

MYCOM

Compound 2-stage Screw Compressor 2016**C Instruction Manual

2016LLC / 2016LMC / 2016LSC

/ 2016MSC / 2016SSC



ATTENTION

Before operating, servicing, or inspecting this product, read this manual thoroughly to fully understand the contents.

Keep this Instruction Manual in a safe, designated place for future reference whenever the manual is needed.

Specifications of this product is subject to change without prior notice.

株式会社 前川製作所

Preface

Thank you for purchasing the **MYCOM** compound 2-stage screw compressor 2016**C (hereinafter referred to as "this product").

This Instruction Manual (hereinafter referred to as "this manual") provides safety information and operation and maintenance procedures, so that users correctly understand how to handle this product and, as a result, can use it safely and efficiently. This manual is applicable to the following models:

2016LLC-*B*-51, 2016LMC-*B*-51, 20162LSC-*B*-51, 2016MSC-*B*-51, 2016SSC-*B*-51
2016LLC-*B*-61, 2016LMC-*B*-61, 20162LSC-*B*-61, 2016MSC-*B*-61, 2016SSC-*B*-61

* -51 (-61) may not be written. For more information, see 2.2 "Model designation of the compressor" in this manual Chapter 2.

Before installing or using this product, make sure you read this manual.

Keep this manual in a safe place near this product for quick reference.

Revision History

Title		Document No.	First edition issue date
2016**C Instruction Manual		2200LZJE-HO-C6-N_2013.12.	Dec. 16, 2013
Revision No.	Issue date	Contents of revisions (modified clause, page, and details)	Created / approved by:
-	Jun. 30, 1974	Issuance of 2016C first edition	S. Yamamoto
-	Oct. 01, 1983	Newly issued as 1612**C/2016**C edition.	S. Yamamoto
-	Jun. 30, 1993	Revision of 1612**C/2016**C (correction of errors, etc.)	S. Yamamoto
-	Jun. 30, 1996	Reviewed pursuant to the Product Liability Law, established June 1994	Ikehara / Shozu
00	Dec. 16, 2013	Overall review associated with reissue as electronic document, document No. change	Ikehara, kawamoto / Hirao

Chapter 2 Configuration and Specifications of Compressor

2.1 Features of the **MYCOM** Compound 2-stage Screw Compressor 2016**C

The 2-stage compression system, which has hitherto required two units of standard-type screw compressor for its embodiment, can now be realized by a single unit of compound 2-stage screw compressor.

Generally, screw compressors use oil injection to keep discharge temperature at a low level during operation without loss of volumetric efficiency even at high compression ratios. It can, therefore, be operated with a single-stage compression system even at evaporative temperatures near -40°C.

However, for normal use at low temperatures, a 2-stage compression system is applied in order to improve KW/RT (ratio of power consumption versus cooling ability). If the 2-stage compression system is configured with standard-type screw compressors, at least two screw compressor units need to be installed, one on the high-stage and the other on the low-stage, which inevitably requires double installation of the entire system including machinery, motors, utilities, etc.

This 2-stage screw compressor is produced to solve this problem. It is a single unit that has two single-stage compressor units combined into one.

The 2016**C model has a capacity control mechanism for startup load reduction on the high-stage, and a capacity control mechanism for coping with load change on the low-stage.

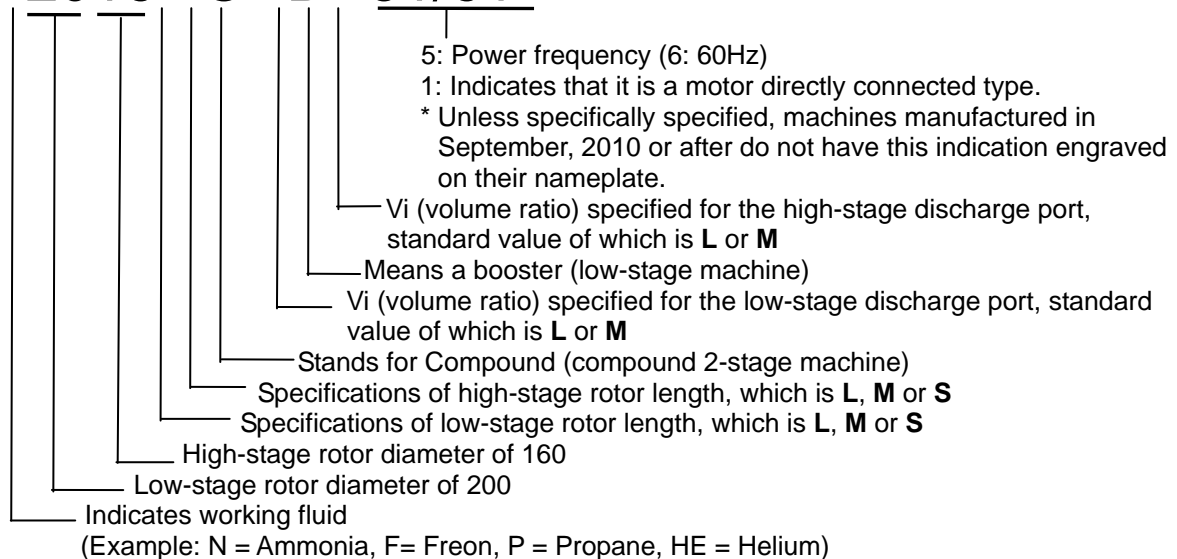
There are various combinations of machine control methods/capacity control methods. However, as they are not directly related to the inspection of the compressor, they are omitted here.

2.2 Model Designation of the Compressor

This manual describes 2016**C-*B*-51 and 2016**C-*B*-61 models.

The meaning of the type designation, which is engraved on the MODEL column of the compressor nameplate, is as follows.

***2016**C-*B*-51/61**



2.3 Compressor Specifications

2.3.1 Specifications

Table 2-1 2016**C Screw Compressor Specifications

Items		2016				
		LLC	LMC	LSC	MSC	SSC
Weight	kg	1180	1140	1100	1050	1000
Low-stage theoretical displacement @3550 rpm /2950 rpm	m ³ /h	1460/1210	1460/1210	1460/1210	1220/1020	975/810
High-stage theoretical displacement @3550 rpm /2950 rpm	m ³ /h	749/622	624/519	499/415	499/415	499/415
Refrigerant	-	NH ₃ , HFC, etc.				
Design pressure	MPa	2.6				
Capacity control (Actual load)	-	10 to 100%				
Rotation direction	-	Counterclockwise viewed from motor				
Connected pipe size	Low-stage suction flange	-	JIS 20K 150A (6")			
	Low-stage discharge flange	-	JIS 20K 100A (4")			
	High-stage suction flange	-	JIS 20K 100A (4")			
	High-stage discharge flange	-	JIS 20K 80A (3")			
	Journal lubrication (low-stage)	-	JIS 20K 25A (1")			
	Journal lubrication (high-stage)	-	JIS 20K 20A (3/4")			
	Oil injection lubrication	-	JIS 20K 15A (1/2")			
	Low-stage capacity control	-	Load: Rc1/4, Unload: Rc3/8			
	High-stage capacity control	-	Load: Rc3/8, Unload: Rc1/4			

- Unless otherwise noted, the pressure unit MPa represents the gauge pressure in this manual.
- For limits of working temperature and pressure, see "2.3.2 Operation Limits" in this manual.

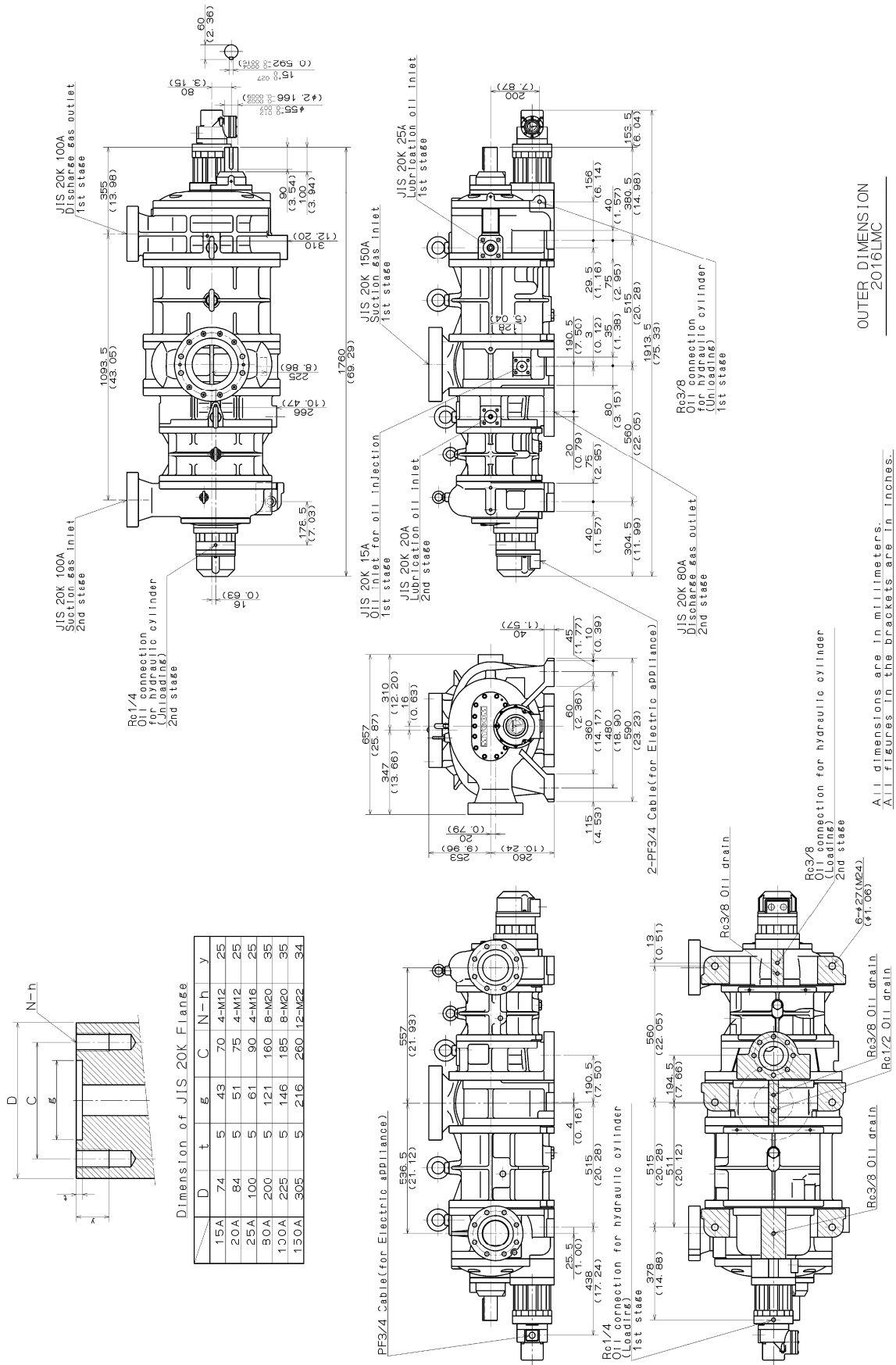


Figure 2-2 Outer Dimensions 2016LMC

2.4 Configuration of Compressor

[POINT]

- For names of each part of the compressor, refer to "7.1 Development Views, Assembly Sectional Views", and "7.2 Parts Configuration Table".

2.4.1 Sectional View

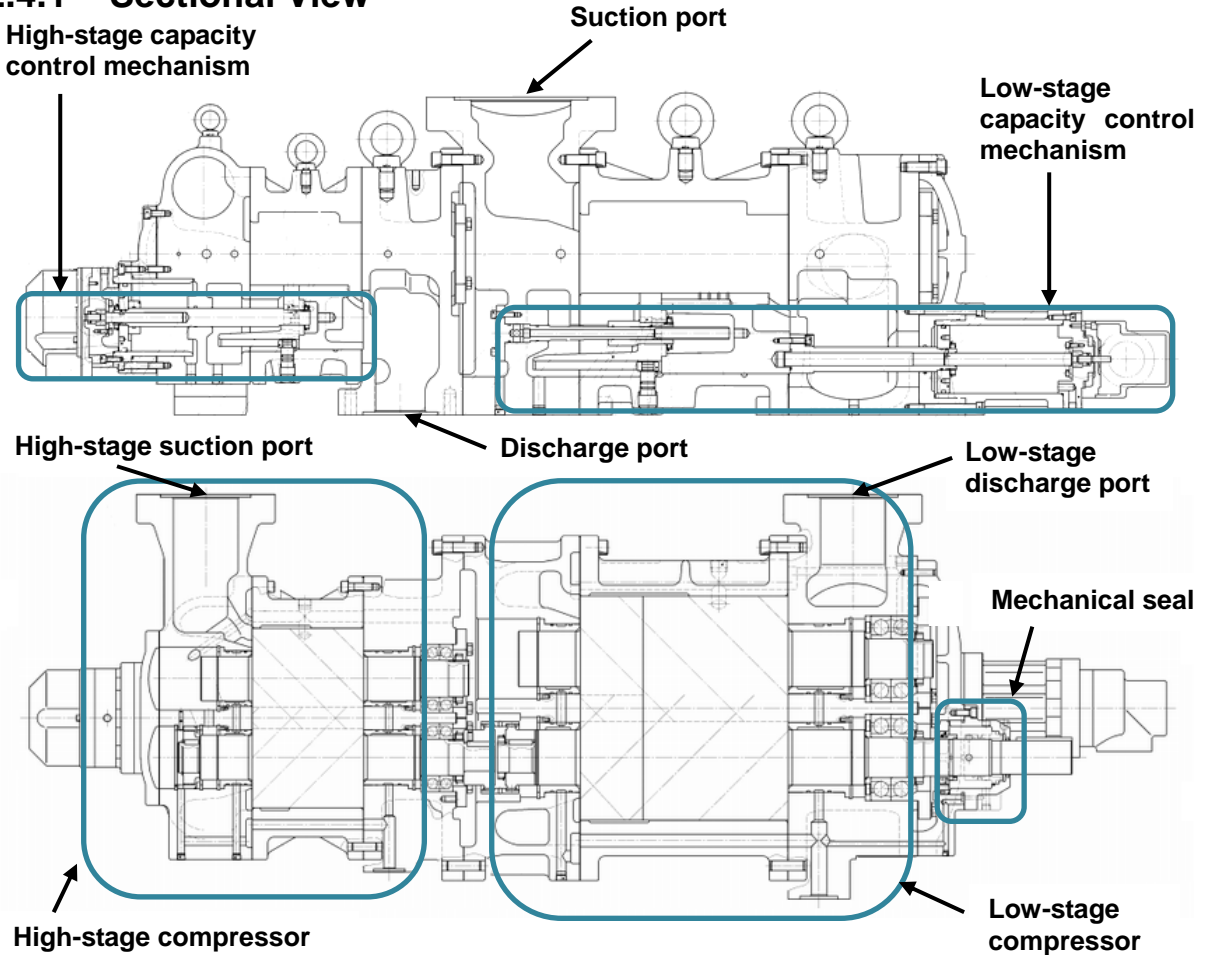


Figure 2-6 2016**C Screw Compressor Sectional View

The 2016**C model, a compound 2-stage compressor, consists of two compressors, (i) a low-stage compressor which suctions gas, working fluid, from the refrigerating unit and compresses (pressure-raises) the gas and (ii) an high-stage compressor which furthermore compresses the gas that has been pressure-raised by the low-stage compressor and sends the resulting gas to the equipment side.

In each casing (low-stage, high-stage), two screw rotors with long leads are supported on both ends by bearings. They are meshed with each other in a joint assembly. These two screw rotors are a set of a male rotor having 4 protruding tooth profiles (M rotor) and a female rotor having 6 concave profiles (F rotor). They conduct compressing according to the mechanism explained below.

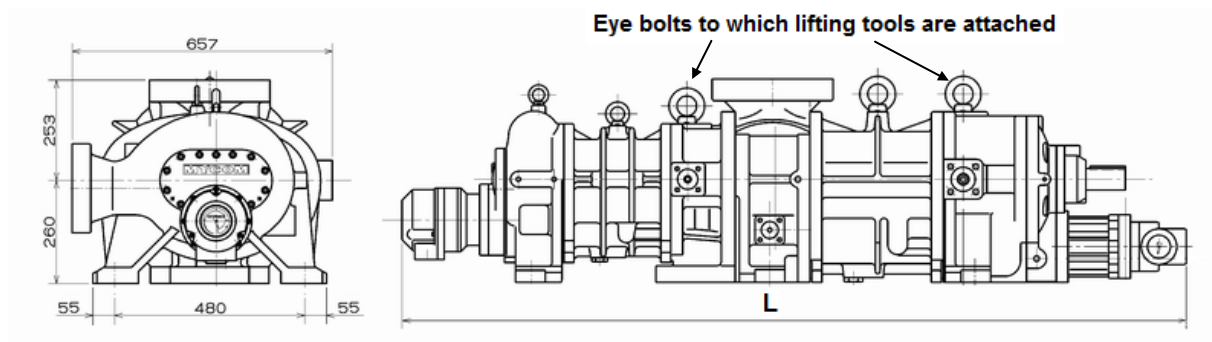
The standard compressor's M rotor is driven by a 2-pole motor; it operates at 3000 rpm (50 Hz) or 3600 rpm (60 Hz). F rotor operates at 2000 rpm (50 Hz) or 2400 rpm (60 Hz), conforming to the operation of M rotor.

* The actual speed of a motor is less than its calculated speed (synchronous speed). This difference is caused by slipping of the motor rotor.

The shaft of the low-stage compressor's M rotor which is linked with the motor has a mechanical seal that keeps gas and lubricating oil from escaping from inside the compressor.

For high efficient operation, the 2016**C model has a capacity control mechanism for coping with load change on the low-stage, and a capacity control mechanism for reducing startup load on the high-stage.

■ Outer Dimensions, Weight and Lifting Position



	2016LLC	2016LMC	2016LSC	2016MSC	2016SSC
Weight (kg)	1180	1140	1100	1050	1000
L (mm)	1980.5	1913.5	1842.5	1787.5	1730.5

Figure 3-1 Outer Dimensions, Weight and Lifting Position of Compressor



Photo 002 Lifting Position

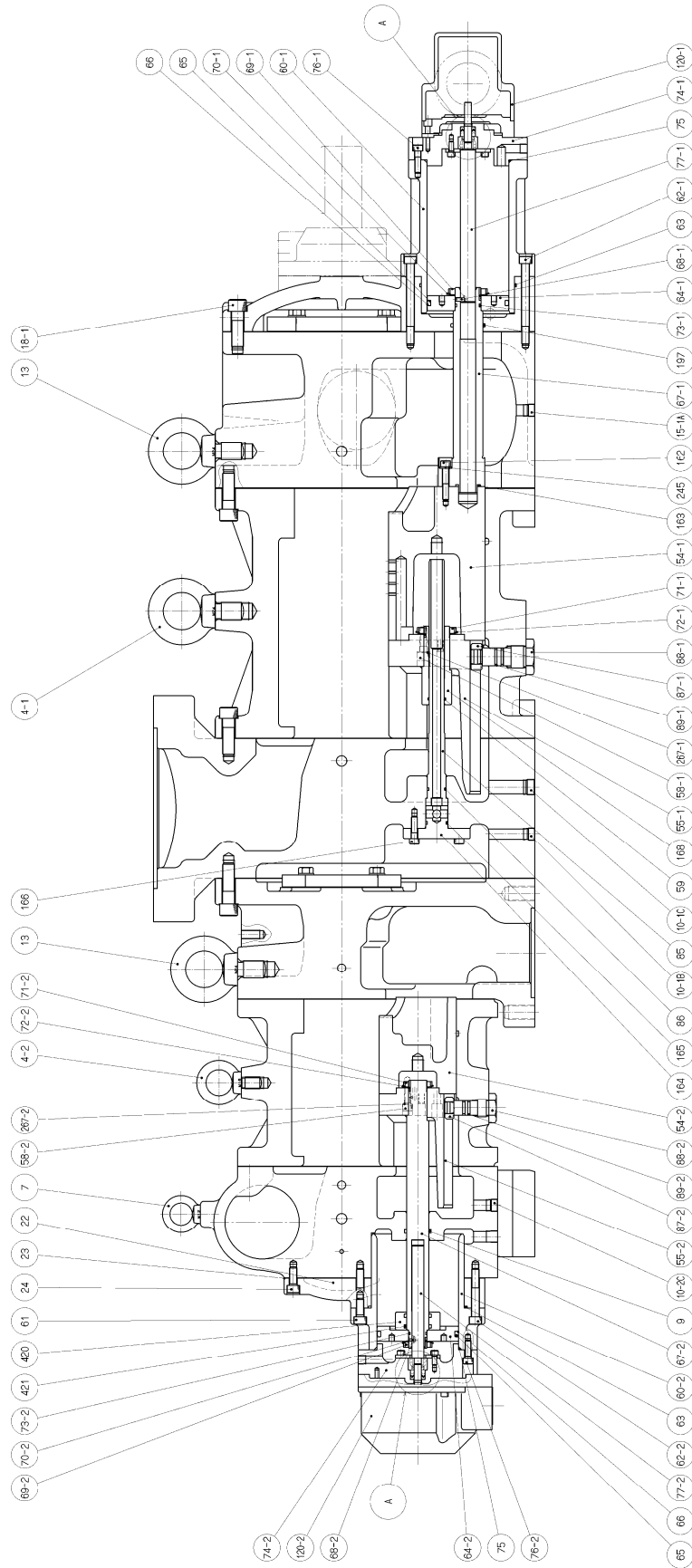


Figure 7-5 2016LMC Assembly Sectional View (Vertical)

7.2 Parts Configuration Table

Table 7-1 Parts Configuration Table

No.	Part name	Code No.	Remarks	Q'ty.				
				LLC	LMC	LSC	MSC	SSC
1-1	Main Rotor Casing (1)	CS00100-200L	200L**	1	1	1	-	-
1-1	Main Rotor Casing (1)	CS00100-200M	200M**	-	-	-	1	-
1-1	Main Rotor Casing (1)	CS00100-200S	200S**	-	-	-	-	1
1-2	Main Rotor Casing (2)	CS00100-160L	160L**	1	-	-	-	-
1-2	Main Rotor Casing (2)	CS00100-160M	160M**	-	1	-	-	-
1-2	Main Rotor Casing (2)	CS00100-160S	160S**	-	-	1	1	1
2-1	Hexagon Socket Head Cap Screw	NB35416-050	M16×50	50	50	50	50	50
2-2	Hexagon Socket Head Cap Screw	NB35412-040	M12×40	52	52	52	52	52
3-1	Alignment Pin	NE2016-055	Φ16×55	4	4	4	4	4
3-2	Alignment Pin	NE2013-040	Φ13×40	4	4	4	4	4
4-1	Eye Bolt	NB600-020	M20	1	1	1	1	1
4-2	Eye Bolt	NB600-016	M16	1	1	1	1	1
5-1	Suction Cover (1)	CS00500-2016C1	2016**C	1	1	1	1	1
5-2	Suction Cover (2)	CS00500-2016C2	2016**C	1	1	1	1	1
6-1	Gasket, Suction Cover (1)	CS00600-200N	200***	1	1	1	1	1
6-2	Gasket, Suction Cover (2)	CS00600-160N	160***	1	1	1	1	1
7	Eye Bolt	NB600-012	M12	2	2	2	2	2
8-1	Spring Pin (1)	NE3206-012	Φ6×12	2	2	2	2	2
8-2	Spring Pin (2)	NE3204-010	Φ4×10	2	2	2	2	2
9	O-ring	PA11-030	JISB24011AP30	1	1	1	1	1
10-1A	Plug	NF06-010	R3/8	1	1	1	1	1
10-1B	Plug	NF06-015	R1/2	1	1	1	1	1
10-2A	Plug	NF06-008	R1/4	1	1	1	1	1
10-2B	Plug	NF06-008	R1/4	1	1	1	1	1
10-2C	Plug	NF06-010	R3/8	1	1	1	1	1
11-1	Bearing Head (1)	CS01100-2016C1	2016**C	1	1	1	1	1
11-2	Bearing Head (2)	CS01100-2016C2	2016**C	1	1	1	1	1
12-1	Gasket, Bearing Head (1)	CS01200-200N	200***	1	1	1	1	1
12-2	Gasket, Bearing Head (2)	CS01200-160N	160***	1	1	1	1	1
13	Eye Bolt	NB600-024	M24	2	2	2	2	2
14-1	Spring Pin	NE320G-012	Φ6×12	2	2	2	2	2
14-2	Spring Pin	NE3204-010	Φ4×10	2	2	2	2	2
15-1A	Plug	NF06-015	R1/2	1	1	1	1	1
15-1B	Plug	NF06-010	R3/8	1	1	1	1	1
16	Bearing Cover	CS01600-2016C	2016**C	1	1	1	1	1
17-1	Gasket, Bearing Cover (1)	CS01700-2016C1N	2016**C	1	1	1	1	1
17-2	Gasket, Bearing Cover (2)	CS01700-2016C2N	2016**C	1	1	1	1	1
18-1	Hexagon Socket Head Cap Screw	NB35416-050	M16×50	18	18	18	18	18
18-2	Hexagon Socket Head Cap Screw	NB35416-055	M16×55	25	25	25	25	25

No.	Part name	Code No.	Remarks	Q'ty.				
				LLC	LMC	LSC	MSC	SSC
19-1	Alignment Pin	NE2010-050	Φ10×50	2	2	2	2	2
19-2	Alignment Pin	NE2016-055	Φ16×55	2	2	2	2	2
20	Spring Pin	NE3203-010	Φ3×10	1	1	1	1	1
21	Plug	NF06-004	R1/8	1	1	1	1	1
22	Balance Piston Cover	CS02202-160VD	160***	1	1	1	1	1
23	Gasket, Balance Piston Cover	CS02300-160N	160***	1	1	1	1	1
24	Hexagon Socket Head Cap Screw	NB35410-025	M10×25	11	11	11	11	11
25-1	Male Rotor (1)	CS02500-2016****	2016L*C	1	1	1	-	-
25-1	Male Rotor (1)		2016M*C	-	-	-	1	-
25-1	Male Rotor (1)		2016S*C	-	-	-	-	1
25-2	Male Rotor (2)		2016*LC	1	-	-	-	-
25-2	Male Rotor (2)		2016*MC	-	1	-	-	-
25-2	Male Rotor (2)		2016*SC	-	-	1	1	1
26-1	Female Rotor (1)		2016L*C	1	1	1	-	-
26-1	Female Rotor (1)		2016M*C	-	-	-	1	-
26-1	Female Rotor (1)		2016S*C	-	-	-	-	1
26-2	Female Rotor (2)		2016*LC	1	-	-	-	-
26-2	Female Rotor (2)		2016*MC	-	1	-	-	-
26-2	Female Rotor (2)		2016*SC	-	-	1	1	1
27-1	Main bearing (1)	CS0270-ERT	200***	2	2	2	2	2
27-2	Main bearing (2)	CS0270-DRT	160***	2	2	2	2	2
28-1	Side bearing (1)	CS0280-ERT	200***	2	2	2	2	2
28-2	Side bearing (2)	CS0280-DRT	160***	2	2	2	2	2
29-1	Stop Ring (1)	NG11-130	H130	4	4	4	4	4
29-2	Stop Ring (2)	NG11-102	H102	4	4	4	4	4
30	Balance Piston	CS03000-160	160***	1	1	1	1	1
31	Key, Balance Piston	CS03100-160	160***	1	1	1	1	1
32	Stop Ring	NG12-050	S50	1	1	1	1	1
33	Sleeve, Balance Piston	CS03300-160	160***	1	1	1	1	1
34	Set Screw	NA83606-015	M6×15	2	2	2	2	2
35	O-ring	PA12-095	JISB24011AG95	1	1	1	1	1
36	Spacer, O-ring	CS03600-160	160***	1	1	1	1	1
37	Stop Ring	NG11-102	H102	2	2	2	2	2
38-1	Thrust Bearing (1)	CS03800-200P	7313B	2	2	2	2	2
38-2	Thrust Bearing (2)	CS03800-160P	7212B	2	2	2	2	2
39-1	Lock Nut (1)	NG31-013	AN13	2	2	2	2	2
39-2	Lock Nut (2)	NG31-012	AN12	2	2	2	2	2
40-1	Lock Washer (1)	NG32-013	AW13	2	2	2	2	2
40-2	Lock Washer (2)	NG32-012	AW12	2	2	2	2	2
41-1	Spacer, Thrust Bearing (1)	CS04100-200	200***	2	2	2	2	2
41-2	Spacer, Thrust Bearing (2)	CS04100-160	160***	2	2	2	2	2
42-1	Spacer, Thrust Alignment (1)	CS04200B200	200***	2	2	2	2	2
42-2	Spacer, Thrust Alignment (2)	CS04200-160	160***	2	2	2	2	2



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