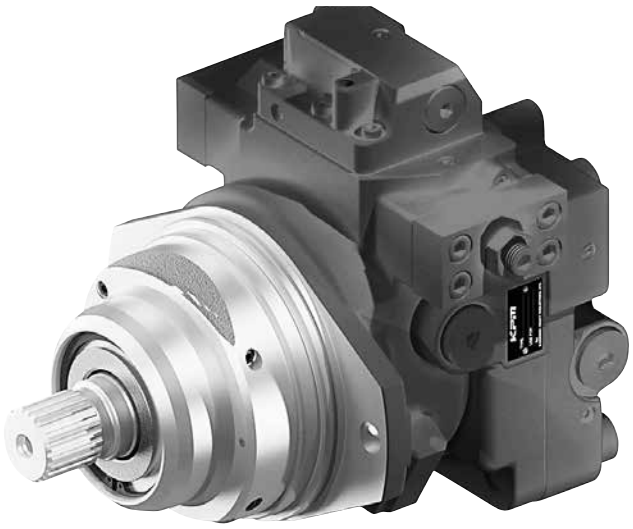
Variable Displacement Type Axial Piston Motors (Cartridge type)



■Specifications

Size : 160

Nominal Pressure : 42MPa (6,090 psi)
Maximum Pressure : 50MPa (7,250 psi)

■General Descriptions

- Applicable to an open circuit and closed circuit.
- Applicable to construction machinery and industrial vehicles.
- Swash plate design allows for a compact motor.
- High power density.

■Features

Superior performance at High and Low speed

Optimized rotary balance design enables high speed perfomance and excellent low speed characteristics.

Low noise

Swash plate configuration provides the low noise.

Compact size

Swash plate configuration provides the more compact structure and flexibility in system design.

Long bearing life

Swash plate configuration results in longer bearing life.

Cartridge type

Space saving configuration, easy to install into the gearbox.

5 M7VC Ordering Code

Model Code

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M7VC	160	A	C	4	7	-	A	A	1	T1	X	X	X	N	-	01

1. M7VC Series

M7VC Series, Variable Displacement, Axial Piston Motor, Cartridge Type, Applicable in Both Open and Closed Loops.

2. Size

	160
Standard Size	●

3. Series Specifications

A	Standard

4. Mounting Flange and Port Position*

	Mounting	Port Position	160
C	ϕ200(ϕ250 - 2 bolt mount)	Rear	●
D		Side	○
E		Bottom	○

5. Port and Flange Fixing Thread*

	Type of Threaded Port	Thread Type for Flange Port	160
1	ANSI ISO11926	ANSI ASME B1.1	○
4	Parallel Piping ISO228	Metric ISO724	●

6. Shaft End*

	Standard	Specifications	160
2	ANSI B92.1	1 3/4 in 13T 8/16DP	○
3	ANSI B92.1	2 in 15T 8/16DP	○
7	DIN 5480	W45x2x21x9 g	●
8	DIN 5480	W50x2x24x9 g	●

*Following combination of code [5], [6] is available.

	Ordering Code	
	Code[5]	Code[6]
M7VC160	1	2 or 3
	4	7 or 8

● : Available
○ : Under development
— : Not available

5. M7VC Ordering Code

Model Code **M7VC 160 A C 4 7 - A A 1 T1 X X X N - 01**

(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15)

7. Maximum Displacement

Size	160	A : 160	●	B : 155	●	C : 150	●	D : 140	●

8. Minimum Displacement

Size	160	A : 96	●	B : 80	●	C : 60	●	D : 40	●	E : 32	●

9. Speed Sensor

		160
1	w/o Speed Sensor	●
2	w/ Speed Sensor	●

○For code [10] [11] please refer to page 57.

12. Accessories

	Flushing Valve	Internal Cooling	Flushing Flow	160
X	w/o Flushing Valve	w/ Internal Cooling	5.0 L/min (M7VC160) at ΔP(Lower Pressure - Drain Pressure)= 2.5MPa and ν =10mm²/s	●
1	w/o Flushing Valve	w/o Internal Cooling	—	●
2	w/ Flushing Valve	w/ Internal Cooling	5.0 L/min (M7VC160) at ΔP(Lower Pressure - Drain Pressure)= 2.5MPa and ν =10mm²/s	○

13. Counter Balance Valve

		160
X	w/o Counter Balance Valve	●
1	w/ Counter Balance Valve Hoist at CW Rotation (A port inlet)	○
2	w/ Counter Balance Valve Hoist at CCW Rotation (B port inlet)	○

14. Response Speed of Control

		160
N	Standard	●

15. Design Code

		160
**	01~	●

● : Available
○ : Under development
— : Not available

5. M7VC Ordering Code

Model Code

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M7VC	160	A	C	4	7	-	A	A	1	T1	X	X	X	N	-	01

10.Regulator(See the table on possible combinations of optional valve and regulator options.)

				160
T	T1	Electric Two Position Displacement Control	Negative Control, 24V	●
	T2		Negative Control, 12V	●
Y	Y1	Hydraulic Two Position Displacement Control	Negative Control	●
	Y2		Positive Control	●
E	E1	Electric Proportional Control	Negative Control, 24V	●
	E2		Positive Control, 24V	●
	E3		Negative Control, 12V	●
	E4		Positive Control, 12V	●
P	P1	Hydraulic Proportional Control	Negative Control, Pi = 2.5MPa	●
	P2		Positive Control, Pi = 2.5MPa	●
	P3		Negative Control, Pi = 1.0MPa	●
	P4		Positive Control, Pi = 1.0MPa	●
H	H1	Pressure Related Control	w/o Pressure Increase	●
	H2		w/ Pressure Increase	●
	H3		w/ Pressure Increase and Hydraulic Remote Control	●

11. Options for Optional Valves (See the table on possible combinations of optional valve and regulator options.)

			160
X	w/o Any Optional Valve		●
A1	Pressure Control Valve	w/ a Pressure Control Valve	●
B	B1	Electric Two Position Control Valve	w/ Electric Two Position Control Valve, 24V	●
	B2		w/ Electric Two Position Control Valve, 12V	●
C	C1	Hydraulic Two Position Control Valve	w/ Hydraulic Two Position Control Valve, Negative Control	●
	C2		w/ Hydraulic Two Position Control Valve, Positive Control	●

★ M7V Control Options

Note: The control options are common for all motor sizes.

				Options for Optional Valves (code [11])					
				w/o Any Optional Valve	w/ a Pressure Control Valve	w/ Electric Two Position Control Valve, 24V	w/ Electric Two Position Control Valve, 12V	w/ Hydraulic Two Position Control Valve, Negative Control	w/ Hydraulic Two Position Control Valve, Positive Control
Regulator : Code [10]				X	A1	B1	B2	C1	C2
T	T1	Electric Two Position Displacement Control	Negative Control, 24V	●	–	–	–	–	–
	T2		Negative Control, 12V	●	–	–	–	–	–
Y	Y1	Hydraulic Two Position Displacement Control	Negative Control	●	–	–	–	–	–
	Y2		Positive Control	●	–	–	–	–	–
E	E1	Electric Proportional Control	Negative Control, 24V	●	●	–	–	–	–
	E2		Positive Control, 24V	●	○	–	–	–	–
	E3		Negative Control, 12V	●	●	–	–	–	–
	E4		Positive Control, 12V	●	○	–	–	–	–
P	P1	Hydraulic Proportional Control	Negative Control (Pi = 2.5MPa)	●	●	–	–	–	–
	P2		Positive Control (Pi = 2.5MPa)	●	○	–	–	–	–
	P3		Negative Control (Pi = 1.0MPa)	●	●	–	–	–	–
	P4		Positive Control (Pi = 1.0MPa)	●	○	–	–	–	–
H	H1	Pressure Related Control	w/o Pressure Increase	●	–	●	●	●	●
	H2		w/ Pressure Increase	●	–	●	●	●	●
	H3		w/ Pressure Increase and Hydraulic Remote Control	●	–	●	●	●	●

(Note)
For combination of two position control and pressure cut-off control, please select the pressure related control (code H) with two position control as option valve.

● : Available
○ : Under development
— : Not available

6 Technical Information

6-1 Specifications

M7VC Series

Size		160
Min. Displacement : q_{min}	cm^3 (in^3)	0 to 128 (0 to 7.9)
Max. Displacement : q_{max}	cm^3 (in^3)	128 to 160 (7.9 to 9.8)
Max. Speed : N_{nom} / N_{max} *1	min^{-1} (rpm)	3,100 / 4,900
Nominal pressure : P_{nom} *2	MPa (psi)	42 (6,090)
Max. Pressure : P_{max}	MPa (psi)	50 (7,250)
Theoretical output torque	Nm (lbf ft)	1,070 (789)
Power	kW (hp)	347 (465)
Max. Flow : Q	L/min (gallon/min)	496 (131)
Moment of inertia	$kg \cdot m^2$	0.030
Volume in the case	L (gallon)	2.5 (0.66)
Mass	kg (lb)	72 (158)
Temperature	℃ (°F)	−20 to +115 (−4 to +239) at drain port −20 to +90 (−4 to +194) at inlet port
Coating		Red synthetic resin primer

Values shown in the table above are theoretical values.

∗1 : N_{nom} : Max. speed at q_{max}.
N_{max} : Max. speed at $q < 0.6q_{max}$.
(In case that 1 is selected at ordering code [12] , N_{max} goes down up to N_{nom} regardless of displacement of the motor.)

∗2 : Nominal pressure corresponds to the design pressure to provide proper performance, function, and service life.

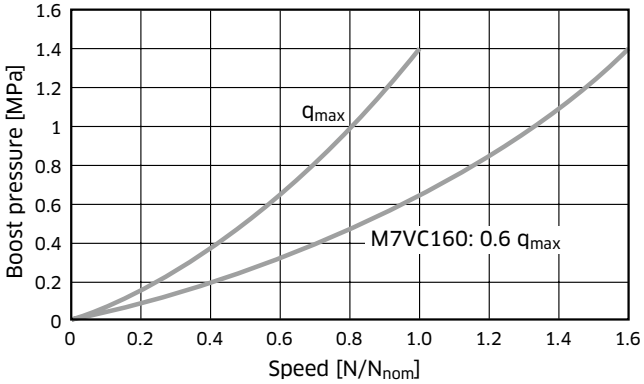
6-2 Precautions for System Design

M7VC series

Minimum Boost Pressure

To prevent cavitation when the motor is operating in a pumping mode, a positive pressure is required at the suction port.
The figure on the right shows the minimum boost pressure requirement based on the regular operation. In case of a rapid change of the flow volume, more boost pressure must be applied.

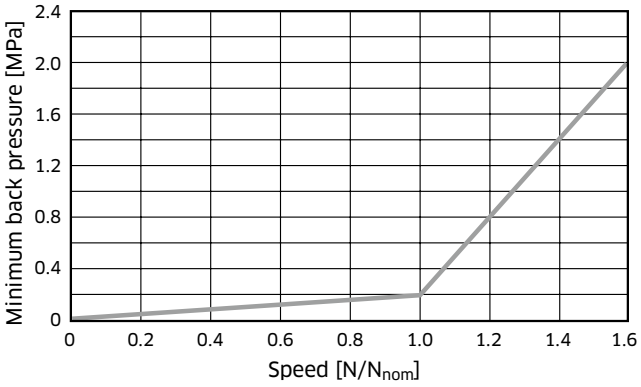
Minimum boost pressure



Minimum Back Pressure

To ensure the optimal performance and life time the back pressure is required at the lower pressure port.
Motor casing pressure must be ≦ 0.2 MPa.

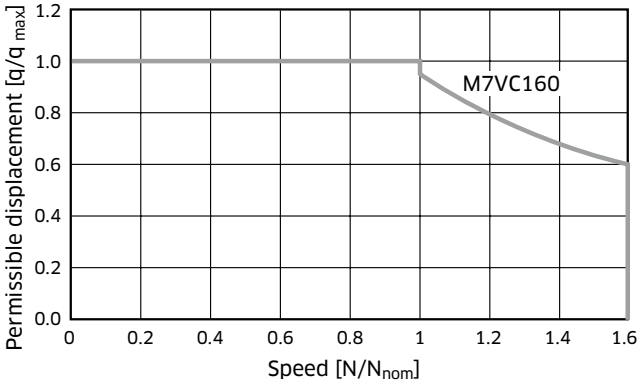
Minimum back pressure



Permissible Displacement, Speed Related

The figure on the right shows permissible displacement in relation to the motor operating speed. Design the system not to exceed this requirement.

Permissible displacement



Beginning of Control for Winch Device

For the safety reasons, winch devise are not permissible with beginning control at q_{min}.

6-3 Speed Sensor

Ordering Code [9] : 1, 2

◆ 1 : w/o Speed Sensor

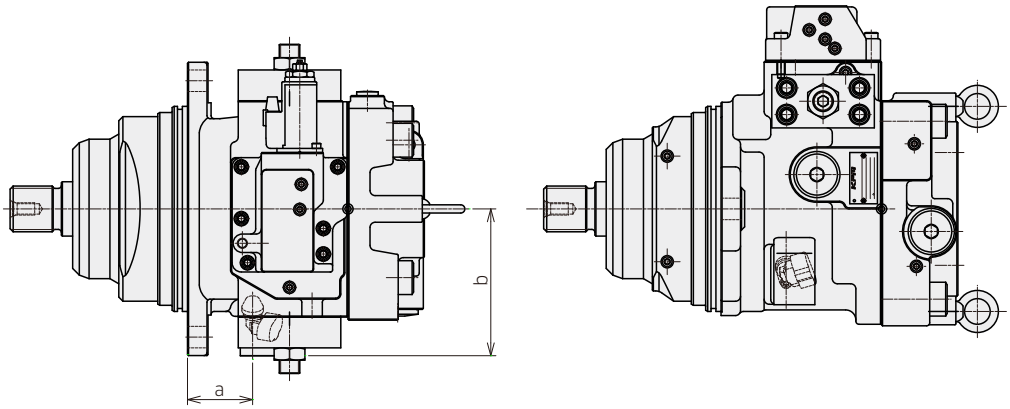
●A speed sensor is not installed.

◆ 2 : w/ Speed Sensor

●A speed sensor that detects the motor direction and measures the rotational speed of the motor is installed at the position as below figure.

Specification

Supply Voltage : 4.5V ~ 26V DC
Mating Connector : TE Connectivity AMP Superseal 1.5 series, 4 positions(part number : 282088)
IP Protection Rating : IP69K



	M7VC160
a [mm]	63.5
b [mm]	143
Pulse Frequency [pulse/rev]	87

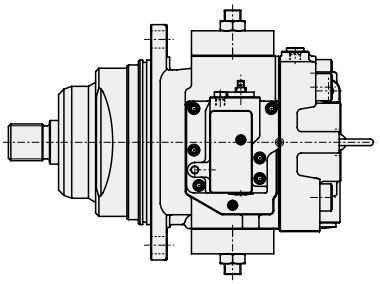
7 Dimensions

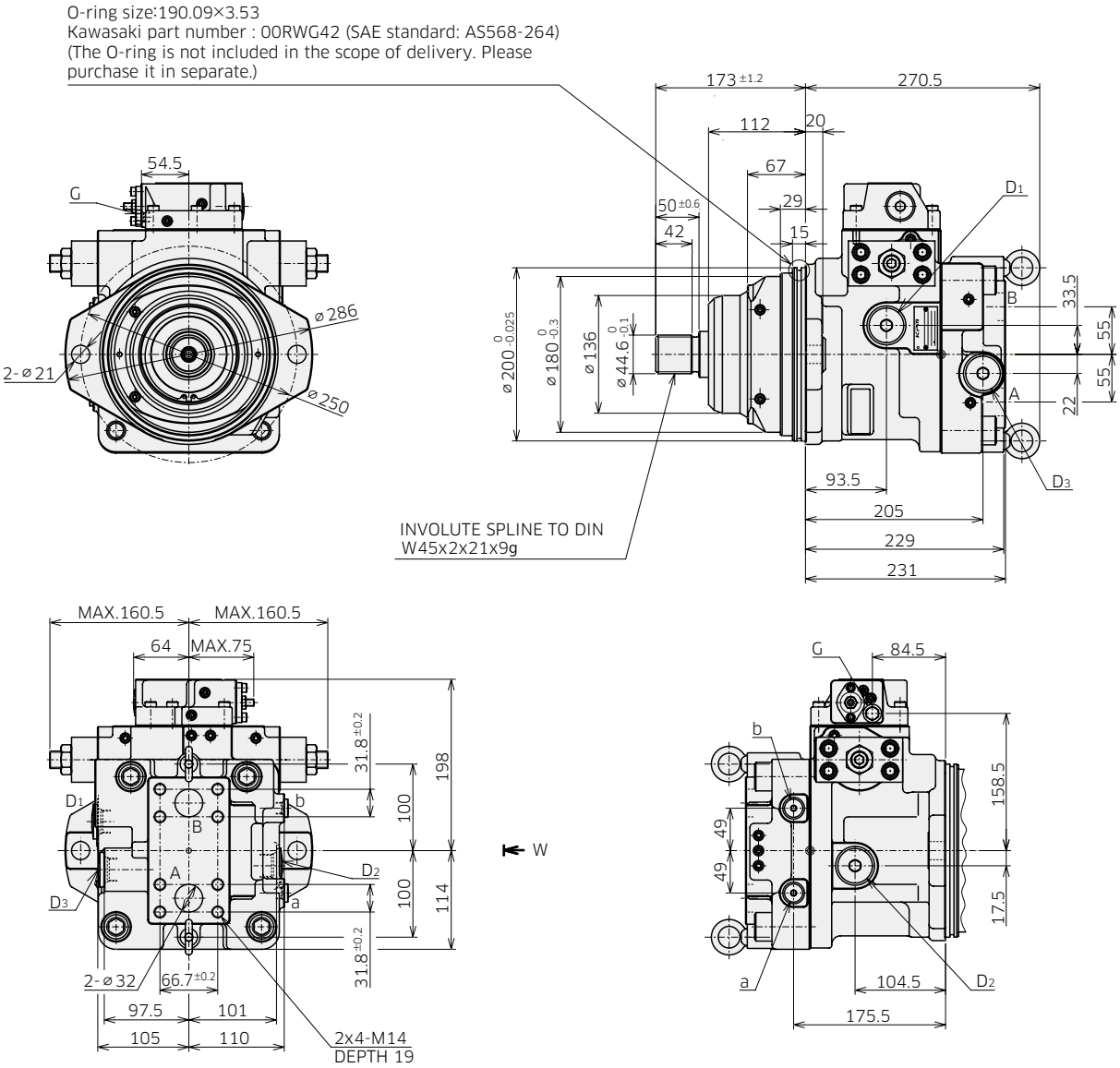
7-1 Installation Dimensions

∗Dimensions in mm.

◆ M7VC160,Rear Port

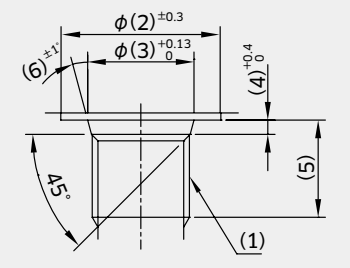
Model Code : M7VC 160 A C 4 7 – ∗∗∗∗∗∗∗∗





Refer to the page 63 and 64 for dimensions with other regulator options.

7-1 Installation Dimensions



*Dimensions in mm.

◆ M7VC160 Port and Flange Fixing Thread (Ordering code [5])

Thread Port

ANSI thread type (Code : 1)

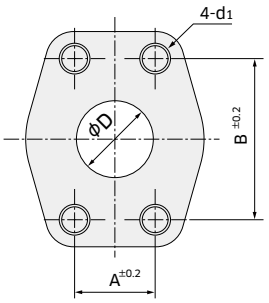
	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Gauge port	G	7/16-20UNF-2B	21	12.4	2.4	11	12	12
Pilot port	Pi	9/16-18UNF-2B	25	15.6	2.5	12.7	12	59
Drain port	D1 to D5	1-1/16-12UN-2B	41	29.2	3.3	16.7	15	170

Parallel piping thread type (Code : 4)

	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	Tightening torque (Nm)
Gauge port	a, b	G 1/4	25	15.6	2.5	15	15	36
Pilot port	Pi	G 1/4	24	15.6	2.5	14	15	36
Drain port	D1 to D5	G 3/4	45	30.8	3.5	16.7	15	170

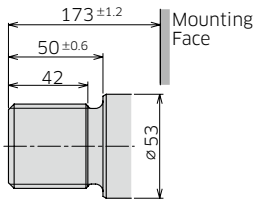
Flange Port

Port thread type code	d1	A	B	D
1	1/2-13UNC-2B	31.8	66.7	32
4	M14	31.8	66.7	32



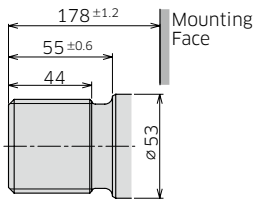
◆ Shaft End (Ordering Code [6])

DIN 5480
(W45x2x21x9g)



Code : 7

DIN 5480
(W50x2x24x9g)

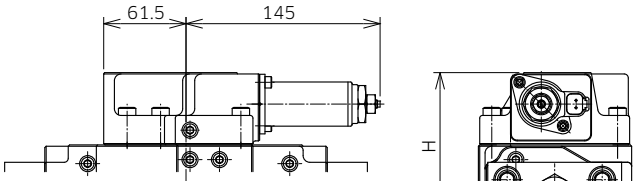


Code : 8

7-2 Regulators Installation Dimensions

*Dimensions in mm.

Electric Two Position Displacement Control
Regulator Code: T1, T2

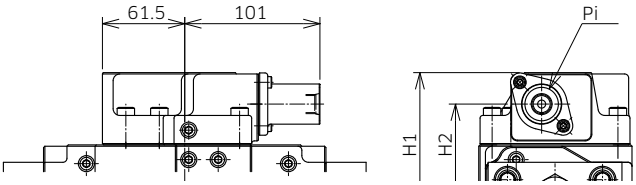


Dimension H : Height from shaft center.

Dimension H (mm)

Motor size	Dimension
	H
160	198

Hydraulic Two Position Displacement Control
Regulator Code: Y1, Y2



Dimension H : Height from shaft center.

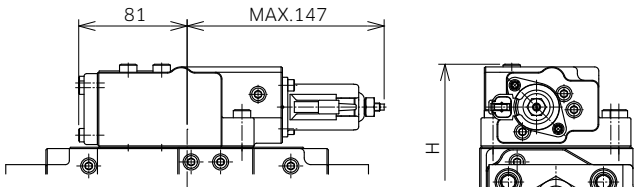
Dimension H1, H2 (mm)

Motor size	Dimension	
	H1	H2
160	198	175

7-2 Regulators Installation Dimensions

*Dimensions in mm.

◆ Electric Proportional Control
Regulator Code: E1, E2, E3 and E4

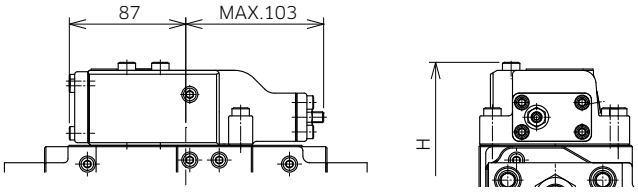


Dimension H : Height from shaft center.

Dimension H (mm)

Motor size	Dimension
	H
160	206

◆ Pressure Related Control
(with Pressure Increase)
Regulator Code: H2



Dimension H : Height from shaft center.

Dimension H (mm)

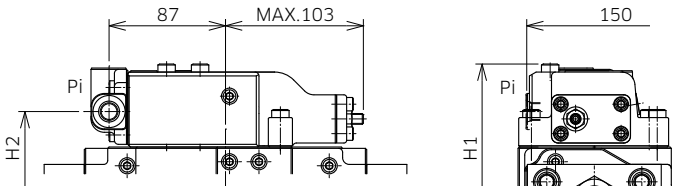
Motor size	Dimension
	H
160	206

◆ Pressure Related Control
(with Pressure Increase Cut-Off Shift)
Regulator Code: H3

◆ Hydraulic Proportional Control
Regulator Code: P1, P2, P3 and P4

Dimension H1, H2 (mm)

Motor size	Dimension	
	H1	H2
160	206	171



Dimension H : Height from shaft center.

M7X Series

Fixed Displacement Type Axial Piston Motors

■Specifications

Size : 85, 112, 160

Nominal Pressure : 42 (6,090 psi)
Maximum Pressure : 50 (7,250 psi)

■General Descriptions

- Applicable to an open circuit and closed circuit.
- Applicable to construction machinery and industrial vehicles.
- Swash plate design allows for a compact motor.
- High power density.

■Features

Superior performance at High and Low speed

Optimized rotary balance design enables high speed perfomance and excellent low speed characteristics.

Low noise

Swash plate configuration provides the low noise.

Compact size

Swash plate configuration provides the more compact structure and flexibility in system design.

Long bearing life

Swash plate configuration results in longer bearing life.