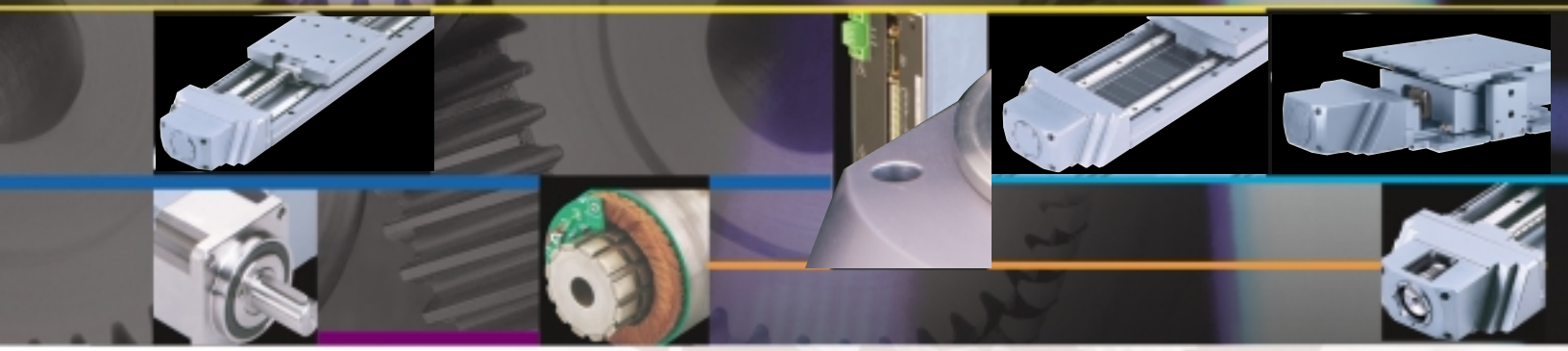
Product Manual

Put Your Ideas In Motion.



BAYSIDE
Automation Systems & Components
PRECISION IN MOTION

Direct Drive Rotary Table Product Manual

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Product Manual

Direct Drive Rotary Table

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baysidemotion.com

I. Introduction

Thank you for your purchase of the R Series of direct drive rotary tables. The R Series rotary stages designed to meet the most demanding of automation applications. This manual provides installation and maintenance information for the:

R100D Rotary Stages
R150D Rotary Stages
R200D Rotary Stages
R300D Rotary Stages

If there are any questions regarding the set up of your product, please feel free to contact Bayside Motion Group, Technical Services at (516)484-5353 for additional support

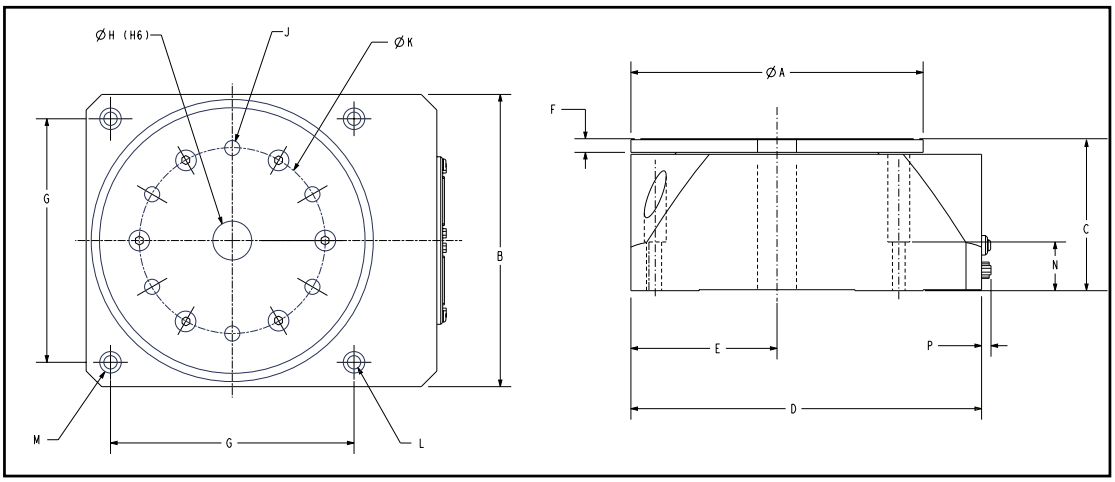
II. Packaging

The stage is packaged in a wooden crate/carton with high density foam padding to avoid any damage during transportation. The assembly is wrapped in plastic to maintain cleanliness and should be handled with appropriate care.

Uncrating
All appropriate stage documentation (including this manual) will be found on top of the stage. The stage can be easily lifted out of the crate/box and placed on a secure surface.

III. Mechanical Specifications

Dimensions



MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M	N	P
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	Tap	(mm)	(mm)	(mm)	(mm)	(mm)
R100D	100	100	75	130	50	5	85	20	M5	60	5.5	9.5	25	5
R150D	150	150	78	180	75	7	125	20	M6	95	6.5	11.2	25	5
R200D	200	200	100	230	100	10	160	30	M8	125	8.5	14.0	25	5

Performance Specifications

MODEL NO	AXIAL CAPACITY	PERPENDICULAR CAPACITY AT RADIUS	CONT OUTPUT TORQUE	PEAK OUTPUT TORQUE	MAX OUTPUT SPEED	RADIAL RUNOUT AT HØ	AXIAL RUNOUT AT KØ	WOBBLE AT AXIS OF ROTATION	INERTIA	STAGE WEIGHT
	(kgf)		(Nm)	(Nm)	(RPM)	(microns)	(microns)	(arcsec)	(gmcm sec.sq.)	(kg)
R100D	75	20kgf @ 50mm	0.65	1.96	700	20	18	60	14.2	2.2
R150D	150	75kgf @ 75mm	4.00	12.00	500	26	23	45	86.4	5.8
R200D	250	150kgf @ 100mm	7.00	21.00	300	36	30	30	338.0	10.5

IV. Electrical Specifications

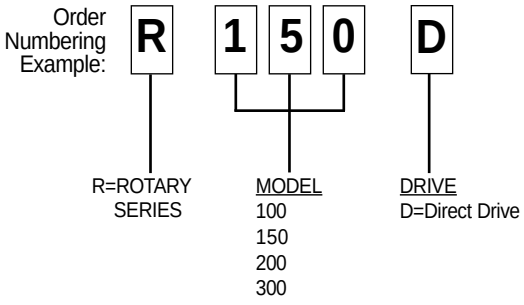
General

The direct drive rotary tables consist of a brushless DC motor, high resolution encoder and load mounting plate assembled on a single shaft and supported by a single set of precision bearings. By eliminating any gearing between the motor and load plate, an extremely stiff assembly is created, with no mechanical backlash or hysteresis, resulting in a high servo performance and wide bandwidth capable unit.

In addition to the encoder, the table contains the circuitry and indicator to display actual position in one degree increments and three switch programmable limit points.

Also, speed is monitored and an over-speed output signal is provided. This is factory set at 200 RPM. The motor can be driven by any three phase brushless DC servo amplifier capable of supplying the voltage and current shown on the outline drawing.

All I/O signals are available in a single D type connector (see below).



For easy installation, motor power and encoder, hall, limit cables can be purchased from Bayside Motion Group. To order cables, please contact Bayside Sales Department at 516-484-5353

Cables

Length	Power Cable Digital Drive	Sensor Cable Digital Drive
3 meter*	B 10963053 Rev 1	B 1096305 Rev 1

* See cable drawings in back of manual for color codes

Motor Specifications

MODEL NO.	VOLTAGE CONSTANT K_e	TORQUE CONSTANT K_t	RESISTANCE R	INDUCTANCE L	RATED VOLTAGE	I_{CONT}	I_{PEAK}	LOGIC VOLTAGE
	(V/KRPM)	(Nm/A)	OHMS@ 25°C	mH	V	Amps	Amps	V/A
R100D	75	0.72	59.9	12	300	0.9	2.72	5 V @ 600 ma
R150D	210	2	11.4	15.5	300	2.0	6.0	5 V @ 600 ma
R200D	210	2	3.72	4.0	300	3.5	10.5	5 V @ 600 ma
R300D	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Temperature

All motor speed/torque curves are based on 25 deg C ambient with a winding temperature of 155 deg C, at stall. Ambient temperatures above 25 deg C will require derating. Consult Bayside Motion Group, Technical Services at (516) 484-5482, ext. 130 for application assistance.

Circumstantial Rotary Encoder

The high resolution encoder has a nominal number of counts per revolution and angular resolution is determined per table shown below.

The number of counts per revolution can vary by a maximum of +/-280 counts (9.8 arc min.) but is repeatable. The control of the system can be enhanced by using the actual line count shown on the calibration supplied on the label of the product.

Although to a large extent a function of the closed loop performance of the total system, repeatability of +/-3 counts (+/-6.3 arc sec nominal) is achievable.

MODEL NO.	R100D	R150D	R200D	R300D
Nominal Count *	472000	629200	943200	1257200
Nominal resolution (arc sec)	2.8 (2.7458)	2.1 (2.0598)	1.4 (1.3740)	1.0 (1.0309)
Repeatability arc sec	± 8.4	± 6.3	± 4.2	± 3

* post quadrature and interpolation

Commutation

Three commutation signals, developed by hall sensors, are available for proper control of the motor by your amplifier.

Electrical Characteristics of Hall Sensors

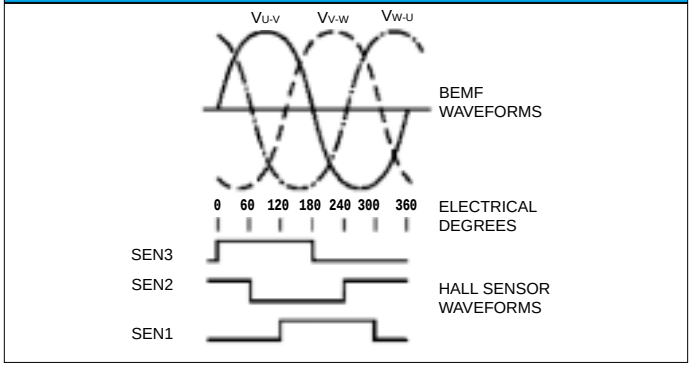
Supply Voltage	5Vdc ± 10% (500ma)*
Output Format	TTL (Internal pull-up resistors provided)

* an external power supply may be required. Most amplifiers only provide 260 ma of power. Intermittent signals may occur.

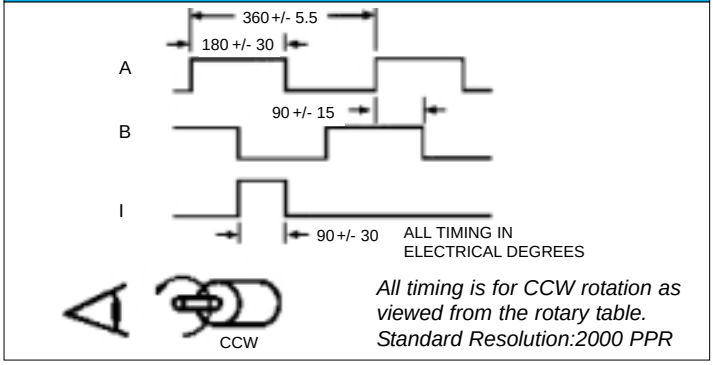
Signal Timing

The following chart shows the timing of the commutation and encoder signals in relation to the motor bemf. See section IV, Wiring, for signal pin designations.

Rotary Motor Signal Timing



Rotary Encoder Timing



V. Wiring

Sensor Signal Connector

PIN ASSIGNMENTS
26-Pin “D” Sub-miniature high density

Pin Number	Name	Function
1	/ENCA	Encoder Channel $\overline{A}$
2	ENCA	Encoder Channel A
3	/ENCB	Encoder Channel $\overline{B}$
4	ENCB	Encoder Channel B
5	/INDEX	Encoder Channel $\overline{I}$
6	INDEX	Encoder Channel I
7	+5v	+5VDC Power Supply for Encoder (600mA)
8	GND	Encoder Common
9	N/C	Spare
10	/OVSP_ISO	Isolated Over Speed Output, Active Low, OC*
11	/AO_ISO	Isolated Position A Output, Active Low, OC*
12	/BO_ISO	Isolated Position B Output, Active Low, OC*
13	/CO_ISO	Isolated Position C Output, Active Low, OC*
14	GND_ISO	Isolated Common*
15	TDI	Programming Port**
16	TMS	Programming Port**
17	TCK	Programming Port**
18	TDO	Programming Port**
19	SEN 1	Hall Sensor 1 (X)
20	SEN 2	Hall Sensor 2 (Y)
21	SEN 3	Hall Sensor 3 (Z)
22	+5 COMM	+5VDC Power Supply for Hall Sensors
23	GND COMM	Hall Sensor Common
24	T1	Thermistor
25	T2	Thermistor
26	SHIELD	Shield

* Opto-isolated outputs; User to supply pull-up resistor.
** All programming ports are used for factory only, DO NOT connect to these pins!
Damage may occur and warranty will be voided

POWER CONNECTOR

PIN ASSIGNMENTS
15-Pin "D" Sub-miniature

Pin Numbers	Name	Function
1, 2, 9, 10	PHASE U (X)	Motor Power In
3, 4, 11, 12	PHASE V (Y)	Motor Power In
5, 6, 13, 14	PHASE W (Z)	Motor Power In
7, 8, 15	GND	Chassis Ground

Note: Power for Phases are split over multiple pins.

LIMIT SWITCH POSITION SETTING

There are nine rotary switches used to set the three limit switch settings. Reading from left to right, the first three are for limit A, the second three are for limit B and the last three are for limit C. In each group of three, the first switch sets the 100s digit, the second sets the 10s digit and the third sets he 1s digit. Each limit can be set from 000 to 359.

User may set any 3 switch comination to set the value (ie. 90^{o}, etc) for the limit output to trip. Figure 2 shows the co-ordinate system for limit setup.

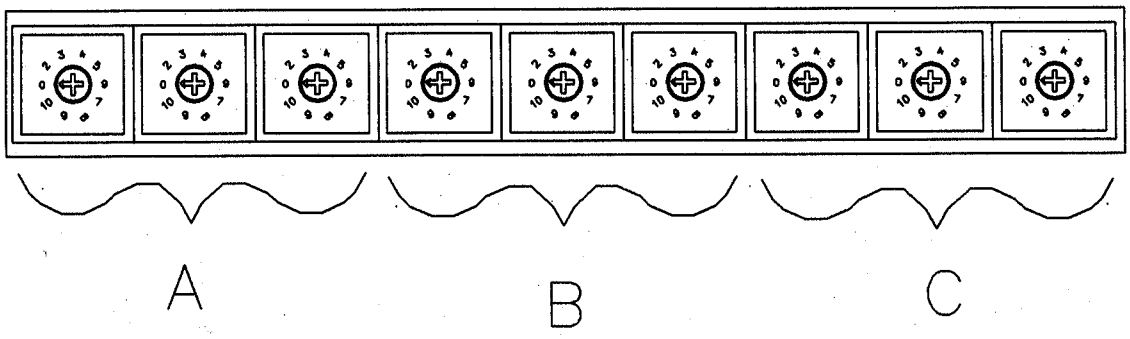


Figure 1

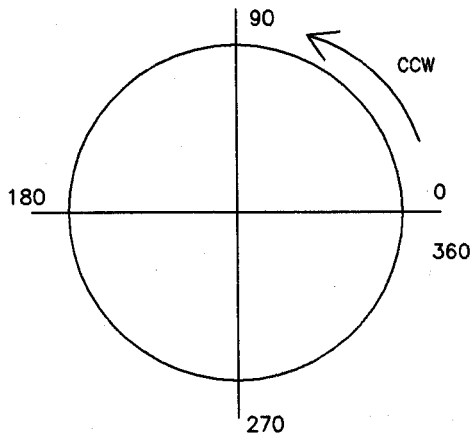


Figure 2

DISPLAY

The 4 digit display shows current position and status. The first three display position in one degree increments. When the actual position is equal to the A/programmable setpoint, the fourth digit will display "A". When the actual position is equal to the B setting, the fourth digit will display "b". When the actual setting is equal to the C setting, the fourth digit will display "c".

The dot located at the right of the fourth digit indicates direction. For CW rotation the dot is off; for CCW rotation it is on.

ERROR INDICATION

ILLEGAL SETTING FAULT:

All settings should be between 0 and 359. If any setting is larger than 360 degrees, all 4-digits will show a blinking bar, and all output position signals will be inhibited.

OVER SPEED FAULT:

If the speed exceeds the maximum setting (see table), the over speed fault signal /OVSP_ISO will be active, and all 4-digits will show two blinking bars, but all output position signals will remain enabled.

Model	R100D	R150D	R200D	R300D
Speed Limit	700 RPM	500 RPM	300 RPM	200 RPM

INITIALIZING

All position signals are based on an index signal from the encoder. In order to initialize the position circuitry, turn on the logic supply, either rotate the table by hand or command the motor to rotate at least one revolution.

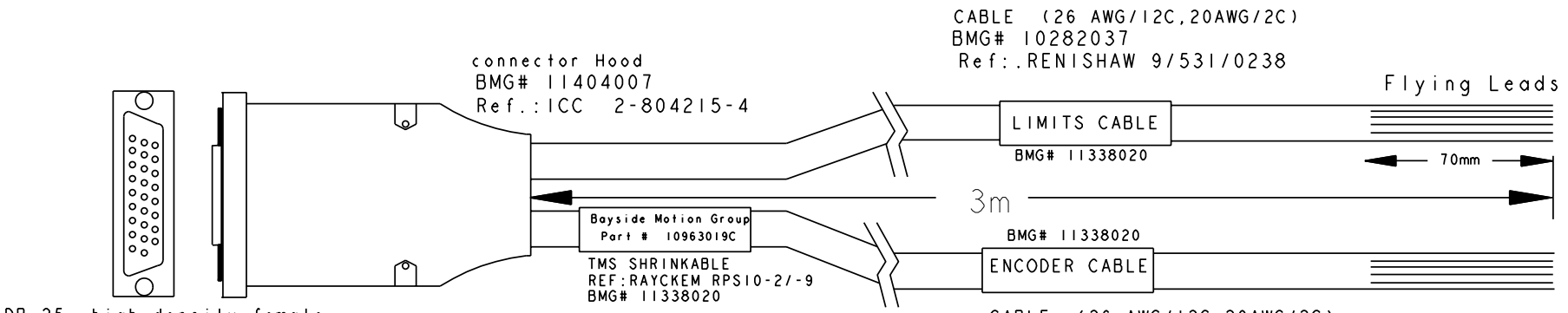
NOTES

1-* IN LINEAR APPLICATION +5V & GND DEFINED ON PIN
22,23 RESPECTIVELY FOR ENCODERS,HALL EFFECTS AND HALL EFFECT LIMIT OPTION.
PIN 7 IS CONNECTED TO PIN 22 INTERNALLY.
PIN 8 IS CONNECTED TO PIN 23 INTERNALLY.
TAKE CARE TO INSULATE UNUSED FLYING LEADS! CONNECTION OF PIN #8 TO EARTH GND
WILL UNDERMINE ISOLATION OF THE AMPLFIER USED! DAMAGE TO AMPLFIER CAN RESULT!

2-LIMITS FOR LINEAR FUNCTIONS
MAX CURRENT 20mA EACH. OPEN CONTACT VOLTAGE :+5 TO + 24 VDC

3-LIMITS FOR ROTARY FUNCTIONS
MAX CURRENT 100mAEACH,OPEN CONTACT VOLTAGE: +5 TO +24 VDC

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PRODUCTION RELEASE	10/09/01	A.DAOUD
B	ECO# 01-310	10/15/01	A.DAOUD
C	ECO# 01-346	11/15/01	A.DAOUD



ENCODER		
DB PIN#	COLOR	FUNCTION
1	PINK	ENCA'
2	GREEN	ENCA
3	YELLOW	ENCB'
4	BLUE	ENCB
5	RED	INDEX'
6	VIOLT	INDEX
19	GREY	MTR HALL1 (x)
20	BLACK	MTR HALL2 (y)
21	ORANGE	MTR HALL3 (z)
22	WHITE/20	+5V *
23	BROWN/20	GND *
24	WHITE	T2(THERMISTOR)
25	CLEAR	T1(THERMISTOR)
--	DRAIN	SHIELD

DB PIN#	LINEAR FUNCTION		ROTARY FUNCTION	wire color
	MECHANICAL TYPE LIMIT	HALL EFFECT TYPE LIMIT		
7	*	*	+5V	WHITE/20
8	*	*LIMIT COM.(ALL LIMIT)	GND	BROWN/20
9	MTR END LIMIT (NO)	----------	---	PINK
10	MTR END LIMIT (NC)	MTR END LIMIT	OVSPD LIMIT	GREEN
11	MTR END LIMIT (com)	----------	A LIMIT	YELLOW
12	FAR END LIMIT (NO)	----------	B LIMIT	RED
13	FAR END LIMIT (NC)	FAR END LIMIT	C LIMIT	VIOLT
14	FAR END LIMIT (com)	----------	LIMIT COM	GREY
15	HOME SW (NO)	----------	---	BLACK
16	HOME SW (NC)	HOME SWITCH	---	WHITE
17	HOME SW (com)	----------	---	CLEAR
18	BRAKE+	BRAKE +	---	ORANGE
26	BRAKE-	BRAKE -	---	BLUE

BAYSIDE MOTION GROUP
PORT WASHINGTON, NEW YORK, 11050

MICRO-SERIES SENSOR CABLE
3m/GENERIC AMP.

SCALE: NONE		SHEET: 1 OF 2	
SIZE: A	FSCM NO. 96559	DRAWING NO. 10963019	REV. C