

# H1 Bent Axis Motors Size

060/080/110/160/210/250 cm<sup>3</sup>



Series H1 variable displacement motors are bent axis design, incorporating spherical pistons.

These motors are designed primarily to be combined with other products in closed circuit systems to transfer and control hydraulic power. Series H1 motors have a large maximum/minimum displacement ratio of 5:1 and high output speed capabilities.

The expanded function of zero degree capability, coupled with a high performance 32 degree maximum angle, creates opportunities to easily improve the machine performance for:

- Wheel assist on the steering axle of high inertia machines (i.e. combines) and could include Anti Slip Control •

Off-highway machines requiring Anti Slip Control (i.e. Ag. sprayer)

- Multi-motor applications requiring optimized work and transport modes (i.e. wheel loader, Ag sprayer) utilizing the zero degree position for maximum transport speed
- Improved machine (i.e. single drum roller) gradeability through precise Anti Slip Control

The Anti Slip Control reduces ground damage, increases traction control and improves machine controllability for the operator.

SAE, Cartridge (not available for 210 cm<sup>3</sup> and 250 cm<sup>3</sup>) and DIN (not available for 250 cm<sup>3</sup>) flange with radial or axial high pressure port configurations are available including the loop flushing device.

A complete family of controls and regulators are available to fulfill the requirements of a wide range of applications.

Motors normally start at maximum displacement. This provides maximum starting torque for high acceleration.

All controls utilize internally supplied servo pressure. This may be overridden by a pressure compensator which functions when the motor is operating in motor and pump modes. A defeat option is available to disable the pressure compensator override when the motor is running in pump mode during deceleration/braking.

The pressure compensator option features a low pressure rise to ensure optimal power utilization throughout the entire displacement range of the motor.

Speed sensor options are available to cover all frame sizes and flange styles.

They are capable of sensing the following, all in one package:

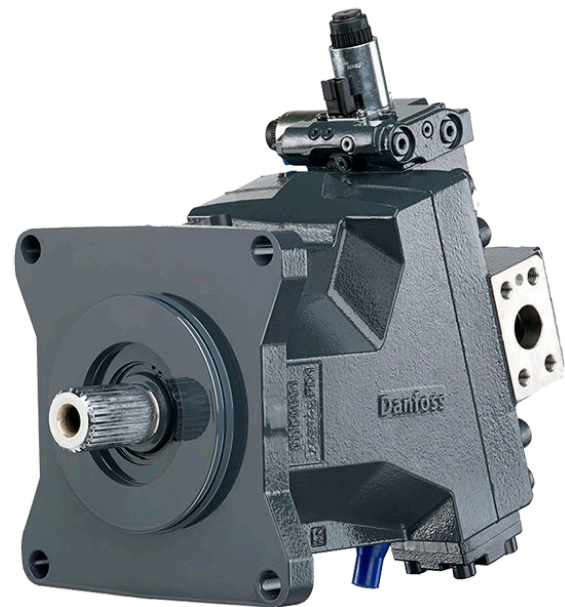
- Speed
- Direction (only group "J", option "S")
- Temperature (only group "J", option "S")

The electric controls are specifically designed for the Danfoss family of PLUS+1<sup>®</sup> microcontrollers for easy "Plug and Perform" installation.

## The H1 range of products

A growing family based on the success of the Series 51 product family:

- Initial release of 060 cm<sup>3</sup>, 080 cm<sup>3</sup>, 110 cm<sup>3</sup>, 160 cm<sup>3</sup>, 210 cm<sup>3</sup> and 250 cm<sup>3</sup> displacement size.
- Development plans include additional displacement sizes.



**General specifications**
*General specifications*

<b>Design</b>	Piston motor with variable displacement bent axis design
<b>Direction of rotation</b>	Bi-directional
<b>Pipe connections</b>	<i>Main pressure ports:</i> ISO split flange boss <i>Remaining ports:</i> SAE straight thread O-ring boss
<b>Recommended installation</b>	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 <sup>3</sup> [in <sup>3</sup> ]	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]
Theor. corner power at rated speed and max. working pressure ( $\Delta p = 450$ bar [6527 psi])		kW [hp]	266 [357]	321 [430]	396 [531]	513 [689]	609 [817]	684 [917]

*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]	–
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	–
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
<b>Axial and radial<sup>1)</sup></b>	DN19 typ 1	DN25 typ 1	DN25 typ 1	DN32 typ 1	DN32 typ 1	DN32 typ 1
<b>Case drain ports<sup>2)</sup></b>	0.875 [ $\frac{7}{8}$ ]-14UN-2B		1.0625 [ $1\frac{1}{16}$ ]-12UN-2B		1.313 [ $1\frac{5}{16}$ ]-12UN-2B]	
<b>Axial gauge ports<sup>2)</sup></b>	0.875 [ $\frac{7}{8}$ ]-14UN-2B	1.0625 [ $1\frac{1}{16}$ ]-12UN-2B				
<b>Gauge port<sup>2)</sup></b>	0.5625 [ $\frac{9}{16}$ ]-18UNF-2B					

<sup>1)</sup> Split flange Boss per ISO6162, 40 MPa series

<sup>2)</sup> SAE O-ring boss

**Operating Parameters**
*Output Speed*

Output Speed	Displacement	Unit	Size					
			060	080	110	160	210	250
Rated	Maximum 32°	min <sup>-1</sup> (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 <sup>1)</sup>	<sup>2)</sup>
Case pressure	Rated	3 bar [44 psi]
	Maximum	5 bar [73 psi]
	Minimum	0.3 bar [4 psi]
Ambient temperature <sup>3)</sup>	Maximum	70 °C [158 °F]
	Minimum	-40 °C [-40 °F]

<sup>1)</sup> Minimum above case pressure (**open** and **closed** circuit)

<sup>2)</sup> See the graphs [Required inlet pressure diagrams \(for cylinder block filling\)](#)
<sup>3)</sup> Air temperature close to the unit.

**SAMER offers following services:**

- Systems design with pumps and motors in closed and open loop circuits including valves,
- Sale of hydraulic components and electronic devices.
- Commissioning and start up on machinery.
- Repair of hydraulic components
- Postsale and service troubleshoot on phone

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# Axial Piston Motors

## L and K Frame



For more than 40 years, Danfoss has been developing state-of-the-art components and systems for mobile machinery used in off-highway operations around the world. We have become a preferred supplier by offering the best of what really matters: The hardware inside your vehicle application.

The L/K motor is designed for use primarily in mobile equipment using existing and proven technology. These motors have been optimized with regard to options, life, package size and installed cost.

The L/K motor family consists of five base displacements which all fit in one package size. Two different configurations are available, an SAE-B two-bolt, or a cartridge style motor.

These motors are a two-position, variable displacement, with smooth, shift-on-the-go capability. The working displacement range of 3.4:1 with a minimum angle option to Zero degree provides exceptional versatility in the application of L/K motors. The motor is spring biased to maximum displacement and can be hydraulically shifted to minimum angle



### Features

#### Wide range of options

- Integral loop flush valve with relief plus orifice
- Minimum angle option to Zero degrees
- Speed sensor with zero rpm and direction sensing capability
- Single and Two line control available for SAE mount motors. Single line control available for cartridge motors
- Twin radial (side) or axial (end) porting is available
- Multiple minimum displacement options available
- Reduced maximum displacement options
- Tapered input shaft with shaft seal dust protector for fan drive applications

#### Installation and Packaging benefits

- SAE-B two-bolt, and cartridge mounting
- Three clean sides with superior clearance and access to mounting bolts
- Short and compact: fits into wheel end and compact installations with improved porting
- The cartridge motor fits through a 178 mm [7 Inch] mounting hole of a gearbox pilot for subassembly installation of motor to gearbox
- High Efficiency - nine piston rotating groups with an 18 degree maximum angle
- Low control pressure requirement (14 bar for servo) - no undue parasitic power loss. Smooth two-speed shift from minimum to maximum angle

#### Designed for Durability and Flexibility

- Versatility - working displacement range of 3.4:1 with a minimum angle option to Zero degrees. SAE-B two-bolt, and cartridge mounting available
- Five displacements allow the optimum selection of hydraulic motor for the lowest possible installed cost
- Reliability - uses existing technology
- Suitable for closed and open circuit applications
- Designed for maximum system pressures up to 420 bar [6100 psi]

**Technical specifications**

*Physical properties*

Parameter	Unit	L25	L30	L35	K38	K45
<b>Displacement maximum</b>	cm <sup>3</sup> [in <sup>3</sup> ]	25 [1.50]	30 [1.83]	35 [2.14]	38 [2.32]	45 [2.75]
<b>Weight (cartridge and SAE-B)</b>	kg [lb]	15.4 [34]				
<b>Mass moment of inertia of rotating components</b>	kg·m <sup>2</sup> [slug·ft <sup>2</sup> ]	0.001666 [0.001229]	0.001582 [0.001167]	0.001530 [0.001128]	0.002326 [0.001716]	0.002286 [0.001687]
<b>Theoretical torque</b>	N·m/bar [lbf·in/1000psi]	0.40 [244]	0.48 [293]	0.56 [347]	0.60 [366]	0.72 [439]

*Operating parameters*

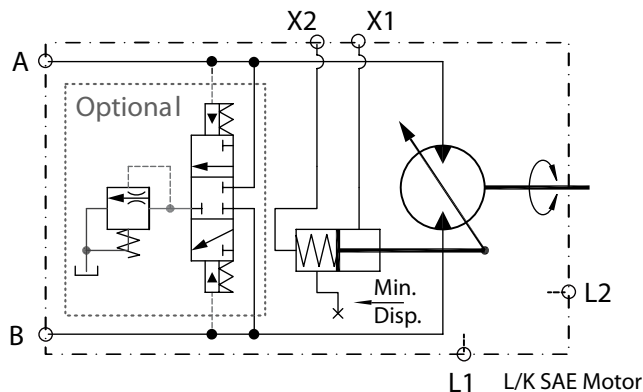
Parameter		Unit	L25	L30	L35	K38	K45
<b>System pressure<sup>1</sup></b>	Maximum operating	bar [psi]	400 [5800]	350 [5075]	300 [4350]	350 [5075]	300 [4350]
	Maximum		420 [6090]	375 [5440]	325 [4715]	415 [6019]	350 [5075]
<b>Speed limit (at max. disp)</b>	Rated	min <sup>-1</sup> (rpm)	3400	3500	3600	3600	3500
	Maximum		3950	4150	4300	4000	3900
<b>Speed limit (at min. disp)<sup>2</sup></b>	Rated	min <sup>-1</sup> (rpm)	4400	4450	4500	4650	4500
	Maximum		5000	5150	5300	5200	5050
<b>Case pressure</b>	Maximum operating	bar [ psi]	2 [29]				
	Maximum		6 [87]				
<b>Shift pressure (single line control)</b>	Maximum operating	bar [ psi]	14 [203]				
	Maximum		69 [1000]				

<sup>1</sup> Refer to bulletin 520L0627 for pressure definitions

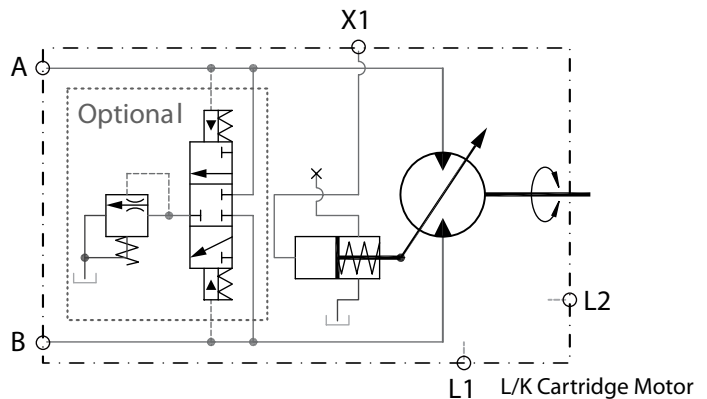
<sup>2</sup> Limit when motor angle is 12 degrees or less

**Schematics**

*SAE Motor schematic, two line control*

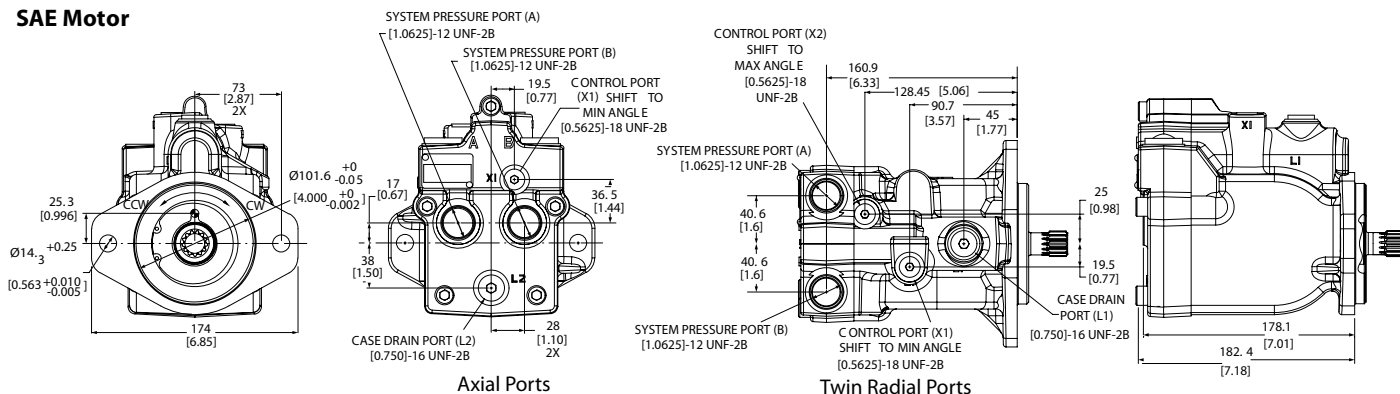


*Cartridge motor schematic, single line control*

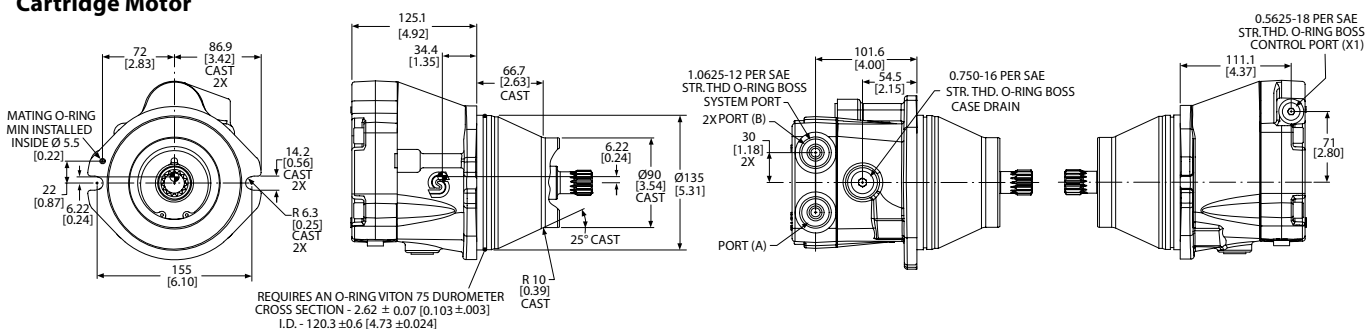


### Dimensions

#### SAE Motor



#### Cartridge Motor



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