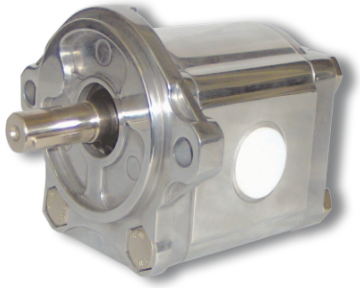
POMPE SIMPLE HP2 – *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 – *DOUBLE GEAR PUMPS HP22*

Descriere şi utilizare
Pompele cu roţi dinţate au volum geometric constant şi sunt utilizate în acţionări hidraulice, la maşini agricole, echipamente anexe pentru tractoare, utilaje de ridicat şi transport, utilaje terasiere grele, maşini unelte, s.a.

Description and use
The gear pumps with constant displacement, are used in the hydro drive installation, for agricultural equipment, mobiles, heavy-duty equipment for transport and earth moving machines-tools.



A - Pompe de uz general HP2 ; HP22
B - Pompe bidirecţionale HBA2 ; HBA22
C - Pompe duble cu o singură aspiraţie HAL22

A - Common use pumps HP2 ; HP22
B - Bidirectional pumps HBA2 ; HBA22
C - Double pumps with a single inlet HAL22

A - Pompe de uz general HP2 ; HP22
A - Common use pumps HP2 ; HP22

Codificare – *Codification*

HP 2 – Vg (cm3/rot, *ccm/rev*) – Ax antrenare (*Driving shaft*) – Flanşa prindere (*Fastening flange*) – Flanşa aspiraţie (*Inlet port*) – Flanşa refulare (*Outlet port*) – Sens (*Rotation*)

Vg (cm3/rot, *ccm/rev*)
4
4.5
5.5
6.3
8.2
11.3
14
15
16
19
22.5
25
27.9

Ax antrenare (*Driving shaft*)	
1	Conic 1:5 BOSCH *Conical 1:5 BOSCH*
C	Conic 1:5 (majorat) *Conical 1:5 (increased)*
D	Conic 1:5 BOSCH *Conical 1:5 BOSCH*
2	Conic 1:8 (micsorat) *Conical 1:8 (diminished)*
3	Conic 1:8 PLESSEY *Conical 1:8 PLESSEY*
5	Canelat-*involute spline* B 17x14 DIN 5482
6	Canelat-*involute spline* SAE 16T 24/48 Dp
A	Canelat-*involute spline* SAE 9T 16/32 Dp
L	Canelat-*involute spline* SAE 9T 16/32 Dp
E	Cilindric Ø15.875 *Cylindrical Ø15.875*
T	Cilindric scurt Ø15.875 *Cilindrical short Ø15.875*
0	Cilindric Ø17.45 *Cylindrical Ø17.45*
B	Cep DEUTZ - scurt *Deutz pin - short*
F	Cep DEUTZ - lung *Deutz pin - long*
G	Cep DEUTZ - scurt cu frezare *DEUTZ pin - short with milling*

Cele mai uzuale variante sunt marcate
The most usual variants are marked

Flanşa prindere (*Fastening flange*)	
1	PLESSEY (4xØ7)
2	DIN (4 xØ9)
3	PLESSEY (4xØ9)
4	GERMAN 2xØ11
4e	GERMAN 2xØ11 cu inel O - *with O-ring*
5	GERMAN 2xØ11
5e	GERMAN 2xØ11 cu inel O - *with O-ring*
6	GERMAN 2xØ11
6e	GERMAN 2xØ11 cu inel O - *with O-ring*
7	Ovala SAE "A" *Oval SAE "A"*
8	GERMAN 2xØ11
8e	GERMAN 2xØ11 cu inel O - *with O-ring*
9	GERMAN 4xØ11

Flanşa aspiraţie (*Inlet port*)	
3, 4, 8, D, E, M	Variante PLESSEY *PLESSEY Variants*
V, W	Variante SAE *SAE Variants*
2, 5, A, B	Variante DIN *DIN Variants*
1, 9, F, G, H, J, T	Variante filetate BSPP *Threaded Variants BSPP*
7, K, N, P, Q, R	Variante filetate ISO (metric) *Threaded Variants ISO (metrical)*
6, C, S, U, Y	Variante filetate UNF *Threaded Variants UNF*
0	Obturat *Closed*

Flanşa refulare (*Outlet port*)	
3, 4, 8, D, E, M	Variante PLESSEY *PLESSEY Variants*
V, W	Variante SAE *SAE Variants*
2, 5, A, B	Variante DIN *DIN Variants*
1, 9, F, G, H, J, T	Variante filetate BSPP *Threaded Variants BSPP*
7, K, N, P, Q, R	Variante filetate ISO (metric) *Threaded Variants ISO (metrical)*
6, C, S, U, Y	Variante filetate UNF *Threaded Variants UNF*
0	Obturat *Closed*

"0" daca aspiraţia şi refularea nu sunt pe corpul pompei
"0" if inlet or outlet ports are not on the body of the pump.

Sens (*Rotation*)	
A	(stânga) *(Anticlockwise)*
C	(dreapta) *(Clockwise)*
B	bidirecţional

Exemplu - *Example*

HP 2	–	11.3	–	3	3	1	1	-	A

POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

Pompe duble, de uz general HP22 (fără accesorii) - codificare
Common use, double pumps HP22 (without accesories) - codification

HP 22	–	(Vg1 + Vg2)	–	Ax antrenare *Driving shaft*	Flanşă prindere *Fastening flange*	Aspirație 1 *Inlet port 1*	Refulare 1 *Outlet port 1*	-	Aspirație 2 *Inlet port 2*	Refulare 2 *Outlet port 2*	-	Sens *Rotation*

Exemplu - *Example*

HP 22	–	(16+6.3)	–	3	3	3	3	-	1	1	-	C

Codificare accesorii (ataşată la codul pompei)
Accessories codification (attached to the pump code)

710 / Pd / Qr — Regulator de debit şi de presiune (retur intern) / Presiune deschidere supapă / Debit reglat
Flow and pressure control valve (internal return) / Valve opening pressure / Regulated flow

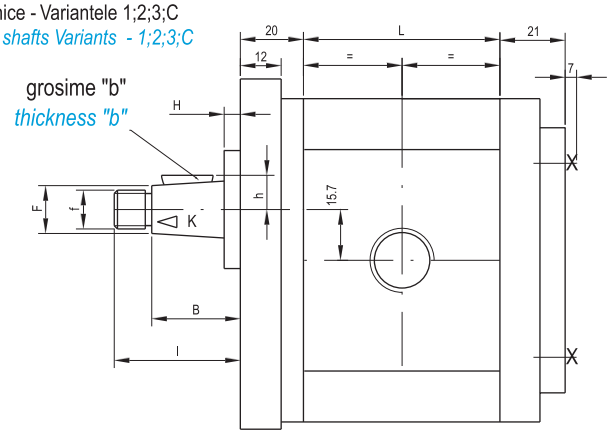
Exemplu - *Example* HP2-11.3-3344-C-710/125/7

760 / Pd — Supapă reglabilă (retur intern) / Presiune deschidere supapă
Adjustable valve (internal return) / Valve opening pressure

Exemplu - *Example* HP22-(11.3+4)-3344-11-A-760/150

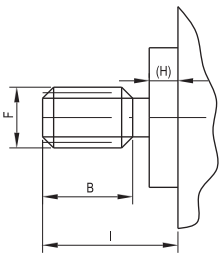
Axe antrenare - *Driving shafts*

Axe conice - Variantele 1;2;3;C
Conical shafts Variants - 1;2;3;C

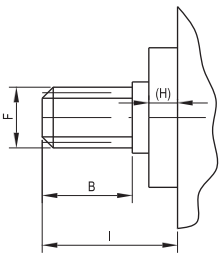


Axe canelate - *Grooved shafts*

Variantele 5 ; 6 ; A
Variants 5 ; 6 ; A



Varianta L
Variant L



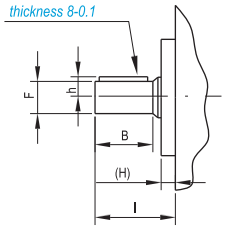
Axe cilindrice
Variantele O;E;T
Cylindrical shafts
Variants O;E;T

Cep DEUTZ lung
Varianta F
DEUTZ pin - long
Variant F

Axe de antrenare (dimensiuni pentru pompe HP2 si HP22)
Driving shafts (dimensions for the pumps HP2 and HP22)

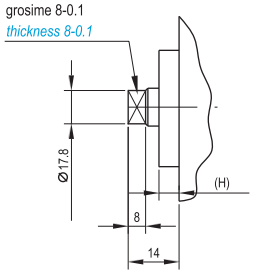
Variant	Shaft type	l [mm]	B [mm]	F [mm]	f [mm]	k	h [mm]	b [mm]	Mmax [Nm]
1	Conic 1:5 BOSCH *Conical 1:5 BOSCH*	38	24.8	13.6	M12x1.25	1:5	9.2	3	150
C	Conic 1:5 (majorat) *Conical 1:5 (increased)*	40	26.6	14	M12x1.25	1:5	9.6	3	160
D	Conic 1:5 BOSCH *Conical 1:5 BOSCH*	40.5	27.3	13.6	M12x1.25	1:5	9.5	3	150
2	Conic 1:8 (redus) *Conical 1:8 (diminished)*	39	30	14	M12x1.25	1:8	9.4	3.2	170
3	Conic 1:8 PLESSEY *Conical 1:8 PLESSEY*	39	27.4	14.8	M12x1.25	1:8	9.4	3.2	180
5	Canelat *Grooved* B17x14 DIN 5482	26	14	16.5	-	-	-	-	75
6	Canelat *Grooved* SAE 16T 24/48 Dp	26	14	17.9	-	-	-	-	80
A	Canelat *Grooved* SAE 9T 16/32 Dp	31.5	19	15.5	-	-	-	-	70
L	Canelat *Grooved* SAE 9T 16/32 Dp	32	24	15.5	-	-	-	-	70
0	Cilindric Ø17.45 *Cylindrical Ø17.45*	43	37	17.45 $^{0}_{-0.02}$	-	-	11.1	4.76	70
E	Cilindric Ø15.875 *Cylindrical Ø15.875*	44.5	36.5	15.87 $^{0}_{-0.02}$	-	-	9.7	3.96	65
T	Cilindric Ø15.875 *Cylindrical Ø15.875*	32	25.4	15.87 $^{0}_{-0.02}$	-	-	9.7	3.96	50
F	Cep DEUTZ - lung *DEUTZ pin - long*	-	-	-	-	-	-	-	65
B	Cep DEUTZ - scurt *DEUTZ pin - short*	-	-	-	-	-	-	-	65
G	Cep DEUTZ cu frezare *DEUTZ pin with milling*	-	-	-	-	-	-	-	65

grosime 8-0.1
thickness 8-0.1



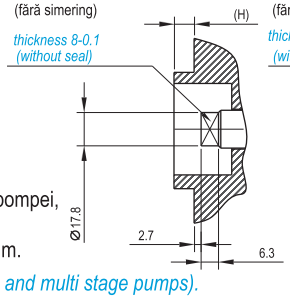
Cep DEUTZ scurt
Varianta B
DEUTZ pin - short
Variant B

grosime 8-0.1
thickness 8-0.1

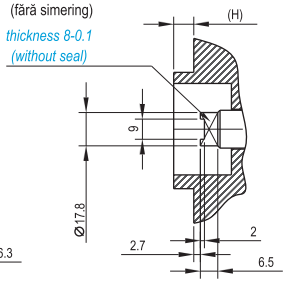


Cep DEUTZ scurt
Varianta G
DEUTZ pin - short
Variant G

grosime 8-0.1
(fără simering)
thickness 8-0.1
(without seal)



grosime 8-0.1
(fără simering)
thickness 8-0.1
(without seal)



Nota: Pentru adoptarea tipului de ax de antrenare, este necesar să se cunoască cuplul de antrenare maxim al pompei, (în special pentru pompele duble sau multiple).
La pompele multiple, este important să se ştie că momentul între treapta 1 şi treapta 2 poate fi max. 65 Nm.

Note: For choosing a shaft type, it is necesary to know the maximal torque of the pump, (specially for the double and multi stage pumps).
For multi stages pumps, it is important to know that the torque between the first and the second stage can be maximal 65 Nm.

POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

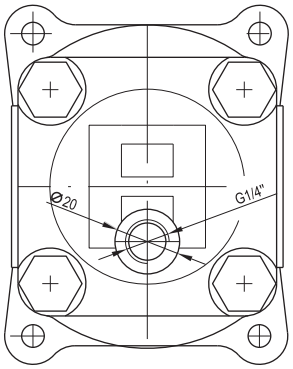
B - Pompe bidirecționale HBA2 ; HBA22
B - Bidirectional pumps HBA2 ; HBA22

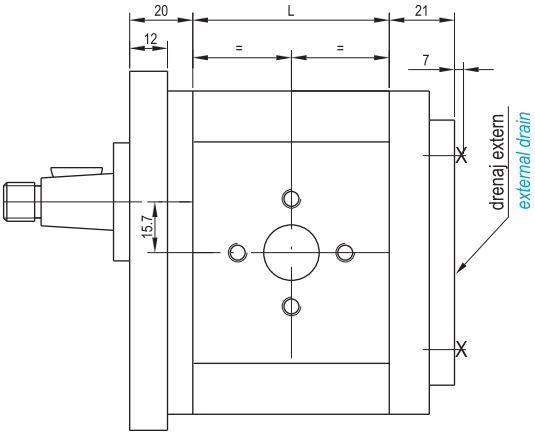
Pompele bidirecționale pot lucra cu sens de rotație stânga sau dreapta. Constructiv sunt similare cu pompele normale, dar au 2 aspirații alternative şi un drenaj extern.

The bidirectional pumps can work clockwise and anticlockwise rotation. The construction of the pumps is similar with normal pumps, but it have 2 alternative inlets and an external drain.

Codificare
Codification

HBA 2	–	Vg cm3/rot *ccm/rev*	–	Ax antrenare *Driving shaft*	Flanşă prindere *Fastening flange*	Flanşă aspirație *Inlet port*	Flanşă refulare *Outlet port*	–	Bidirecțional *Bidirectional*



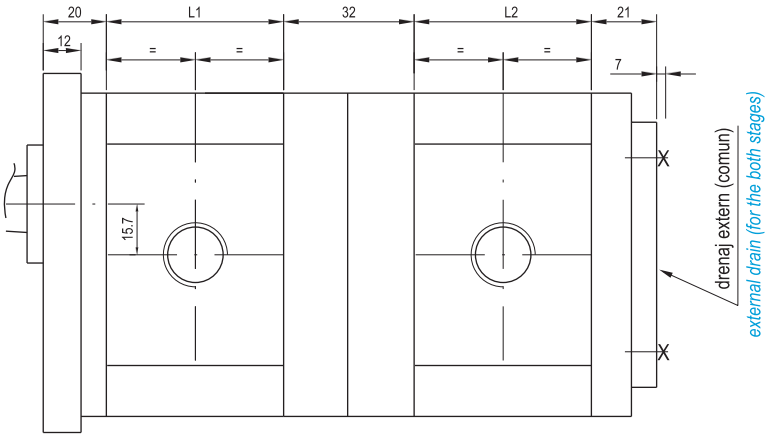


Exemplu - *Example*

HBA 2	–	11.3	–	3	3	3	3	-	B

Codificare - *Codification*

HBA 22	–	(Vg1 + Vg2)	–	Ax antrenare *Driving shaft*	Flanşă prindere *Fastening flange*	Aspirație 1 *Inlet port 1*	Refulare 1 *Outlet port 1*	-	Aspirație 2 *Inlet port 2*	Refulare 2 *Outlet port 2*	-	Bidirecțional *Bidirectional*



Notă: Din cauza drenajului extern comun, pompele nu au etanşare intermediară, între trepte.
Se pot construi şi variante cu drenaj pe fiecare treaptă şi etanşare intermediară.

Note: Because of the common external drain, the pumps have not sealing between stages.
It is possible to produce pumps with drain on every stage and intermediate sealing.

Exemplu - *Example*

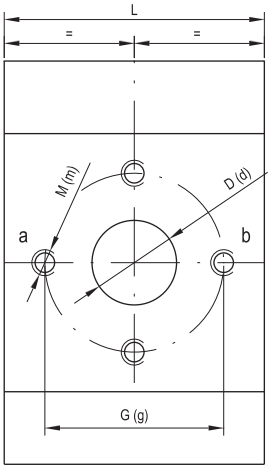
HBA 22	–	(16+6.3)	–	3	3	1	1	-	2	2	-	B

POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

Flanşe aspirație-refulare - *Inlet-outlet ports*

Notă: aspirația trebuie să fie suficient de mare în conformitate cu Vg şi turația
Note: inlet should be large enough, in conformity with Vg and speed

Variante PLESSEY - *PLESSEY variants*



Vg cm3/rev	L mm
4	44.7
4.5	45.6
5.5	47.2
6.3	48.6
8.2	51.7
11.3	56.8
14	61.3
15	63
16	64.7
19	69.7
22.5	75.1
25	79.2
27.9	84

tip 3 - *type 3*					
inlet			outlet		
D	G	M	d	g	m
13.1	30.2	M6	13.1	30.2	M6
19	39.7	M8	14.2	30.2	M6
22	39.7	M8	16	39.7	M8

tip 8 - *type 8*					
inlet			outlet		
D	G	M	d	g	m
13	30.2	M6	13	30.2	M6
19	39.7	M8			
22	39.7	M8			

tip M - *type M*					
inlet			outlet		
D	G	M	d	g	m
13	30	M6	13	30	M6
19	40	M8		40	M8
			19		

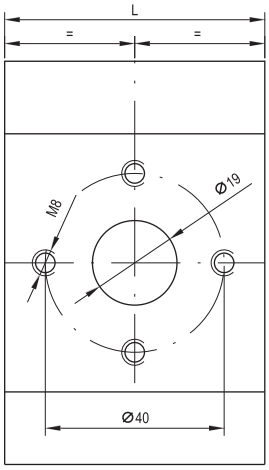
tip 4 - *type 4*					
inlet			outlet		
D	G	M	d	g	m
15	30.2	M6 **	15	30.2	M6 **
20	39.7	M8			

** Pentru varianta 4, mărimile cu Vg=4.....8.2 sunt fără găurile "a" si "b"

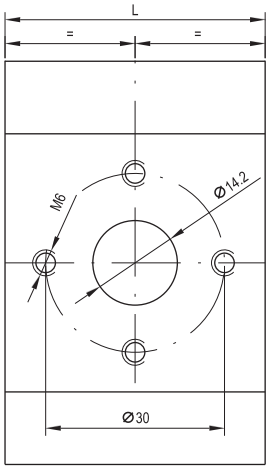
** *For the variant 4, the pumps, with Vg=4.....8.2 are without holes "a" and "b"*

-Variantele 3 ; 8 ; M ; 4 sunt utilizate la pompe unidirecționale
-Variantele D ; E sunt utilizate la pompe bidirecționale
-Variants 3 ; 8 ; M ; 4 are used for the unidirectional pumps
-Variants D ; E are used for the bidirectional pumps

tip D - *type D*

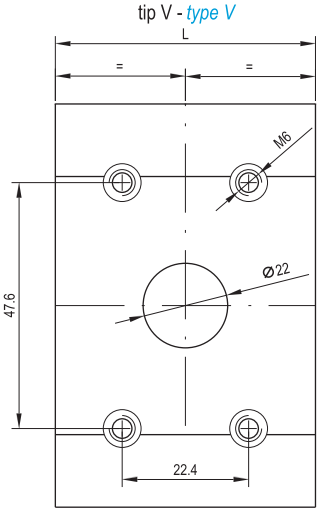


tip E - *type E*

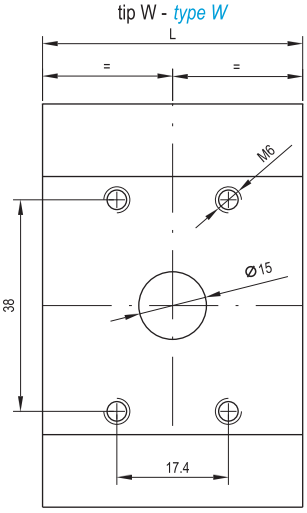


Variante SAE - *SAE variants*

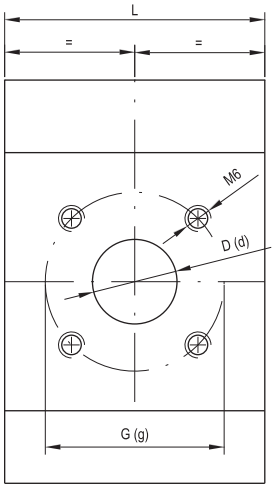
tip V - *type V*



tip W - *type W*



tip 2 - *type 2*

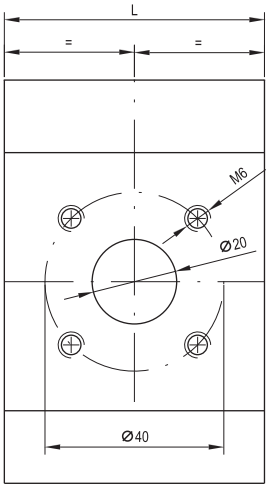


Variante DIN - *DIN variants*

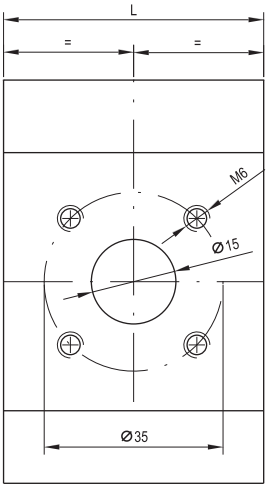
Vg cm3/rev	L mm
4	44.7
4.5	45.6
5.5	47.2
6.3	48.6
8.2	51.7
11.3	56.8
14	61.3
15	63
16	64.7
19	69.7
22.5	75.1
25	79.2
27.9	84

tip 2 - *type 2*			
inlet		outlet	
D	G	d	g
15	40	12	35
20		15	

tip A - *type A*



tip B - *type B*



- Pentru pompe unidirecționale
- For the unidirectional pumps

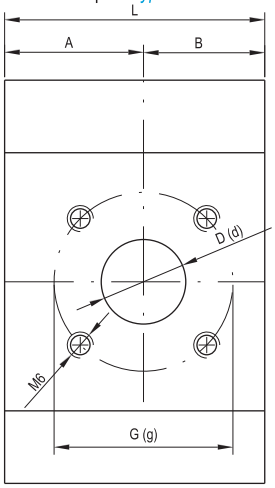
-Variantele A ; B sunt utilizate la pompe bidirecționale
-Variants A ; B are used for the bidirectional pumps

POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

Flanse aspirație-refulare - *Inlet-outlet ports*

Variante asimetrice - *Asimetrical variants*

tip 5 - *type 5*

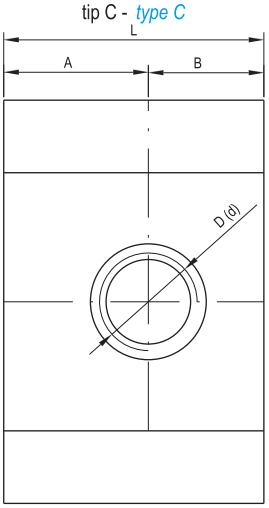


Vg cm3/rev	L mm	tip 5 - *type 5* inlet D	inlet G	outlet d	outlet g	A mm	B mm
4	44.7	15	40	12	35	24.7	20
4.5	45.6					25.6	
5.5	47.2					27.2	
6.3	48.6					28.6	
8.2	51.7					30.1	21.6
11.3	56.8	20		15		34.5	22.3
14	61.3						26.8
15	63						28.5
16	64.7						30.2
19	69.7						35.2
22.5	75.1						33.1
25	79.2					42	37.2
27.9	84						42

Dimensiunea "A" este spre flanșă

Dimension "A" is to the fastening flange side.

tip C - *type C*

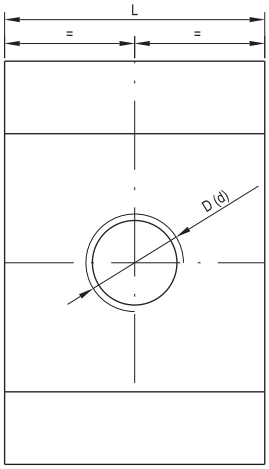


Vg cm3/rev	L mm	tip C - *type C* inlet D	outlet d	A mm	B mm
4	44.7	1 1/16" - 12 UNF	7/8" - 14 UNF		
4.5	45.6				
5.5	47.2				
6.3	48.6				
8.2	51.7				
11.3	56.8				
14	61.3				
15	63				
16	64.7				
19	69.7				
22.5	75.1			36.1	39
25	79.2				
27.9	84	SAE # 12	SAE # 10		

Dimensiunea "A" este spre flanșă

Dimension "A" is to the fastening flange side.

Variante filetate BSPP - *BSPP threaded variants*



Vg cm3/rev	L mm	tip 1 - *type 1* inlet D	outlet d	tip 9 - *type 9* inlet D	outlet d	tip H - *type H* inlet D	outlet d	tip F - *type F* inlet D	outlet d	tip G - *type G* inlet D	outlet d	tip J - *type J* inlet D	outlet d	tip T - *type T* inlet D	outlet d
4	44.7	G1/2"	G1/2"	G3/4"	G1/2"	G3/4"	G1/2"	G3/4"	G3/4"	G1/2"	G1/2"	G3/8"	G3/8"	Rc1/2"	Rc1/2"
4.5	45.6														
5.5	47.2														
6.3	48.6														
8.2	51.7														
11.3	56.8			G1"	G3/4"									Rc3/4"	Rc1/2"
14	61.3														
15	63	G3/4"													
16	64.7														
19	69.7														
22.5	75.1														
25	79.2	G1"	G3/4"												
27.9	84														

Variante filetate ISO 6149 (metric) - *ISO 6149 threaded variants (metrical)*

Vg cm3/rev	L mm	tip 7 - *type 7* inlet D	outlet d	tip P - *type P* inlet D	outlet d	tip K - *type K* inlet D	outlet d	tip N - *type N* inlet D	outlet d	tip Q - *type Q* inlet D	outlet d	tip R - *type R* inlet D	outlet d
4	44.7	M20 x 1.5	M16 x 1.5	M20 x 1.5	M20 x 1.5	M27 x 1.5	M27 x 1.5	M22 x 1.5	M22 x 1.5	M18 x 1.5	M18 x 1.5	M16 x 1.5	M16 x 1.5
4.5	45.6												
5.5	47.2												
6.3	48.6												
8.2	51.7												
11.3	56.8												
14	61.3												
15	63												
16	64.7												
19	69.7												
22.5	75.1												
25	79.2	M22 x 1.5	M20 x 1.5										
27.9	84												

Variante filetate UNF - *UNF threaded variants*

tip 6 - *type 6* inlet D	outlet d	tip S - *type S* inlet D	outlet d	tip U - *type U* inlet D	outlet d	tip Y - *type Y* inlet D	outlet d
1 1/16" - 12 UNF	7/8" - 14 UNF	1 1/16" - 12 UNF	1 1/16" - 12 UNF	7/8" - 14 UNF	7/8" - 14 UNF	9/16" - 18 UNF	9/16" - 18 UNF
		SAE # 12	SAE # 12	SAE # 10	SAE # 10	SAE # 6	SAE # 6

Variantă specială

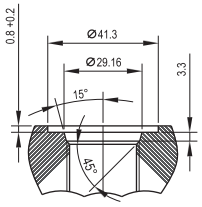
Special variant

tip 0 - *type 0*

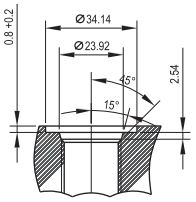
- varianta blocată; dacă aspirația sau refularea nu sunt pe corpul pompei

- closed variant; if inlet or outlet ports are not on the body of the pump.

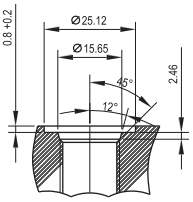
1 1/16" - 12 UNF
SAE # 12



7/8" - 14 UNF
SAE # 10

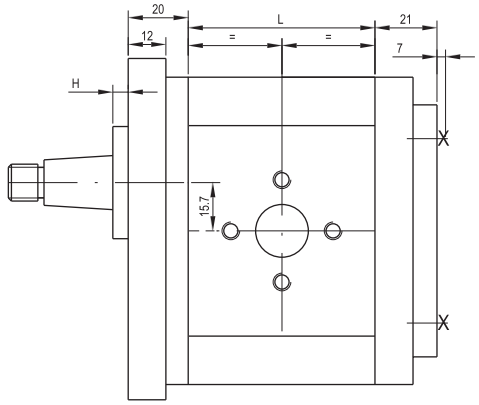


9/16" - 18 UNF
SAE # 6



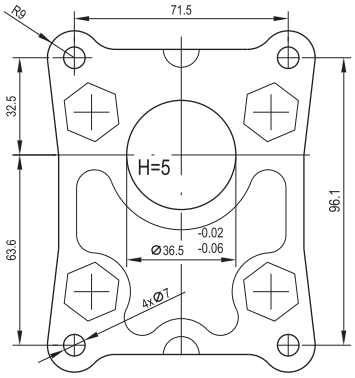
POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

Pompe simple - *Simple pumps*

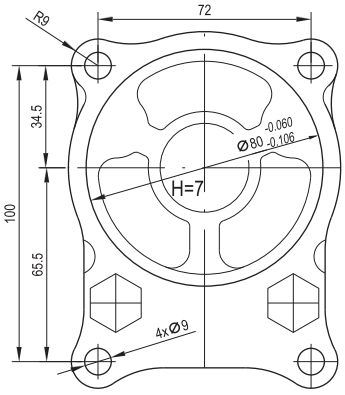


Flanşe prindere - *Fastening Flanges*

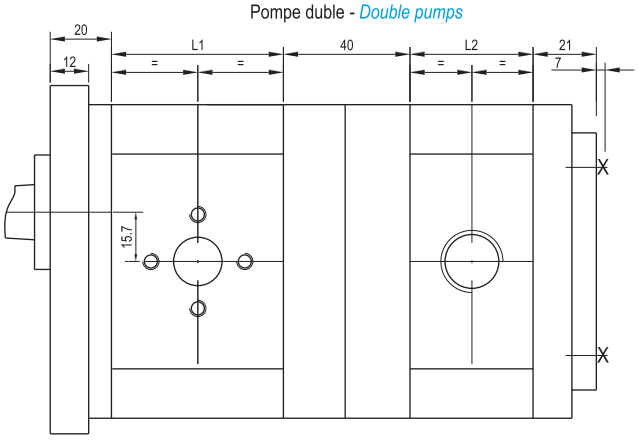
Varianta 1 (Plessey) - *Variant 1 (Plessey)*



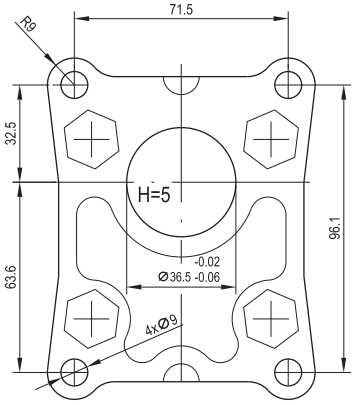
Varianta 2 (DIN) - *Variant 2 (DIN)*



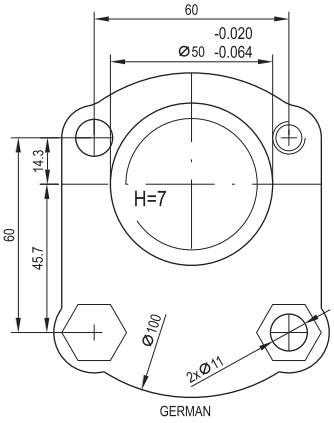
Pompe duble - *Double pumps*



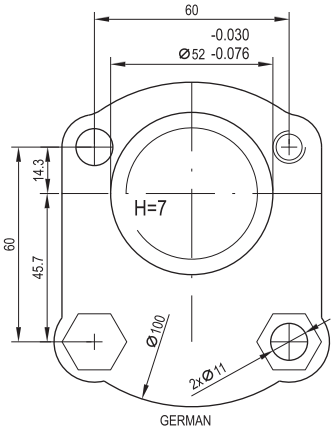
Varianta 3 (Plessey) - *Variant 3 (Plessey)*



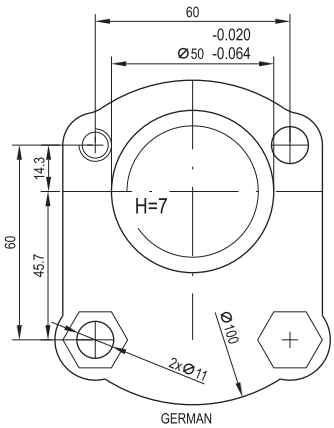
Varianta 4 ; (4e cu inel O) - *Variant 4 ; (4e with O-ring)*



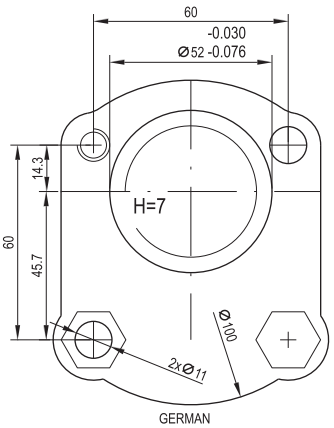
Varianta 5 ; (5e cu inel O) - *Variant 5 ; (5e with O-ring)*



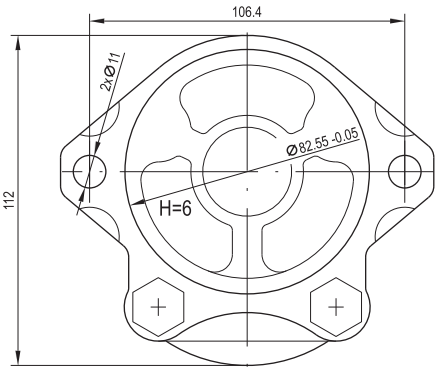
Varianta 6 ; (6e cu inel O) - *Variant 6 ; (6e with O-ring)*



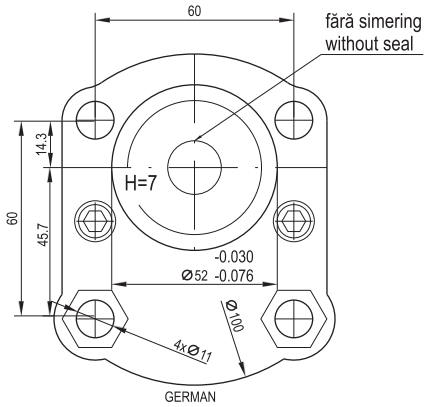
Varianta 8 ; (8e cu inel O) - *Variant 8 ; (8e with O-ring)*



Varianta 7 (SAE "A") - *Variant 7 (SAE "A")*



Varianta 9 (cu inel O) - *Variant 9 (with O-ring)*

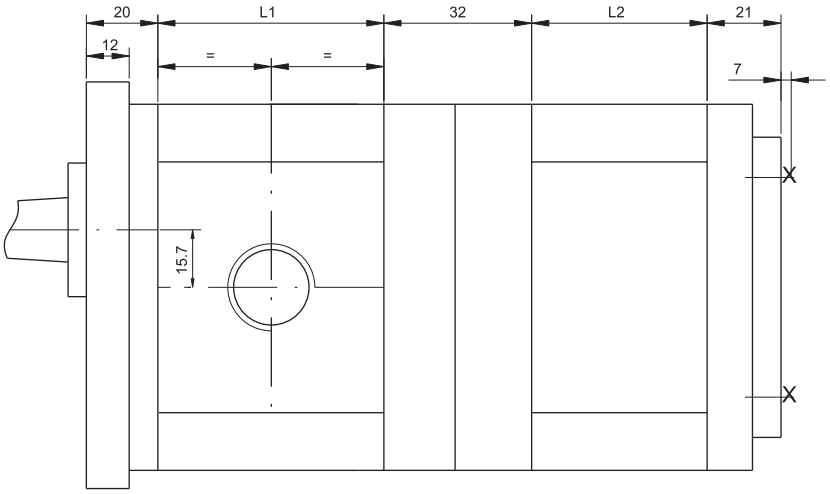


POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

C - Pompe duble cu o singură aspirație HAL22
C - Double pumps with a single inlet HAL22

Codificare - *Codification*

HAL 22	-	(Vg1 + Vg2)	-	Ax antrenare *Driving shaft*	Flanșă prindere *Fastening flange*	Aspirație 1 *Inlet port 1*	Refulare 1 *Outlet port 1*	-	Aspirație 2 *Inlet port 2*	Refulare 2 *Outlet port 2*	-	Sens *Rotation*



NOTĂ:
- Aspirația comună trebuie să fie suficient de mare, pentru ambele trepte.
- Se recomandă amplasarea aspirației comune pe treapta cu cilindree mai mare
- Pentru acest tip de pompe nu se recomandă aspirațiile tip 3; 4; 8; M

NOTE:
- *The common inlet should be large enough, for both stages.*
- *It is recommended, that inlet is on stage with bigger displacement.*
- *For this pumps is not recommended inlets type 3; 4; 8; M*

Exemplu - *Example*

HAL 22	-	(16+6,3)	-	3	3	1	1	-	O	1	-	C

Pompe duble cu aspirație comună pe treapta 1
Double pump with common inlet on first stage

Exemplu - *Example*

HAL 22	-	(11,3+16)	-	3	3	O	1	-	1	1	-	C

Pompe duble cu aspirație comună pe treapta 2
Double pump with common inlet on second stage

Elemente de calcul pentru pompe :

-Debitul la presiunea P = 0 : $Qo = \frac{Vg \times n}{1000}$ [l/min] unde: Vg = volum geometric [cm3/rot]; n = turația efectivă [rot/min]

-Debitul nominal la presiunea Pn : $Qn = Qo \times \eta_v$ [l/min] unde: η_v = eficiența volumetrică nom. [%]

-Puterea consumată la presiunea Pef : $N = \frac{Qo \times Pef}{600 \times \eta_{hm}}$ [kw] unde: Pef = presiune efectivă [bar]; η_{hm} = randament hidromecanic [%] (uzual η_{hm} = 88% la presiunea nominală; scade mult la presiuni mici)

-Momentul de antrenare la presiunea Pef : $M = \frac{Vg \times Pef}{62.8 \times \eta_{hm}}$ [Nm]

Calculation for pumps :

-Flow at P = 0 : $Qo = \frac{Vg \times n}{1000}$ [l/min] where: Vg = displacement [cm3/rot]; n = effective speed [rev/min]

-Nominal flow at P = Pn : $Qn = Qo \times \eta_v$ [l/min] where: η_v = volumetrical efficiency nom. [%]

-Incomming power at P = Pef : $N = \frac{Qo \times Pef}{600 \times \eta_{hm}}$ [kw] where: Pef = effective pressure [bar]; η_{hm} = hydromecanical efficiency [%]

-Driving torque at P = Pef : $M = \frac{Vg \times Pef}{62.8 \times \eta_{hm}}$ [Nm] (usualy η_{hm} = 88 at nominal pressure; will decrease for low pressure)

POMPE SIMPLE HP2 - *SIMPLE GEAR PUMPS HP2*
POMPE DUBLE HP22 - *DOUBLE GEAR PUMPS HP22*

CARACTERISTICI TEHNICE - *TECHNICAL CHARACTERISTICS*

Vg cm^3/rot *ccm/rev*	L L1; L2 mm	η_{vn} %	Presiune - *Pressure* [bar]		Presiune aspirație *Inlet pressure* [bar]	Turație (rot/min) *Speed (rev/min)*			Temperatura *Temperature* [°C]	Vâscozitate *Viscosity* [cSt]	Filtrare *Filtration* [µm]
			Pn	Pmax		nominal	min.	max.			
4	44,7	88	250	280	min. - 0,3 max. 1,5	1500	1000	4500	-15...+ 80 recomandat *recommended* 0...+ 60	12...2000 recomandat *recommended* 25...200	25 concentrație *concentration* max. 0,05%
4,5	45,6	89									
5,5	47,2	90					900	4000			
6,3	48,6	91									
8,2	51,7	92					800	3500			
11,3	56,8	93									
14	61,3	93,6					600	3000			
15	63	94									
16	64,7	94,5	235	250			500				
19	69,7	95	200	220							
22,5	75,1	95,5	160	180				2500			
25	79,2	96	150	170							
27,9	84	97	140	160				2000			

Notă:

- Pn: presiunea nominală la care se garantează fucționarea continuă, durabilitatea şi randamentul volumic.
- Pmax: presiunea maximă la care poate lucra pompa intermitent (max. 20s); presiunea medie nu va depăşi presiunea nominală.
- Vârfurile de presiune, de comutare, pot depăşi presiunea maximă cu 20 bar.
- Randamentele volumice η_{vn} se garantează în condiții nominale şi la o vâscozitate a uleiului de 30….40 mm^2/s.
- Caracteristicile de mai sus sunt valabile şi pentru pompele duble (la fiecare treaptă în parte).

- Pentru n>1500 rot/min, P<6 000 000 / (Vg x nef)
- Funcționarea pompelor la turații ridicate, fără cavitație, este posibilă numai cu o aspirație suficient de largă.
- Presiunea de aspirație nu va scade sub 0,7 bar abs.

La cerere se pot costrui:
- pompe duble HP21 cu treapta a doua din grupa 1, (cu Vg = 0.85…7.8 cm^3/rot)

- pompe cu accesorii:
  a. supapă cu retur extern
  b. supapă cu retur intern
  c. regulator de debit cu supapă, cu retur extern
  d. regulator de debit cu supapă, cu retur intern

Note:

- Pn: nominal pressure for which, continuous running, life time and volumetric efficiency are guaranteed.
- Pmax: maximum pressure at witch the pumps can intermittently work (max. 20s); average pressure should be lower than Pn
- Pressure peaks, in comutations can be 20 bar higher as Pmax.
- Volumetric efficiency η_{vn} is guaranteed in nominal conditions and viscosity 30…40 mm^2/s.
- The characteristics mentioned above are valid also for double pumps (for every stage).

- For n>1500 rev/min, P<6 000 000 / (Vg x nef)
- Functioning at high speed, without cavitation, it is possible only with an enough large inlet.
- The inlet pressure should not decrease under 0.7 bar absolute.

At request, can be manufactured:
- double gear pumps HP21 with second stage from group 1 (with Vg = 0.85….7.8 cm^3/rev)

- pumps with accessories:
a.valve with external return
b.valve with internal return
c.flow control valve with external return
d.flow control valve with internal return.

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The producer reserves the right to make changes in the present documentation, to increase the quality of the product.