

# eCylinder eRotary Quick Start Reference Guide





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#### **ROBOHAND SLA DOCUMENTATION**

Please use the SLA CD for the following installation.

#### \_MAIN PROGRAM\_

Install operations software by clicking setup.exe. You can run sla software without having actual hardware in virtual mode.

Once loaded, the user name and password are both sla

FOLDERS ON C	_D
APPLICATION_MOVIES	SLA software demo movies
eCylinder MECHANICAL	eCylinder Mechanical drawings & repair manuals
eCylinder_WIRING	WIRING DIAGRAMS
EXAMPLE_PROGRAMS	EXAMPLE SLA PROGRAM
SLA MECHANICAL	SLA Mechanical drawings & repair manuals
SLA WIRING	SLA WIRING CONFIGURATIONS
SoftwareDemoMovies	SOFTWARE DEMONSTRATIONS
WebHelp	BROWSER BASED HELP FILE. SEE BELOW.
CE_TEST_SLA_eCylinder.pdf	CE certification of SLA & eCylinder
setup.exe	MAIN SLA PROGRAMMING PACKAGE
SLA_software_manual.pdf	SOFTWARE PROGRAMMING MANUAL
SLA_Sales_Catalog.pdf	SALES CATALOG
SLA_QUICK_START.pdf	SLA QUICK START GUIDE
HELP FILE HI	NTS

Create a folder on your computer called C:\SLA or similar. Drag the entire contents of this CD to this folder. Locate the following files. Right click and create shortcut.

SOFTWARE DOCUMENTATION---WEBHELP\INDEX.HTM SOFTWARE MOVIE DEMO-----\SoftwareDemoMovies\slaMovies.html

PLC PROGRAMMING----

WebHelp\Programming\Binary\_Coded\_Decimal\_Programs\_(BCD).htm

PC PROGRAMMING WebHelp\Programming\Multi\_Motor\_Programs\_(MMP).htm

SLIDE STAND ALONE PROGRAM---WebHelp\Programming\Smart\_Motor\_Programs\_(SMP).htm Run these shortcuts for movies and documetation.

Log onto www.robohandsla.com for even more extensive documentation. You should register to gain extended access.







# EC65 – eCylinder™

EC65 <u>Specificati</u>	ons			EC65 Deflection at	35 kg [77 lb] Payload
Stroke	mm	50 100 15	50 200 250	2.5 [.10]	
Rated Motor Power	W	7	2	2 [.08]	
Repeatability	mm [in]	+/02	25 [.001]	1.5 [.06]	
Weight	KG [lb]	2.7 3 3 [5.9] [6.6] [7	.4 3.7 4 .4] [8.1] [8.8]	1 [.04] 0.5 [.02]	
Motor 48VDC at 3 amps for motor. Option allows 24VDC motor operation	48V	Ster	oper	8 0 <u>                                    </u>	150 200 2 [5.91] [7.87] [9
Linear Position Sensor		Abso	olute	Strok	e mm [in]
		Horizontal	Vertical	EC65 (10mm	Lead Ball Screw)
Max. Speed	mm/sec [in/sec]	85 [3.35]	83 [3.3]	<b>6</b> 00 [23.6]	
Max. Payload	KG [lb]	35 [77]	18.5 [41]	500 [19.7]	
Max. Pitch Moment	N-M [in-lb]	13 [116]	7 [62]	400 [15.7]	
Max. Yaw/Roll Moment	N-M [in-lb]	11 [96]	7 [62]	<u>8</u> 300 [11.8]	
Rated Thrust	N [lb]	343 [77]	182 [41]	200 [7.9]	
Max. Thrust	N [lb]	378 [85]	200 [45]		
Brake Holding Force	N [lb]	300 [67]	300 [67]		
Cycle Time*	Sec	1.5	1.5	1 [2.2] 18	35 [40.8] 35 [77.2]
5		Horizontal	Vertical	Payloa	ad kg [lbs]
Max. Speed	mm/sec [in/sec]	173 [6.8]	165 [6.5]	EC65 (.75" P	itch Lead Screw)
Max. Pavload	KG [lb]	28 [62]	10.1 [22.3]	800 [23.0]	Horizontal Vertica
Max. Pitch Moment	N-M [in-lb]	10.5 [93]	3.8 [34]	500 [19.7]	
Max. Yaw/Roll Moment	N-M [in-lb]	8.8 [77.5]	3.8 [34]	<b>400</b> [15.7]	
Rated Thrust	N [lb]	276 [62]	99 [22.3]	2 300 [11.8]	
Max. Thrust	N [lb]	303 [68]	116 [25]	200 [7.9]	
Brake Holding Force	N [lb]	187 [42]	187 [42]	a 100 [3.94]	
Cvcle Time*	Sec	.9	.9		
		Horizontal	Vertical	1 [2.2] 10	1 [22.3] 28 [61.7]
Max. Speed	mm/sec [in/sec]	430 [16.9]	380 [15]	Paylua Eooce (4 Ellip	au ky [ins]
Max. Payload	KG [lb]	9.2 [20.3]	2.2 [4.9]	EC65 (1.5" P	itch Lead Screw)
Max. Pitch Moment	N-M [in-lb]	3.4 [30.5]	1 [9]	500 [19 7]	Horizontal Vertica
Max. Yaw/Roll Moment	N-M [in-lb]	2.9 [25.4]	1 [9]		
Rated Thrust	N [lb]	90.2 [20.3]	22.2 [5]		
Max. Thrust	N [lb]	98 [22]	26.7 [6]		
Brake Holding Force	N [lb]	93 [21]	93 [21]	E 200 [7.9]	
Cycle Time*	Sec	.7	.7	8 100 [3.94]	
2		*100 mm trav	el @ 10% payload		2 [4 9] 9 2 [20 3]
<b> </b>		— A ———		Payloa	ad kg [lbs]
(				250mm Stroke Shown	
				Myaw	
d					
H-63.50-183.39 [7	7.22]				
[2.50]				4X M5 X 0.8 - 6H ¥ 10.1 [.40]	2
i8				63.50 [2.50] 4X Ø 5mm Press Fit ▼ 10.1 [.40]	19.05 [.75]
				9.53 L3751	4X M5 SHCS L Far Side
Connector Op 75.18 1) Pigtail for S	otions: Stand Alone Application	ns	45 [1 77]		38.10 [1.50]
[2.96] 2) Strain Reli	ef for SLA Applications	i	45 [1.//]	20 [.79] 4X M3 SHCS L Far Side	4 3mm Press
9				Nut Tracks are Same	▼ 5.00 [.20]
				55 [2.56] Size as SLA90 and SLA120 4X M3 >	с U.5 − бН ψ б [.24]
		••		Stroke [mm] 50 100	150 200 250
		Ø 5mm Sli 6.35 [.25] (		A 344.7 395.5	446.3 494.5 547.9 [17 57] [19 57] [21 57]
			10 [.39] B PL	$\begin{array}{c c} \hline \begin{bmatrix} 13.37 \end{bmatrix} \\ \hline \begin{bmatrix} 13.37 \end{bmatrix} \\ \hline \end{array}$	

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EC90 –	eCyli	nder™
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# ER21 – eRotary™

ER21 Specificati	ons	Horizontal	Vertical								
Max. Speed	RPM	183	151								
Max. 180° Move Time	SEC	0.17	0.17	1		ER	21 Torqu	ie at T	ime to T	urn 18	BO°
Torque at Max. RPM	N-M [in-lb]	1.4 [12.4]	.31 [2.7]	1	[26.6]						2.5
Torque at Min. RPM	N-M [in-lb]	2.5 [22.4]	.7 [5.8]	_	2.5						[22.4]
Payload	KG [lb]	11.3 [25]	6.8 [15]	<b>9</b>	[22.1]						
Mx. Mv	N-M [in-lb]	8.5 [75]	6.8 [60]	- E	[17.7]	1.4					
Weight	KG [lb]	1.7 [3.7]	1.7 [3.7]	- M	1.5	[12.4]		-	Ho	rizontal	Vertical
Rated Motor Power	W	7	2	Ż	[13.3]					Ique	Torque
Motor (5:1 belt drive)	48V	Ster	oper	Bup	[8.9]						0.7
Repeatability	DEG	+/-	02	Lo Lo	0.5	0.31					
Rotary Position Sensor	520	., Ahsi	olute		[4.4]	[2.7]					
Brake Holding Torque	N-M [in-lb]	45	[4]		0 L	6	0.5 1		5 2	2,	
		.+0	נין		0.1	0	U.U I	to Turn	ے در 180° (2م	c)	) 3
12 Input 24 VDC - 5	ource						THIC		1100 (36	6)	
10 Output 24 VDC - S	ource .2A			J							
Robohand DirectConnect Mounting Patterns Blank Turntables Also Available			Bore for M5 on Head Screw PL Far Side	[.75] 19.05			4X M5 - 2B	▼7.6 [.30]			
C'Bore for M3 Button Head Screw	(Ø 3H7T 7 1 [ 28]		M3 - 2B ¥ 7.1 [.28]			2X⊄	5H7∓7 [.28]				
C'Bore for M3 Button Head Screw 4 PL Far Side	¢Ø3H7∓7.1 [.28]	[.75]	M3 - 2B ¥ 7.1 [.28]			<u>2</u> x⊄	5H7 <b></b>				
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢3H7∓7.1 [.28]	[.75] 19.05	M3 - 2B ¥ 7.1 [.28]			∑ 2x¢	5H7 ¥ 7 [.28]	GAUGE	DESCR	J9	P2
C'Bore for M3 Button Head Screw 4 PL Far Side	¢ 3H7∓ 7.1 [.28]	[.75] 19.05 Mx, My	M3 - 28 V 7.1 [.28]			_ 2X⊄	5H7 ¥ 7 [.28] COLOR RED	<b>GAUGE</b> 18	DESCR 48 power	<b>J9</b> 30.31	P2 P2-1 P2-2 P2-3 P2-4
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢ 3H7∓ 7.1 [.28]	[.75] 19.05 Mx, My	M3 - 2B ¥ 7.1 [.28]			2X¢	<b>COLOR</b> RED BLK wht*	<b>GAUGE</b> 18 18 24	DESCR 48 power 48 com Tx	<b>J9</b> 30.31 28.29 25	P2-1 P2-2 P2-3 P2-4 P2-5
C'Bore for M3 Button Head Screw 4 PL Far Side	¢3H7∓7.1 [.28]	[.75] 19.05 Mx, My	M3 - 2B ¥ 7.1 [.28]			2x¢	COLOR RED BLK wht* Dlu*	<b>GAUGE</b> 18 18 24 24	DESCR 48 power 48 com Tx Rx	<b>J9</b> 30.31 28.29 25 26	P2-1 P2-2 P2-3 P2-4 P2-5 P2-6
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢ 3H7 ∓ 7.1 [.28]	[.75] 19.05 Mx, My	M3 - 28 ¥ 7.1 [.28]				COLOR RED BLK wht* Dlu* Dlk*	<b>GAUGE</b> 18 18 24 24 24 24	DESCR 48 power 48 com Tx Rx Com	<b>J9</b> 30.31 28.29 25 26 27	P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-7
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 \vec{7}, 1 [.28]	[.75] 19.05 Mx, My	3-28 ¥7.1 [.28]				COLOR RED BLK wht* Dlu* Dlk* SHIELD*	<b>GAUGE</b> 18 18 24 24 24 24 shield	DESCR 48 power 48 com Tx Rx Com shield	<b>J9</b> 30.31 28.29 25 26 27 34	P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1
C'Bore for M3 Button Head Screw 4X 4 PL Far Side		[.75] 19.05 Mx, My	(3.37) (3.37) (3.37)				5H7⊽7 [28] COLOR RED BLK wht* DIU* DIK* SHIELD* BROWN	<b>GAUGE</b> 18 18 24 24 24 24 shield	DESCR 48 power 48 com Tx Rx Com shield 24 power	<b>J</b> 9 30.31 28.29 25 26 27 34	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1 P1-1
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢3H7⊽7.1 [.28]	[.75] 19.05 Mx, My	(3.37) 85.50				SH7¥7 [28] COLOR RED BLK Wht* Dlu* Dlk* SHIELD* BROWN BLUE	<b>GAUGE</b> 18 18 24 24 24 24 shield 20 20	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com	<b>J9</b> 30.31 28.29 25 26 27 34 	P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 \vec{7}, 1 [.28]	[.75] 19.05 Mx, My	3 [3.37] 85.50				COLOR RED BLK wht* Dlu* Dlk* SHIELD* BROWN BLUE white	<b>GAUGE</b> 18 18 24 24 24 24 shield 20 20 20 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1	J9 30.31 28.29 25 26 27 34 1 2 3 4	P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 $v$ 7.1 [.28]		3-28 ¥7.1 [.28]				COLOR RED BLK wht* Dlu* Dlk* SHIELD* BROWN BLUE white /ellow Jreen	<b>GAUGE</b> 18 18 24 24 24 24 shield 20 20 20 20 20 24 24 24 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3	<b>J9</b> 30.31 28.29 25 26 27 34 1 2 3 4 5	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 ⊽ 7.1 [.28]		(3.37) (3.37) (3.37) (3.550				COLOR RED BLK wht* Dlu* Dlk* SHIELD* BROWN BLUE white rellow green Dlue	<b>GAUGE</b> 18 18 24 24 24 24 shield 20 20 20 20 24 24 24 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7⊽ 7.1 [.28]	[.75] 19.05 Mx, My	S [3.37] 85.50 (3.37]				COLOR RED 3LK wht* olu* olu* olk* SHIELD* BROWN 3LUE white vellow green olue orange	GAUGE 18 18 24 24 24 24 24 20 20 20 20 24 24 24 24 24 24 24 24 24 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 6 7	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 \vec{7}, 1 [.28]	[.75] 19.05 Mx, My	B (3.37) (3.	INDEF	<b>R</b> IM		COLOR RED 3LK wht* Dlu* Dlk* SHIELD* SHIELD* BROWN 3LUE white rellow green Dlue Drange red	GAUGE 18 18 24 24 24 24 20 20 20 20 24 24 24 24 24 24 24 24 24 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 7 8 0	P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-7 P1-8 P1-0
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 $v$ 7.1 [.28]	[.75] 19.05 Mx, My	eCYL	INDEF	₹™.		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white yellow green Dlue prange red Drown violet	GAUGE           18           18           24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 5 6 6 7 8 9 9 10	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-7 P1-8 P1-9 P1-10
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 $v$ 7.1 [.28]		eCYL eRO1	.INDEF ſARY™	<b>R</b> IM		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white yreen Dlue Drange red Drange red Drown yiolet gray	GAUGE           18           24	DESCR           48 power           48 com           Tx           Rx           Com           shield           24 power           24 com           IN 1           IN 2           IN 3           IN 4           IN 5           IN 6           IN 7           IN 8           IN 9	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-9 P1-10 P1-11
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	(Ø 3H7 \$\vec{7},1 [.28] Indicator Lights 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		eCYL eROT Cable	.INDEF ſARY™ e Asse	<b>₹</b> ™ •		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white vellow green Dlue prange red prown violet gray Dlack	GAUGE           18           24	DESCR           48 power           48 com           Tx           Rx           Com           shield           24 power           24 com           IN 1           IN 2           IN 3           IN 4           IN 5           IN 6           IN 7           IN 8           IN 9           IN 10	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11 12	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-9 P1-10 P1-11 P1-12
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢ 3H7 ⊽ 7.1 [.28]		eCYL eROT Cable	INDEF INDEF IARY™ e Asse	R™ ' embly		COLOR RED BLK wht* Dlu* Dlk* SHIELD* BROWN BLUE white rellow green Dlue prange red Drown <i>i</i> olet gray Dlack white/blk	GAUGE 18 18 24 24 24 24 24 20 20 20 20 24 24 24 24 24 24 24 24 24 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8 IN 9 IN 10 IN 11 IN 12	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 7 8 9 10 11 12 13 14	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-9 P1-10 P1-11 P1-12 P1-13 P1-13 P1-4
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢ 3H7 ⊽ 7.1 [.28]	[.75] 19.05 Mx, My	eCYL eROT Cable Detai	.INDEF ſARY™ e Asse ils	R™ embly		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white vellow green Dlue prange red prown violet gray Dlack white/blk vellow/blk	GAUGE 18 18 24 24 24 24 20 20 20 20 20 24 24 24 24 24 24 24 24 24 24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8 IN 9 IN 10 IN 11 IN 12 OUIT 1	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 6 7 7 8 9 10 11 12 13 14 15	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-9 P1-10 P1-11 P1-12 P1-13 P1-14 P1-15
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	rd 3H7 $\sqrt{7.1}$ [28]		eCYL eROT Cable Detai	.INDEF ſARY™ e Asse ils	R™ embly		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white BROWN BLUE white yreen Dlue Drange red Drown violet gray Dlack white/blk yellow/blk prange/blk	GAUGE           18           18           24           24           24           20           20           24            24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8 IN 9 IN 10 IN 11 IN 12 OUT 1 OUT 2	<b>J9</b> 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 7 8 9 10 11 12 13 14 15 16	P2         P2-1 P2-2         P2-3 P2-4         P2-5         P2-6         P2-7         P2-8         P1-1         P1-2         P1-3         P1-4         P1-5         P1-6         P1-7         P1-8         P1-9         P1-10         P1-11         P1-12         P1-13         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-16
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	rd 3H7 $\overline{v}$ 7.1 [.28]		eCYL eRO1 Cable Detai	.INDEF ſARY™ e Asse ils	ז™ mbly		COLOR RED BLK wht* oblu* oblu* oblk* SHIELD* BROWN BLUE white yreen olue orrange red orrange red orrown violet gray black white/blk yellow/blk orange/blk red/blk	GAUGE           18           18           24	DESCR           48 power           48 com           Tx           Rx           Com           shield           24 power           24 com           IN 1           IN 2           IN 3           IN 4           IN 5           IN 6           IN 7           IN 8           IN 9           IN 10           IN 11           IN 12           OUT 1           OUT 2           OUT 3	<b>J9</b> 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-9 P1-10 P1-11 P1-12 P1-13 P1-14 P1-15 P1-16 P1-17
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢¢ 3H7 ⊽ 7.1 [.28]		eCYL eROT Cable Detai	.INDEF ſARY™ e Asse iIs	₹™ embly		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white vellow green Dlue prange red prown violet gray Dlack white/blk vellow/blk prange/blk red/blk gray/blk gray/blk	GAUGE           18           18           24           24           24           24           24           24           20           20           20           24            24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8 IN 9 IN 10 IN 11 IN 12 OUT 1 OUT 2 OUT 3 OUT 4 OUT 4 OUT 5	<b>J9</b> 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 16	P2 P2-1 P2-2 P2-3 P2-4 P2-5 P2-6 P2-7 P2-8 P1-1 P1-2 P1-3 P1-4 P1-5 P1-6 P1-7 P1-8 P1-9 P1-10 P1-11 P1-12 P1-13 P1-14 P1-15 P1-16 P1-17 P1-18 P1-16 P1-17 P1-18 P1-16 P1-17 P1-18 P1-16 P1-17 P1-18
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢ 3H7 ⊽ 7.1 [.28]	[.75] 19.05 Mx, My	eCYL eROT Cable Detai	.INDEF ſARY™ e Asse ils	R™ • •mbly		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white rellow green Dlue prange red Drown <i>v</i> iolet gray Dlack white/blk red/blk gray/blk graen/wht Dlue/wht Dlue/wht	GAUGE           18           18           24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8 IN 9 IN 10 IN 11 IN 12 OUT 1 OUT 2 OUT 3 OUT 4 OUT 5 OUT 6	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	P2         P2-1 P2-2         P2-3 P2-4         P2-5         P2-6         P2-7         P2-8         P1         P1-2         P1-3         P1-4         P1-5         P1-6         P1-7         P1-8         P1-9         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-16         P1-17         P1-18         P1-19         P1-16         P1-17         P1-18         P1-17         P1-18         P1-19         P1-10         P1-13         P1-14         P1-15         P1-16         P1-17         P1-18
C'Bore for M3 Button Head Screw 4X 4 PL Far Side	¢ 3H7 ⊽ 7.1 [.28]	[.75] 19.05 Mx, My	eCYL eROT Cable Detai	.INDEF ГARY™ e Asse iIs	R™ embly		COLOR RED BLK Wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE White Vellow Drange red Drange red Drange red Drown Violet Drange/blk vellow/blk prag/blk reen/wht Dlue/wht Dlue/wht Dlue/wht	GAUGE           18           18           24           24           24           20           20           24	DESCR 48 power 48 com Tx Rx Com shield 24 power 24 com IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 IN 7 IN 8 IN 9 IN 10 IN 11 IN 12 OUT 1 OUT 2 OUT 3 OUT 4 OUT 5 OUT 6 OUT 7	J9 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	P2         P2-1 P2-2         P2-3 P2-4         P2-5         P2-6         P2-7         P2-8         P1         P1-2         P1-3         P1-4         P1-5         P1-6         P1-7         P1-8         P1-9         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-16         P1-17         P1-18         P1-17         P1-18         P1-17         P1-18         P1-19         P1-20         P1-21
C'Bore for M3 Button Head Screw 4X	rd 3H7 $\overline{v}$ 7.1 [28]		eCYL eROT Cable Detai	.INDEF ГARY™ e Asse iIs	R™ embly		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white BROWN BLUE white orange red Dlue orange red orange orange red orang orang orang orang orang orang orang or	GAUGE           18           18           24	DESCR           48 power           48 com           Tx           Rx           Com           shield           24 power           24 com           IN 1           IN 2           IN 3           IN 4           IN 5           IN 6           IN 7           IN 8           IN 9           IN 10           IN 11           IN 2           OUT 1           OUT 2           OUT 3           OUT 4           OUT 5           OUT 6           OUT 7	J9           30.31           28.29           25           26           27           34           1           2           3           4           5           6           7           8           9           10           11           12           13           14           15           16           17           18           19           20           21           22	P2         P2-1 P2-2         P2-3 P2-4         P2-5         P2-6         P2-7         P2-8         P1-1         P1-2         P1-3         P1-4         P1-5         P1-6         P1-7         P1-8         P1-9         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-10         P1-11         P1-12         P1-13         P1-10         P1-11         P1-20         P1-18         P1-19         P1-20         P1-21         P1-22
C'Bore for M3 Button Head Screw 4 PL Far Side	rd 3H7 $\overline{v}$ 7.1 [28]		eCYL eROT Cable Detai	.INDEF ГARY™ e Asse ils	R™ mbly		COLOR RED BLK wht* Dlu* Dlu* Dlk* SHIELD* BROWN BLUE white yreen Dlue prange red prown violet gray Dluek prange red prown violet gray Dluek prange de prown violet gray Dluek prange de prown violet gray Dluek prange de prown violet gray Dluek prange de prown violet gray Dluek prange de prown violet gray Dluek prange de prown violet gray Dluek prange de prown violet gray Dluek prange/blk green/wht prange/wht prown/wht violet/wht prown/wht	GAUGE           18           18           24            24	DESCR           48 power           48 com           Tx           Rx           Com           shield           24 power           24 com           IN 1           IN 2           IN 3           IN 4           IN 5           IN 6           IN 7           IN 8           IN 9           IN 10           IN 11           IN 2           OUT 1           OUT 2           OUT 3           OUT 4           OUT 5           OUT 6           OUT 7           OUT 8           OUT 9	<b>J9</b> 30.31 28.29 25 26 27 34 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 22 23 3	P2         P2-1 P2-2         P2-3 P2-4         P2-5         P2-6         P2-7         P2-8         P1-1         P1-2         P1-3         P1-4         P1-5         P1-6         P1-7         P1-8         P1-9         P1-10         P1-11         P1-12         P1-13         P1-10         P1-11         P1-12         P1-13         P1-10         P1-11         P1-12         P1-13         P1-14         P1-15         P1-16         P1-17         P1-18         P1-19         P1-20         P1-21         P1-22         P1-23

ER75 – eRotary<sup>™</sup>



3



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Strain Relief

[10.94] 277.9

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mm

# Installing SLA OS Software

To install the software:

- 1. Close all programs including any copy of SLA OS Software.
- 2. If you have a previous copy of the software installed, uninstall it before installing the new version. (note: Older versions (before v1.2) require backing up of database located in "C:\Program Files\Robohand\SLA\data\data.mdb" in a safe location.) To uninstall the previous version, open Control Panel, click on 'Add or Remove Programs', click on 'SLA Operating Software' and follow the instructions for removing the software.
- 3. Double click on the installation setup.exe file. The installation wizard will lead through the steps for installation.
- 4. If you had to backup the database in earlier step, copy the database back in the original location.
- 5. Once the software is installed, it will create shortcuts on the Desktop as well as create additional menu items in the program menu accessible from standard Windows Start menu.



## **Quick Start**

## **Quick Introduction to Configuration of SLA OS**

This section is designed for a quick introduction to the SLA OS by showing how easy it is to write useful programs to get the results you want. It shows examples of three different types of programs:

- 1. **Multi Motor Program (MMP)** can handle most applications with its inbuilt library of highly sophisticated commands. It runs from the (optional) SLA Control Unit.
- 2. Smart Motor Program (SMP) runs in the motors (doesn't require SLA Control Unit) and can handle many of the less complex tasks.
- 3. **Binary Coded Decimal Program (BCD)** type of simplified SMP program where PLC based controls can be used to send BCD numbers to the motors to go to pre programmed locations.

Before a program can be written the SLA OS software must be configured to match the settings of the slides configuration.

#### **Quick Configuration**

Once the SLA OS software is installed (it already comes pre-installed if you also ordered the SLA Control Unit), login with the user and password both as "sla" (in lowercase).

শ Login - SLA Operating Software 🛛 🔀						
User Name	sla					
Password	xxx					
Database	data.mdb					
Virtual Motors	None					
ОК	Cancel					

Click on the Configuration icon in the toolbar to open the following configuration screen.

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÷	Applicat	tion Co	nfiguratio	n					
ſ	Lin	ear Slid	les [	Mis	cella	neous			
	Select	Motor	MotorX				-		
	Motor Cor	nfiguratio	n						
	Name	Motor/	<						
	Attache	d Slide —							
	Model		Pitch (mm)	Stroke (mr	n]	Effect	ive Stroke	(mm)	100
	SLA90	) 🔹 X	10 🔻	× 100	-	Negal	ive Homing	g Offset (mm)	0
	MaxV	elocity (m	im/s)	700		Positiv	/e Homing	Offset (mm)	-100
	Max A	.cceleratio	on (mm/s^2)	4900					
	-10				_				
	Input	ln1	In2	In3	In4	ļ	ln5	In6	
	Labels	In7	In8	In9	In1	0	In11	In12	
		,	,		, ,		,	,	External
	Output	Out1	Out2	Out3	Οι	it4	Out5	Out6	10
	Labels	,	,				,	,	
		Save	Changes	Discar	d Cha	anges	Appl	y Changes	

Select the correct slide models and stroke lengths for each of the motors by clicking on the appropriate drop down combobox and saving the settings.

H	Application Configurati	ion 📃	
Í	Linear Slides	Miscellaneous	
	Select Motor MotorX	<b>_</b>	
	Motor Configuration		
	Name MotorX	-	
	Attached Slide		- 1
	Model Pitch (mm)	) Stroke (mm) Effective Stroke (mm) 100	
	SLA90 - × 10 -	X 100 Vegative Homing Offset (mm) 0	
	SLASU SLA120 (mm/s)	700 Positive Homing Offset (mm) .100	-
	EC65 ation (mm/s^2	2) 4900	
	Input		
	Labers In7 In8	ln9 ln10 ln11 ln12	
		External	
	Output Out1 Out2	Out3 Out4 Out5 Out6	
l			
	Save Changes	Discard Changes Apply Changes	

Once the system is configured, the following three sections show how to quickly write programs using the three mentioned program types.

- Multi Motor Program (MMP) Quick Start
   Smart Motor Program (SMP) Quick Start
   Binary Coded Decimal Program (BCD) Quick Start

Later in the manual many of the advanced features will be discussed in more details to fully harness the power of SLA OS.

### **Quick Introduction to Multi Motor Programming** with **SLA OS**

This section is designed for a quick introduction to Multi Motor Programming with SLA OS by writing a simple Multi Motor Program (MMP) for dispensing along a square shape of 60 mm side with rounded corners of radius 5 mm. The three main steps are

- 1. Position Data Creation
- 2. Programming
- 3. Results

#### **Quick Position Data Creation**

Click on the Datasets icon in the toolbar to open 'Create Datasets' screen.



Click on the 'Create Path' icon in the screen to create a new path for dispensing.





With the mouse, create the desired path as shown below. The six point square includes starting from the center of a side and selecting all four corners and back to the original center point to create six points as shown below.



#### Quick Programming

Open a 'New Program...' dialog by clicking on File menu or pressing Ctrl+N (Control and N together). By default, the MMP program is selected. Type the name of the new program in 'Program Name' textbox and click 'Create Program' button.

* Create New Program
Create programs that run on separate SLA Control Unit or PC
Coordinated Motor Motion (MMP) Program
Create programs that run on the integrated motor control
C Binary Coded Decimal (BCD) Program
⊂ Smart Motor (SMP) Program MotorX 💌
Program Name quickstart .mmp
Cancel Next Finish

This will bring up the MMP Programming Environment with the template of the program already created as shown below.



Just after the 'init' call to calibrate the system, add the following line to make the slide follow the square path (Path1) just created. Note that as soon as you start typing 'sla.' the autocomplete feature of the environment displays all the possible completion. At this point it is a matter of selecting from the options and filling in the arguments. The following command will make slide follow the Path1 with 10 mm/sec. speed and acceleration of 500 mm/sec.^2. Note, how easy it is to add the rounding of 5 mm for the corners.

```
sla.DoPath( Path1, 10, 500, 5)
```

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🛡 quickstart (mmp) - Multi Motor Programming Environment [design] 🔲 🗖	×
File Edit View Macro Debug	
🖹 🚅 🗐 🎒 🔰 🕕 🗉 🕘 🔐 🔶 🗣 🗐 🗐	
Proc: Main	
	~
'=====================================	
#USES 'D:\work\apps\sta\src\sta\programs\staFunctions.mmp''	
·	
'=======SLA Multi Motor Program==============	
Sub Main	
On Error GoTo HandleError:	
init	
sla.DoPath( Path1, 10, 500, 5)	
Exit Sub	
HandleError:	
End Sub	
· · · · · · · · · · · · · · · · · · ·	
'=====================================	
Private Sub init()	
sla.Reset 'initial reset of all motors & coordinate system	
sla.Calibrate(0) 'home all motors End Sub	
	~
	9

#### **Quick Results**

Select the 'Monitor All' and 'Visual Trace' checkboxes on the main window to follow the movement of the slides on the Dataset screen. Click the Start button on the MMP Programming Environment to run the program to see the following successful result.



# Quick Introduction to Smart Motor Programming with SLA OS

This section is designed for a quick introduction to Smart Motor Programming with SLA OS by writing a simple Smart Motor Program (SMP) for creating a constant velocity motion of for MotorX in positive direction. The two main steps are

- 1. Programming
- 2. Results

#### **Quick Programming**

Open a 'New Program...' dialog by clicking on File menu or pressing Ctrl+N (Control and N together). Select the SMP program type and enter the name of the new program in 'Program Name' textbox. Note that by default, MotorX is selected. Click 'Create Program' button.

* Create New Program	
Create programs that run on separate SLA Control Unit or PC	
Coordinated Motor Motion (MMP) Program	
Create programs that rup on the integrated motor control	
bleate programs that fair on the integrated motor control.	
C Binary Coded Decimal (BCD) Program	
Smart Motor (SMP) Program MotorX	
Program Name quickstart _1.smp	
Cancel Next	Finish

This will bring up the SMP Programming Environment with the template of the program already created as shown below which includes the instructions for downloading tuning parameters and homing the motor at the start of the program.

```
D:\work\apps\sla\src\sla\programs\quickstart_1.smp
                                🚅 🔚 🎒 👗 🖻 🛍 🗠 🗠 📲 🍡 🖅 🗌
                   ▶ ■
Motor:
   MotorX
~
=== variables used
=== d = directionHoming
=== y = (reserved)
F=2 'right handed screw
'Tuning values for MotorX
KP=150
KI=28
KD=600
KL=20
KS=1
KV=0
KA=O
KG=0
 'load the Tuning values
F
'home the motor first
d = -1 'direction of homing
GOSUBO 'call homing subroutine
vvvvv---user code starts below this line---vvvvv
'^^^^^---user code ends above this line---^^^^^^
END
_____
=== variables used
=== o = origin
'=== p = position
'=== i = index
'=== z = homeFlag
CO
    'home current motor
 z=0 'motor is not homed yet
 IF d == −1
```

Between the section indicated for user code, add the following lines to make the slide move in the positive X direction with 1000000 Smart Motor Unit speed and 100 Smart Motor Unit acceleration. The command MV defines the velocity mode for motion and the command G starts the motion.

MV A = 100 V = 1000000 G

```
D:\work\apps\sla\src\sla\programs\quickstart_1.smp*
                                  📂 🖬 🎒 👗 🖻 🛍 🗠 🗠 🖅 🍡 🖅 🕨 🔳
Motor:
  MotorX
1 _____
                                     ~
'=== variables used
'=== d = directionHoming
'=== y = (reserved)
· _____
F=2 'right handed screw
'Tuning values for MotorX
KP=150
KI=28
KD=600
KL=20
KS=1
KV=0
KA=O
KG=O
F 'load the Tuning values
'home the motor first
d = -1 'direction of homing
GOSUBO 'call homing subroutine
! ______
! _____
'vvvvv---user code starts below this line---vvvvv
MV
A = 100
V = 1000000
G
'^^^^^---user code ends above this line---^^^^^^^
END
· _____
'=== variables used
'=== o = origin
'=== p = position
'=== i = index
'=== z = homeFlag
/ _____
CO
     'home current motor
 z=0 'motor is not homed vet
                                    >
```

#### **Quick Results**

Before you can run the program, first build the program by clicking on the 'Build the Smart Motor Program' button in the toolbar. You should see the following confirmation to make sure that the program compiles successfully.



Next step is to download the compiled program to motor. Click on the 'Transfer Program from PC to Motor' button in the toolbar. You should see the following confirmation dialog box.



Now, to run the program, click on the 'Run' button. This will result in the downloaded programs running in the destination MotorX. By default, the generated programs run the homing routine initially. This behavior can be changed by modifying the program and rebuilding and downloading again.



The slide will move in the positive X direction and come to stop at the limit switch at the end of the slide.

## Quick Introduction to Binary Coded Decimal Programming with SLA OS

This section is designed for a quick introduction to Binary Coded Decimal Programming with SLA OS by writing a simple Binary Coded Decimal Program (BCD) for generating series of positions to move The three main steps are

- 1. Position Data Creation
- 2. Programming
- 3. Results

#### **Quick Position Data Creation**

Click on the Datasets icon in the toolbar to open 'Create Datasets' screen.



With the mouse, click on the screen to create the positions corresponding to the BCD input. With each click, a new point is added to the Points node as shown below. Since this is just for the test purpose, the exact locations of the points don't matter.



#### **Quick Programming**

Open a 'New Program...' dialog by clicking on File menu or pressing Ctrl+N (Control and N together). Select the BCD program type and enter the name of the new program in 'Program Name' textbox. Click 'Next' button.

* Create New Program		
Create programs that run on separate	SLA Control Unit or PC	
C Coordinated Motor Motion (MMP) P	rogram	
Create programs that run on the integr	ated motor control	
Binary Coded Decimal (BCD) Progra	m	
⊂ Smart Motor (SMP) Program Motor	< -	
Program Name	quickstart .bcd	
Cancel	Next	Finish

In the task selection window, yo	u can select different ways to	create a BCD program.	Select the
second option for creating a BC	D program from existing data		

* Create New Program				
From the following list, select the task you would like to accomplish.				
C Blank template				
Select from the existing collection of po	ints			
Cancel	Next	Finish		

This will bring up a window with the position data tree that was earlier created in the Datasets window. Select the collection of points (either a path or points) to create BCD program from as shown below.

♥ Create New Program					
Select collection of independent points or those contained in a path.					
Position Data     GLOBAL     Points     Point2     Point3     Point4     Paths					
Cancel	Next	Finish			

This will bring up the BCD Programming Environment showing the points and the corresponding BCD values.

🖶 D: \work\apps\sla\src\sla\programs\quickstart. bc d					
Download Program Run Program Stop Program					
	Table View Code View				ew
្ច្រ- Update Point	► Run Selected Dele	Common Absolute	values (mode, speed	, acceleration A% = 10	) for all points Assign different values per point
BCD	Point Name	X	Y		
0	Point1	22.2225	70.916		
1	Point2	33.073	32.32		
2	Point3 Reint4	47.045	33.18		
3	r oint4	74.343	03.210		
L					
	-		-	-	
					1.

Click on the 'Code View' tab to see the SLA OS generated code which also includes code for homing to match the existing configuration information. Note that the displayed code depends on the type of slide connected to the axis. The following display corresponds to SLA.

D:\work\apps\sla\src\sla\prog	rams\quickstart_1.smp	
Download Program Run Program Table View	Stop Program	
Tuning values for Motor1 KP=150 KI=28 KD=600 KL=20 KS=1		×

#### **Quick Results**

Since all the code is already generated by the SLA OS software, there is no additional programming involved. Before you can run the program, compile and download the programs to all the motors by clicking on the 'Build and Download' button on the top. You should see the following confirmation to make sure that everything is successful.



Now, to run the program, click on the 'Run' button. This will result in the downloaded programs running in all the motors. By default, the generated programs run the homing routine initially. This behavior can be changed using the SMP Programming Environment since BCD programs are basically SLA OS generated SMP programs.



Once the programs are running, the motion can be achieved by feeding the correct input values using either a test BCD input box or PLC.