

**INDUSTRIAL
INDEXING
SYSTEMS**



**DELTA
SERIES™**
Motors&Drives



Delta Series Motors and Drives

Delta Series is a family of all digital high performance motors and drives for today's demanding applications. SMT board design, embedded high speed 32-bit RISC processor and clever engineering result in a very compact, lightweight driver containing advanced features and performance at modest cost. Compact, high power density motors provide low rotor inertia, making them ideal for positioning and indexing applications.

Driver parameters are digitally controlled for consistent performance and are accessed through the built-in tactile membrane keypad. And the front panel digital display gives realtime readout of all key servo parameters and diagnostics.



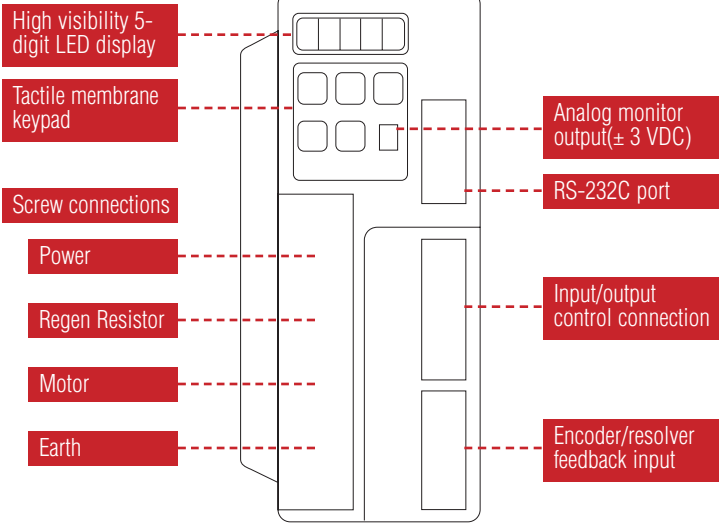
An RS-232 port is also available for programming the driver using your personal computer. PC software is available for complete driver setup, diagnostics and PC screen oscilloscope functions.

High resolution resolver or optional encoder feedback provides very precise speed control and accurate electronic gear ratios. Built-in accel-decel control and S-curve profiling make the driver very flexible for standalone applications.

The driver can be used as a positioning controller accepting pulse train or step/direction outputs from PLCs, follower encoders or stepper motor controllers.

Delta Series Features

- 19 models from 120 W to 6500 W
- Low cost with high performance
- Compact motors and drives
- High power density motors
- Internal 24 VDC I/O power supply
- Sine wave commutation
- Membrane keypad
- Digital display
- Powerful 32-bit RISC processor
- All digital electronics and SMT boards
- S-curve profiling
- PC software for quick setup, diagnostics and scope functions
- Dozens of programmable parameters
- Auto servo tuning
- Fault history log
- RS-232 port built-in
- All motors available with mechanical holding brakes
- High resolution resolver feedback
- Available encoder feedback
- Available Power Off absolute feedback
- Master follower encoder input channel
- Motor position output channel



Diagnostic Tool, Cables and Accessories



This tool plugs into the Delta Driver and allows you to check most driver and motor functions. Can be used for all six operational modes. Toggle switches, LEDs and pots provide easy setup and use.

Mechanical brake power supply, dynamic brake and external regen resistor are available options.

Resolver and motor cables are available in standard 20, 50 and 100-foot lengths. A 36-position I/O cable and DIN track-mounted I/O terminal strip is available. A 10-foot RS-232 communications cable is available for Delta to IBM PC AT, using a 9-pin D connector. All cables are also available in non-standard lengths.

Delta Series Driver Specifications

- Processor: One 32-bit RISC
- Communications port: RS-232
- Driver operating temperature 0-55°C
- Analog inputs: 10-bit A/D; 14-bit available
- Analog input range: +/-10V
- Optically isolated inputs: 8 @ 24 VDC/8 mA
- Optically isolated outputs: 8 @ 24 VDC/40 mA
- Pulse command input: photo-coupler 200 kpps
- Pulse position output: RS-422 line driver 400 kpps
- Peak current available for 3 sec.
- Internal regen resistor on DSD-35 thru DSD-115
- Current, velocity and position loops closed digitally
- Feedback: resolver standard; encoder and absolute available
- Resolver resolution: 24,000 bits/rev
- Encoder resolution dependent on encoder
- Output form: PWM 3Ø sine wave
- Motor ripple frequency: DSD8.5-50 A=20 kHz DSD70-115 A=10 kHz

Delta Drive Part Number	Peak Driver Current(3 sec)	Continuous Driver Current	Supply Voltage Maximum Range
DSD-8.5/RA	8.5 A rms	3.4 A rms	170-264 VAC 50/60 Hz Single Phase
DSD-8.5/RB	8.5 A rms	2.1 A rms	85-126 VAC 50/60 Hz Single Phase
DSD-17.5/RA	17.5 A rms	5.7 A rms	170-264 VAC 50/60 Hz Single Phase
DSD-35/RA	35.0 A rms	14.1 A rms	170-264 VAC 50/60 Hz 3 Phase
DSD-50/RA	50.0 A rms	16.3 A rms	170-264 VAC 50/60 Hz 3 Phase
DSD-70/RA	70.0 A rms	24.8 A rms	170-264 VAC 50/60 Hz 3 Phase
DSD-115/RA	115.0 A rms	53.0 A rms	170-264 VAC 50/60 Hz 3 Phase

6 Modes of Operation

1

Speed Control

In this mode the Driver is a precision speed regulator, with command from an external analog voltage...a pot, follower tach, dancer loop, etc.

A torque limit can be

applied with a second analog input or via preset parameters. Accel/decel rates are fully programmable with S-curve or linear profiles.

Inputs	Outputs
<ul style="list-style-type: none"> • Brake Confirm • Stop at Marker • Drive Enable • Controlled Stop • Monitor Select • Set "O" Position • Alarm Reset • Torque Limit Enable 	<ul style="list-style-type: none"> • Brake Output • Speed Coincidence • Torque Limit On • Stopped at Marker • Set "O" Confirm • Motor Stopped • Battery Alarm • Servo Normal

Speed/Torque/Position Control

Real versatility: The Driver can be switched among all three modes. Analog speed, torque command and limits can all be programmed. Many features of Modes 1, 2 & 3

are available here, with the additional benefit of seamless switching between modes with I/O points. This mode is particularly powerful for winding applications.

Inputs	Outputs
<ul style="list-style-type: none"> • Brake Confirm • Stop at Marker • Drive Enable • Torque Control • Position Control • Set "O" Position • Alarm Reset • Limit Enable 	<ul style="list-style-type: none"> • Brake Output • Speed/Position Coincidence • Stopped at Marker • Motor Stopped • Limit On • Servo Normal

4

Torque Control

In analog torque mode the Driver is a precision torque regulator, commanded from an external analog source such as a dancer loop, tension controller or positioning

controller. A speed limit can be programmed using either an internal preset parameter or external analog voltage.

Inputs	Outputs
<ul style="list-style-type: none"> • Brake Confirm • Drive Enable • Monitor Select • Alarm Reset • Speed Limit Enable 	<ul style="list-style-type: none"> • Brake Output • Running CW • Running CCW • Absorbing Torque • Driving Torque • Motor Stopped • Speed Limit On • Servo Normal

Speed Preset Control

Here the Driver is a precision speed regulator using an analog speed command from an external source or internal speed presets. Using I/O, choose among four preset

speeds and rotation direction, with speeds changeable on the fly. Speed command is maintained in position lock to prevent low speed drift.

Inputs	Outputs
<ul style="list-style-type: none"> • Brake Confirm • Speed Select 1 • Drive Enable • Speed Select 2 • Run CCW • Run CW • Alarm Reset • Torque Limit Enable 	<ul style="list-style-type: none"> • Brake Output • Speed Coincidence • Running CW • Running CCW • Motor Stopped • Torque Limit On • Servo Normal

5

Pulse Position Control

In the pulse position control mode the Driver is a position loop controller accepting pulse train commands from another Delta Driver, a stepper controller, PLC

or follower encoder. Gear ratios between input pulse train and motor shaft movement are fully programmable. Torque, speed and travel limits are also programmable.

Inputs	Outputs
<ul style="list-style-type: none"> • Brake Confirm • Stop at Marker • Drive Enable • CCW Run Enable • CW Run Enable • Set "O" Position • Alarm Reset • Torque Limit Enable 	<ul style="list-style-type: none"> • Brake Output • Stopped at Marker • Set "O" Confirm • CCW Run Inhibited • CW Run Inhibited • Position Coincidence • Battery Alarm • Servo Normal

Electronic Gearing

In this mode the Driver is a positioning follower commanded from an external encoder. Electronic ratio between servo and master encoder is adjustable via I/O or

program parameters. This mode is excellent for web control where the follower axis must draw, or for the traverse function in a spooling application.

Inputs	Outputs
<ul style="list-style-type: none"> • Ratio Trim 7(MSB) • Ratio Trim 6 • Ratio Trim 5 • Ratio Trim 4 • Ratio Trim 3 • Ratio Trim 2 • Ratio Trim 1(LSB) • Drive Enable 	<ul style="list-style-type: none"> • Speed Coincidence • Running CW • Running CCW • Motor Stopped • Torque Limit On • Servo Normal

6

Driver Programming: Fast, Easy, Versatile

Use The Built-In Front Panel Keypad

The convenient tactile membrane keypad on the front of the Delta Driver makes setup a snap. Using the five keys you can scroll

through, confirm or change any of dozens of operational variables as shown here, with all data indicated on the five digit LED display.

And since the control mechanism is built right into the driver, there's nothing to lose, nothing to hunt for.

Use Your IBM-Compatible Personal Computer

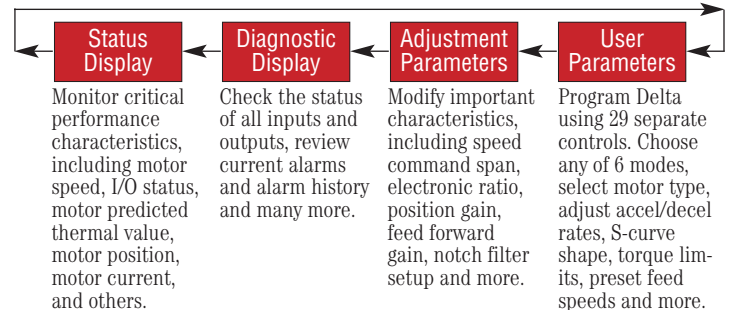
Plug your computer into the Delta Driver through the RS-232 port. Using the Delta software, you have instant access to all variables

and parameters. The software even allows you to use your PC as an oscilloscope to display speed and current waveforms. And you

can modify triggering, sampling intervals and scaling so the data is displayed exactly as you want it.

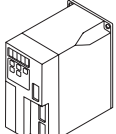
Complete Operational and Setup Information Instantly Available

Use the keypad or your PC to display and modify Delta Driver operational data.



Delta Driver DSD-8.5 Motor/Drive Packages

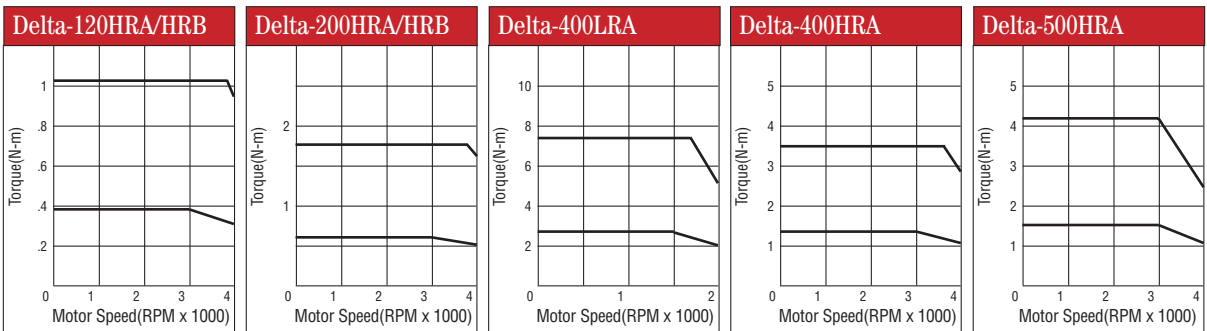
Motor/Drive Package	Motor Part Number	Drive Part Number	Power Output Watts	Rated Speed RPM	Max Speed RPM	Rated Torque			Peak Torque			Rotor Inertia		
						N-M	Lb-in	Lb-ft	N-M	Lb-in	Lb-ft	Kg-cm ²	Lb-in-sec ²	Lb-ft-sec ²
Delta-120HRA	DBM-120/30R	DSD-8.5/RA	120	3000	4000	0.38	3.36	0.28	1.03	9.12	0.76	0.103	0.000091	0.0000076
Delta-120HRB	DBM-120/30R	DSD-8.5/RB	120	3000	4000	0.38	3.36	0.28	1.03	9.12	0.76	0.103	0.000091	0.0000076
Delta-200HRA	DBM-200/30R	DSD-8.5/RA	200	3000	4000	0.64	5.66	0.47	1.76	15.58	1.30	0.148	0.000131	0.0000109
Delta-200HRB	DBM-200/30R	DSD-8.5/RB	200	3000	4000	0.64	5.66	0.47	1.76	15.58	1.30	0.148	0.000131	0.0000109
Delta-400LRA	DBM-400/15R	DSD-8.5/RA	400	1500	2000	2.55	22.57	1.88	7.35	65.05	5.42	0.760	0.000673	0.0000561
Delta-400HRA	DBM-400/30R	DSD-8.5/RA	400	3000	4000	1.27	11.24	0.94	3.53	31.24	2.60	0.233	0.000206	0.0000172
Delta-500HRA	DBM-500/30R	DSD-8.5/RA	500	3000	4000	1.59	14.07	1.17	4.20	37.17	3.10	0.470	0.000416	0.0000347



Dimensions

	in.	(mm.)
Panel height	6.70	170
Panel width	3.15	80
Depth off panel	5.90	150

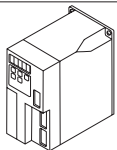
Motor/Drive Package	Motor Part Number	Motor Length		Mounting Face (Sq)		Shaft Length		Shaft Diameter		Motor Weight		Resolver Cable	Motor Cable
		mm	in	mm	in	mm	in	mm	in	kg	lbs		
Delta-120HRA	DBM-120/30R	105	4.13	60	2.36	30	1.18	14	0.551	1.0	2.2	C-245YYY	C-686YYY
Delta-120HRB	DBM-120/30R	105	4.13	60	2.36	30	1.18	14	0.551	1.0	2.2	C-245YYY	C-686YYY
Delta-200HRA	DBM-200/30R	122	4.80	60	2.36	30	1.18	14	0.551	1.3	2.9	C-245YYY	C-686YYY
Delta-200HRB	DBM-200/30R	122	4.80	60	2.36	30	1.18	14	0.551	1.3	2.9	C-245YYY	C-686YYY
Delta-400LRA	DBM-400/15R	190	7.48	95	3.74	45	1.77	19	0.748	4.5	9.9	C-246YYY	C-687YYY
Delta-400HRA	DBM-400/30R	156	6.14	60	2.36	30	1.18	14	0.551	1.9	4.2	C-245YYY	C-686YYY
Delta-500HRA	DBM-500/30R	158	6.22	95	3.74	35	1.38	14	0.551	3.2	7.1	C-246YYY	C-687YYY



All specifications are at nominal line voltage

Delta Driver DSD-17.5 Motor/Drive Packages

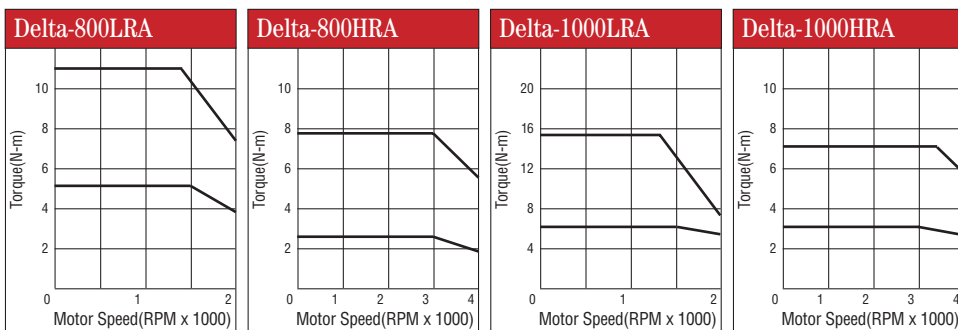
Motor/Drive Package	Motor Part Number	Drive Part Number	Power Drive Watts	Rated Output Speed RPM	Max Speed RPM	Rated Torque			Peak Torque			Rotor Inertia		
						N-M	Lb-in	Lb-ft	N-M	Lb-in	Lb-ft	Kg-cm ²	Lb-in-sec ²	Lb-ft-sec ²
Delta-800LRA	DBM-800/15R	DSD-17.5/RA	800	1500	2000	5.10	45.14	3.76	11.00	97.36	8.11	1.890	0.001673	0.0001394
Delta-800HRA	DBM-800/30R	DSD-17.5/RA	800	3000	4000	2.55	22.57	1.88	7.80	69.04	5.75	0.760	0.000673	0.0000561
Delta-1000LRA	DBM-1000/15R	DSD-17.5/RA	1000	1500	2000	6.37	56.38	4.70	15.40	136.30	11.36	2.570	0.002275	0.0001896
Delta-1000HRA	DBM-1400/30R	DSD-17.5/RA	1000	3000	4000	3.10	27.44	2.29	7.14	63.19	5.27	1.890	0.001673	0.0001394



Dimensions

	in.	(mm.)
Panel height	6.70	170
Panel width	4.69	119
Depth off panel	5.90	150

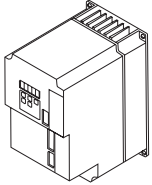
Motor/Drive Package	Motor Part Number	Motor Length		Mounting Face (Sq)		Shaft Length		Shaft Diameter		Motor Weight		Resolver Cable	Motor Cable
		mm	in	mm	in	mm	in	mm	in	kg	lbs		
Delta-800LRA	DBM-800/15R	178	7.01	130	5.12	45	1.77	19	0.748	6.2	13.7	C-246YYY	C-688YYY
Delta-800HRA	DBM-800/30R	190	7.48	95	3.74	45	1.77	19	0.748	4.5	9.9	C-246YYY	C-687YYY
Delta-1000LRA	DBM-1000/15R	196	7.72	130	5.12	45	1.77	19	0.748	7.8	17.2	C-246YYY	C-688YYY
Delta-1000HRA	DBM-1400/30R	178	7.01	130	5.12	45	1.77	19	0.748	6.2	13.7	C-246YYY	C-688YYY



All specifications are at nominal line voltage

Delta Driver DSD-35 Motor/Drive Packages

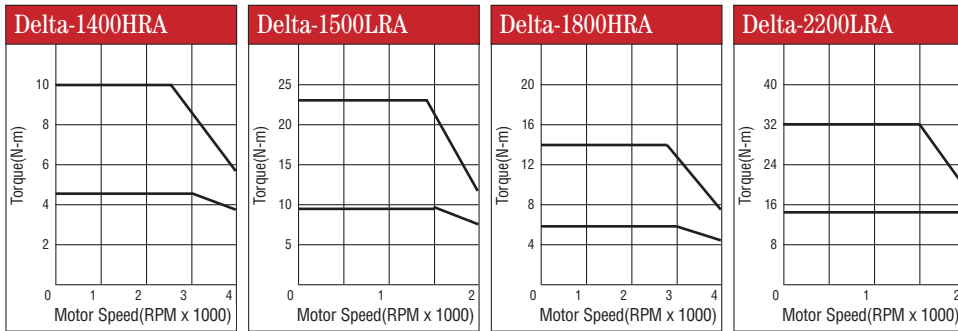
Motor/Drive Package	Motor Part Number	Drive Part Number	Power Output Watts	Rated Speed RPM	Max Speed RPM	Rated Torque			Peak Torque			Rotor Inertia		
						N-M	Lb-in	Lb-ft	N-M	Lb-in	Lb-ft	Kg-cm ²	Lb-in-sec ²	Lb-ft-sec ²
Delta-1400HRA	DBM-1400/30R	DSD-35/RA	1400	3000	4000	4.46	39.47	3.29	10.00	88.51	7.38	1.890	0.001673	0.0001394
Delta-1500LRA	DBM-1500/15R	DSD-35/RA	1500	1500	2000	9.55	84.52	7.04	23.00	203.57	16.96	4.100	0.003629	0.0003024
Delta-1800HRA	DBM-1800/30R	DSD-35/RA	1800	3000	4000	5.73	50.71	4.23	14.00	123.91	10.33	2.570	0.002275	0.0001896
Delta-2200LRA	DBM-2600/15R	DSD-35/RA	2200	1500	2000	14.08	124.62	10.38	31.66	280.21	23.35	15.200	0.013453	0.0011211



Dimensions

	in. (mm.)
Panel height	9.84 250
Panel width	5.31 135
Depth off panel	7.87 200

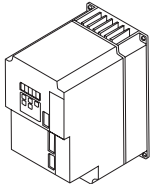
Motor/Drive Package	Motor Part Number	Motor Length		Mounting Face (Sq)		Shaft Length		Shaft Diameter		Motor Weight		Resolver Cable	Motor Cable
		mm	in	mm	in	mm	in	mm	in	kg	lbs		
Delta-1400HRA	DBM-1400/30R	178	7.01	130	5.12	45	1.77	19	0.748	6.2	13.7	C-246YYY	C-689YYY
Delta-1500LRA	DBM-1500/15R	236	9.29	130	5.12	55	2.17	24	0.945	10.9	24.0	C-246YYY	C-689YYY
Delta-1800HRA	DBM-1800/30R	196	7.72	130	5.12	45	1.77	19	0.748	7.8	17.2	C-246YYY	C-689YYY
Delta-2200LRA	DBM-2600/15R	238	9.37	180	7.09	79	3.11	35	1.378	20.0	44.1	C-246YYY	C-690YYY



All specifications are at nominal line voltage

Delta Driver DSD-50 Motor/Drive Packages

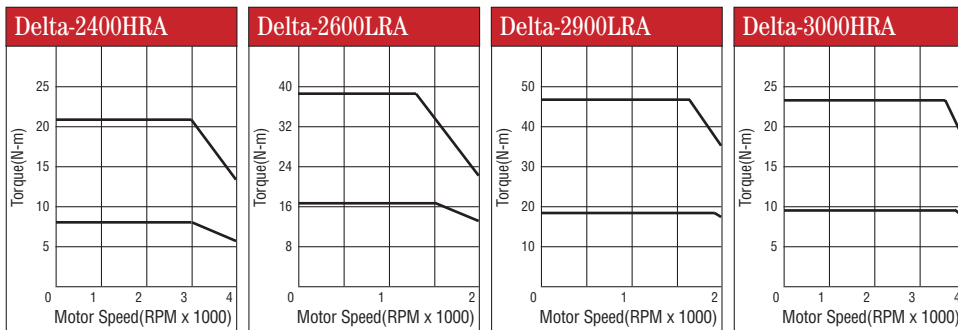
Motor/Drive Package	Motor Part Number	Drive Part Number	Power Output Watts	Rated Speed RPM	Max Speed RPM	Rated Torque			Peak Torque			Rotor Inertia		
						N-M	Lb-in	Lb-ft	N-M	Lb-in	Lb-ft	Kg-cm ²	Lb-in-sec ²	Lb-ft-sec ²
Delta-2400HRA	DBM-2400/30R	DSD-50/RA	2400	3000	4000	7.64	67.62	5.63	21.00	185.87	15.49	4.100	0.003629	0.0003024
Delta-2600LRA	DBM-2600/15R	DSD-50/RA	2600	1500	2000	16.60	146.92	12.24	38.00	336.33	28.03	15.200	0.013453	0.0011211
Delta-2900LRA	DBM-3700/15R	DSD-50/RA	2900	1500	2000	18.58	164.45	13.70	46.67	413.06	34.42	22.300	0.019737	0.0016448
Delta-3000HRA	DBM-3700/30R	DSD-50/RA	3000	3000	4000	9.56	84.61	7.05	23.18	205.16	17.10	15.200	0.013453	0.0011211



Dimensions

	in. (mm.)
Panel height	9.84 250
Panel width	5.31 135
Depth off panel	7.87 200

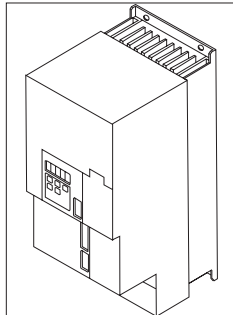
Motor/Drive Package	Motor Part Number	Motor Length		Mounting Face (Sq)		Shaft Length		Shaft Diameter		Motor Weight		Resolver Cable	Motor Cable
		mm	in	mm	in	mm	in	mm	in	kg	lbs		
Delta-2400HRA	DBM-2400/30R	236	9.29	130	5.12	55	2.17	24	0.945	10.9	24.0	C-246YYY	C-689YYY
Delta-2600LRA	DBM-2600/15R	238	9.37	180	7.09	79	3.11	35	1.378	20.0	44.1	C-246YYY	C-690YYY
Delta-2900LRA	DBM-3700/15R	288	11.34	180	7.09	79	3.11	35	1.378	27.0	59.5	C-246YYY	C-691YYY
Delta-3000HRA	DBM-3700/30R	236	9.29	180	7.09	79	3.11	35	1.378	20.0	44.1	C-246YYY	C-691YYY



All specifications are at nominal line voltage

Delta Driver DSD-70 Motor/Drive Packages

Motor/Drive Package	Motor Part Number	Drive Part Number	Power Output Watts	Rated Speed RPM	Max Speed RPM	Rated Torque			Peak Torque			Rotor Inertia		
						N-M	Lb-in	Lb-ft	N-M	Lb-in	Lb-ft	Kg-cm ²	Lb-in-sec ²	Lb-ft-sec ²
Delta-3700LRA	DBM-3700/15R	DSD-70/RA	3700	1500	2000	23.60	208.88	17.41	60.00	531.05	44.25	22.300	0.019737	0.0016448
Delta-3700HRA	DBM-3700/30R	DSD-70/RA	3700	3000	4000	11.80	104.44	8.70	29.80	263.75	21.98	15.200	0.013453	0.0011211
Delta-4300HRA	DBM-5500/30R	DSD-70/RA	4300	3000	4000	13.76	121.79	10.15	36.15	319.95	26.66	22.300	0.019737	0.0016448

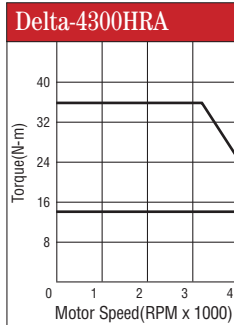
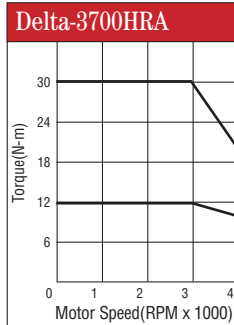
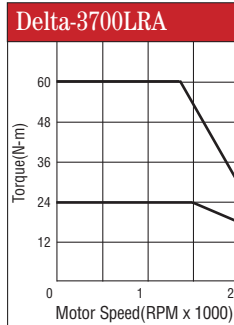


Dimensions

	in.	(mm.)
Panel height	14.56	370
Panel width	6.29	160
Depth off panel	8.66	220

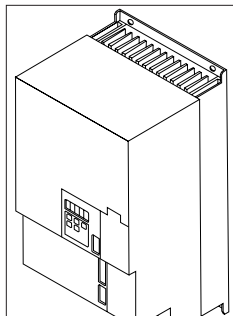
All specifications are at nominal line voltage

Motor/Drive Package	Motor Part Number	Motor Length		Mounting Face (Sq)		Shaft Length		Shaft Diameter		Motor Weight		Resolver Cable	Motor Cable
		mm	in	mm	in	mm	in	mm	in	kg	lbs		
Delta-3700LRA	DBM-3700/15R	288	11.34	180	7.09	79	3.11	35	1.378	27.0	59.5	C-246YYY	C-691YYY
Delta-3700HRA	DBM-3700/30R	236	9.29	180	7.09	79	3.11	35	1.378	20.0	44.1	C-246YYY	C-691YYY
Delta-4300HRA	DBM-5500/30R	288	11.34	180	7.09	79	3.11	35	1.378	27.0	59.5	C-246YYY	C-692YYY



Delta Driver DSD-115 Motor/Drive Packages

Motor/Drive Package	Motor Part Number	Drive Part Number	Power Output Watts	Rated Speed RPM	Max Speed RPM	Rated Torque			Peak Torque			Rotor Inertia		
						N-M	Lb-in	Lb-ft	N-M	Lb-in	Lb-ft	Kg-cm ²	Lb-in-sec ²	Lb-ft-sec ²
Delta-5000LRA	DBM-5000/15R	DSD-115/RA	5000	1500	2000	31.80	281.45	23.45	76.00	672.66	56.05	30.000	0.026552	0.0022127
Delta-5500HRA	DBM-5500/30R	DSD-115/RA	5500	3000	4000	17.50	154.89	12.91	47.00	415.99	34.67	22.300	0.019737	0.0016448
Delta-6500HRA	DBM-6500/30R	DSD-115/RA	6500	3000	4000	20.70	183.21	15.27	60.00	531.05	44.25	30.000	0.026552	0.0022127

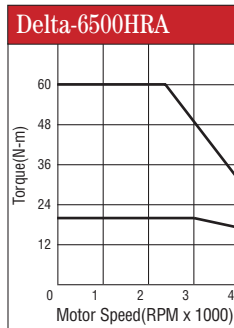
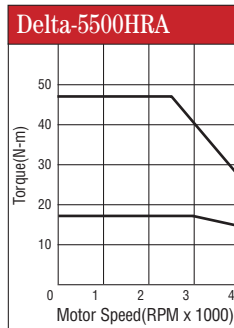
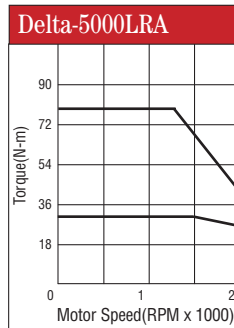


Dimensions

	in.	(mm.)
Panel height	16.14	410
Panel width	8.66	220
Depth off panel	8.66	220

All specifications are at nominal line voltage

Motor/Drive Package	Motor Part Number	Motor Length		Mounting Face (Sq)		Shaft Length		Shaft Diameter		Motor Weight		Resolver Cable	Motor Cable
		mm	in	mm	in	mm	in	mm	in	kg	lbs		
Delta-5000LRA	DBM-5000/15R	338	13.31	180	7.09	79	3.11	35	1.378	34.0	75.0	C-246YYY	C-692YYY
Delta-5500HRA	DBM-5500/30R	288	11.34	180	7.09	79	3.11	35	1.378	27.0	59.5	C-246YYY	C-692YYY
Delta-6500HRA	DBM-6500/30R	338	13.31	180	7.09	79	3.11	35	1.378	34.0	75.0	C-246YYY	C-692YYY



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This data is subject to change without notice.