessories supplied with the standard pump: woodruff key (code 522057), M12x1.5 hexagonal nut (code 523016), washer (code 523005).
Standard ports: M6 threads depth 13 mm. Please strictly follow assembly and use indications given in this catalogue for top performance and longer life of the ELI Marzocchi series. It is also very important to equip the hydraulic system with a proper filtering unit.

ELI2A

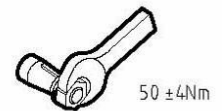
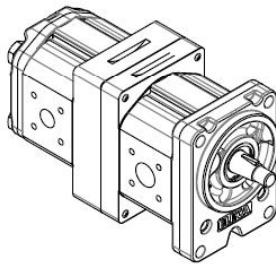
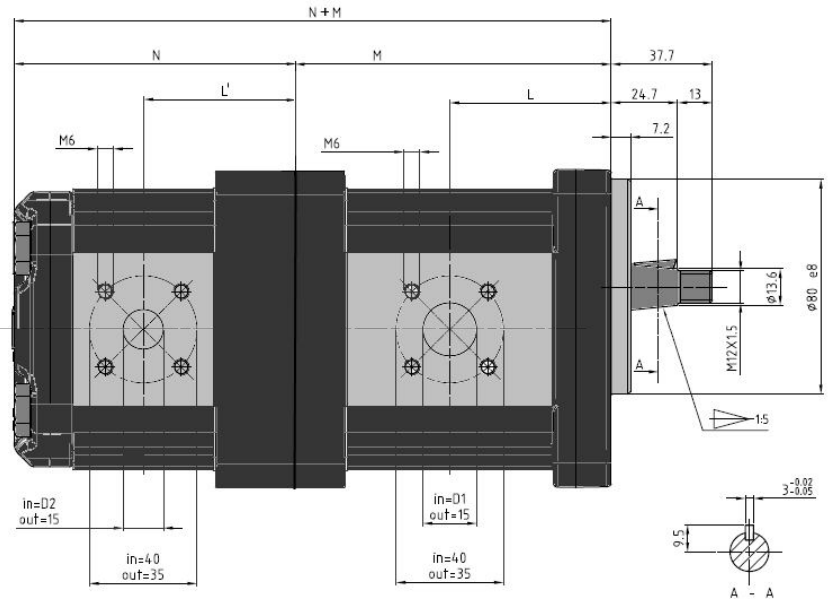
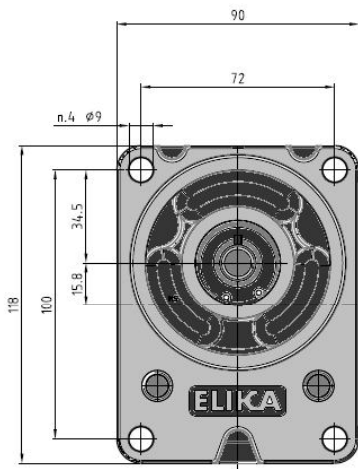


FRONT STAGE			
Pump Type	Displ. cm³/rev	Dimensions	
		L mm	M mm
ELI2-7.0	7.0	48.0	94.0
ELI2-8.2	8.2	49.0	96.0
ELI2-9.6	9.6	50.3	98.5
ELI2-11.4	11.4	51.8	101.5
ELI2-14.0	14.0	54.0	106.0
ELI2-16.1	16.1	55.8	109.5
ELI2-17.8	17.8	57.3	112.5
ELI2-21.0	21.0	60.0	118.0
ELI2-23.7	23.7	62.3	122.5
ELI2-25.7	25.7	64.0	126.0
ELI2-28.0	28.0	66.0	130.0
ELI2-35.0	35.1	72.0	142.0

REAR STAGE			
Pump Type	Displ. cm³/rev	Dimensions	
		L' mm	N mm
ELI2-7.0	7.0	64.5	112.5
ELI2-8.2	8.2	65.5	114.5
ELI2-9.6	9.6	66.8	117.0
ELI2-11.4	11.4	68.3	120.0
ELI2-14.0	14.0	70.5	124.5
ELI2-16.1	16.1	72.3	128.0
ELI2-17.8	17.8	73.8	131.0
ELI2-21.0	21.0	76.5	136.5
ELI2-23.7	23.7	78.8	141.0
ELI2-25.7	25.7	80.5	144.5
ELI2-28.0	28.0	82.5	148.5
ELI2-35.0	35.1	88.5	160.5

**** With thread ports a reduction of body fatigue strength may occur if the pump is working at elevated and intermittent pressures.** Accessories supplied with the standard pump: key (code 522067). Mounting flange 82-2 (A) in compliance with SAE J744C. "D" and "d" ports are machined in compliance with threaded port with O-ring seal in truncated housing SAE J1926/1 (ISO 11926-1). Please strictly follow assembly and use indications given in this catalogue for top performance and longer life of the ELI Marzocchi series. It is also very important to equip the hydraulic system with a proper filtering unit.

ELI2BK1

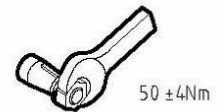
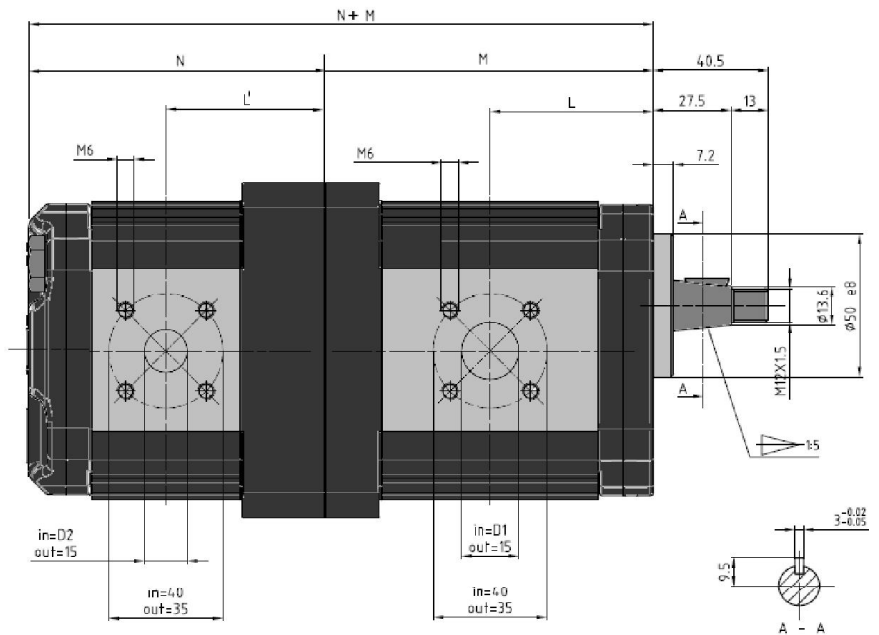
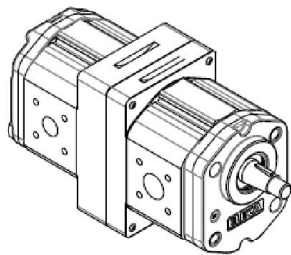
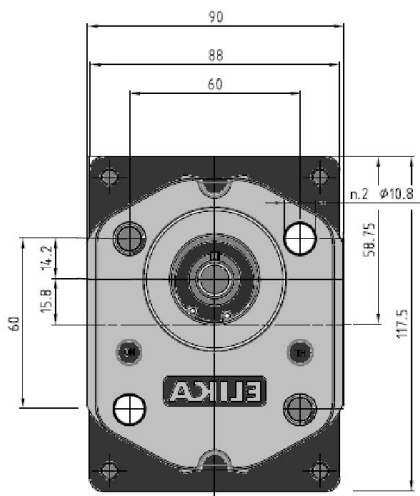


FRONT STAGE			
Pump Type	Displ. [cm ³ /rev]	Dimensions	
		L [mm]	M [mm]
ELI2-7.0	7.0	48.0	94.0
ELI2-8.2	8.2	49.0	96.0
ELI2-9.6	9.6	50.3	98.5
ELI2-11.4	11.4	51.8	101.5
ELI2-14.0	14.0	54.0	106.0
ELI2-16.1	16.1	55.8	109.5
ELI2-17.8	17.8	57.3	112.5
ELI2-21.0	21.0	60.0	118.0
ELI2-23.7	23.7	62.3	122.5
ELI2-25.7	25.7	64.0	126.0
ELI2-28.0	28.0	66.0	130.0
ELI2-35.0	35.1	72.0	142.0

REAR STAGE			
Pump Type	Displ. [cm ³ /rev]	Dimensions	
		L' [mm]	N [mm]
ELI2-7.0	7.0	64.5	112.5
ELI2-8.2	8.2	65.5	114.5
ELI2-9.6	9.6	66.8	117.0
ELI2-11.4	11.4	68.3	120.0
ELI2-14.0	14.0	70.5	124.5
ELI2-16.1	16.1	72.3	128.0
ELI2-17.8	17.8	73.8	131.0
ELI2-21.0	21.0	76.5	136.5
ELI2-23.7	23.7	78.8	141.0
ELI2-25.7	25.7	80.5	144.5
ELI2-28.0	28.0	82.5	148.5
ELI2-35.0	35.1	88.5	160.5

Accessories supplied with the standard pump: woodruff key (code 522055), M12x1.5 hexagonal nut (code 523016), washer (code 523005). Standard ports: M6 threads depth 13 mm. Please strictly follow assembly and use indications given in this catalogue for top performance and longer life of the ELI Marzocchi series. It is also very important to equip the hydraulic system with a proper filtering unit.

ELI2BK2

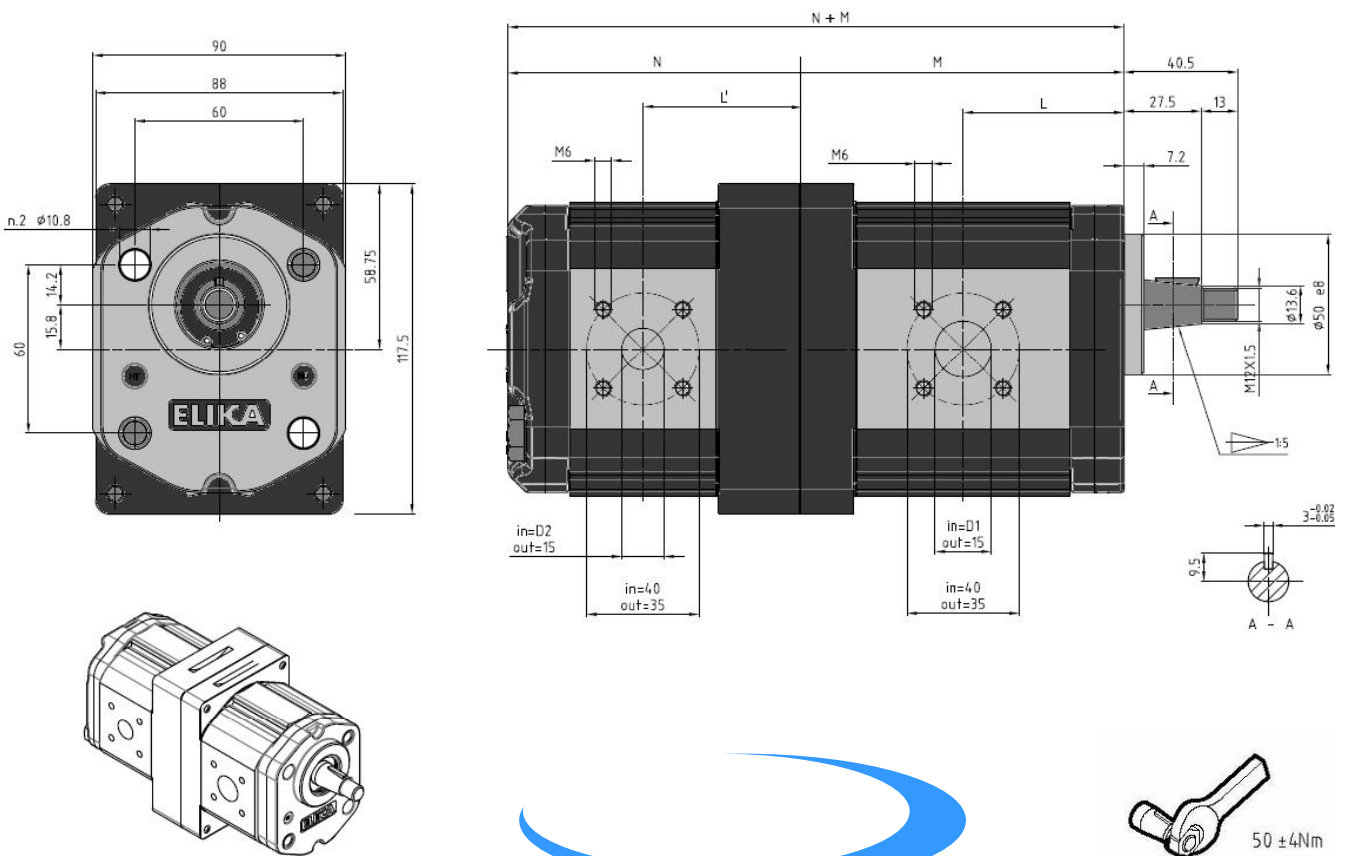


FRONT STAGE			
Pump Type	Displ. cm³/rev	Dimensions	
		L mm	M mm
ELI2-7.0	7.0	45.0	91.0
ELI2-8.2	8.2	46.0	93.0
ELI2-9.6	9.6	47.3	95.5
ELI2-11.4	11.4	48.8	98.5
ELI2-14.0	14.0	51.0	103.0
ELI2-16.1	16.1	52.8	106.5
ELI2-17.8	17.8	54.3	109.5
ELI2-21.0	21.0	57.0	115.0
ELI2-23.7	23.7	59.3	119.5
ELI2-25.7	25.7	61.0	123.0
ELI2-28.0	28.0	63.0	127.0
ELI2-35.0	35.1	69.0	139.0

REAR STAGE			
Pump Type	Displ. cm³/rev	Dimensions	
		L' mm	N mm
ELI2-7.0	7.0	61.5	109.5
ELI2-8.2	8.2	62.5	111.5
ELI2-9.6	9.6	63.8	114.0
ELI2-11.4	11.4	65.3	117.0
ELI2-14.0	14.0	67.5	121.5
ELI2-16.1	16.1	69.3	125.0
ELI2-17.8	17.8	70.8	128.0
ELI2-21.0	21.0	73.5	133.5
ELI2-23.7	23.7	75.8	138.0
ELI2-25.7	25.7	77.5	141.5
ELI2-28.0	28.0	79.5	145.5
ELI2-35.0	35.1	85.5	157.5

Accessories supplied with the standard pump: woodruff key (code 522055), M12x1.5 hexagonal nut (code 523016), washer (code 523005). Standard ports: M6 threads depth 13 mm. To mount the pump: n°2 M10 screws with a torque wrench setting fixed at 46±4 Nm. Please strictly follow assembly and use indications given in this catalogue for top performance and longer life of the ELI Marzocchi series. It is also very important to equip the hydraulic system with a proper filtering unit.

ELI2BK4

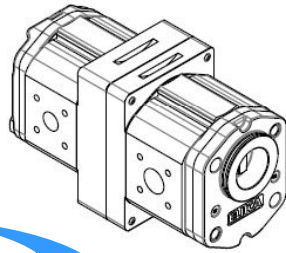
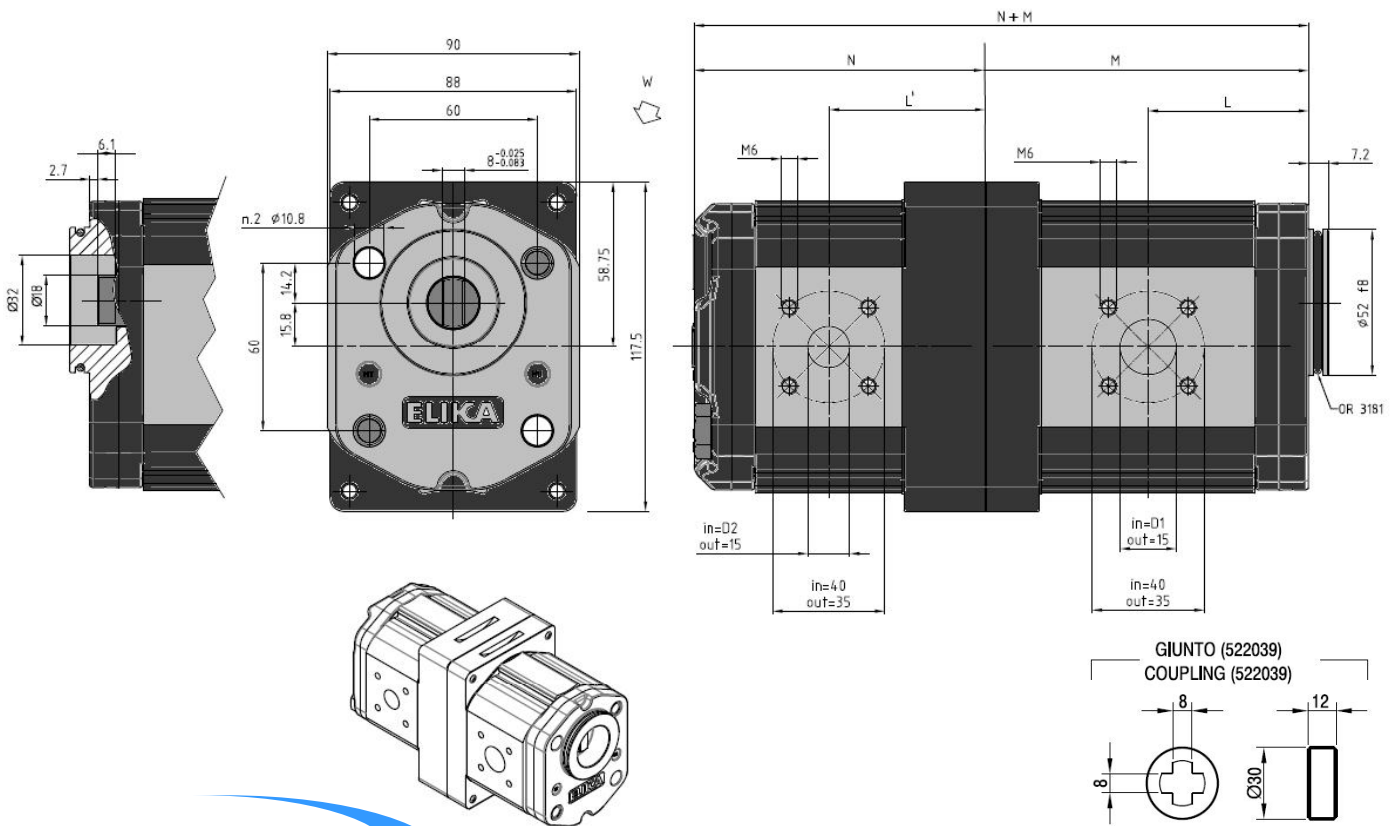


FRONT STAGE			
Pump Type	Displ. cm³/rev	Dimensions	
		L mm	M mm
ELI2-7.0	7.0	45.0	91.0
ELI2-8.2	8.2	46.0	93.0
ELI2-9.6	9.6	47.3	95.5
ELI2-11.4	11.4	48.8	98.5
ELI2-14.0	14.0	51.0	103.0
ELI2-16.1	16.1	52.8	106.5
ELI2-17.8	17.8	54.3	109.5
ELI2-21.0	21.0	57.0	115.0
ELI2-23.7	23.7	59.3	119.5
ELI2-25.7	25.7	61.0	123.0
ELI2-28.0	28.0	63.0	127.0
ELI2-35.0	35.1	69.0	139.0

REAR STAGE			
Pump Type	Displ. cm³/rev	Dimensions	
		L' mm	N mm
ELI2-7.0	7.0	61.5	109.5
ELI2-8.2	8.2	62.5	111.5
ELI2-9.6	9.6	63.8	114.0
ELI2-11.4	11.4	65.3	117.0
ELI2-14.0	14.0	67.5	121.5
ELI2-16.1	16.1	69.3	125.0
ELI2-17.8	17.8	70.8	128.0
ELI2-21.0	21.0	73.5	133.5
ELI2-23.7	23.7	75.8	138.0
ELI2-25.7	25.7	77.5	141.5
ELI2-28.0	28.0	79.5	145.5
ELI2-35.0	35.1	85.5	157.5

Accessories supplied with the standard pump: woodruff key (code 522055), M12x1.5 hexagonal nut (code 523016), washer (code 523005). Standard ports: M6 threads depth 13 mm. To mount the pump: n°2 M10 screws with a torque wrench setting fixed at 46±4 Nm. Please strictly follow assembly and use indications given in this catalogue for top performance and longer life of the ELI Marzocchi series. It is also very important to equip the hydraulic system with a proper filtering unit.

ELI2BK7



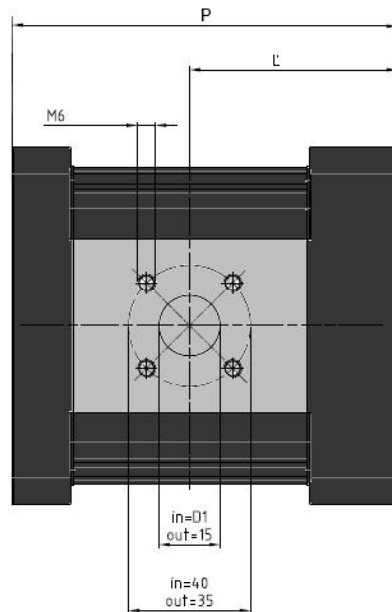
FRONT STAGE			
Pump Type	Displ. cm ³ /rev	Dimensions	
		L mm	M mm
ELI2-7.0	7.0	45.0	91.0
ELI2-8.2	8.2	46.0	93.0
ELI2-9.6	9.6	47.3	95.5
ELI2-11.4	11.4	48.8	98.5
ELI2-14.0	14.0	51.0	103.0
ELI2-16.1	16.1	52.8	106.5
ELI2-17.8	17.8	54.3	109.5
ELI2-21.0	21.0	57.0	115.0
ELI2-23.7	23.7	59.3	119.5
ELI2-25.7	25.7	61.0	123.0
ELI2-28.0	28.0	63.0	127.0
ELI2-35.0	35.1	69.0	139.0

REAR STAGE			
Pump Type	Displ. cm ³ /rev	Dimensions	
		L' mm	N mm
ELI2-7.0	7.0	61.5	109.5
ELI2-8.2	8.2	62.5	111.5
ELI2-9.6	9.6	63.8	114.0
ELI2-11.4	11.4	65.3	117.0
ELI2-14.0	14.0	67.5	121.5
ELI2-16.1	16.1	69.3	125.0
ELI2-17.8	17.8	70.8	128.0
ELI2-21.0	21.0	73.5	133.5
ELI2-23.7	23.7	75.8	138.0
ELI2-25.7	25.7	77.5	141.5
ELI2-28.0	28.0	79.5	145.5
ELI2-35.0	35.1	85.5	157.5

Standard ports: M6 threads depth 13 mm. To mount the pump: n°2 M10 screws with a torque wrench setting fixed at 46±4 Nm. Please strictly follow assembly and use indications given in this catalogue for top performance and longer life of the ELI Marzocchi series. It is also very important to equip the hydraulic system with a proper filtering unit.

Medium element

Rear stage

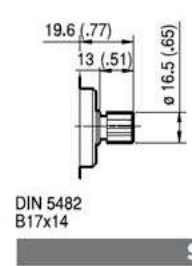
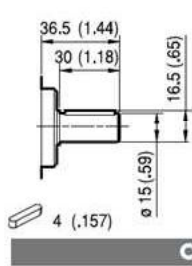
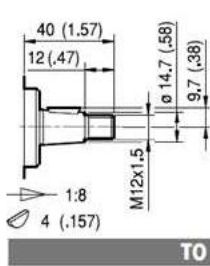
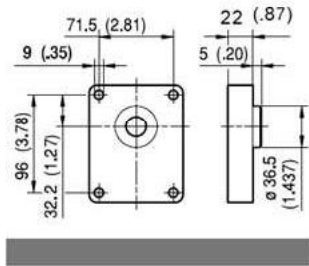
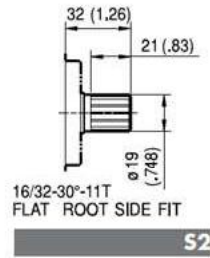
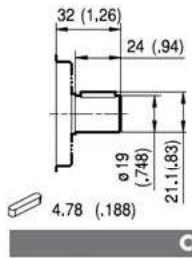
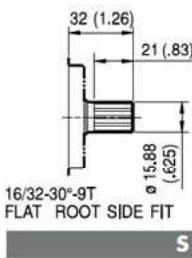
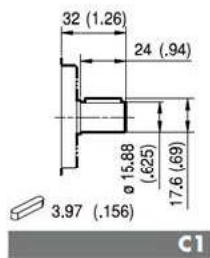
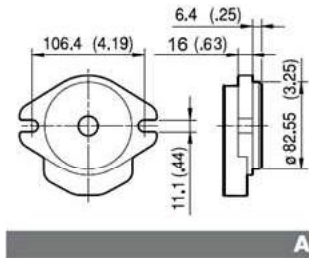
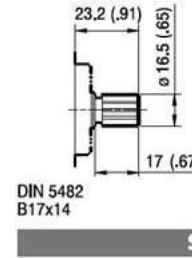
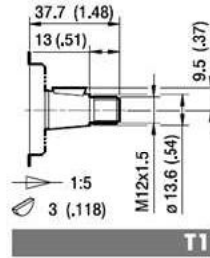
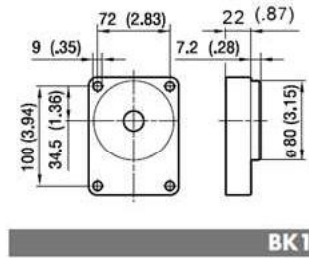
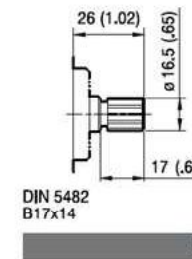
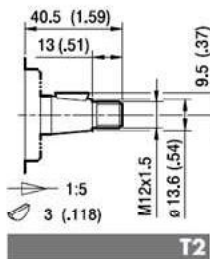
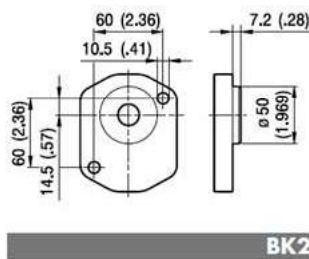


Front stage

MEDIUM ELEMENT			
Pump Type	Displ.	Dimensions	
		L'	P
	cm ³ /rev	mm	mm
ELI2-7.0	7.0	61.5	106.5
ELI2-8.2	8.2	62.5	108.5
ELI2-9.6	9.6	63.8	111.0
ELI2-11.4	11.4	65.3	114.0
ELI2-14.0	14.0	67.5	118.5
ELI2-16.1	16.1	69.3	122.0
ELI2-17.8	17.8	70.8	125.0
ELI2-21.0	21.0	73.5	130.5
ELI2-23.7	23.7	75.8	135.0
ELI2-25.7	25.7	77.5	138.5
ELI2-28.0	28.0	79.5	142.5
ELI2-35.0	35.1	85.5	154.5

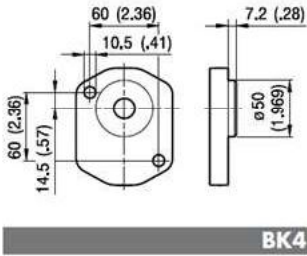
To obtain the total size of a multi-stage pump, add to the size of the double pump (M+N) the size of the intermediate stages (M+N+P+P'*.).

ELI Multiple pumps are provided by Marzocchi completely assembled, the customer or the installer can not modify the original configuration.

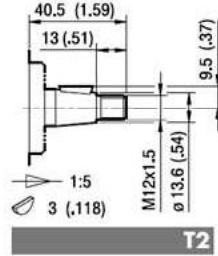
FLANGE / FLANGES
ALBERI / SHAFTS

T0
 Coppia Max
 Max Torque **145 Nm**
C0
 Coppia Max
 Max Torque **125 Nm**
S0
 Coppia Max
 Max Torque **130 Nm**

C1
 Coppia Max
 Max Torque **105 Nm**
S1
 Coppia Max
 Max Torque **110 Nm**
C2
 Coppia Max
 Max Torque **150 Nm**
S2
 Coppia Max
 Max Torque **230 Nm**

T1
 Coppia Max
 Max Torque **130 Nm**
S3
 Coppia Max
 Max Torque **130 Nm**

T2
 Coppia Max
 Max Torque **130 Nm**
S4
 Coppia Max
 Max Torque **130 Nm**

FLANGE / FLANGES

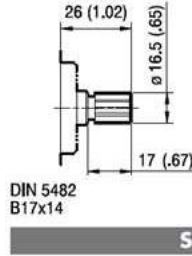
ALBERI / SHAFTS



BK4



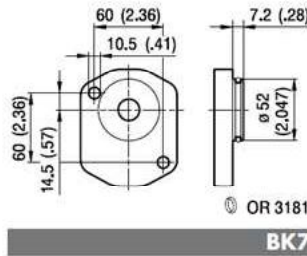
T2



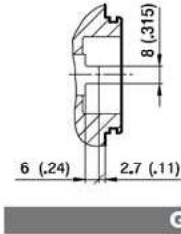
S4

Coppia Max
Max Torque 130 Nm

Coppia Max
Max Torque 130 Nm



BK7

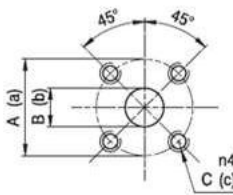


G0

Coppia Max
Max Torque 105 Nm

Maximum torque ratings are referred to ideal working conditions; such values may reduce based on the quality of joints and connections used.

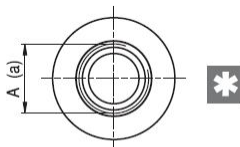
PORTE / PORTS



D

Tipo Type	Aspirazione Inlet			Mandata Outlet		
	A	B	C	a	b	c
ELI 7.0 + 8.2	40	15	M6	35	15	M6
ELI 9.6 + 35.0	40	19	M6	35	15	M6

Tightening torques for M6 screws 10 Nm.



STANDARD SAE J1926/1

FA

Type Tipo	Aspirazione Inlet	Mandata Outlet
	A	a
ELI 7.0 + 28.0	1 1/16-12 UNF	7/8-14 UNF
ELI 35.0	1 5/16-12 UNF	7/8-14 UNF

Tightening torques for 7/8-14 UNF fitting 50 Nm.
Tightening torques for 1 1/16-12 UNF and 1 5/16-12 UNF fitting 60 Nm.



A reduction of body fatigue strength may occur if the pump is working at elevated and intermittent pressures. For further details please contact our Sales and Technical Dept. we suggest to provide application specification through our PID form.

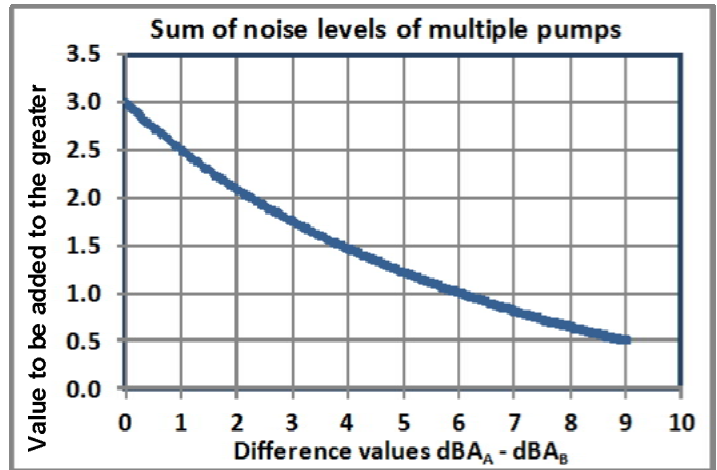


Sum of pump noise level

To add two noise level values in decibel can be used the following formula or the graph shown on side.

$$\text{Sum dBA} = 10 \text{ Log} (10^{\text{dBA}_A/10} + 10^{\text{dBA}_B/10})$$

In the graph the abscissa axis represents the arithmetic difference between the values to be added $\text{dBA}_A - \text{dBA}_B$, the ordinate axis shows the value to be added to the greater of the two values dBA_A to obtain the sum of dBA.



EXAMPLE:

Pump type: ELI2-D-14.0/9.6

Rotation speed = 1500 rpm

Operating pressure front element = 250 bar

Operating pressure rear element = 150 bar

Noise level front element $\text{dBA}_A = 56$ dBA (graphs pag. 19)

Noise level rear element $\text{dBA}_B = 53$ dBA

Difference between the values to be added $\text{dBA}_A - \text{dBA}_B = 3$

Value to be added to $\text{dBA}_A = 1.8$

Noise level multiple pump = $56 + 1.8 = 57.8$ dBA

In the case in which the double pump have two stages of equal displacement, operating at the same pressure, just add to the noise single value 3 dBA.

Verification of the limit of transmitted torque

The maximum transmissible torque between the elements is 100 Nm; therefore in the case of double pumps there are no restrictions on configurations. It is still need to check the resistance of the front shaft. Must verify that the total torque to be transmitted will be less than the upper limit of the shaft (pag. 14, 15). For each stage, calculate the maximum torque with the formula (3) or from the graphs on pag. 17, 18. Add the values obtained and to verify if they fare lower than the maximum defined for the shaft chose.

EXAMPLE:

Poump type: ELI2-D-14.0/9.6—T0

Operating pressure front element = 250 bar

Operating pressure rear element = 150 bar

Torque front element = 60 Nm (graphs pag. 17, 18)

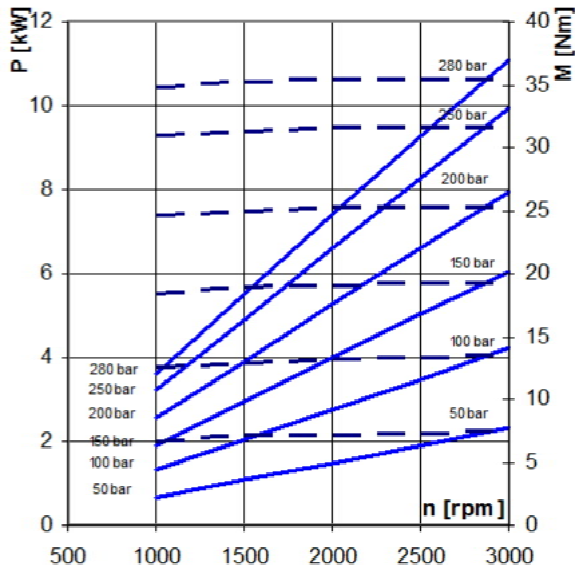
Torque rear element = 26 Nm (<100Nm)

Maximum torque transmitted from front shaft = $60 + 27 = 87$ Nm

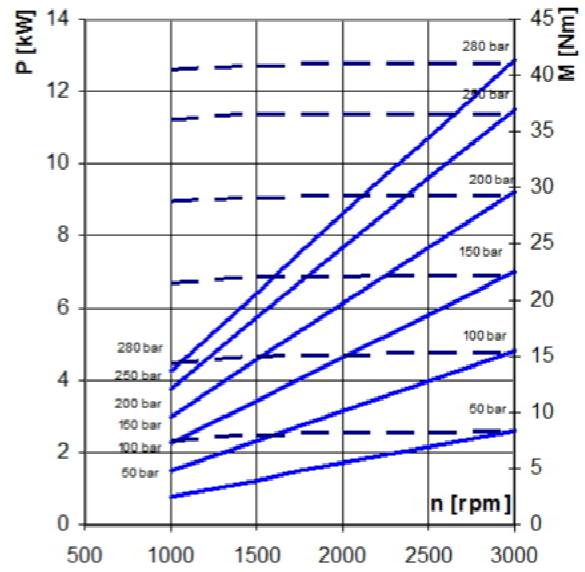
Maximum torque shaft type T0 = 145 Nm > 87 Nm

Shaft checked

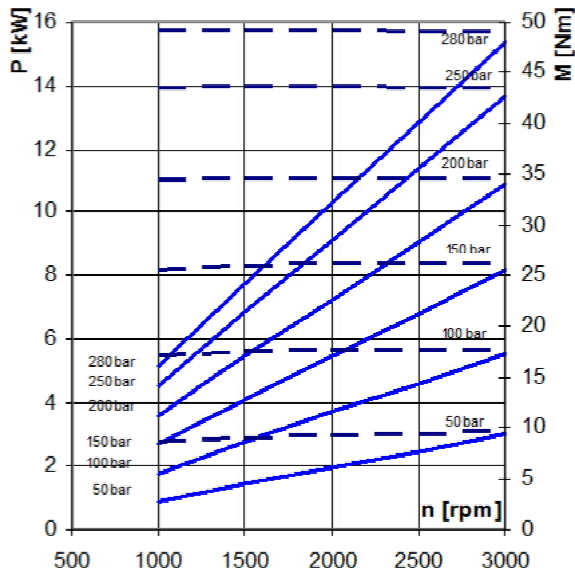
ELI2-7.0



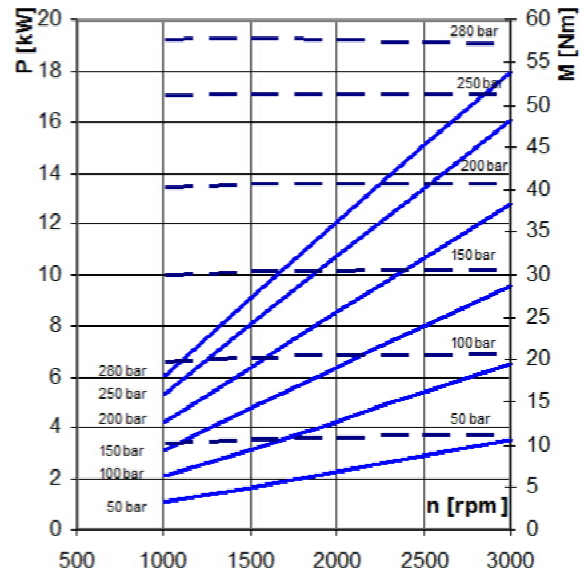
ELI2-8.2



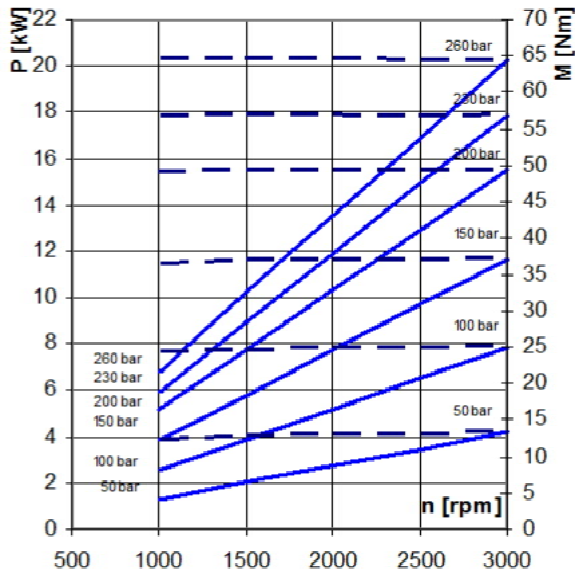
ELI2-9.6



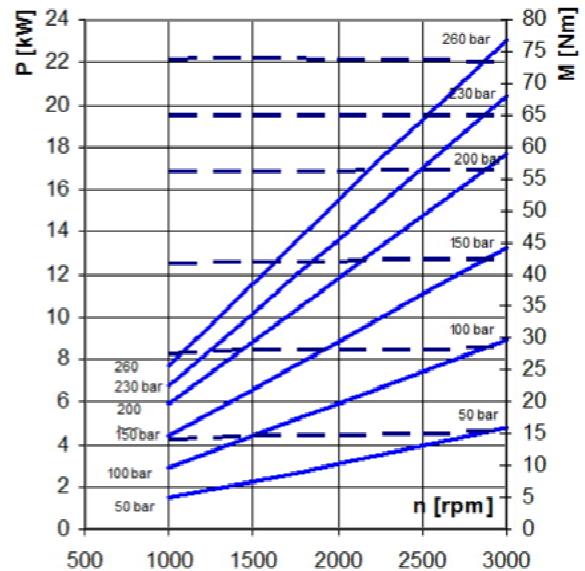
ELI2-11.4



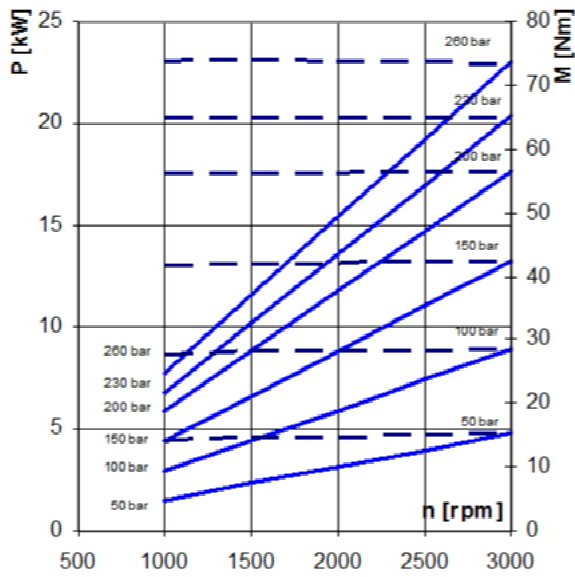
ELI2-14.0



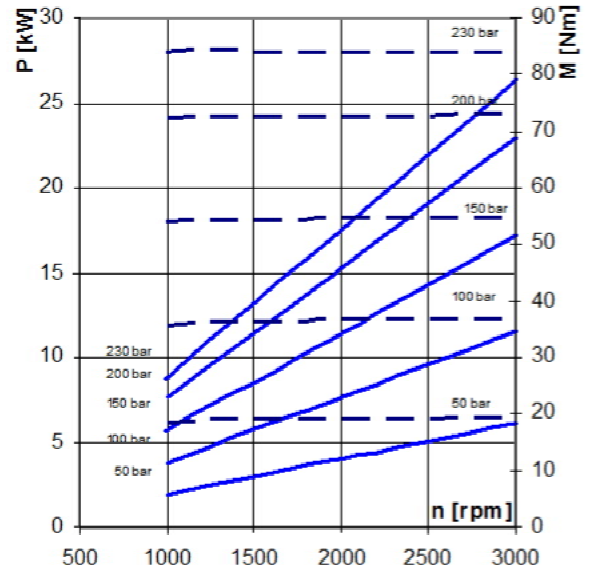
ELI2-16.1



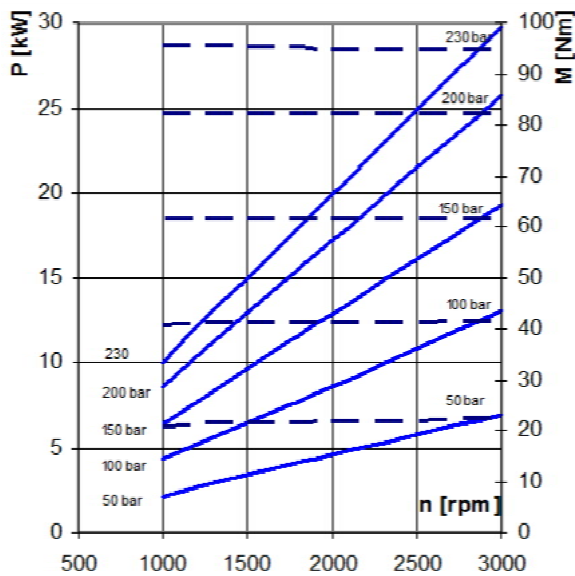
ELI2-17.8



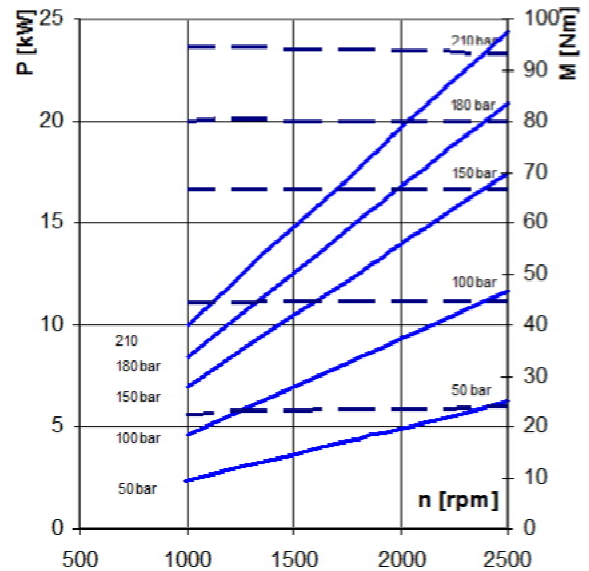
ELI2-21.0



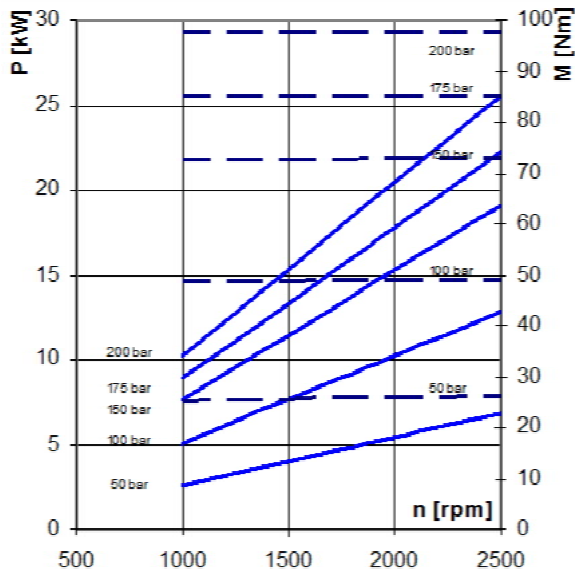
ELI2-23.7



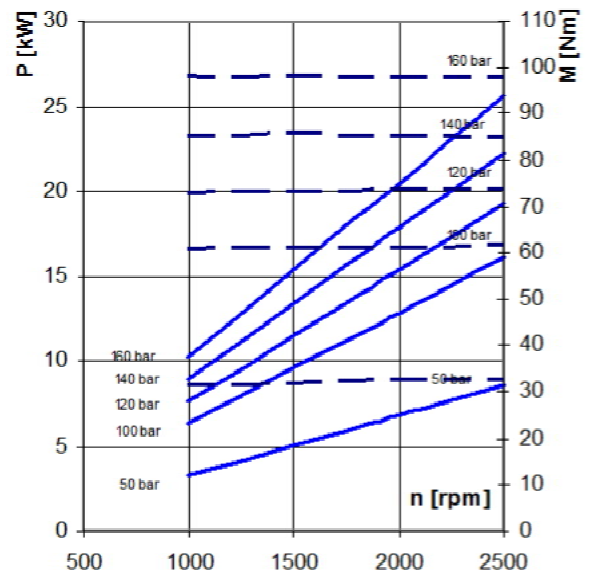
ELI2-25.7



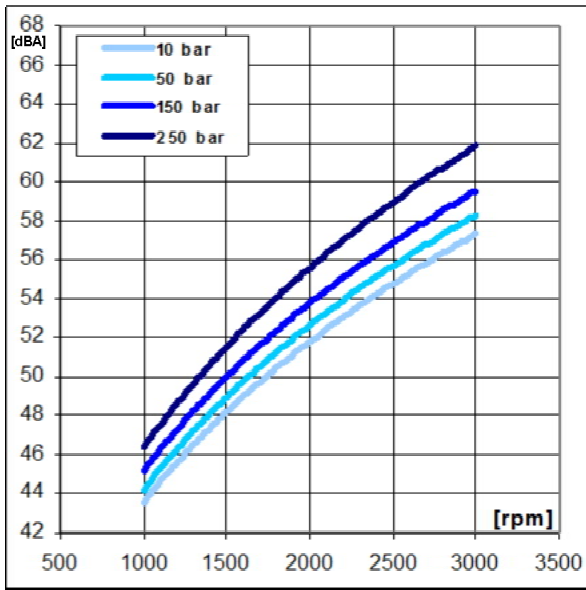
ELI2-28.0



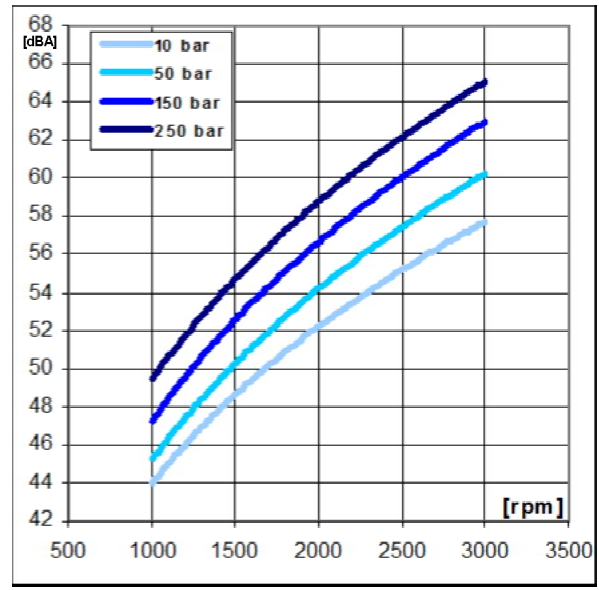
ELI2-35.0



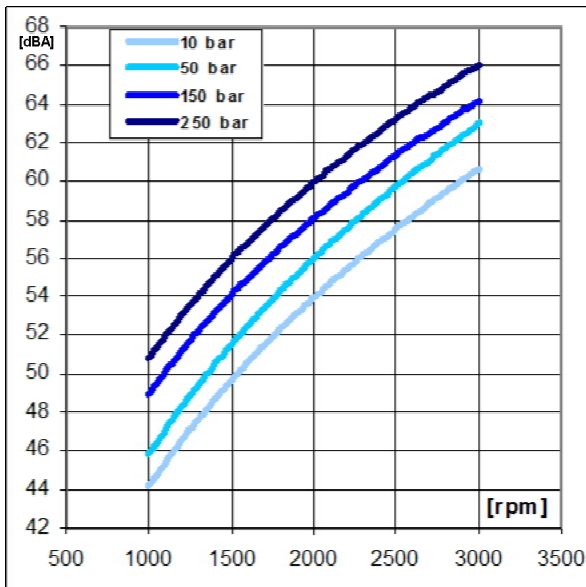
ELI2-7.0 / ELI2-8.2



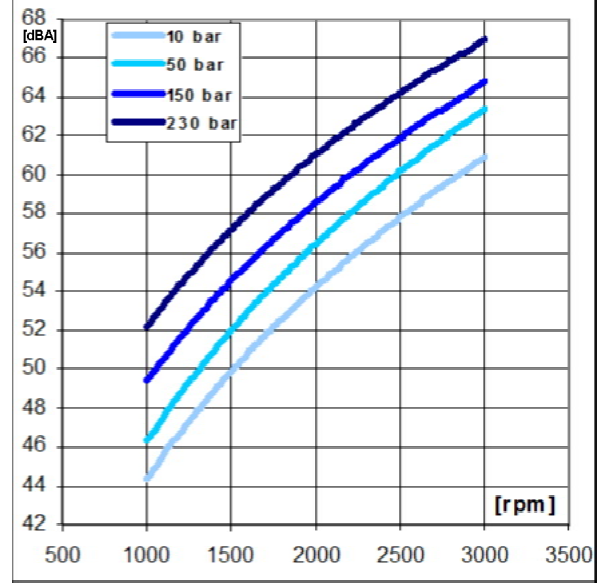
ELI2-9.6 / ELI2-11.4



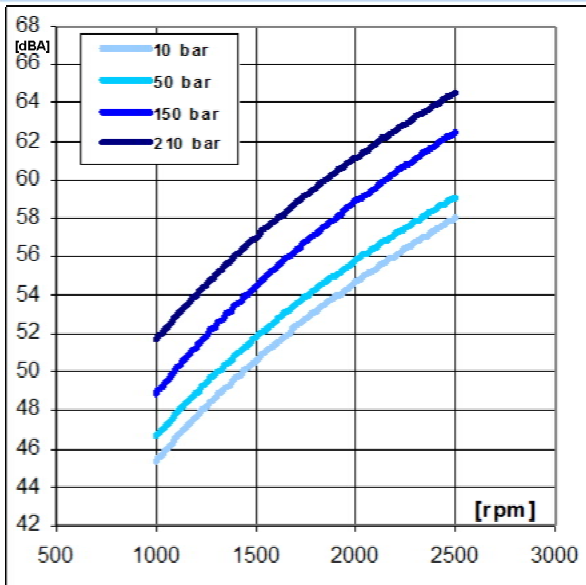
ELI2-14.0 / ELI2-16.1



ELI2-17.8 / ELI2-21.0



ELI2-23.7 / ELI2-25.7



ELI2-28.0 / ELI2-35.0

