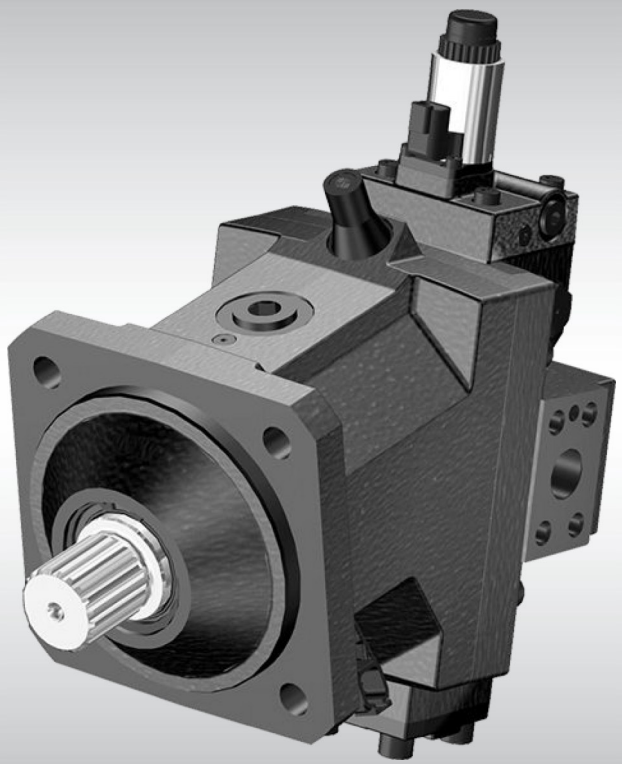
MAKING MODERN LIVING POSSIBLE

Technical Information

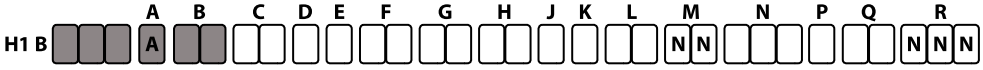
H1 Bent Axis Variable Displ. Motors

Size 060/080/110/160/250



powersolutions.danfoss.com

H1B Master Model Code



Displacement

060	060 cm³ [3.66 in³]
080	080 cm³ [4.88 in³]
110	110 cm³ [6.71 in³]
160	160 cm³ [9.76 in³]
250	250 cm³ [15.25 in³]

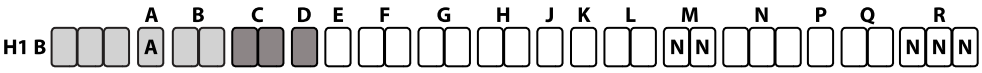
A – Product version

A	Revision code

B – Control

L1	Electr. Proport. 12 V, Deutsch DT 04-2P connector, de-energized = max. displacement, no PCOR
L2	Electr. Proport. 24 V, Deutsch DT 04-2P connector, de-energized = max. displacement, no PCOR
D1	Electr. Proport. 12 V, Deutsch DT 04-2P connector, de-energized = max. displacement, with PCOR
D2	Electr. Proport. 24 V, Deutsch DT 04-2P connector, de-energized = max. displacement, with PCOR
M1	Electr. Proport. 12 V, Deutsch DT 04-2P connector, de-energized = min. displacement, no PCOR
M2	Electr. Proport. 24 V, Deutsch DT 04-2P connector, de-energized = min. displacement, no PCOR
K1	Electr. Proport. 12 V, Deutsch DT 04-2P connector, de-energized = min. displacement, with PCOR
K2	Electr. Proport. 24 V, Deutsch DT 04-2P connector, de-energized = min. displacement, with PCOR
E1	Electr. 2 Pos. 12 V, Deutsch DT 04-2P connector, de-energized = max. displacement, no PCOR
E2	Electr. 2 Pos. 24 V, Deutsch DT 04-2P connector, de-energized = max. displacement, no PCOR
F1	Electr. 2 Pos. 12V, Deutsch DT04-2P connector, de-energized = min. displacement, no PCOR
F2	Electr. 2 Pos. 24V, Deutsch DT04-2P connector, de-energized = min. displacement, no PCOR
TA	PCOR, default (high pressure below PCOR pressure) = min. displacement
T1	Electr. 2 Pos. 12 V, Deutsch DT 04-2P connector, de-energized = min. displacement, with PCOR
T2	Electr. 2 Pos. 24 V, Deutsch DT 04-2P connector, de-energized = min. displacement, with PCOR
P1	Electr. 2 Pos. 12 V, Deutsch DT 04-2P connector, de-energized = min. displ., with EPPCOR
P2	Electr. 2 Pos. 24 V, Deutsch DT 04-2P connector, de-energized = min. displ., with EPPCOR
HE	Hydraulic 2 Pos., external control pressure supply, default (w/o control pressure) = max. displac., no PCOR
HF	Hydraulic 2 Pos., external control pressure supply, default (w/o control pressure) = min. displac., no PCOR
DH	Hydraulic proport., external control pressure supply, default (w/o control pressure) = max. displacement, with PCOR
MH	Hydraulic proport., external control pressure supply, default (w/o control pressure) = min. displacement, no PCOR
LH	Hydraulic proport., external control pressure supply, default (w/o control pressure) = max. displacement, no PCOR

H1B Master Model Code



C – PCOR and BPD

BA	Without PCOR & without BPD; use with **L*** controls
CA	Without PCOR & without BPD; use with **M*** controls
K1	With PCOR & electr. 12 V BPD (de-energized BPD = PCOR active at port A), Deutsch DT 04-2P connector use with **K1** controls
K2	With PCOR & electr. 24 V BPD (de-energized BPD = PCOR active at port A), Deutsch DT 04-2P connector use with **K2** controls
KA	With PCOR & without BPD; use with **K*** controls
AA	Without PCOR & without BPD; use with **E*** controls
EA	Without PCOR & without BPD; use with **F*** controls
M1	With PCOR & electr. 12 V BPD (de-energized BPD = PCOR active at port B), Deutsch DT 04-2P connector use with **D1** controls
M2	With PCOR & electr. 24 V BPD (de-energized BPD = PCOR active at port B),Deutsch DT 04-2P connector use with **D2** controls
MA	With PCOR & without BPD; use with **D*** controls
D1	With PCOR & electr. 12 V BPD (de-energized BPD = PCOR active at port A), Deutsch DT 04-2P connector use with **P1, T1** and **TA** controls
D2	With PCOR & electr. 24 V BPD (de-energized BPD = PCOR active at port A), Deutsch DT 04-2P connector use with **P2, T2** and **TA** controls
DA	With PCOR & without BPD; use with **P*** and **T*** controls
HE	Without PCOR & without BPD, internal servo pressure supply; use with **HE** control
HF	Without PCOR & without BPD, internal servo pressure supply; use with **HF** control
MH	With PCOR & hydraulic BPD, (de-energized BPD = PCOR active port not defined without pilot pressure difference on **XA** or **XB**, use with **DH**-control

D – Threshold setting (Hydraulic adjustment)

A	2 bar [29 psi]	**N**	Non applicable
B	3 bar [43.5 psi]	**O**	15 bar [217.6 psi]
C	4 bar [58 psi]	**P**	16 bar [232.1 psi]
D	5 bar [72.5 psi]	**Q**	17 bar [246.6 psi]
E	6 bar [87 psi]	**R**	18 bar [261 psi]
F	7 bar [101.5 psi]	**S**	19 bar [275.6 psi]
G	8 bar [116 psi]	**T**	20 bar [290 psi]
H	9 bar [130.5 psi]	**U**	22 bar [319 psi]
I	10 bar [145 psi]	**V**	24 bar [348 psi]
J	11 bar [159.5 psi]	**W**	26 bar [377.1 psi]
K	12 bar [174 psi]	**X**	28 bar [406.1 psi]
L	13 bar [188.5 psi]	**Y**	30 bar [435 psi]
M	14 bar [203 psi]		

All options are intended to be used for **DH, LH, MH** controls (except **N** - Non applicable).

H1B Master Model Code

E – Orifices

A	1.2 mm [0.047 in] diameter orifices M4 and M5
B	0.8 mm [0.031 in] diameter orifices M4 and M5
C	0.6 mm [0.024 in] diameter orifices M4 and M5

F – Endcap type and ports

PA	Endcap for proportional controls, **axial** ports ISO 6162 type 1 (metric)	Use with controls: **L*** and **D***
PB	Endcap for proportional controls, **side** ports ISO 6162 type 1 (metric)	
RA	Endcap for proportional controls, **axial** ports ISO 6162 type 1 (metric)	Use with controls: **M*** and **K***
RB	Endcap for proportional controls, **side** ports ISO 6162 type 1 (metric)	
TA	Endcap for 2 Pos. and PCOR controls, **axial** ports ISO 6162 type 1 (metric)	Use with controls: **E*, F*, H*, T*** and **P***
TB	Endcap for 2 Pos. and PCOR controls, **side** ports ISO 6162 type 1 (metric)	

G – Flange and housing

	Size	060	080	110	160	250
VN	SAE flange motor housing (ISO 3019/1), no speed sensor port	●	●	●	●	●
DN	DIN flange motor housing (ISO 3019/2), no speed sensor port	●	●	●	●	–
CN	Cartridge flange motor housing, no speed sensor port	●	●	●	●	–
VS	SAE flange motor housing (ISO 3019/1), with speed sensor port	●	●	●	●	●
DS	DIN flange motor housing (ISO 3019/2), with speed sensor port	●	●	●	●	–
CS	Cartridge flange motor housing, with speed sensor port	●	●	●	●	–

H – Shaft options, NO speed ring

	Size	060	080	110	160	250
AN	14 teeth 12/24 pitch ANSI 92.1 1970 class 5, no speed ring	●	●	–	–	–
BN	21 teeth 16/32 pitch ANSI 92.1 1970 class 5, no speed ring	●	●	–	–	–
CN	23 teeth 16/32 pitch ANSI 92.1 1970 class 5, no speed ring	–	●	–	–	–
DN	27 teeth 16/32 pitch ANSI 92.1 1970 class 5, no speed ring	–	–	●	●	●
EN	13 teeth 8/16 pitch ANSI 92.1 1970 class 5, no speed ring	–	–	●	●	–
FN	15 teeth 8/16 pitch ANSI 92.1 1970 class 5, no speed ring	–	–	–	●	●
GN	W30x2x30x14x9g DIN 5480, no speed ring	●	–	–	–	–
HN	W35x2x30x16x9g DIN 5480, no speed ring	●	●	–	–	–
JN	W40x2x30x18x9g DIN 5480, no speed ring	–	●	●	–	–
KN	W45x2x30x21x9g DIN 5480, no speed ring	–	–	●	●	–
LN	W50x2x30x24x9g DIN 5480, no speed ring	–	–	–	●	–

● = available option, – = not available option

H1B Master Model Code

H – Shaft options With speed ring

	Size	060	080	110	160	250
AS	14 teeth 12/24 pitch ANSI 92.1 1970 class 5, with speed ring	●	●	–	–	–
BS	21 teeth 16/32 pitch ANSI 92.1 1970 class 5, with speed ring	●	●	–	–	–
CS	23 teeth 16/32 pitch ANSI 92.1 1970 class 5, with speed ring	–	●	–	–	–
DS	27 teeth 16/32 pitch ANSI 92.1 1970 class 5, with speed ring	–	–	●	●	●
ES	13 teeth 8/16 pitch ANSI 92.1 1970 class 5, with speed ring	–	–	●	●	–
FS	15 teeth 8/16 pitch ANSI 92.1 1970 class 5, with speed ring	–	–	–	●	●
GS	W30x2x30x14x9g DIN 5480, with speed ring	●	–	–	–	–
HS	W35x2x30x16x9g DIN 5480, with speed ring	●	●	–	–	–
JS	W40x2x30x18x9g DIN 5480, with speed ring	–	●	●	–	–
KS	W45x2x30x21x9g DIN 5480, with speed ring	–	–	●	●	–
LS	W50x2x30x24x9g DIN 5480, with speed ring	–	–	–	●	–

J – Sensor

N	No speed sensor
B	Speed sensor, 7 V to 32 V, DEUTSCH DTM 04-6P connector
S	Speed sensor, 4.5 V to 8 V, DEUTSCH DTM 04-6P connector
P	Speed sensor ready (plugged)

K – Loop flushing shuttle system

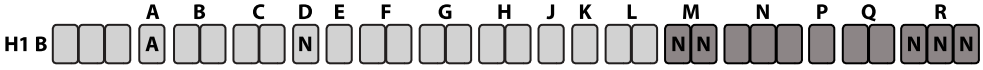
	Size	060	080	110	160	250
A	Standard 6.5 bar [94 psi] shift pressure	●	●	●	●	●
B	12.5 bar [181 psi] shift pressure	–	–	–	●	●
N	No loop flushing function	●	●	●	●	●

L – Loop flushing relief valve (non adjustable)

	Size	060	080	110	160	250
05	5 l/min [1.321 US gal/min], 16 bar [232 psi] cracking pressure	●	●	–	–	–
10	10 l/min [2.642 US gal/min], 16 bar [232 psi] cracking pressure	●	●	●	–	–
15	15 l/min [3.963 US gal/min], 16 bar [232 psi] cracking pressure	–	–	●	–	–
20	20 l/min [5.283 US gal/min], 16 bar [232 psi] cracking pressure	–	–	–	●	●
30	30 l/min [7.925 US gal/min], 16 bar [232 psi] cracking pressure	–	–	–	●	●
40*	40 l/min [10.567 US gal/min], 16 bar [232 psi] cracking pressure	–	–	–	●	●
50*	50 l/min [13.209 US gal/min], 16 bar [232 psi] cracking pressure	–	–	–	●	●
NN	No loop flushing function	●	●	●	●	●

* only in conjunction with loop flushing shuttle system B

H1B Master Model Code



M – Special hardware feature

NN	Standard hardware

N – Minimum displacement

XXX	**000** or **012** to **040** cm^3/rev minimum displacement setting for frame size 060 cm^3/rev **000** or **016** to **054** cm^3/rev minimum displacement setting for frame size 080 cm^3/rev **000** or **022** to **074** cm^3/rev minimum displacement setting for frame size 110 cm^3/rev **000** or **032** to **108** cm^3/rev minimum displacement setting for frame size 160 cm^3/rev **000** or **050** to **169** cm^3/rev minimum displacement setting for frame size 250 cm^3/rev

P – Maximum displacement (non adjustable)

	Size	060	080	110	160	250
N	100 % max. displacement for all **L*, M*, K*, D*** control options	●	●	●	●	●
B	90 % max. displacement for all **L*, D*** control options	–	–	–	●	–
C	85 % max. displacement for all **L*, D*** control options	–	–	–	–	●
E	75 % max. displacement for all **L*, D*** control options	–	–	–	–	●
Z	100 % max. displacement for all **E*, F*, H*, T*, P*** control options	●	●	●	●	●
Q	95 % max. displacement for all **E*, F*, H*, T*, P*** control options	●	●		●	●
R	90 % max. displacement for all **E*, F*, H*, T*, P*** control options	●	●	●	●	●
S	85 % max. displacement for all **E*, F*, H*, T*, P*** control options	●	–	●	●	●
T	80 % max. displacement for all **E*, F*, H*, T*, P*** control options	–	–	●	●	–
U	75 % max. displacement for all **E*, F*, H*, T*, P*** control options	●	–	●	–	–
V	65 % max. displacement for all **E*, F*, H*, T*, P*** control options	●	–	–	–	–

● = available option

Q – PCOR pressure setting

00	For all controls without PCOR function	**23**	230 bar [3336 psi]
16	160 bar [2321 psi]	**24**	240 bar [3481 psi]. Standard setting at production test for **P*** controls: • 800 mA for **P1** • 400 mA for **P2**
17	170 bar [2466 psi]	**25**	250 bar [3626 psi]
18	180 bar [2611 psi]	**26**	260 bar [3771 psi]
19	190 bar [2756 psi]	**27**	270 bar [3916 psi]
20	200 bar [2901 psi]	**28**	280 bar [4061 psi]
21	210 bar [3046 psi]	**29**	290 bar [4206 psi]
22	220 bar [3191 psi]	**30**	300 bar [4351 psi]

R – Paint and nametag

NNN	Black paint and Nametag

Technical specifications

General specifications

General specifications

Design	Piston motor with variable displacement bent axis design
Direction of rotation	Bi-directional
Pipe connections	*Main pressure ports:* ISO split flange boss *Remaining ports:* SAE straight thread O-ring boss
Recommended installation	Discretionary, the housing must always be filled with hydraulic fluid

Physical properties

Physical properties

Features		**Unit**	**Size**					
			060	**080**	**110**	**160**	**210**	**250**
Displacement	**maximum**	cm^3 [in^3]	60 [3.66]	80 [4.88]	110 [6.71]	160 [9.76]	210 [12.81]	250 [15.25]
	minimum		12 [0.73]	16 [0.98]	22 [1.34]	32 [1.95]	42 [2.56]	50 [3.05]
Theoretical flow at max. displ.	**at rated speed**	l/min [US gal/min]	216 [57]	256 [68]	319 [84]	416 [110]	504 [133]	550 [145]
	at max. speed		270 [71]	328 [87]	407 [108]	528 [139]	630 [166]	700 [185]
Theoretical torque at max. displacement		N•m/bar [lb•in/1000 psi]	0.96 [583]	1.27 [777]	1.75 [1069]	2.55 [1555]	3.34 [2038]	3.98 [2426]
Theor. corner power at rated speed and max. working pressure (Δp = 450 bar [6527 psi])		kW [hp]	266 [357]	321 [430]	396 [531]	513 [689]	609 [817]	684 [917]
Mass moment of inertia of rotating components		$kg•m^2$ [$slug•ft^2$]	0.0038 [0.0028]	0.0062 [0.0046]	0.0108 [0.0080]	0.0211 [0.0156]	0.0306 [0.0226]	0.0402 [0.0296]
Case volume		l [US gal]	0.9 [0.24]	1.0 [0.26]	1.4 [0.37]	2.7 [0.71]	2.8 [0.74]	4.1 [1.08]

Weight dry (Electric proportional control)

Configuration	**Size**					
	060	**080**	**110**	**160**	**210**	**250**
SAE	29.8 kg [65.7 lb]	34.8 kg [76.7 lb]	48.8 kg [107.6 lb]	61.9 kg [136.5 lb]	81.0 kg [179 lb]	87.0 kg [196.2 lb]
DIN	28.3 kg [62.4 lb]	34.4 kg [75.8 lb]	45.0 kg [99.2 lb]	59.3 kg [130.7 lb]	75.0 kg [165 lb]	79.6 kg [175.5 lb]
Cartridge	26.9 kg [59.3 lb]	33.0 kg [72.6 lb]	41.8 kg [92.2 lb]	54.7 kg [120.6 lb]	–	–

Mounting flange

Configuration	**Size**					
	060	**080**	**110**	**160**	**210**	**250**
SAE ISO 3019/1	127-4 (SAE C) 4-bolt		152-4 (SAE-D) 4-bolt		165-4 (SAE E)	
DIN ISO 3019/2, B4	125 HL 4-bolt	140 HL 4-bolt	160 HL 4-bolt	180 HL 4-bolt	200 HL 4-bolt	200 HL 4-bolt
Cartridge	Pilot Ø160 mm 2-bolt (200 dist.) M16	Pilot Ø190 mm 2-bolt (224 dist.) M20	Pilot Ø200 mm 2-bolt (250 dist.) M20		–	–

Technical specifications

Customer ports

Size	060	080	110	160	210	250
Axial and radial[1]	DN19 typ 1	DN25 typ 1	DN25 typ 1	DN32 typ 1	DN32 typ 1	DN32 typ 1
Case drain ports[2]	0.875 [7/8]–14UN-2B		1.0625 [1 1/16]–12UN-2B		1.313 [1 5/16]–12UN-2B]	
Axial gauge ports[2][3]	0.875 [7/8]–14UN-2B	1.0625 [1 1/16]–12UN-2B				
Radial gauge port[2][3]	0.5625 [9/16]–18UNF-2B					

[1] Split flange Boss per ISO6162, 40 MPa series

[2] SAE O-ring boss

[3] Countersink may be deeper that specified in the standard.

Operating Parameters

Output Speed

Output Speed	Displacement	Unit	Size					
			060	080	110	160	210	250
Rated	Maximum 32°	min^{-1} (rpm)	3600	3200	2900	2600	2350	2200
	Minimum 6°		5900	5300	4800	4250	3850	3650
	Zero 0°		6600	5950	5350	4750	4300	4050
Maximum	Maximum 32°		4500	4100	3700	3300	3000	2800
	Minimum 6°		7250	6600	5950	5250	4800	4500
	Zero 0°		7950	7200	6500	5750	5250	4900

System and Case Pressure, Ambient Temperature

Parameter		All sizes
System pressure	Maximum working	450 bar [6527 psi]
	Maximum	480 bar [6962 psi]
	Minimum[1]	[2]
Case pressure	Rated	3 bar [44 psi]
	Maximum	5 bar [73 psi]
	Minimum	0.3 bar [4 psi]
Ambient temperature[3]	Maximum	70 °C [158 °F]
	Minimum	-40 °C [-40 °F]

[1] Minimum above case pressure (**open** and **closed** circuit)

[2] See the graphs *Required inlet pressure diagrams (for cylinder block filling)* on page 14.

[3] Air temperature close to the unit.