

MOTOMAN-ES280D-230 INSTRUCTIONS

SUPPLEMENTARY FOR TYPE: YR-ES0280D-A10

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

- MOTOMAN-ES200D INSTRUCTIONS
- DX100 INSTRUCTIONS
- DX100 OPERATOR'S MANUAL
- DX100 MAINTENANCE MANUAL

The DX100 operator's manual above corresponds to specific usage.
Be sure to use the appropriate manual.

Part Number: 159754-1CD
Revision: 2

Introduction

This supplementary instruction manual describes how YR-ES0280D-A10(hereinafter referred to as ES0280D-A10) is different from the YR-ES0200D-A00 (hereinafter referred to as ES0200D-A00). In case of using ES0280D-A10, read this supplementary instruction manual thoroughly with: "MOTOMAN-ES200D INSTRUCTIONS" (Part Number 155977-1CD).

Differences

The ES0280D-A10 differs from the ES0200D-A00 in the following points:

- 230 kg payload

The differences are described based on "MOTOMAN-ES200D INSTRUCTIONS" (Part Number 155977-1CD). Read this manual thoroughly replacing the subject matters for changes with this supplementary instruction manual.

5 Basic Specifications

5.1 Basic Specifications (5-1 page)

Table 5-1: Basic Specifications^{a)}

Item	Model	MOTOMAN-ES280D-230 (YR-ES0280D-A10)
Structure		Vertically Articulated
Degree of Freedom		6
Payload		230 kg
Repeatability ^{b)}		±0.2 mm
Range of Motion	S-Axis (turning)	±180°
	L-Axis (lower arm)	+76°, -60°
	U-Axis (upper arm)	+230°, -142.5°
	R-Axis (wrist roll)	±360°
	B-Axis (wrist pitch/yaw)	±125°
	T-Axis (wrist twist)	±360°
Maximum Speed	S-Axis	1.39 rad/s, 80°/s
	L-Axis	1.22 rad/s, 70°/s
	U-Axis	1.39 rad/s, 80°/s
	R-Axis	2.01 rad/s, 115°/s
	B-Axis	1.92 rad/s, 110°/s
	T-Axis	3.32 rad/s, 190°/s
Allowable Moment ^{c)}	R-Axis	1333 N•m (136 kgf•m)
	B-Axis	1333 N•m (136 kgf•m)
	T-Axis	706 N•m (72 kgf•m)
Allowable Inertia (GD ² /4)	R-Axis	142 kg•m ²
	B-Axis	142 kg•m ²
	T-Axis	79 kg•m ²
Approx. Mass		1130 kg
Ambient Conditions	Temperature	0° C to 45° C
	Humidity	20 to 80% RH (non-condensing)
	Vibration Acceleration	4.9 m/s ² or less (0.5 G)
	Others	Free from corrosive gasses or liquids, or explosive gasses Free from exposure to water, oil, or dust Free from excessive electrical noise (plasma)
Power Requirements		5 kVA

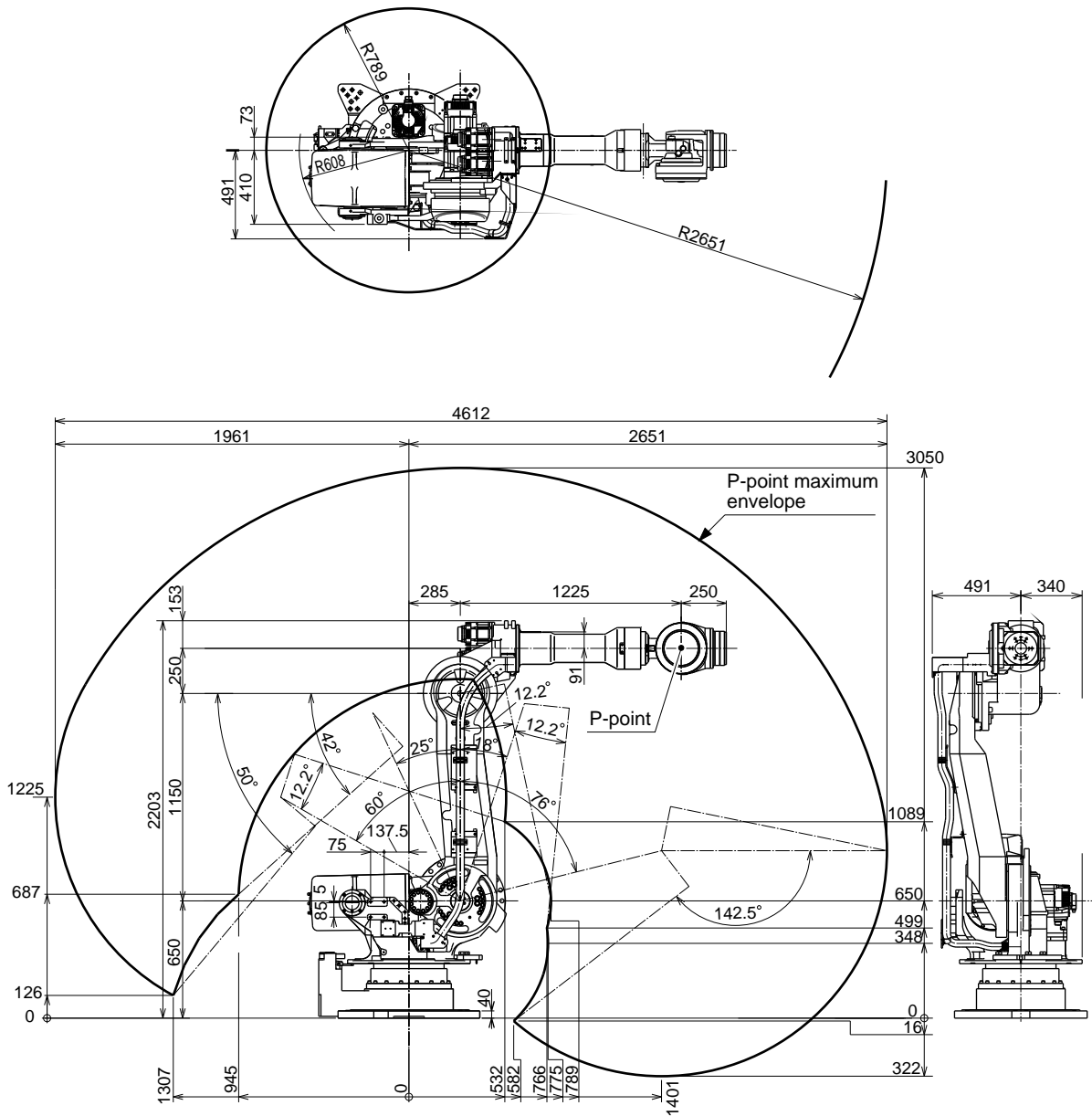
a SI units are used in this table. However, gravitational unit is used in ().

b Conformed to ISO9283

c Refer to table *chapter 6 "Allowable Load for Wrist Axis and Wrist Flange"* at page 6-5 for details on the permissible moment of inertia.

5.4 Dimensions and P-Point Maximum Envelope (5-3 page)

Fig. 5-3: Dimensions and P-Point Maximum Envelope



6 Allowable Load for Wrist Axis and Wrist Flange

6.1 Allowable Wrist Load (6-1 page)

The allowable wrist load including the weight of the mount/gripper is:

- YR-ES0280D-A10: 230 kg maximum

If force is applied to the wrist instead of the load, force on R-, B-, and T-axes should be within the value shown in *Table 6-1 Allowable Wrist Load*. Contact your Yaskawa representative for further information or assistance.

Table 6-1: Allowable Wrist Load

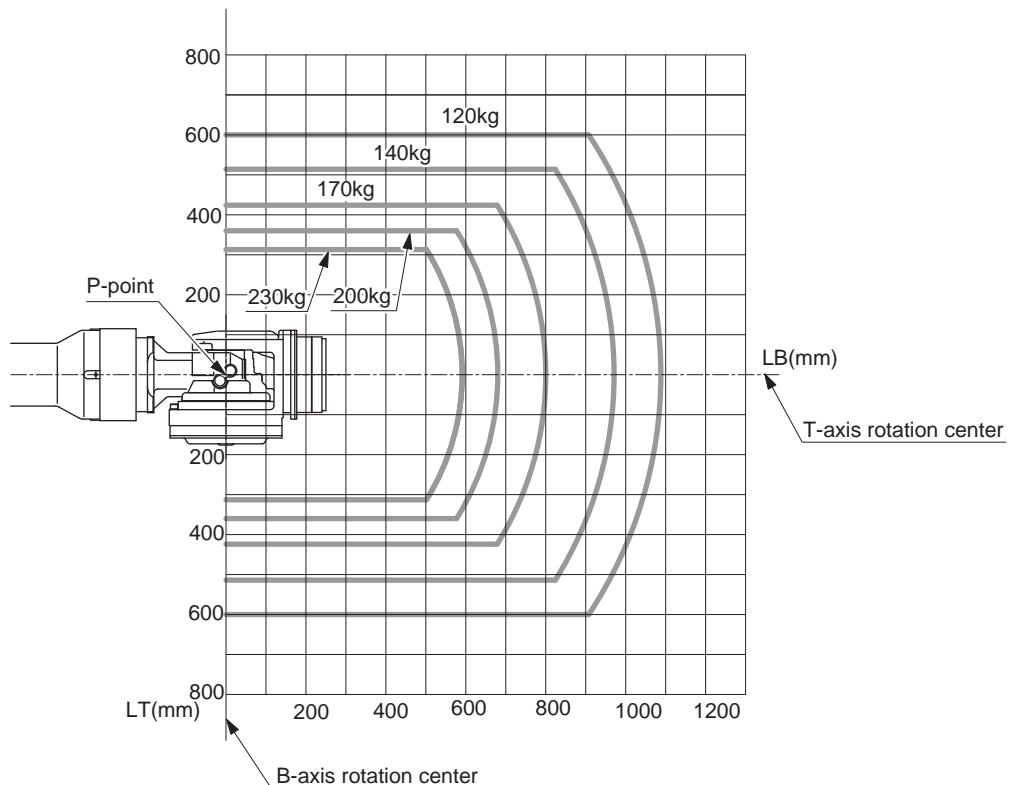
Axis	Moment N•m (kgf•m) ^{a)}	GD ² /4 Total Moment of Inertia kg•m ²
R-Axis	1333 (136)	142
B-Axis	1333 (136)	142
T-Axis	706 (72)	79

a (): Gravitational unit

When the volume load is small, refer to the moment arm rating shown in *Fig.6-1 Moment Arm Rating*.

The allowable total moment of inertia is calculated when the moment is at the maximum. Contact your Yaskawa representative beforehand when only moment of inertia, or load moment is small and moment of inertia is large. Also, when the load mass is combined with an outside force, contact your Yaskawa representative beforehand.

Fig. 6-1: Moment Arm Rating



10 Recommended Spare Parts (10-1 page)

It is recommended to keep the parts and components in the following table in stock as spare parts for the MOTOMAN-ES280D-230. Product performance cannot be guaranteed when using spare parts from any company other than Yaskawa. The spare parts are ranked as follows:

- Rank A: Expendable and frequently replaced parts.
- Rank B: Parts for which replacement may be necessary as a result of frequent operation.
- Rank C: Drive unit.



For replacing parts in Rank B or Rank C, contact your Yaskawa representative.

Table 10-1: Spare Parts for the YR-ES0280D-A10 (Sheet 1 of 2)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
A	1	Grease	VIGO Grease RE No. 0	Yaskawa	16 kg	-	for all axes speed reducers and wrist units
A	2	Grease	Alvania EP Grease 2	Showa Oil Co.,Ltd.	16 kg	-	for balancer joint part
A	3	Liquid Seal	Three Bond 1206C	Three Bond Co., Ltd.	1	1	
A	4	Battery Pack	HW0470360-A	Yaskawa	1	1	
A	5	Battery Pack	HW9470932-A	Yaskawa	1	-	For wire harness in manipulator replacing
B	6	S-Axis Speed Reducer	HW0388208-A	Yaskawa	1	1	
B	7	S-Axis Input Gear	HW0314016-1	Yaskawa	1	1	
B	8	L-Axis Speed Reducer	HW0390225-B	Yaskawa	1	1	
B	9	L-Axis Input Gear	HW0301778-1	Yaskawa	1	1	
B	10	U-Axis Speed Reducer	HW0388210-C	Yaskawa	1	1	
B	11	U-Axis Input Gear	HW0315955-1	Yaskawa	1	1	
B	12	R-Axis Speed Reducer	HW0388212-A	Yaskawa	1	1	
B	13	B-Axis Speed Reducer	HW9381453-B	Yaskawa	1	1	
B	14	T-Axis Speed Reducer	HW0380794-A	Yaskawa	1	1	
B	15	Wrist Unit	HW0170621-I	Yaskawa	1	1	
C	16	AC Servo Motor for S-Axis	SGMRV-37ANA-YR1* HW0388670-A	Yaskawa	1	1	
C	17	AC Servo Motor for L- and U-Axes	SGMRV-44ANA-YR2* HW0388671-A	Yaskawa	1	2	

Table 10-1: Spare Parts for the YR-ES0280D-A10 (Sheet 2 of 2)

Rank	Parts No.	Name	Type	Manufacturer	Qty	Qty per Unit	Remarks
C	18	AC Servo Motor for R-Axis	SGMRV-13ANA-YR1* HW0388666-A	Yaskawa	1	1	
C	19	AC Servo Motor for B-and T-Axes	SGMRV-13ANA-YR2* HW0388667-A	Yaskawa	1	2	
C	20	Internal Wire Harness	HW0174287-A	Yaskawa	1	1	
C	21	Connector Base Set	HW0374283-A	Yaskawa	1	1	

11 Parts List

11.1 S-Axis Unit (11-1 page)

Fig. 11-1: S-Axis Unit

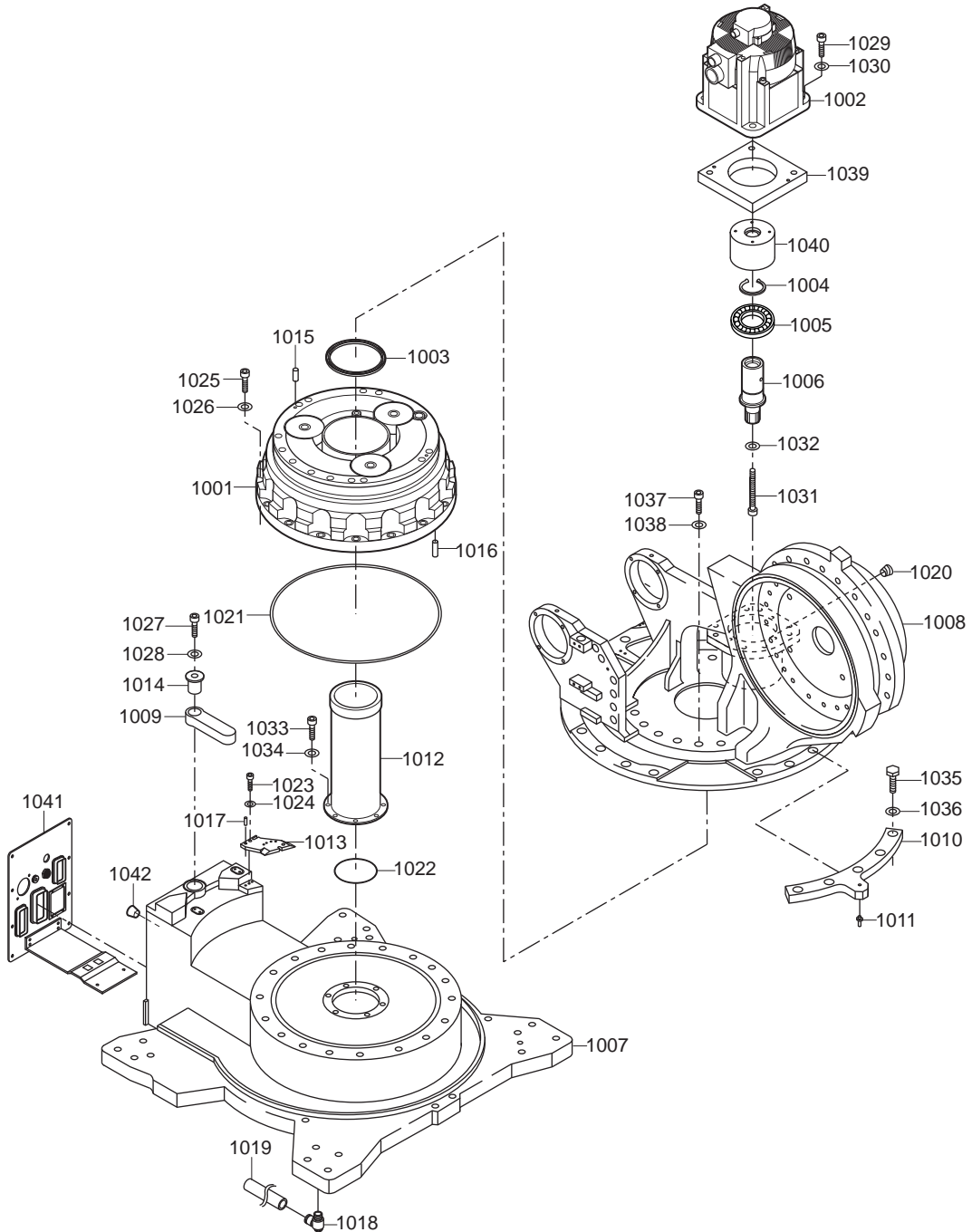


Table 11-1: S-Axis Unit

No.	DWG No.	Name	Pcs
1001	HW0388208-A	Speed reducer	1
1002	SGMRV-37ANA-YR1*	Motor	1
1003	TC12015014	Oil seal	1
1004	STW-50	Retaining rings	1
1005	6310	Bearing	1
1006	HW0314016-1	Gear	1
1007	HW0100193-2	Base	1
1008	HW0101612-1	S head	1
1009	HW0402102-1	Stopper	1
1010	HW0302424-2	Stopper	1
1011	HW0402104-1	Pin	1
1012	HW0306181-1	Pipe	1
1013	HW0403903-1	Plate	1
1014	HW9404486-1	Shaft	1
1015	MSTH12-30	Pin	1
1016	MSTH12-40	Pin	2
1017	MSTH6-20	Pin	2
1018	KQ2L10-01S	Union	1
1019	NB-1075-1	Tube	1
1020	PT3/8	Plug	1
1021	G415	O ring	1
1022	G105	O ring	1
1023	M6X16	Socket screw	1
1024	2H-6	Spring washer	1
1025	M12X50	Socket screw	16
1026	SW2H-12	Spring washer	16
1027	M8X40	Socket Screw	1
1028	2H-8	Spring washer	1
1029	M12X60	Socket screw	3
1030	2H-12	Spring washer	3
1031	M8X110	Socket screw	1
1032	2H-8	Spring washer	1
1033	M6X14	Socket screw	6
1034	2H-6	Spring washer	6
1035	M20X45(12.9)	Bolt	3
1036	M20	Washer	3
1037	M16X60	Socket screw	12
1038	GT-SH-16	Spring washer	12
1039	HW0404753-1	Spacer	1
1040	HW0404752-1	Fly wheel	1
1041	HW0372066-A	Connector base	1
1042	EZ5002A0	Cap	1

11.2 L-Axis Unit (11-3 page)

Fig. 11-2: L-Axis Unit

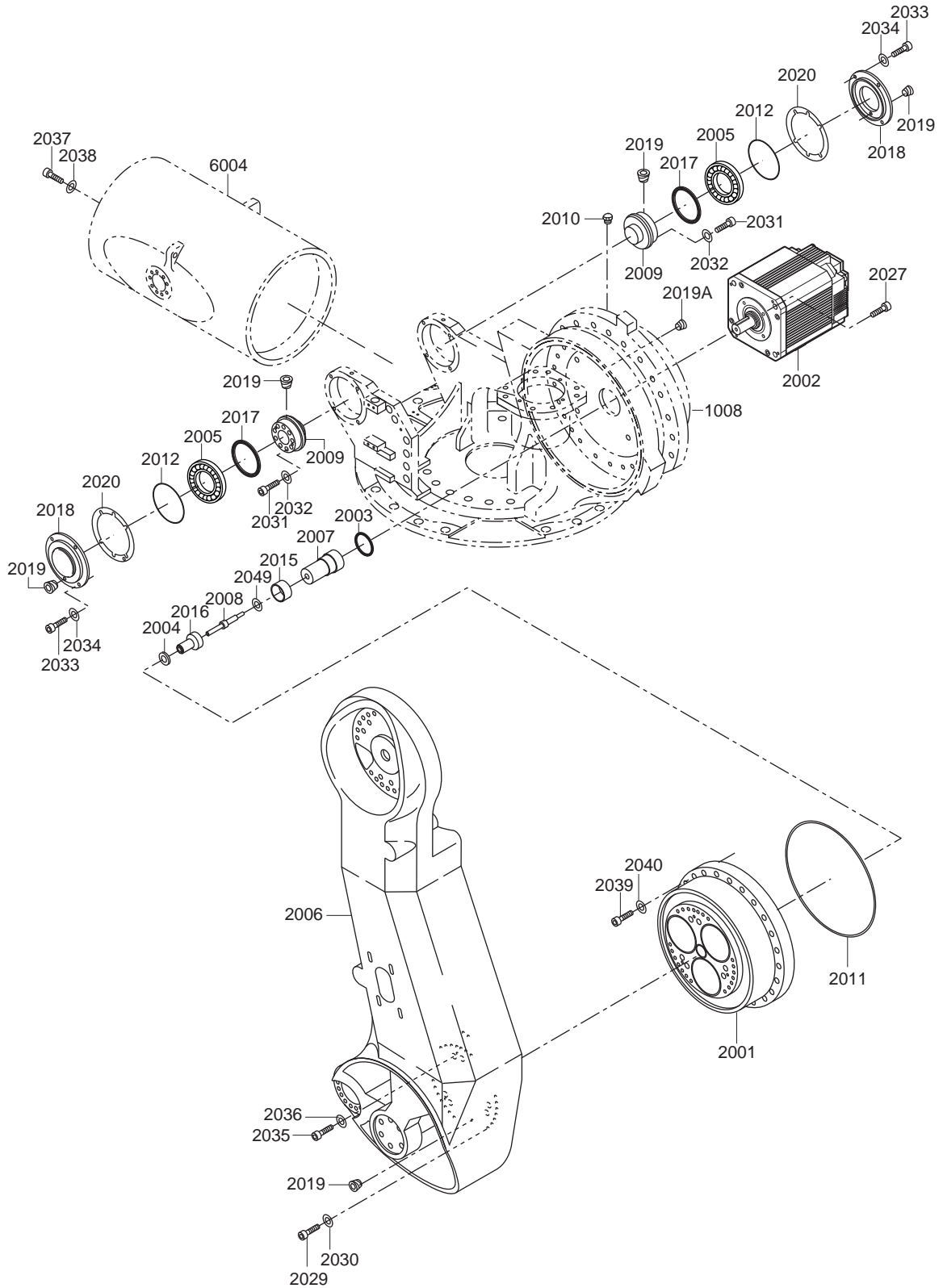


Table 11-2: L-Axis Unit

No.	DWG No.	Name	Pcs
2001	HW0390225-B	Speed reducer	1
2002	SGMRV-44ANA-YR2*	Motor	1
2003	Y507212.5	Oil seal	1
2004	ISTW-10	Retaining rings	1
2005	HR32916J	Bearing	2
2006	HW0100647-2	L arm	1
2007	HW9482306-E	Shaft	1
2008	HW0481082-A	Bolt	1
2009	HW9405055-1	Shaft	2
2010	EZ0094-A0	Air breather	1
2011	G300	O ring	1
2012	S105	O ring	2
2015	HW9481343-A	Gear	1
2016	HW0301778-1	Gear	1
2017	KE901107	Oil seal	2
2018	HW9405699-1	B cover	2
2019	PT1/8 (Stainless)	Plug	5
2019A	PT3/8 (Stainless)	Plug	1
2020	HW9405195-*	Shim	-
2027	GT-SA-M12X35	Socket screw	4
2029	M12X50	Socket screw	21
2030	2H-12	Spring washer	21
2031	M10X50	Socket screw	18
2032	2H-10	Spring washer	18
2033	M8X25	Socket Screw	8
2034	2H-8	Spring washer	8
2035	M16X60	Socket Screw	6
2036	2H-16	Spring washer	6
2037	M8X16	Socket Screw	3
2038	2H-8	Spring washer	3
2039	M12X60	Socket Screw	24
2040	SW-2H-12	Spring washer	24
2049	HW0408806-1	Spring washer	1
1008	HW0101612-1	S head	1
6004	HW0100477-1	Case	1

11.3 URBT-Axes Unit (11-5 page)

Fig. 11-3: URBT-Axes Unit

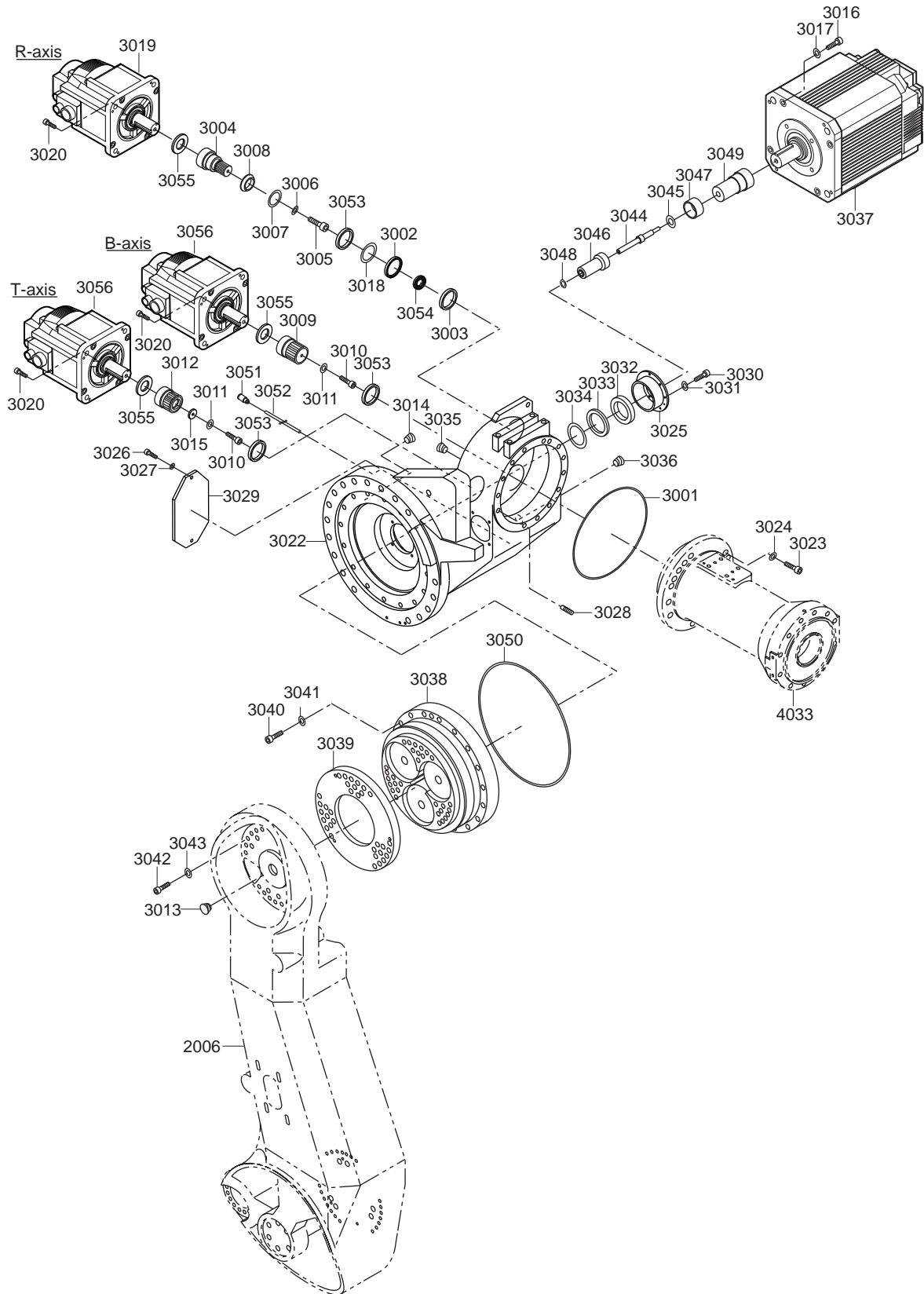


Table 11-3: URBT-Axes Unit (Sheet 1 of 2)

No.	DWG No.	Name	Pcs
3001	GS210	O ring	1
3002	HW0402391-1	Collar	1
3003	HW0402406-1	Collar	1
3004	HW0306788-1	Gear	1
3005	M6X60	Socket screw	1
3006	2H-6	Spring washer	1
3007	ISTW-30	Retaining rings	1
3008	HW0402544-1	Collar	1
3009	HW0306797-1	Gear	1
3010	M6X25	Socket screw	2
3011	2H-6	Spring washer	2
3012	HW0306795-1	Gear	1
3013	PT1/8	Plug	1
3014	PT1/8	Plug	1
3015	HW0401507-1	Plate	1
3016	M12X40	Socket screw	4
3017	2H-12	Spring washer	4
3018	IRTW-55	Retaining rings	1
3019	SGMRV-13ANA-YR1*	Motor	1
3020	M8X25	GT-SA bolt	12
3022	HW0100239-4	Casing	1
3023	M12X40	Socket screw	18
3024	2H-12	Spring washer	18
3025	HW9405703-1	Flange	1
3026	M6X16	Socket screw	2
3027	2H-6	Spring washer	2
3028	MSTM8-20	Pin	1
3029	HW0402885-1	Cover	1
3030	M6X16	Socket screw	4
3031	2H-6	Spring washer	4
3032	HW9482447-A	Oil Seal	1
3033	HW9405481-1	Collar	1
3034	IRTW-72	Stopper	1
3035	PT1/8	Plug	1
3036	PT1/8	Plug	1
3037	SGMRV-44ANA-YR2*	Motor	1
3038	HW0388210-C	Speed reducer	1
3039	HW0301779-1	Spacer	1
3040	M12X60	Socket screw	24
3041	SW-2H-12	Spring washer	24
3042	M12X50	Socket screw	33
3043	2H-12	Spring washer	33
3044	HW0481083-A	Bolt	1
3045	HW0408806-1	Washer	1

Table 11-3: URBT-Axes Unit (Sheet 2 of 2)

No.	DWG No.	Name	Pcs
3046	HW0315955-1	Gear	1
3047	HW9481343-A	Shaft	1
3048	ISTW-12	Retaining ring C-type	1
3049	HW9482306-E	Shaft	1
3050	G280	O ring	1
3051	TSH6-01M	Union	2
3052	UB0640-0.1C	Air tube	2
3053	Y507212.5	Oil seal	3
3054	TAFI405520	Needle bearing	1
3055	HW0401506-1	Plate	3
3056	SGMRV-13ANA-YR2*	Motor	2
2006	HW0100647-2	L arm	1
4001	HW0100241-1	U arm	1

11.4 U-Arm Unit (11-8 page)

Fig. 11-4: U-Arm Unit

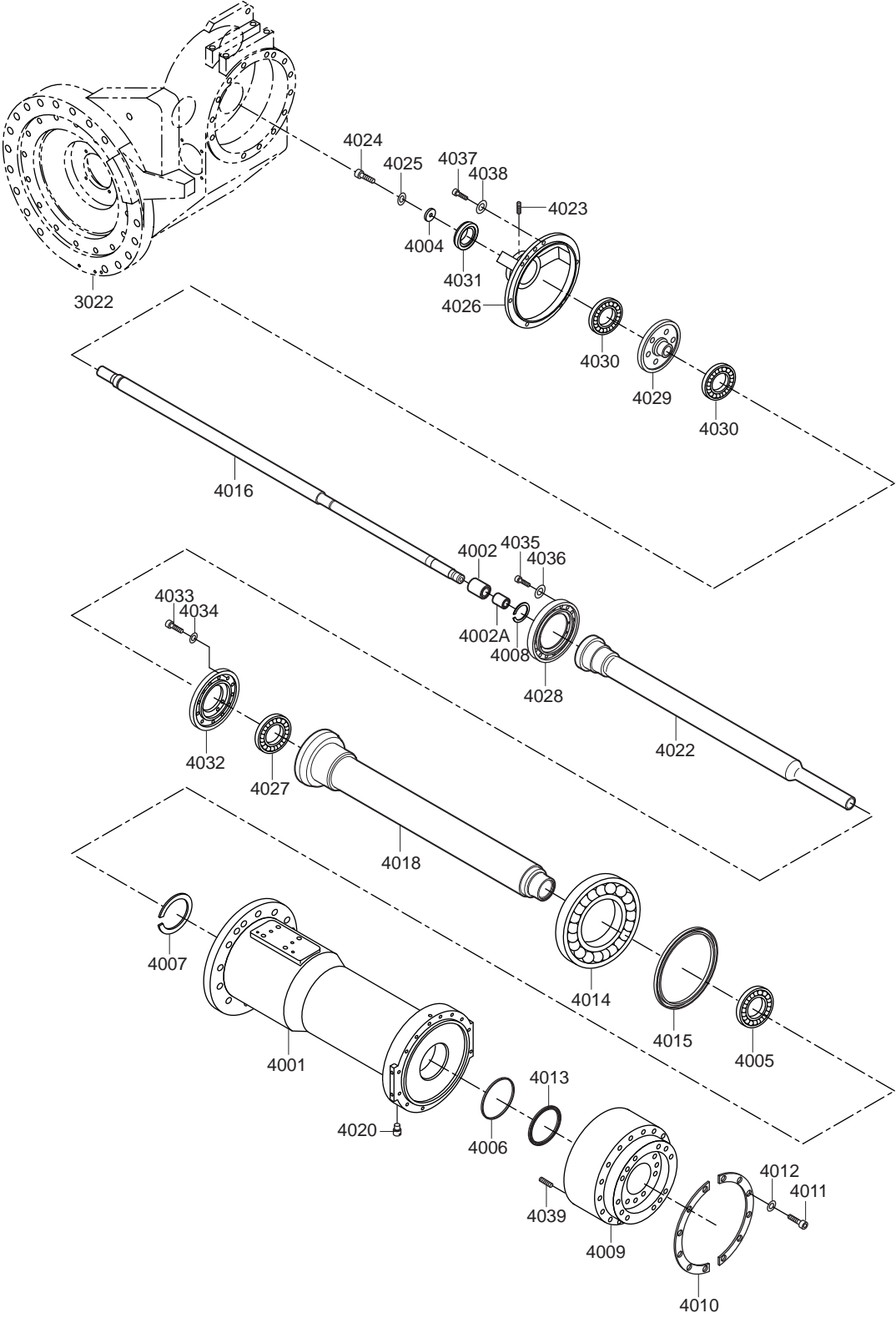


Table 11-4: U-Arm Unit

No.	DWG No.	Name	Pcs
4001	HW0100241-1	U-Arm	1
4002	NK25/20R	Bearing	1
4002A	LRT202526	Bearing	1
4004	HW0401508-1	Plate	1
4005	6812LLU	Bearing	1
4006	HW0402204-1	Collar	1
4007	STW-60	Retaining ring C-type	1
4008	WR20	Retaining ring C-type	1
4009	HW0388212-A	Speed reducer	1
4010	HW9302581-1	washer	1
4011	M12X120	Socket screw	12
4012	2H-12	Spring washer	12
4013	SC60789	Oil seal	1
4014	HR32017XJ	Bearing	1
4015	AC3842-F1-FKM	Oil seal	1
4016	HW0312106-1	Shaft	1
4018	HW0306113-A	Shaft C	1
4020	PT1/8 (Stainless)	Plug	1
4022	HW0302261-A	Shaft	1
4023	M4X6	H set screw	1
4024	M8X20	Socket screw	1
4025	2H-8	Spring washer	1
4026	HW0100173-2	Housing	1
4027	HR32013XJ	Bearing	1
4028	HW0306798-1	Gear	1
4029	HW0306796-1	Gear	1
4030	HR32006XJ	Bearing	2
4031	HW0401505-1	B nut	1
4032	HW0306787-1	Gear	1
4033	M5X16	Socket screw	3
4034	2H-5	Spring washer	3
4035	M5X12	Socket screw	3
4036	2H-5	Spring washer	3
4037	M8X20	Socket screw	6
4038	2H-8	Spring washer	6
4039	MSTH6-15	Parallel pin	1
3022	HW0100239-4	Casing	1

Table 11-5: Wrist Unit (Sheet 1 of 2)

No.	DWG No.	Name	Pcs
5001	HW0100242-1	Wrist base	1
5002	M12X30	Socket screw	12
5003	2H-12	Spring washer	12
5004	HW0100243-1	Wrist	1
5005	HW9381453-B	Speed reducer	1
5006	M14X115	Socket screw	6
5007	GT-SH M14	Spring washer	6
5008	M12X60	Socket screw	10
5009	2H-12	Spring washer	10
5010	M8X20	Socket screw	18
5011	2H-8	Spring washer	18
5012	ARP568-263	O ring	1
5013	6908DB	Bearing	1
5014	HW0401511-1	B holder	1
5015	HW0306791-1	Gear	1
5016	HW0401509-1	Housing	1
5017	HW0401510-1	B nut	1
5018	M4X8	H set screw	1
5019	6909	Bearing	1
5020	G220	O ring	1
5021	HW0306792-1	Gear	1
5022	6009	Bearing	1
5023	STW-45	Retaining rings C-type	2
5024	ISTW-35	Retaining rings	2
5025	HW0309518-1	Gear	1
5026	HW0301223-1	Gear	1
5027	6007	Bearing	1
5028	M6X12	Socket screw	6
5029	2H-6	Spring washer	6
5030	HW0409072-1	Cover	1
5031	G140	O ring	1
5032	HR32004XJ	Bearing	4
5033	6911	Bearing	1
5034	AE3290E3	Oil seal	1
5035	S60	O ring	1
5036	HW9403618-1	Housing	1
5037	M6X15	GT-SA bolt	5
5038	M6X20	Socket screw	3
5039	2H-6	Spring washer	3
5040	HW0301224-1	Gear	1
5041	HW0301225-1	Gear	1
5042	HW0401514-1	B nut	2
5043	M5X7	Magic screw	4

ES280D-230

11 Parts List
11.5 Wrist Unit (11-10 page)

Table 11-5: Wrist Unit (Sheet 2 of 2)

No.	DWG No.	Name	Pcs
5044	M8X20	Socket screw	14
5045	2H-8	Spring washer	14
5046	M10X20	Socket screw	3
5047	2H-10	Spring washer	3
5048	HW9403617-1	Housing	1
5049	HW0200615-1	Cover	1
5050	M4X12	GT-SA bolt	4
5051	HW9302370-1	Cover	1
5052	M4X12	GT-SA bolt	4
5053	PT1/8	Plug	1
5054	HW0306790-1	Gear	1
5055	M6X15	GT-SA bolt	6
5057	HW0306789-1	Gear	1
5058	HW0380794-A	Speed reducer	1
5059	M8X30	Socket screw	14
5060	2H-8	Spring washer	14
5063	HW0302422-2	Flange	1
5064	HW0301782-1	Spacer	1
5065	PT1/16	Plug	1
5066	HW0402206-*	Shim	-
5067	STW-30	Retaining ring C-type	1
5068	6006	Bearing	1
5069	M6X15	GT-SA bolt	4
5070	M4X12	GT-SA bolt	4
5071	EZ5036A0	Cap	2
5072	PT1/8	Plug	1
5073	HW9403621	Shim	-
5077	HW9403622	Shim	-
5078	HW0401516-*	Shim	-
5081	HW0402205-*	Shim	-
5083	HW0410868-*	Shim	-
5084	HW0411721-1	B nut	1
5085	M5X7	Magic screw	2
5086	HW0411718-1	Collar	1
5087	HW0404270-1	Shim	1
4016	HW0312106-1	Shaft	1

11.6 Balancer Unit (11-13 page)

Fig. 11-6: Balancer Unit

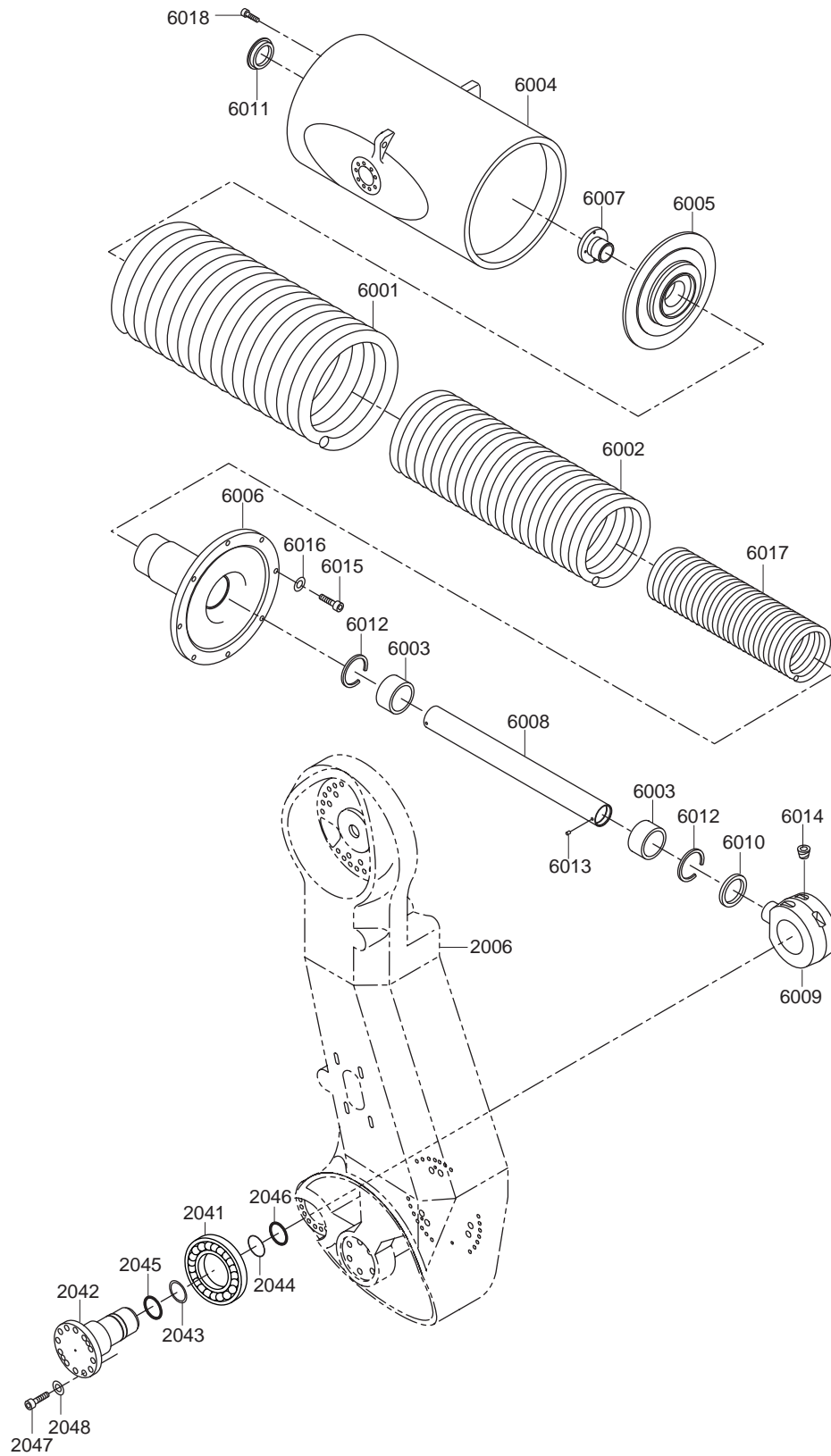


Table 11-6: Balancer Unit

No.	DWG No.	Name	Pcs
6001	HW0481740-A	Coil spring	1
6002	HW0481741-A	Coil spring	1
6003	SOB607440	Oilless	2
6004	HW0100477-1	Case	1
6005	HW0306033-1	Flange	1
6006	HW0200420-1	Flange	1
6007	HW0401112-1	Flange	1
6008	HW0303581-1	Rod	1
6009	HW9405057-1	Clevis	1
6010	FD3187A0	Dust seal	1
6011	EZ2228B0	Cap	1
6012	IRTW-75	Stopper	2
6013	M6X8	Magic screw	2
6014	PT1/8 (Stainless)	Plug	3
6015	M10X40	Socket screw	8
6016	2H-10	Spring washer	8
6017	HW0481742-A	Coil spring	1
6018	M8X40	Socket screw	3
2006	HW0100647-2	L arm	1
2041	NA6912	Needle bearing	1
2042	HW9302054-1	Shaft	1
2043	AR-85	Clip	1
2044	WR60	Sir clip	1
2045	VB75X95X6	Oil seal	1
2046	VB60X78X7	Oil seal	1
2047	M12X50	Socket screw	12
2048	2H-12	Spring washer	12

MOTOMAN-ES280D-230

INSTRUCTIONS

SUPPLEMENTARY FOR TYPE: YR-ES0280D-A10

HEAD OFFICE

2-1 Kurosakishiroishi, Yahatanishi-ku, Kitakyushu 806-0004 Japan
Phone +81-93-645-7745 Fax +81-93-645-7746

YASKAWA America Inc. MOTOMAN Robotics Division
100 Automation Way, Miamisburg, OH 45342, U.S.A.
Phone +1-937-847-6200 Fax +1-937-847-6277

YASKAWA Nordic AB
Verkstadsгатan 2, PO Box 504, SE-385 25 Torsås, Sweden
Phone +46-480-417-800 Fax +46-486-414-10

YASKAWA Europe GmbH Robotics Div.
Kammerfeldstr. 1, 80591 Allershausen, Germany
Phone +49-8166-90-0 Fax +49-8166-90-103

YASKAWA Electric Korea Co., Ltd
9F, KYOBO Securities Bldg., 26-4, Yeoido-Dong Yeoungseongpo-ku, Seoul, KOREA
Phone +82-2-784-7844 Fax +82-2-784-8495

YASKAWA Electric (Singapore) PTE Ltd.
151 Lorong Chuan, #04-02A, New Tech Park, Singapore 556741
Phone +65-6282-3003 Fax +65-6289-3003

YASKAWA Electric (Thailand) Co., Ltd.
252/246, 4th Floor, Muang Thai-Phatra Office Tower II Rachadaphisek Road, Huaykwang Bangkok, 10320 Thailand
Phone +66-2-693-2200 Fax +66-2-693-4200

YASKAWA Shougang Robot Co. Ltd.
No.7, Yongchang-North Road, Beijing E&T Development Area, China 100176
Phone +86-10-6788-0548 Fax +86-10-6788-0548-813

YASKAWA ELECTRIC (SHANGHAI) Co., Ltd.
No.18Xizang Zhong Road, 17F, Harbour Ring Plaza, Shanghai 200001, CHINA
Phone +86-21-5385-0655 Fax +86-21-5385-2770

YASKAWA Robotics India Ltd.
#426, Udyog Vihar, Phase- IV, Gurgaon, Haryana, India
Phone +91-124-475-8500 Fax +91-124-414-8016

Specifications are subject to change without notice
for ongoing product modifications and improvements.