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Kawasaki Robot Manipulator Parameter Sheet

RS020N

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(6 SHEETS INCL. COVER)

1. Kinematics & Dynamics Parameter

(1) Coordinate system

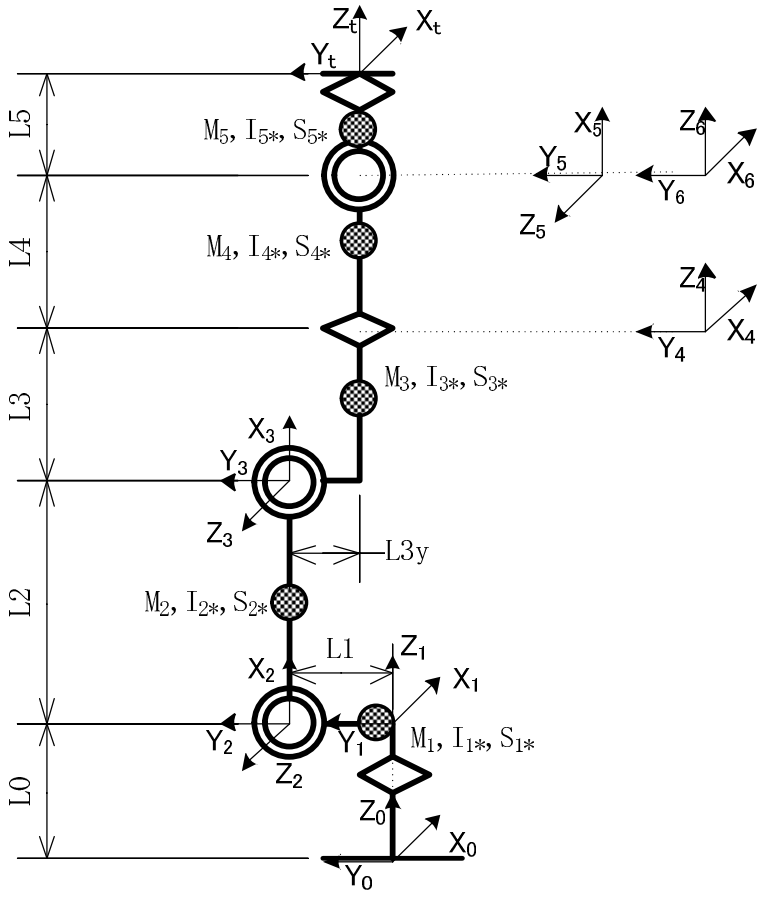

Fig.1 R-type

(2) Link length

Unit:[m]

Link No.	L0*	L1*	L2*	L3*	L4*	L5*	L6*
Li	0.465	0.15	0.77	0.161	0.644	0.095	0
Liy	0	0	0	0	0	0	0

(3) Link mass

Unit:[kg]

Link No.	M0	M1	M2	M3	M4	M5	M6
Mi	-	105.819	34.056	24.361	17.376	2.699	-

(4) Center of mass

Unit:[m]

Link No.	S0*	S1*	S2*	S3*	S4*	S5*	S6*
Six	-	-1.0844.E-02	4.3170.E-01	4.2155.E-02	2.6980.E-03	4.1683.E-02	-
Siy	-	5.5887.E-02	5.2490.E-03	6.1750.E-03	-1.1550.E-03	7.6000.E-05	-
Siz	-	-1.3208.E-01	-1.3668.E-01	-4.4200.E-03	2.9188.E-01	-1.2370.E-03	-

(5) Principal moment of inertia

Unit:[kg･m^2]

Link No.	I0*	I1*	I2*	I3*	I4*	I5*	I6*
Iixx	-	2.4662.E+00	1.8643.E-01	2.7260.E-01	9.9186.E-01	3.2000.E-03	-
Iiyy	-	2.3289.E+00	3.8671.E+00	3.3739.E-01	1.0047.E+00	5.6700.E-03	-
Iizz	-	1.7986.E+00	3.9003.E+00	2.4438.E-01	4.6490.E-02	5.8800.E-03	-

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2. Arm Parameter

(6) Total Reduction Gear Ratio

out/in

Joint No.	1	2	3	4	5	6	7
Rg*	1110/7	1880/13	4897/29	1175/13	100	119/2	-

(7) 手首軸誘起係数

θ out=A・θ in

$\theta_5 = \theta_{5in}$

$\theta_6 = K_{56} \cdot \theta_{5in} + \theta_{6in}$ $K56 = -0.021008403$

(8) Motion Range

Unit:[deg]

Joint No.	1	2	3	4	5	6	7
UpperLimit	180	155	150	270	145	360	-
LowerLimit	-180	-105	-163	-270	-145	-360	-

(9) Max. Speed

Unit:[deg/s]

Joint No.	1	2	3	4	5	6	7
Vmax.	190	205	210	400	360	610	-

(10) Max. Current command

Unit:[A(rms)]

Joint No.	1	2	3	4	5	6	7
Imax.	29.5	26.5	15	⚠E 2.9	⚠E 3.1	⚠E 3.6	-

(11) Over Load Time at Max. Current command

Unit:[sec]

Joint No.	1	2	3	4	5	6	7
Tol	7.4	9.4	4.8	⚠E 15.6	⚠E 13.3	⚠E 9.4	-

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3. Motor Parameter

(1) Specification

Parameter		Unit	Jt.1	Jt.2	Jt.3	Jt.4	Jt.5	Jt.6
Rated Voltage (Vm)	Nominal	Vac	200～240	200～240	200～240	200～240	200～240	200～240
	LowerLimit	%	-15	-15	-15	-15	-15	-15
	UpperLimit	%	10	10	10	10	10	10
Pole Pairs			10	10	10	10	10	10
RatedOutput (Pr)*2		W	2000	2000	675	200	200	200
RatedTorque (Tr)*2		N･m	9.5	9.5	2.15	0.637	0.637	0.637
Max.Torque (Tp)*2		N･m	30	30	8.5	2.2	2.2	2.2
RatedSpeed (Nr)*2		r/min	2000	2000	3000	3000	3000	3000
Max.Speed (Nmax)		r/min	5000	5000	6000	6000	6000	6000
RatedCurrent (Ir)*2		A(rms)	11	11	4.6	1.5	1.5	1.5
Max.Current (Ip)		A(rms)	35	35	15.5	5.6	5.6	5.6
TorqueConstant (Kt)*3		N･m/A(rms)±10%	0.97	0.97	0.559	0.476	0.476	0.476
Back-emfConstant (Ke)*3		V/rpm ±10%	0.101	0.101	0.585	0.0498	0.0498	0.0498
Resistance (Ra)*3		Ω	0.66	0.66	1.2	8.1	8.1	8.1
Inductance (La)*3		mH	12.3	12.3	2.07	0.279	0.279	0.279
MotorInertia (Jm)*1		10^{-4}kg･m^2	13.5940	12.7600	2.6411	0.7822	0.5495	0.7800
InsulationClass			F	F	F	F	F	F
MotorManufacturer			SANYO DENKI	SANYO DENKI	SANYO DENKI	SANYO DENKI	SANYO DENKI	SANYO DENKI
MotorModel			R2AA13200L	R2AA13200L	R2AA08075F	R2AA06020F	R2AA06020F	R2AA06020F
MotorAllowableTemperature		℃	-*6	-*6	-*6	-*6	-*6	-*6
Abs.EncoderFormat			Nikon A-format	Nikon A-format	Nikon A-format	Nikon A-format	Nikon A-format	Nikon A-format
EncoderResolution			17bit	17bit	17bit	17bit	17bit	17bit
EncoderComm.Baudrate		Mbps	4	4	4	4	4	4
EncoderAllowableAmbientTemperature*5		℃	85	85	85	85	85	85
Encoder Temperature Data Threshold*7		℃	95	95	95	95	95	95

*1:include Brake Inertia, etc.

*2:Indicate typical values after temperature rise saturation when used with a standard servo amplifier of motor maker.

*3:Indicates a typical value when the winding temperature is 20°C.

*4:Equivalent and、Line、Phase char.

	Equivalent DC machine		Line		Phase
Current	I [A(rms)]	=	Il [A(rms)]	=	Iφ [A(rms)]
Back-emf_Constant	Ke [V(rms)]	=	(√3)×Kel [V(rms)]	=	3×Keφ [V(rms)]
Resistance	Ra	=	1.5×Rl	=	3×Rφ
Inductance	La	=	1.5×Ll	=	3×Lφ

*5:The encoder's ambient temperature indicates the ambient temperature of a encoder board.
These values varies depending on the optional setting of the mounted encoder model.

*6:The motor must be used by the condition that the encoder temperature is less than its allowable temperature shown in the table.

*7:These values indicate limited threshold of temperature date read by Encoder.
These threshold are determined as a result of evaluation by Kawasaki Robot system.

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(2) Speed-Torque characteristic

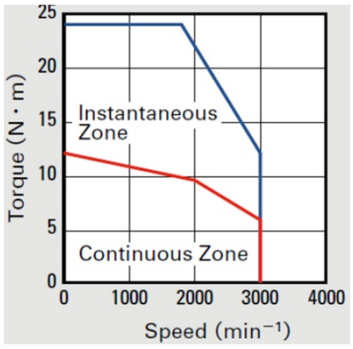

Fig.2-1 R2AA13200L

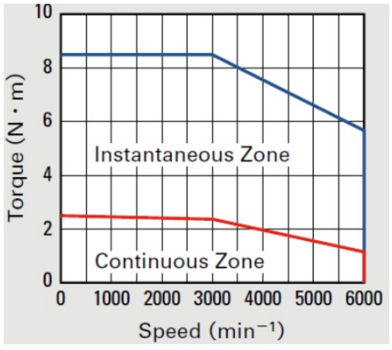

Fig.2-2 R2AA08075F

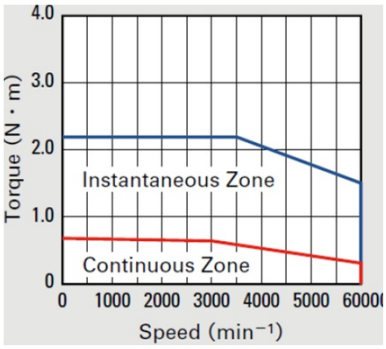

Fig.2-3 R2AA06020F

These values are for when the input power supply is a 3-phase AC 200 V circuit.
The area of the instantaneous zone decreases when the power supply voltage is less than 200 V.
Indicate typical values after temperature rise saturation when used with a standard servo amplifier of motor maker.

(3) Relations with the motor Back-emf and the encoder data

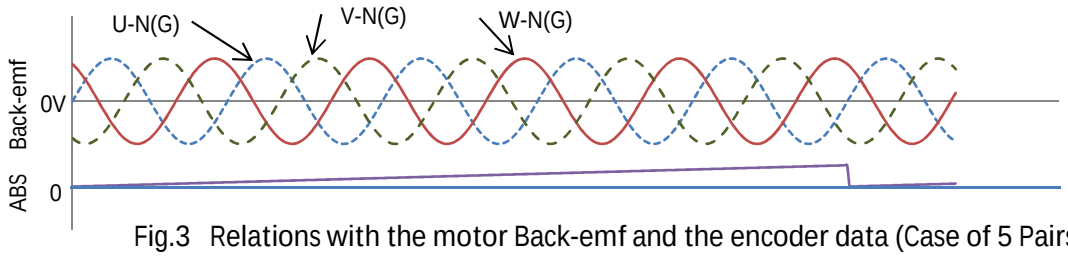

Fig.3 Relations with the motor Back-emf and the encoder data (Case of 5 Pairs)

4. Brake Parameter

(1) Specification

Parameter	Unit	Jt.1	Jt.2	Jt.3	Jt.4	Jt.5	Jt.6
RatedVoltage (V_B)	V_{DC} ±10%	24	24	24	24	24	24
ConsumptionCurrent	A(rms)	0.66	0.66	0.37	0.32	0.32	0.32
Min.StaticFrictionTorque	N・m	13	13	2.55	1.37	1.37	1.37
Max.ArmaturePullInVoltage	V	15	15	15	15	15	15
Max.ArmaturePullInTime	ms	70	70	40	30	30	30
Min.ArmatureReleaseVoltage	V	1.3	1.3	1.3	1.3	1.3	1.3
Max.ArmatureReleaseTime	ms	100	100	200	120	120	120

Do not use this brake for mechanical braking as the common exciting brake because this brake is holding brake.

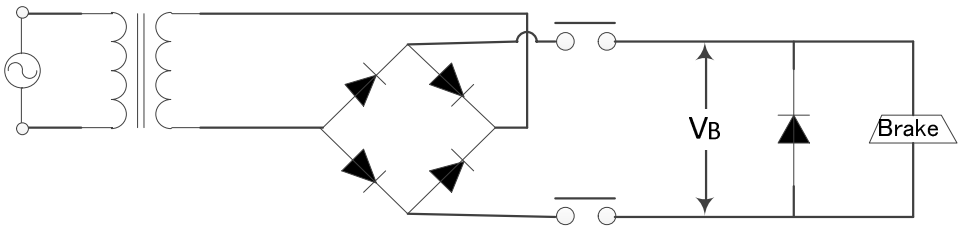

Fig.4 Brake characteristics measurement circuit diagram

5. ReductionGear parameter

(1) Specification

Parameter	Unit	Jt.1	Jt.2	Jt.3	Jt.4	Jt.5	Jt.6
Inertia *1	$kg \cdot m^2$	23.797	0.962	5.881	0.168	0.977	0.516
Rated Torque *2	N·m	1534	1225	412	42.93	52	33
Rated Output Speed	r/min	15	15	29.66	22.13	20	40
Max.Torque *2	N·m	2914	3062	1030	96.17	107	73
Efficiency		0.76	0.80	0.76	0.80	0.69	0.72

*1:Value of the inertia for the output shaft.

*2:Value of the torque for the output shaft.