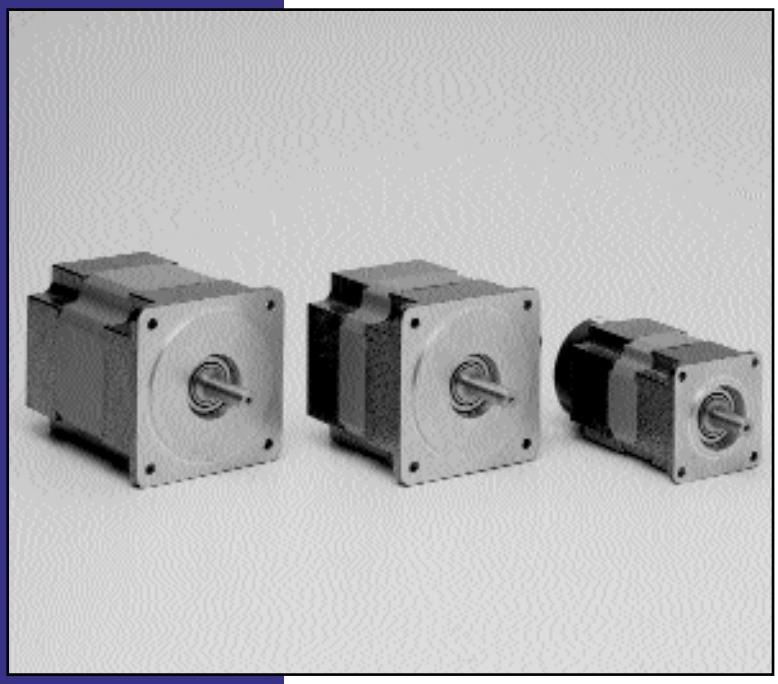
Data Publication

Kollmorgen SILVERLINE™ Brushless Series Motors



- **58.8 to 786 oz-in (0.4 to 5.5 N-m) Continuous Stall Torque**
- **2.3” to 3.43” Square Frame**
- **Mechanically Equivalent to NEMA Size 23* and 34* Step Motors**
- **Standard Hall Effect Feedback**
- **Optional Encoder**
- **IP-40 Sealing**

Now, low cost servos can replace steppers and enhance performance without loss of reliability. Engineered for high performance, the H-Series brushless servomotors offer the advantage of being mechanically equivalent to NEMA Size 23* and 34* step motors.

These servomotors and the complementary Kollmorgen **SILVER**LINE Series Amplifiers are available at a low cost making possible many new opportunities for servo motion.

FEATURES:

- Multiple stack length and winding variations provide optimization of product selection for a particular application
- High-energy product rare earth magnets result in low inertia rotors allowing rapid acceleration and deceleration
- Use with Kollmorgen’s low cost six-step controllers
- Standard options include:
  - Encoders
  - Connectors

COMPATIBLE PRODUCTS

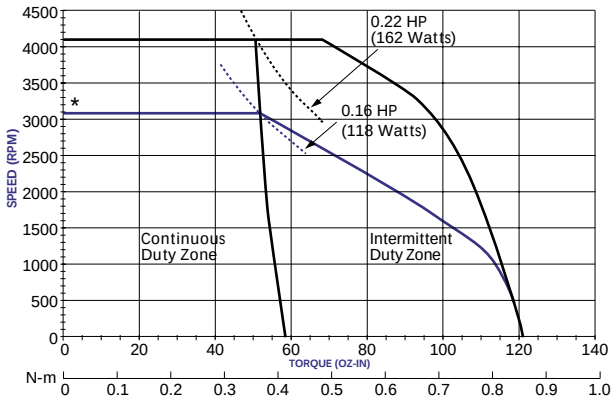
- SO Amplifier
- RO Amplifier
- ROL Amplifier
- BJR Amplifier/Positioner
- BJRL Amplifier/Positioner
- SERVO**STAR** SE

KOLLMORGEN
Motion Technologies Group

H-23X PERFORMANCE CURVES

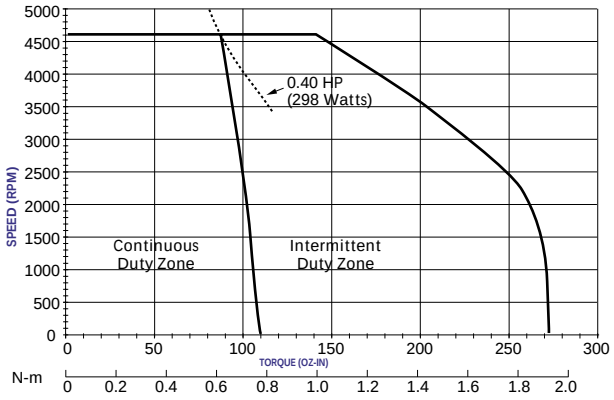
■ Motor: H-232-G ■ Amplifier: SO-4008 ■ Bus Voltage: 40

Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	58.8
		N-m	0.415
Peak Torque at stall	Tp	oz-in	121.0
		N-m	0.85
Cont. Power	HP rated	HP	0.22
	W rated	Watts	162
Max. Speed	N	RPM	4150
Motor Inertia x 10^4	Jm	oz-in-s^2	24.4
		kg-cm^2	0.17
Motor Weight	Wt	lb	2.0
		kg	0.91



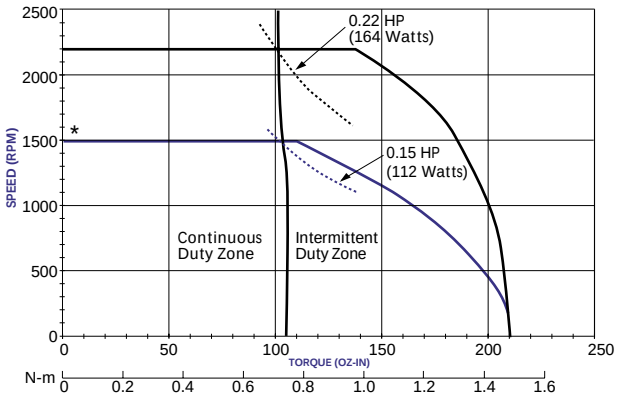
■ Motor: H-234-F ■ Amplifier: ROL-20004 ■ Bus Voltage: 150

Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	111.0
		N-m	0.784
Peak Torque at stall	Tp	oz-in	272.0
		N-m	1.93
Cont. Power	HP rated	HP	0.40
	W rated	Watts	298
Max. Speed	N	RPM	4600
Motor Inertia x 10^4	Jm	oz-in-s^2	32.6
		kg-cm^2	0.23
Motor Weight	Wt	lb	2.8
		kg	1.27



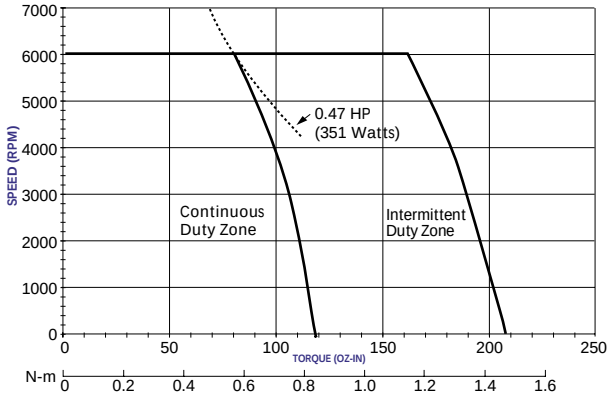
■ Motor: H-234-G ■ Amplifier: SO-4008 ■ Bus Voltage: 40

Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	106.0
		N-m	0.749
Peak Torque at stall	Tp	oz-in	210.0
		N-m	1.49
Cont. Power	HP rated	HP	0.22
	W rated	Watts	164
Max. Speed	N	RPM	2200
Motor Inertia x 10^4	Jm	oz-in-s^2	32.6
		kg-cm^2	0.23
Motor Weight	Wt	lb	2.8
		kg	1.27



■ Motor: H-234-H ■ Amplifier: ROL-20012 ■ Bus Voltage: 150

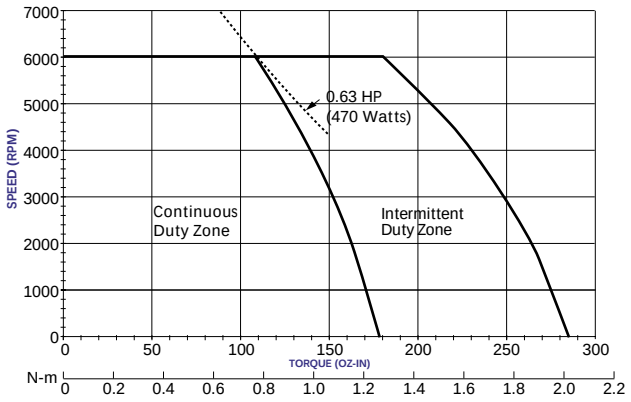
Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	118.0
		N-m	0.833
Peak Torque at stall	Tp	oz-in	208
		N-m	1.47
Cont. Power	HP rated	HP	0.47
	W rated	Watts	351
Max. Speed	N	RPM	6000
Motor Inertia x 10^4	Jm	oz-in-s^2	32.6
		kg-cm^2	0.23
Motor Weight	Wt	lb	2.8
		kg	1.27



H-34X PERFORMANCE CURVES

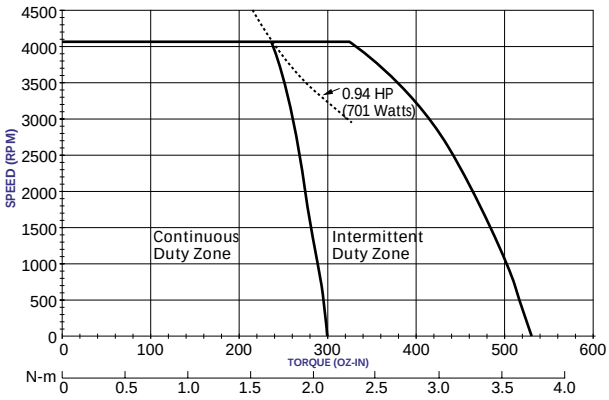
■ **Motor: H-342-H** ■ **Amplifier: ROL-20012** ■ **Bus Voltage: 150**

Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	179.0
		N-m	1.26
Peak Torque at stall	Tp	oz-in	290
		N-m	2.06
Cont. Power	HP rated	HP	0.63
	W rated	Watts	470
Max. Speed	N	RPM	6000
Motor Inertia x 10^4	Jm	oz-in-s^2	67.9
		kg-cm^2	0.48
Motor Weight	Wt	lb	3.92
		kg	1.78



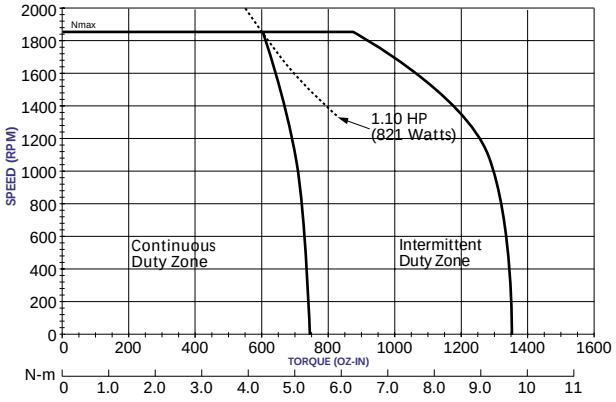
■ **Motor: H-344-H** ■ **Amplifier: ROL-20012** ■ **Bus Voltage: 150**

Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	297.0
		N-m	2.10
Peak Torque at stall	Tp	oz-in	532
		N-m	3.77
Cont. Power	HP rated	HP	0.94
	W rated	Watts	701
Max. Speed	N	RPM	4050
Motor Inertia x 10^4	Jm	oz-in-s^2	130.0
		kg-cm^2	0.92
Motor Weight	Wt	lb	5.84
		kg	2.65



■ **Motor: H-348-H** ■ **Amplifier: ROL-20012** ■ **Bus Voltage: 150**

Performance Specification	Symbol	Units	
Cont. Torque at stall	Tc	oz-in	745.0
		N-m	5.21
Peak Torque at stall	Tp	oz-in	1350
		N-m	9.45
Cont. Power	HP rated	HP	1.10
	W rated	Watts	821
Max. Speed	N	RPM	1850
Motor Inertia x 10^4	Jm	oz-in-s^2	377.2
		kg-cm^2	2.66
Motor Weight	Wt	lb	13.9
		kg	6.32



* For performance curves H-232-G and H-234-G,
— colored line is SO-4008 with SPS-4008, 30 VDC Bus

Notes:
All charts: Curve @ ambient temp of 40° C

H-23X CHARACTERISTIC DATA TABLE

H-23X						
MOTOR PARAMETERS SIX STEP OPERATION	Symbol	Units	WINDING DATA H-232-G	H-234-F	H-234-G	H-234-H
Continuous Power	HP rtd	HP	0.22	0.40	0.22	0.47
	W rtd	W	162	299	164	351
**Speed[4]	N rtd	RPM	4150	4600	2200	6000
		oz-in	53.0	88.0	101	79
Torque	T rtd	N-m	0.374	0.621	0.712	0.558
Maximum Speed[3]	N max	RPM	6000	6000	6000	6000
*Continuous Torque (stall)	Tc	oz-in	58.8	111	113	118
@ 40ºC ambient		N-m	0.415	0.784	0.798	0.833
Cont. Line Current	Ic	amps DC	6.85	3.89	7.65	12.6
		oz-in	131	282	253	258
*Peak Torque	Tp	N-m	0.93	1.99	1.78	1.82
Peak Line Current	Ip	amps DC	17.0	11.0	19.0	30.5
Theoretical Acceleration	acc	rad/sec^2	53900	86500	77500	79100
*Torque Sensitivity		oz-in/ADC	8.59	28.5	14.8	9.39
(Effective) +/- 10%	Kt[1]	N-m/ADC	0.0607	0.201	0.104	0.0663
Back EMF (line to line)+/- 10%	Kb[2]	V_{O-PK}/KRPM	7.21	23.9	12.4	7.89
Max Line to Line Volts	V max	$Volts_{RMS}$	250	250	250	250
DC Res @ 25ºC (line to line)+/- 10%	Rm	ohms	0.497	2.30	0.606	0.252
Inductance (line to line)+/- 30%	Lm	mh	0.941	4.63	1.27	0.52
		oz-in-sec^2	0.00244	0.00326	0.00326	0.00326
Rotor Inertia	Jm	kg-m^2	0.000017	0.000023	0.000023	0.000023
		lb	2.0	2.8	2.8	2.8
Weight including Encoder	Wt	kg (f)	0.91	1.27	1.27	1.27
		oz-in	4.05	6.2	6.2	6.2
Coulomb Friction	Tf	N-m	0.029	0.044	0.044	0.044
Thermal Time Constant	TCT	minutes	8.1	12.5	12.5	12.5
Viscous Damping	Fi	oz-in/KRPM	0.174	0.41	0.41	0.41
Infinite Z Source		N-m/KRPM	0.0012	0.0029	0.0029	0.0029
		lb	0.075	0.075	0.075	0.075
Encoder Weight	Wt	kg (f)	0.0340	0.0340	0.0340	0.0340
Time Constant Mech	Tm	msec	2.05	1.15	1.13	1.16
@ 25ºC Elec	Te	msec	1.89	2.01	2.09	2.08
Motor Constant @ 25ºC	Km	oz-in/$\sqrt{\text{watts}}$	13.2	20.3	20.5	20.2
Thermal Resistance @ stall	Rth	ºC/Watt	2.9	2.2	2.7	2.0

Hall Switches Set For 120 Degree Commutation. Pole Pairs = 3
*PARAMETERS AT ULTIMATE WINDING TEMPERATURE .... FOR 25°C AMBIENT DATA MULTIPLY BY: 1.08
Continuous ratings with motor on 6" x 6" x 0.25" isolated aluminum heatsink.

1. For RMS Parameters when used with Sinusoidal Drives, multiply KT above by 1.2828 to get KT = oz-in/Arms.
2. For RMS Parameters when used with Sinusoidal Drives, divide KB shown above by 1.414 to get KB = Vrms/krpm.
3. Max Speed is least of the electical, mechanical, feedback or bearing limits. Motor must be used with drives w/overspeed protection.
4. Speeds below 6000 RPM are system limited, see performance curves.

H-34X CHARACTERISTIC DATA TABLE

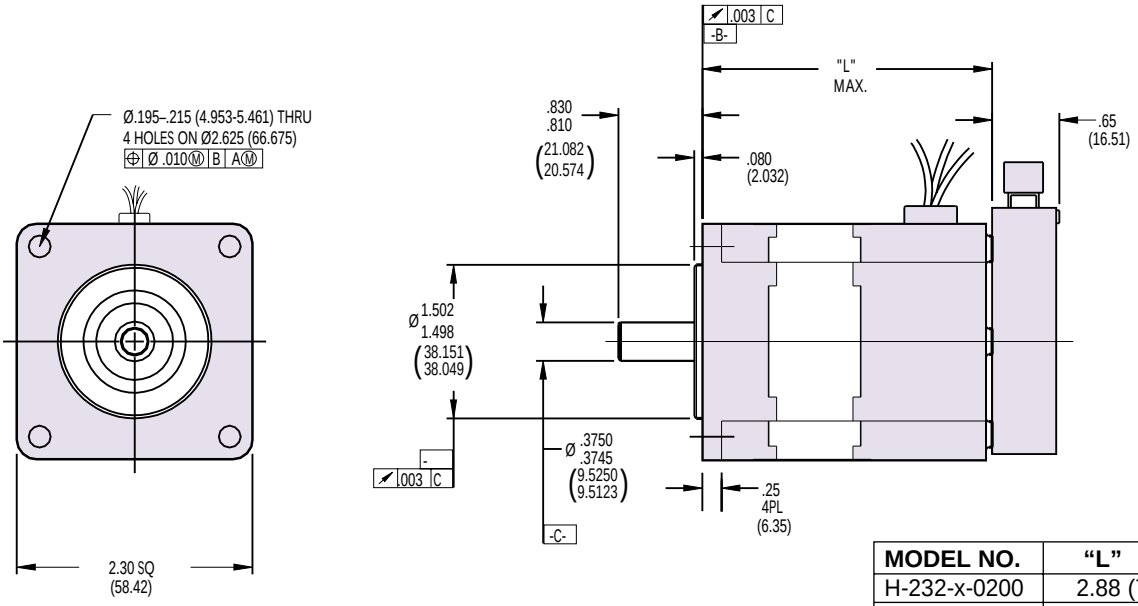
MOTOR PARAMETERS SIX STEP OPERATION	Symbol	Units	H-34X WINDING DATA H-342-H	H-344-H	H-348-H
Continuous Power	HP rtd	HP	0.63	0.94	1.10
	W rtd	W	470	701	821
**Speed[4]	N rtd	RPM	6000	4050	1850
		oz-in	106	234	600
Torque[3]	T rtd	N-m	0.749	1.65	4.24
Maximum Speed	N max	RPM	6000	6000	6000
*Continuous Torque (stall)	Tc	oz-in	179	297	745
@ 40ºC ambient		N-m	1.26	2.10	5.26
Cont. Line Current	Ic	amps DC	12.0	11.7	11.5
		oz-in	375	745	2012
*Peak Torque	Tp	N-m	2.65	5.26	14.21
Peak Line Current	Ip	amps DC	28.0	32.6	34.5
Theoretical Acceleration	acc	rad/sec^2	55300	57300	53300
*Torque Sensitivity		oz-in/ADC	14.9	25.40	64.7
(Effective) +/- 10%	Kt[1]	N-m/ADC	0.105	0.179	0.457
Back EMF (line to line)+/- 10%	Kb[2]	V_{O-PK}/KRPM	12.5	21.3	54.3
Max Line to Line Volts	V max	$Volts_{RMS}$	250	250	250
DC Res @ 25ºC (line to line)+/- 10%	Rm	ohms	0.318	0.360	0.582
Inductance (line to line)+/- 30%	Lm	mh	1.53	2.04	4.25
		oz-in-sec^2	0.00679	0.0130	0.0377
Rotor Inertia	Jm	kg-m^2	0.000048	0.000092	0.000266
		lb	3.92	5.8	13.9
Weight including Encoder	Wt	kg (f)	1.78	2.65	6.32
		oz-in	4.0	8.52	8.5
Coulomb Friction	Tf	N-m	0.028	0.060	0.060
Thermal Time Constant	TCT	minutes	11.4	16.2	33
Viscous Damping	Fi	oz-in/KRPM	0.81	0.951	4.73
Infinite Z Source		N-m/KRPM	0.0057	0.00672	0.0334
		lb	0.075	0.075	0.075
Encoder Weight	Wt	kg (f)	0.0340	0.0340	0.0340
Time Constant Mech	Tm	msec	1.21	0.91	0.654
@ 25ºC Elec	Te	msec	4.81	5.67	7.3
Motor Constant @ 25ºC	Km	oz-in/$\sqrt{\text{watts}}$	28.5	45.7	91.6
Thermal Resistance @ stall	Rth	ºC/Watt	1.7	1.6	0.9

Hall Switches Set For 120 Degree Commutation. Pole Pairs = 3
*PARAMETERS AT ULTIMATE WINDING TEMPERATURE .... FOR 25°C AMBIENT DATA MULTIPLY BY: 1.08
Continuous ratings with motor on 10" x 10" x 0.25" isolated aluminum heatsink.

1. For RMS Parameters when used with Sinusoidal Drives, multiply KT above by 1.2828 to get KT = oz-in/Arms.
2. For RMS Parameters when used with Sinusoidal Drives, divide KB shown above by 1.414 to get KB = Vrms/krpm.
3. Max Speed is least of the electical, mechanical, feedback or bearing limits. Motor must be used with drives w/overspeed protection.
4. Speeds below 6000 RPM are system limited, see performance curves.

H-SERIES OUTLINE AND DIMENSIONS

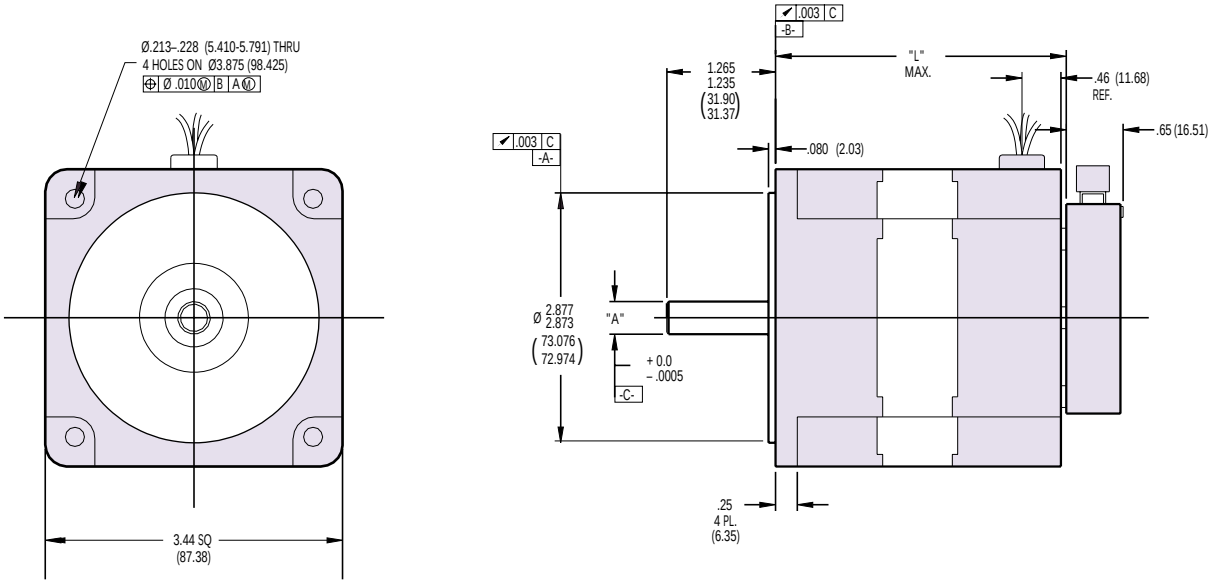
H-23X-0200



MODEL NO.	"L"
H-232-x-0200	2.88 (73.15)
H-234-x-0200	3.68 (93.47)
H-236-x-0200	5.28 (134.11)
H-238-x-0200	6.88 (174.75)

Dimensions in Inches (mm)

H-34X-0200

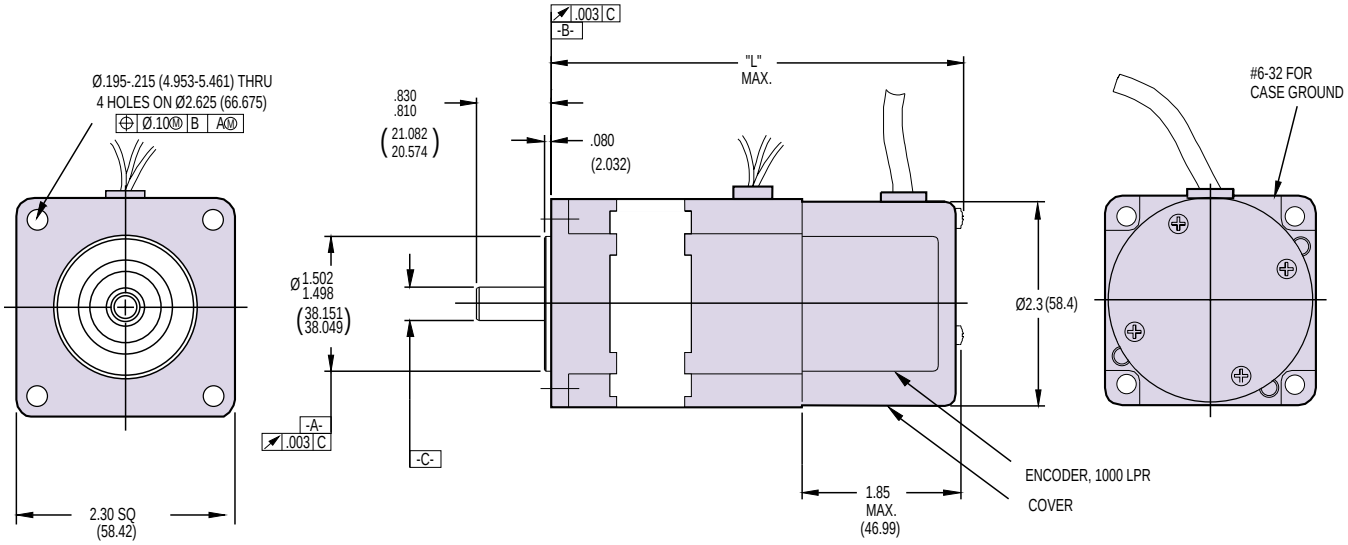


MODEL NO.	"L"	"A"
H-342-x-0200	3.42 (86.87)	.3750 (9.525)
H-344-x-0200	4.38 (111.25)	.3750 (9.525)
H-346-x-0200	6.23 (158.24)	.5000 (12.7)
H-348-x-0200	8.06 (204.72)	.5000 (12.7)

Dimensions in Inches (mm)

H-SERIES OUTLINE AND DIMENSIONS

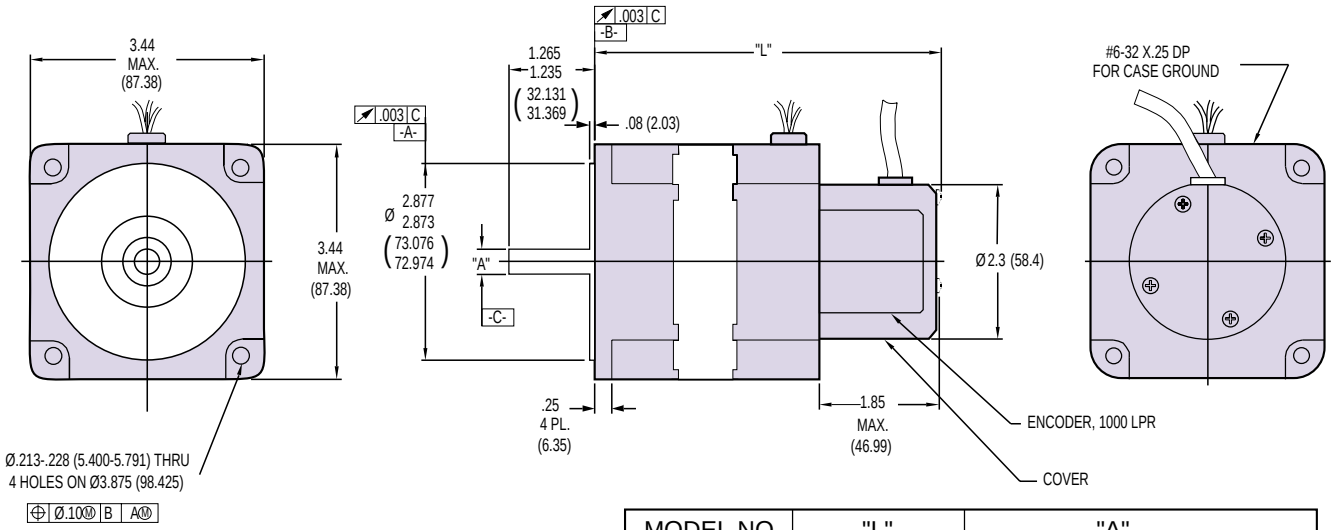
H-23X-0600



MODEL NO.	"L"
H-232-0600	4.73 (120.14)
H-234-0600	5.53 (140.46)

Dimensions in Inches (mm)

H-34X-0600

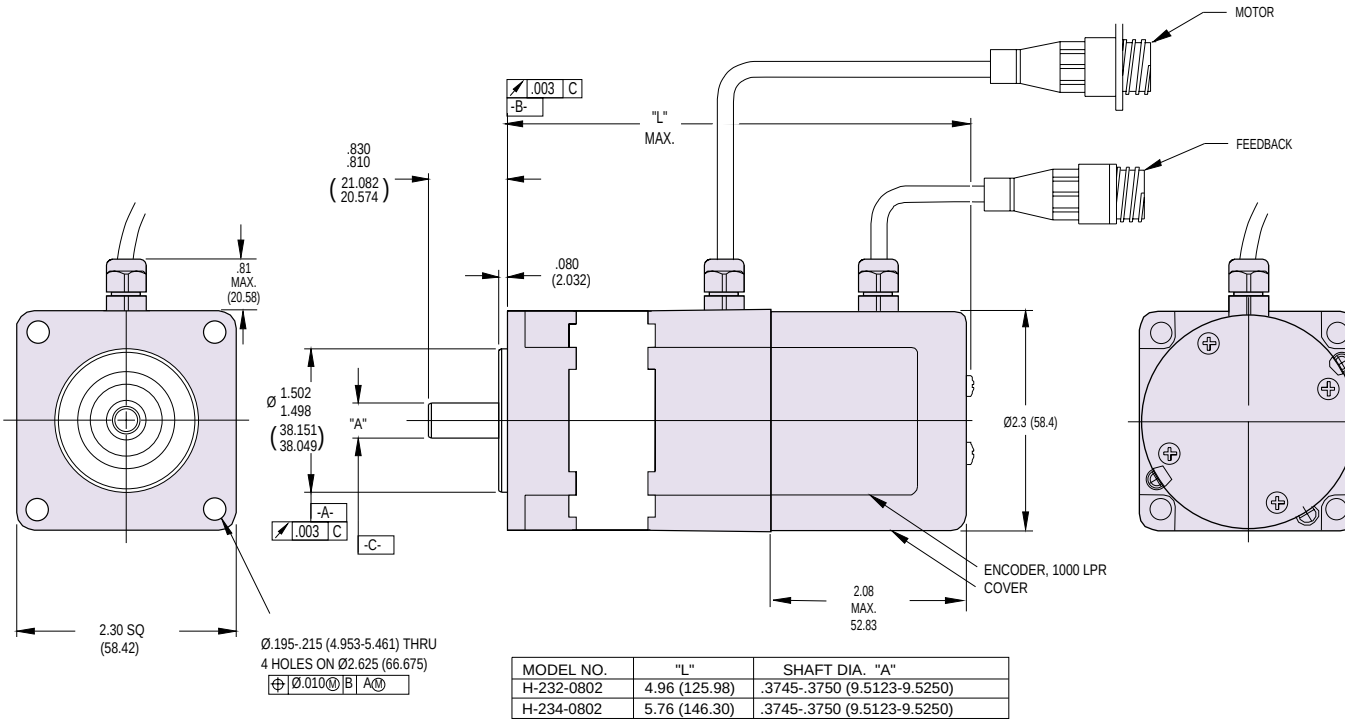


MODEL NO.	"L"	"A"
H-342-0600	5.22 (132.59)	.3745-.3750 (9.5123-9.5250)
H-344-0600	6.17 (156.72)	.3745-.3750 (9.5123-9.5250)
H-348-0600	9.84 (249.94)	.4995-.5000 (12.6873-12.7000)

Dimensions in Inches (mm)

H-SERIES OUTLINE AND DIMENSIONS

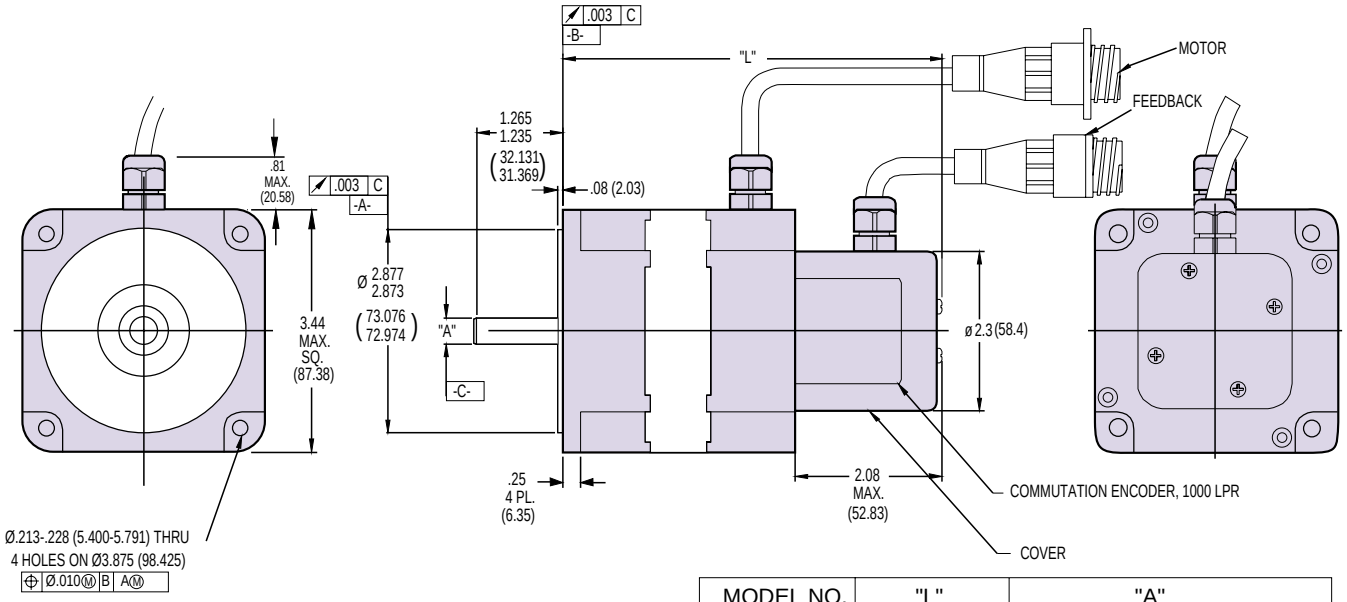
H-23X-0802



MODEL NO.	"L"	SHAFT DIA. "A"
H-232-0802	4.96 (125.98)	.3745-.3750 (9.5123-9.5250)
H-234-0802	5.76 (146.30)	.3745-.3750 (9.5123-9.5250)

Dimensions in Inches (mm)

H-34X-0802



MODEL NO.	"L"	"A"
H-342-0802	5.37(136.40)	.3745-.3750 (9.5123-9.5250)
H-344-0802	6.32 (160.53)	.3745-.3750 (9.5123-9.5250)
H-348-0802	9.99 (243.75)	.4995-.5000 (12.6873-12.7000)

Dimensions in Inches (mm)

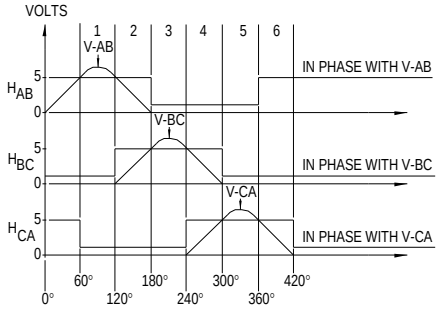
H-SERIES NOTES

NOTES (GENERAL)

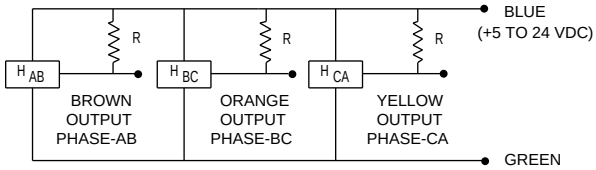
1. FOR A C.C.W. ROTATION AS VIEWED FROM MOUNTING END. ENERGIZE PER EXCITATION SEQUENCE TABLE.
2. 1.5K OHMS APPROX. PULL UP RESISTERS REQUIRED ACROSS EACH HALL OUTPUT TO +V, IF NOT SUPPLIED BY DRIVE. (INCLUDED IN ALL KMTG DRIVES)
3. V-AB, V-BC AND V-CA IS BACK EMF OF MOTOR PHASES AB, BC AND CA RESPECTIVELY, ALIGNED WITH SENSOR OUTPUT AS SHOWN FOR C.C.W. ROTATION ONLY.
4. SHAFT RUNOUT .0015 MEASURED .12 FROM END OF SHAFT.
5. METRIC DIMENSIONS SHOWN IN ( ).
6. SEE ED-27381 FOR ENCODER SPECIFICATION.(0600)
7. SEE ED-27403 FOR COMMUTATION ENCODER SPECIFICATION.(0802)
8. SEE ED-27404 FOR THERMISTOR SPECIFICATION.(0802)

STEP	PHASE A RED	PHASE B WHITE	PHASE C BLACK
1	+	-	
2	+		-
3		+	-
4	-	+	
5	-		+
6		-	+

MOTOR EXCITATION SEQUENCE TABLE



SENSOR OUTPUT



SENSOR WIRING DIAGRAM

NOTES (0200)

LEADS:

MOTOR: 3-#16 AWG, TEFLON 18" MIN. LONG EACH

SENSOR: 5-#26 AWG, TEFLON 18" MIN. LONG EACH

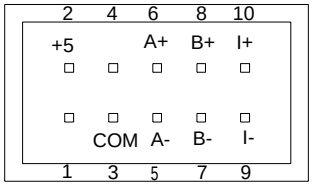
ENCODER: 10 PIN RIBBON CABLE

MOTOR WIRING TABLE	
WIRE COLOR	FUNCTION
RED	PHASE A
WHITE	PHASE B
BLACK	PHASE C

HALL WIRING TABLE	
WIRE COLOR	FUNCTION
BROWN	PHASE AB (S1)
ORANGE	PHASE BC (S2)
YELLOW	PHASE CA (S3)
BLUE	+5 TO 24 VDC
GREEN	COMMON

ENCODER WIRING TABLE	
CH A LEADS CH B, C.C.W.	
PIN #	FUNCTION
PIN 1	NC
PIN 2	+5 V
PIN 3	COMMON
PIN 4	NC
PIN 5	DATA $\bar{A}$
PIN 6	DATA A
PIN 7	DATA $\bar{B}$
PIN 8	DATA B
PIN 9	INDEX $\bar{Z}$
PIN 10	INDEX Z

△ON CONECTOR IDENTIFIES PIN #1 ON BOTH LD AND MODULE



H-SERIES NOTES

NOTES (0600)

LEADS:

MOTOR: 3-#16 AWG, TEFLON
18" MIN. LONG EACH

SENSOR: 5-#26 AWG, TEFLON
18" MIN. LONG EACH

ENCODER: #28 AWG, PVC,
18" LONG SHIELDED CABLE

MOTOR WIRING TABLE

WIRE COLOR	FUNCTION
RED	PHASE A
WHITE	PHASE B
BLACK	PHASE C

HALL WIRING TABLE

WIRE COLOR	FUNCTION
BROWN	PHASE AB (S1)
ORANGE	PHASE BC (S2)
YELLOW	PHASE CA (S3)
BLUE	+5 TO 24 VDC
GREEN	COMMON

ENCODER WIRING TABLE

CH A LEADS CH B, C.C.W.

WIRE COLOR	FUNCTION
BLACK	COMMON
WHITE	+5 VDC
RED	DATA A
BROWN	DATA B
ORANGE	INDEX Z
GREEN	DATA $\bar{A}$
YELLOW	DATA $\bar{B}$
BLUE	INDEX $\bar{Z}$
BARE	SHIELD DRAIN

NOTES (0802)

MOTOR:
12" LG CONNECTOR ASS'Y,
AMP CPC SERIES 1, VDE, 13-7
BOX RECEPTACLE #211401-1

FEEDBACK:
12" LG CONNECTOR ASS'Y,
AMP CPC SERIES 1, 17-16
FREE HANGING RECEPTACLE #206036-3

MOTOR CONNECTION TABLE

13-7 SHELL

PIN #	COLOR	FUNCTION
PIN 1	RED	PHASE A
PIN 2	WHITE	PHASE B
PIN 3	———	NC
PIN 4	BARE	SHIELD
PIN 5	———	NC
PIN 6	BLACK	PHASE C
PIN 7	GREEN	CASE GND

FEEDBACK WIRING TABLE

CH A LEADS CH B, C.C.W.

PIN #	FUNCTION
PIN 1	THERMISTOR
PIN 2	THERMISTOR
PIN 3	DATA A
PIN 4	DATA B
PIN 5	INDEX Z
PIN 6	DATA $\bar{A}$
PIN 7	DATA $\bar{B}$
PIN 8	INDEX $\bar{Z}$
PIN 9	+5 VDC
PIN 10	COMMON
PIN 11	SHIELD
PIN 12	H_{AB} (S1)
PIN 13	H_{BC} (S2)
PIN 14	H_{CA} (S3)
PIN 15	NC
PIN 16	NC

REFERENCE: AMP MATING PLUG P/N NOT SUPPLIED WITH MOTOR

	CONNECTOR	BACKSHELL	SOCKETS	AWG
MOTOR (13-7)	211399-1	206966-1	66601-2	14-18
FEEDBACK (17-16)	206037-1	206070-1	66105-3	20-24

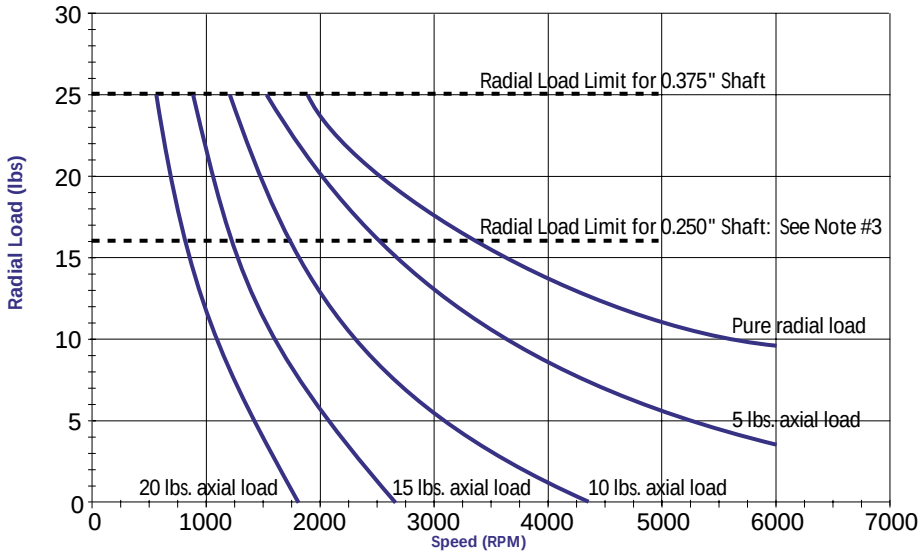
CABLE SETS

CS-SL-CSE1SQ-06
6 meter cable set for BJRLs and H-Series motors with 0802 and 0804 options

CS-SL-CSD1SQ-06
6 meter cable set for ROLs and H-Series motors with 0802 and 0804 options

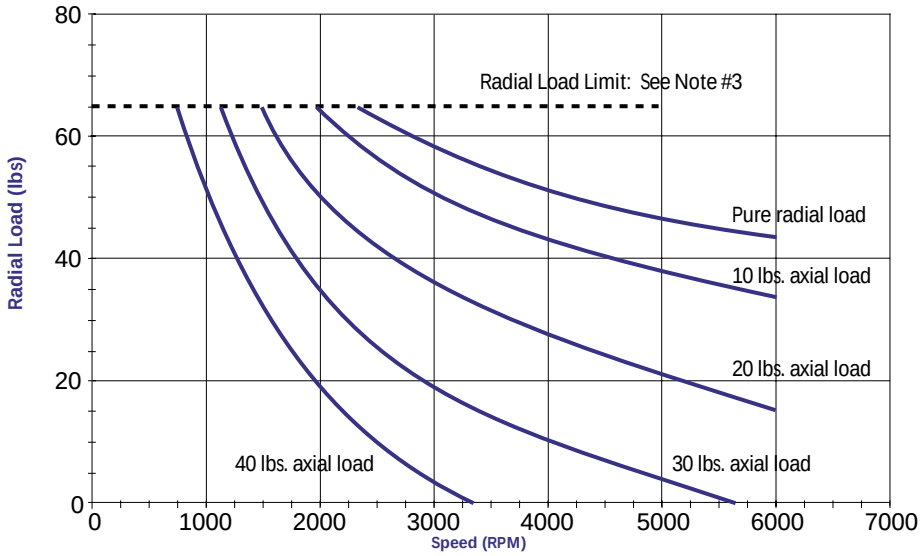
SHAFT LOADING

H-23X Allowable Shaft Loading (Calculated Combined Radial & Axial loads for 20,000 hours L10)



1.) Pure radial load assumes axial load = 10% radial
2.) Pure axial load rating occur where curve intercepts x axis at zero radial load
3.) 0.250" shaft only available on H-232 & H-234 motors
4.) Radial loads applied 0.75" from mounting surface

H-34X Allowable Shaft Loading (Calculated Combined Radial & Axial loads for 20,000 hours L10)



1.) Pure radial load assumes axial load = 10% radial
2.) Pure axial load rating occur where curve intercepts x axis at zero radial load
3.) For 0.375" diameter shaft on H-342, H-344 motors. For 0.5" diameter shaft on H-346, H-348 motors
4.) Radial loads applied 1.0" from mounting surface

H-SERIES COMPATIBILITY MATRIX / MODEL NUMBER

Motor	Continuous Torque	Peak Torque	Continuous Power	Rated Max Speed	MOTOR/AMPLIFIER COMBINATIONS		
	oz-in (N-m)	oz-in (N-m)	HP (Watts)	RPM	SO-4008 BJR-4008	RO(L)-20004 BJRL-20004	RO(L)-20012 BJRL-20012
H-232-G	58.8 (0.415)	131 (0.93)	0.22 (162)	4150	X		
H-234-F	111 (0.784)	282 (1.99)	0.40 (298)	4600		X	
H-234-G	113 (0.798)	253 (1.78)	0.22 (164)	2200	X		
H-234-H	118 (0.883)	258 (1.82)	0.47 (351)	6000			X
H-342-H	179 (1.26)	375 (2.65)	0.63 (470)	5500			X
H-344-H	297 (2.10)	745 (5.26)	0.94 (701)	4050			X
H-348-H	745 (5.21)	2012 (14.21)	1.10 (821)	1850			X

Maximum System Speed (6000 RPM) is limited by the encoder in velocity loop mode

H-Series Motors

H - 2 3 2 - G - 0 0 0 0

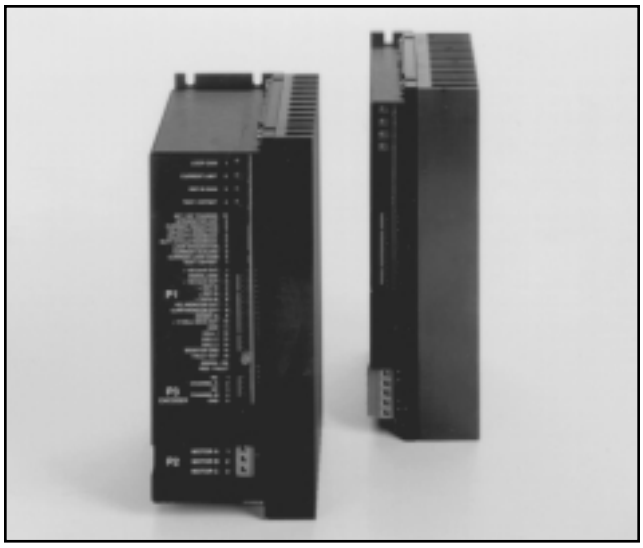
H-Series Motors with Hall feedback

Frame Size/Stack Length
232
234
342
344
348

Winding

Options
0000 - Standard without Encoder
0200 - 1000 LPR Encoder with 10 pin ribbon connector
0201 - Same as 0200 except 0.25 inch diameter shaft (H-23x only)
0600 - 1000 LPR Encoder with shielded cable & protective housing
0601 - Same as 0600 except 0.25 inch diameter shaft (H-23x only)
0802 - 1000 LPR Commutation Encoder with shielded cable and CPC connector, shielded motor cable with ground and CPC connector, thermistor
0804 - Same as 0802 except 0.25 inch diameter shaft (H-23x only)

SO/RO/ROL SERIES



- Small Convenient Package
- Economical for Cost-sensitive Applications
- 4, 8, and 12 Amp Continuous Output
- 20 to 40 Volts DC Input (SO)
- 135-190 Volts DC Input (RO)
- 90-130 Volts AC Input (ROL)

The ROL and SO Series of amplifiers from Kollmorgen offers high performance for cost-sensitive applications. These amplifiers provide fast response and robust protection in a low cost, versatile package.

The SO amplifier features two jumper selectable modes of operation: current or open loop; while the ROL amplifier features two additional jumper selectable modes: encoder or tachometer velocity.

- In current loop mode, the unit can achieve very high response (>2500 Hz bandwidth).
- In open loop mode, the amplifier can be used in applications where precision speed regulation is not required or desired.
- In encoder velocity mode, the encoder frequency is converted to an analog signal for velocity loop control. (ROL only)
- In tachometer velocity mode, an analog tachometer is used for velocity loop control. (ROL only)

IDEAL FOR POSITION CONTROLLERS

The RO and SO Series amplifiers are ideal for position controllers requiring a high performance current loop amplifier.

- Current loops provide very fast response
- Open loop control is provided for set-up
- For multi-axis applications, the compact package and "book end" mounting minimizes valuable cabinet space.

COMPACT PACKAGE

The small and versatile ROL and SO amplifiers interface directly with motion controllers or can be used as stand alone drives. The SO and RO require a DC input while the ROL requires only a single AC power supply.

FEATURES

- Up to: 40 DC bus (SO)
  190 DC bus (RO)
  130 DC input (ROL)
- Up to: 16 ADC peak current (SO)
  25 ADC peak current (RO/ROL, BJRL)
- Up to: 8 ADC continuous current (SO)
  25 ADC continuous current (RO/ROL, BJRL)
- Four quadrant, regenerative operation
- High performance current loops
- Compact size
- Selectable operation modes
- Optically isolated l/O
- Full protection including
  - over current
  - over voltage
  - over temperature
  - short circuits
- Single red/green LED indicates operation status.
- Six-step commutation
- Built-in heatsink

COMPATIBLE PRODUCTS

- H-Series Motors
- RBE Series Motors

SO/RO/ROL AMPLIFIER RATINGS AND POWER SUPPLY INFORMATION

Description	SO-4004	SO-4008	RO-20004	RO-20012	ROL-20004	ROL-20012
Input Voltage	20-40 VDC	20-40 VDC	135-190 VDC	135-190 VDC	90-130 VAC	90-130 VAC
Frequency	DC	DC	DC	DC	47-63 Hz	47-63 Hz
Cont. Current (ADC) @40ºC Amb	4 ADC	8 ADC	4 ADC	12 ADC	4 ADC	12 ADC
Peak Current (ADC) (2 sec)	8 ADC	16 ADC	25 ADC	25 ADC	8 ADC	25 ADC
Min. Inductance	250 µH	250 µH	200 µH	200 µH	200 µH	200 µH
PWM Switching	18 kHz	18 kHz	22 kHz ± 15%	22 kHz ± 15%	22 kHz ± 15%	22 kHz ± 15%
Heatsink Temp.	0-65ºC	0-65ºC	-25º to + 65ºC*	-25º to + 65ºC*	-25º to + 65ºC*	-25º to + 65ºC*
Overvolts	41 VDC	41 VDC	195 VDC	195 VDC	195 VDC	195 VDC
Bandwidth	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
Regen Watts (Cont.)	–	–	–	–	10 W	30 W
Regen Current (Peak)	–	–	–	–	20 ADC	20 ADC
Regen Trip Voltage	–	–	–	–	190 VDC	190 VDC

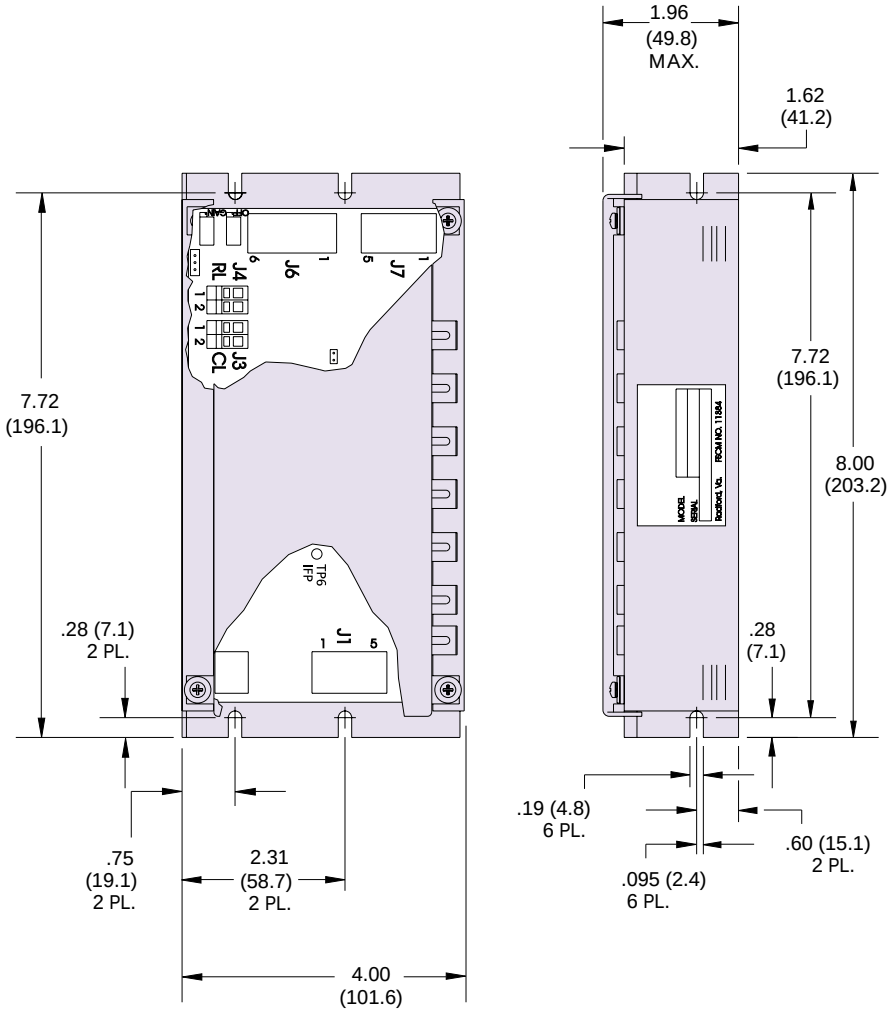
* Disables if > 65ºC

SPS POWER SUPPLY

The SPS power supply module allows convenient operation of up to four SO amplifiers from a single phase line operated power source. Input voltage is jumper selectable for 115 or 230 volt AC, single phase. A 25 watt regeneration resistor package is available as an option.

POWER SUPPLY SPECIFICATIONS	
DESCRIPTION	SPS(R)-4008
Input Voltage	
(short terminal 2-3)	207-264 VAC
(short terminal 1-2 & 3-4)	104-132 VAC
Phase	1
Frequency	57-63 Hz
Cont. Current (ADC) (40ºC Amb)	8 ADC
Peak Current (ADC)	
(2 Sec)	16 ADC
(50.0 msec)	24 ADC
DC Bus Output	30 VDC
Shunt Regulator Current (PK)	16 ADC
Regen Power Dissipation (Cont.) (Option)	25 Watts
Regen Power Dissipation (PK) (Option)	250 Watts
Internal Heat Dissipation (Option)	25 Watts
Regen Trip Voltage (Option)	41-43 VDC

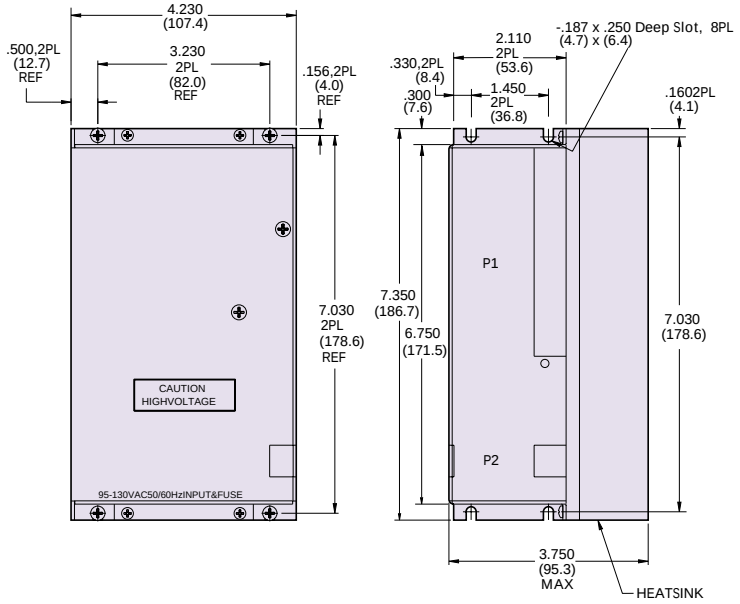
SO OUTLINE AND DIMENSIONS



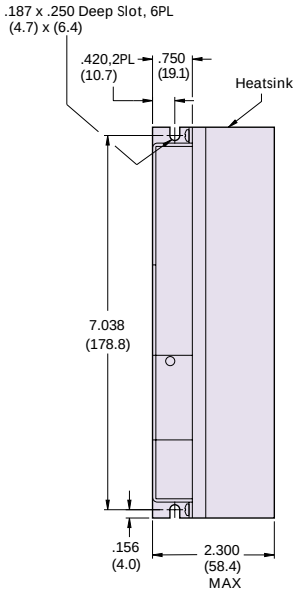
Dimensions in Inches (mm)

J1 Bus Power and Motor Leads 5 Pin Screw Terminal	J6 Amplifier Status and Control 6 Pin Screw Terminal	J7 Hall Sensor Input 5 Pin Screw Terminal
1. Motor A	1. Amp O.K. (+)	1. Hall Sensor Power (5 volt)
2. Motor B	2. Amp O.K. (-)	2. Hall Sensor Common
3. Motor C	3. Analog Command (-)	3. Sensor S1
4. Bus (-) (Common)	4. Analog Command (+)	4. Sensor S2
5. Bus (+)	5. Enable (+)	5. Sensor S3
	6. Enable (-)	

ROL/RO OUTLINE AND DIMENSIONS/CONNECTOR INFORMATION

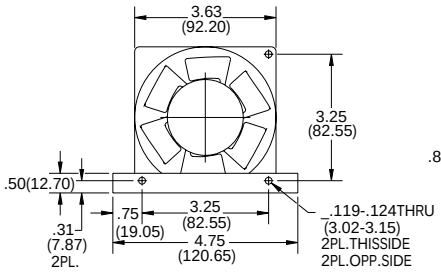


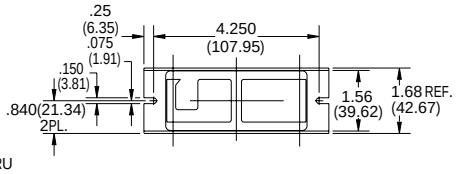
ROL



RO

Dimensions in Inches (mm)





Separately Mounted Fan For ROL-20012

J6 Customer I/O 16 Pin Molex Crimp	J9 Encoder 5 Pin Molex Crimp	J1 Power & Motor Leads 3 or 5 Pin Screw Terminal
1. +10v out	1. N/C	1. Motor A
2. Common	2. A	2. Motor B
3. -10v out	3. N/C	3. Motor C
4. Analog CMD+	4. B	4. Power Ground (RO Only)
5. Analog CMD-	5. Common	5. DC Power input (RO Only)
6. Tach In	**Potentiometers**	**SW 2 Switches**
7. Tach Out	1. VEL Loop Gain	1. Test/Offset
8. I Monitor	2. Current Limit	2. Current Loop Gain
9. Enable	3. Scaling	3. Current Scaling
10. Hall Sensor Power	4. Test/Offset	4. Integrating Velocity Loop
11. Hall Sensor Common	**JL (ROL Only)**	5. Duty Cycle
12. S3	115 VAC	6. Encoder/Tach
13. S1	3 Prong Line Cord	7. Direction
14. S2	IEC-Style	8. Cont. Current Reduction
15. I Monitor Return	Neutral Ground	9. Velocity Loop Gain
16. Fault (Red LED)		10. 120º Commutation

SO/RO/ROL/SPS MODEL NUMBER SYSTEM

SO Analog Amplifier

- Input voltage 20-40 VDC
- Output current 4 or 8 ADC continuous
- Torque mode standard
- Velocity mode (option)
- Six-step commutation
- Analog ± 10 volts

SO - 40 04 - 00 0 0

SO Analog Amplifier

Input Voltage
20 - 40 VDC

Continuous Output Current
04 - 4 ADC
08 - 8 ADC

Cover
0 - No Cover
1 - Cover

Mode of Operation
0 - Current Mode
2 - Velocity Mode
(Encoder Feedback Required)

Reserved
00 - Standard

RO(L) Analog Amplifier

- Input voltage 135-190 VDC (RO)
- Input voltage 90-130 VAC (ROL)
- Output current 4 or 12 ADC continuous
- Analog ± 10 volts
- Torque or velocity mode dip switch configurable
- Six-step commutation

RO(L) - 200 04 - 0000

RO Analog Amplifier

ROL Analog Amplifier Line Operated

Input Voltage
200 - (135-190 VDC, RO only)
200 - (90-130 VAC, ROL only)

Continuous Output Current
04 - 4 ADC
12 - 12 ADC

Reserved
0000 - Standard

SPS Power Supply

- 240 Watts
- Input voltage 115/230 VAC
- Bus voltage 30 VDC
- 8 ADC
- Regeneration available as option

SPS(R) - 40 08 - 1 - 000

SPS Power Supply

SPSR Power Supply with Regen

DC Bus Output Voltage
30 VDC
(Nominal 115/230 VAC Input)

Continuous Ouput Current
08 - 8 ADC

Reserved
000 - Standard

Number of Axes
1 - 1 Axis
2 - 2 Axis*
3 - 3 Axis*
4 - 4 Axis*

* Increasing axis mounting capability does not increase electrical rating

BJR/BJRL SERIES

- 4 to 12 Amps DC Continuous
- 20 to 40 Volts DC Input (BJR)
- 90 to 135 VAC (BJRL)
- Economical for Cost Sensitive Applications
- Simple, BASIC-like Programming

The BJR(L) is a fully integrated positioner/amplifier package. The Series utilizes the BJR(L) language which has set standards for motion control with its simple BASIC-like command structure and sophisticated decision-making capability. The BJR(L) provides the servo performance you have come to expect from Kollmorgen. By incorporating a high-performance microprocessor, Kollmorgen has designed the BJR(L) without compromising on either positioner software or servo performance. This single microprocessor closes all servo loops, resulting in a truly integrated positioning system. The BJR(L) has the features and performance you need in your next positioning application.

FEATURES

The BJR(L) offers a wide feature set to accommodate real world positioning requirements.

- Low cost
- Integrated package
- Simple programming language
- Advanced motion control moves
- Master/Slave - Electronic Gearbox and Profile Regulation
- Motion Gating
- Registration - 40 microseconds
- Mathematics
  - 100 program labels
  - 750 user-definable variables
  - 50 user-definable switches
  - 15 mathematical/logical operations
- User units
- Superior servo loop control
- Self-Tuning
- Step motor emulation
- Digital servo loops
- Feed-forward gain
- Diagnostics - 20 errors through power loss
- Menu-driven software

Inputs/Outputs

- Digital Inputs include 14 optically isolated lines for 5VDC, 12VDC, or 24VDC—and all inputs can source and sink current.
- Digital Outputs include 6 optically isolated outputs for up to 24VDC. Each output is fused and they can all source and sink current.
- Three 10-bit Analog Inputs allow you to bring in signals from pots or sensors.
- One 8-bit Analog Output allows you to drive meters or command VFAC drives.

Profiles

- Incremental and absolute profiles.
- GOHOME command for easy homing.
- Multiple S-curves to tailor acceleration profiles to the machine.
- GATED motion allows preloaded profiles for hardware control and to synchronize multiple axis.
- Change profiles in response to real-time events.

Master/Slave

- Electronic Gearing sets one axis to follow another. Integer and non-integer gear ratios are supported without error accumulating.

- Electronic Camming extends gearing by allowing users to define irregular cam lobes.
- Profile Regulation locks profiles to the speed of external sensors such as encoders fitted to line operated motors.
- Stepper Motor Emulation supports standard stepper inputs and virtually any number of steps per revolution.

Programming

- Popular BDS5 Language used in demanding applications since 1987. The large command set provides flexible decision making and servo control for single and multiple axis motion control.
- MOTIONLINK for IBM-PCs. Powerful programming environment. Includes PC-Scope for display of motion signals.
- Multitasking simplifies control by adding alarms and background processing.
- 250 User Variables and extensive math support complex calculations.
- Units display parameters in familiar terms—including floating point display.
- TRACE and SINGLE-STEP modes support efficient debugging.

Communications

- Autobauding simplifies installation.
- RS-232 provided for interface to IBM-PC's, PLC's, terminals, and most other serial devices.
- RS-485 and Multidrop allow networking of up to 32 BJR(L)'s or other RS-485 devices.
- RS-485 and RS-232 supported simultaneously as a standard.
- A separate backlight supply supports backlit terminals such as the HHT-02 without external power supplies.
- Serial Watchdog and Serial Checksum to increase reliability of RS-232 or RS-485 serial communication.

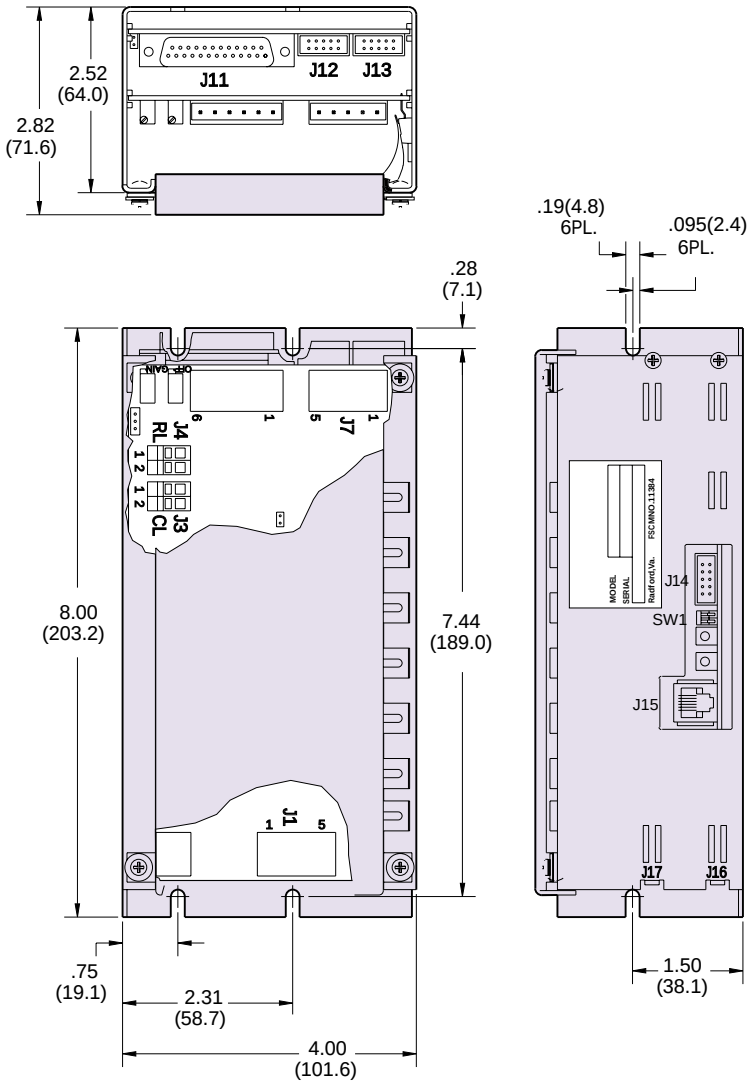
Accessories

- HHT-02 is a cost-effective handheld terminal ideal for operator interface. The HHT-02 is available with backlit screen and it plugs directly to the BJR(L).
- The BJ-CONN connector kit provides connectors and cables to simplify installation.
- BJ-BKO-6, -10, -25 are breakout boxes which support conventional field wiring by converting high density connectors to screw terminals.

COMPATIBLE PRODUCTS

- H-Series Motors
- RBE Series Motors

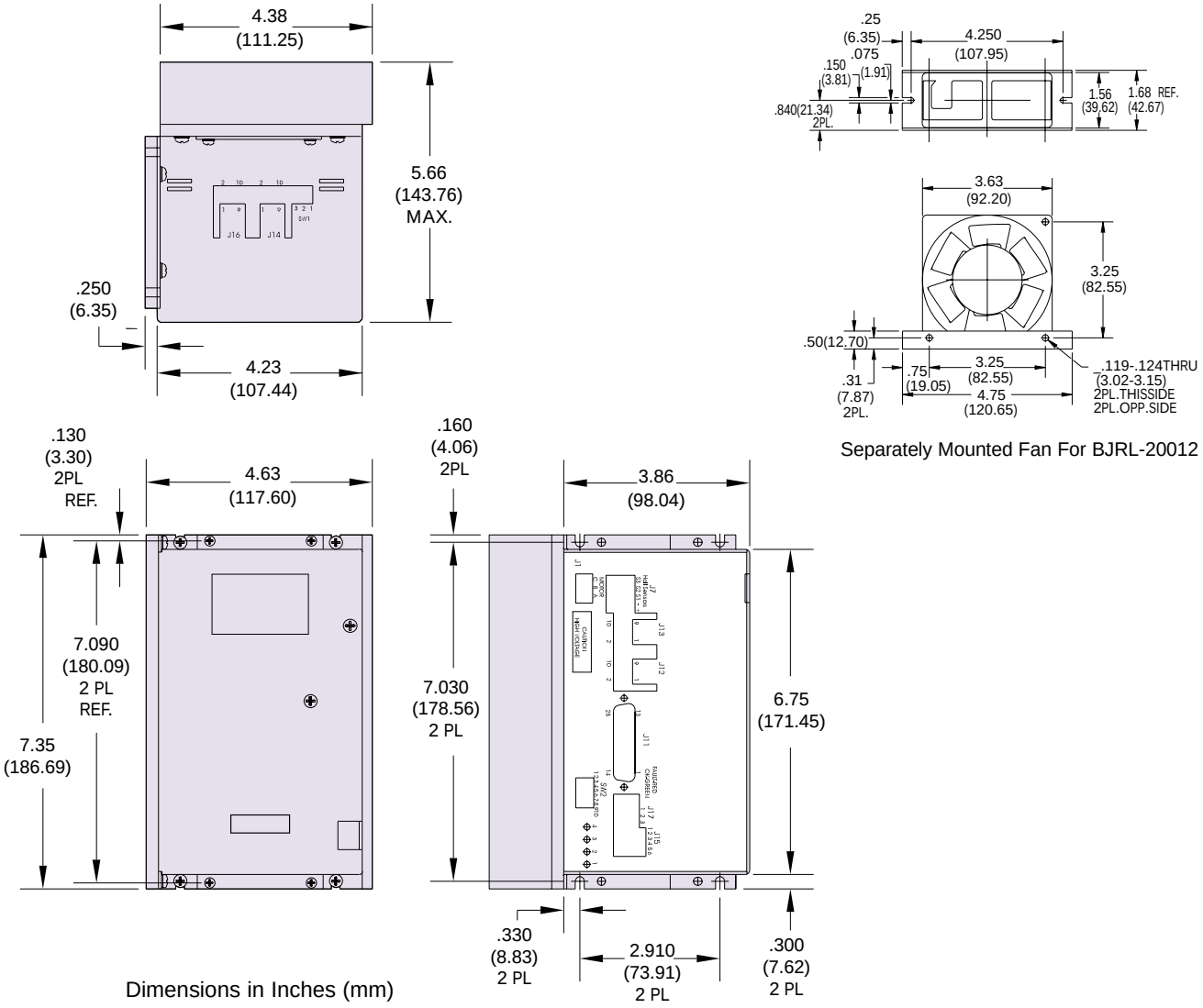
BJR AMPLIFIER RATINGS/OUTLINE AND DIMENSIONS



Dimensions in Inches (mm)

BJR AMPLIFIER RATINGS		
Description	BJR-4004	BJR-4008
Input Voltage	20-40 VDC	20-40 VDC
Frequency	DC	DC
Cont Current (ADC) @40ºC Amb	4 ADC	8 ADC
Peak Current (ADC) (2 sec)	8 ADC	16 ADC
Min. Inductance	250 µH	250 µH
PWM Switching	18 kHz	18 kHz
Heatsink Temp.	0-65ºC	0-65ºC
Overvolts	41 VDC	41 VDC
Bandwidth	2.5 kHz	2.5 kHz

BJRL AMPLIFIER RATINGS/OUTLINE AND DIMENSIONS



Separately Mounted Fan For BJRL-20012

Dimensions in Inches (mm)

BJRL AMPLIFIER RATINGS		
Description	BJRL-20004	BJRL-20012
Input Voltage	90-135 VAC	90-135 VAC
Frequency	47-63 Hz	47-63 Hz
Cont Current (ADC) @40ºC Amb	4 ADC	12 ADC
Peak Current (ADC) (2 sec)	8 ADC	25 ADC
Min. Inductance	250 µH	250 µH
PWM Switching	22 kHz	22 kHz
Heatsink Temp.	-25 to 65ºC	-25 to 65ºC
Over Volts	195 VDC	195 VDC
Bandwidth	2.5 kHz	2.5 kHz
Regen Watts (Cont.)	10 W	30 W
Regen Current (Peak)	20 ADC	20 ADC
Regen Trip Voltage	190 VDC	190 VDC

BJR/BJRL CONNECTOR INFORMATION

J1 Bus Power and Motor Leads
5-PIN Screw Terminal

1.	Motor A
2.	Motor B
3.	Motor C
4.	Bus – (BJR Only)
5.	Bus + (BJR Only)

J7 Hall Sensor Input
6-PIN Screw Terminal

1.	Hall Sensor Power (5 volt)
2.	Hall Sensor Common
3.	S1
4.	S2
5.	S3

J11 Main I/O
25-PIN DB Connector

1.	In 1	14.	01
2.	In 2	15.	01 Return
3.	In 3	16.	02
4.	In 4	17.	02 Return
5.	In 5	18.	03
6.	In 6	19.	03 Return
7.	In 7	20.	04
8.	In 8	21.	04 Return
9.	Motion	22.	05
10.	Gate	23.	05 Return
11.	Remote	24.	OK
12.	Cycle	25.	OK Return
13.	Source/Sink		

J12 Feedback Encoder
10-PIN Ribbon Connector

1.	NC
2.	+ 5 Volt Supply
3.	Common
4.	N/C
5.	A –
6.	A +
7.	B +
8.	B –
9.	Index –
10.	Index +

J13 Master Encoder
10-PIN Ribbon Connector

1.	NC
2.	+ 5 Volt Supply
3.	Common
4.	N/C
5.	A –
6.	A +
7.	B +
8.	B –
9.	Index –
10.	Index +

J14 RS 485 Serial Connector
10-PIN Ribbon Connector

1.	RX +
2.	RX –
3.	Common
4.	N/C
5.	N/C
6.	N/C
7.	N/C
8.	Common
9.	TX
10.	TX +

J15 RS 232 Serial Connector
RJ-11

6.	Backlight Supply
5.	Enable Supply (VCC)
4.	External Term Enable
3.	Data OUT
2.	Data IN
1.	Common

J16 Analog Inputs
10-PIN Ribbon Connector

1.	Common
2.	AIN 1
3.	5 Volt Supply
4.	Common
5.	AIN 2
6.	5 Volt Supply
7.	Common
8.	AIN 3
9.	5 Volt Supply
10.	A Out

J17 Auxiliary Inputs
3-PIN Screw Terminal

1.	Power for J11 Inputs
2.	Limit
3.	Home

JL AC Power Input (BJRL Only)

115 VAC
3 Prong Line Cord
IEC Style
Neutral Ground

SW1 Serial I/O Dipswitch

1.	Term Enable
2.	Auto Baud
3.	12/24V I/O Select (BJRL Only)

BJR/BJRL MODEL NUMBER SYSTEM AND CONNECTOR KITS

SILVERLINE

BJRL Series Amplifier/Positioner

BJR(L)-40 04-1 1 000 1-101-0000

BJR
Amplifier/Positioner

BJRL
Amplifier/Positioner
Line operated

Input Voltage
40 - (20-40 VDC, BJR Only)
200 - (90-135 VAC, BJRL Only)

Continuous Output Current
04 - 4 ADC (BJR, BJRL)
08 - 8 ADC (BJR only)
12 - 12 ADC (BJRL only)

Memory & I/O
1 - 16 K Memory
20 I/O
14 Inputs
6 Outputs

Reserved for System Programmed by Kollmorgen
0000 - Standard
(No user Program)

Firmware Version

Mechanical Configuration
1 - Standard

Reserved
000 - Standard

Master/Slave
1 - Master/Slave

BJR CONNECTOR KITS

The BJR connector kits provide all necessities for installation and operation. The kits are ordered as a separate item.

BJ-C100 Connector Kit

The BJ-C100 connector kit includes:

- 2 DB25M ribbon cable (J11) connectors
- 2 ft 25-pin ribbon cable
- 8 10-pin ribbon cable connectors for (J12, J13, J14, and J16) are provided as standard
- 10 ft 10-pin ribbon cable
- 7 ft serial cable
- Strain relief for all ribbon cable connectors
- Fuses for SPS/R
- Fuses for 115/230 VAC BJP

BJ-BKO-6

- Break out for J15

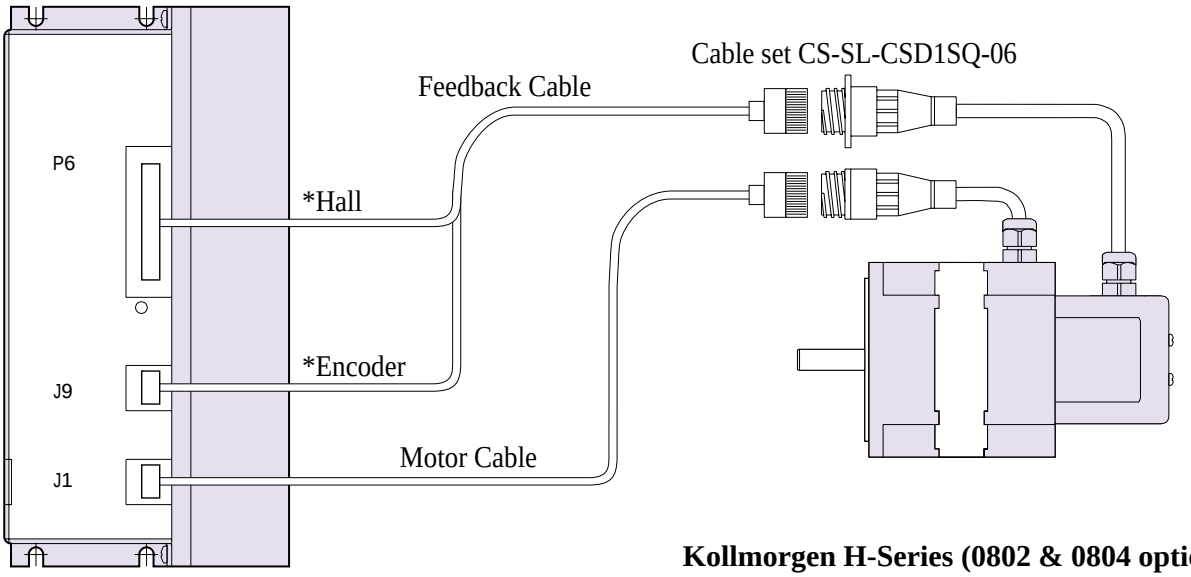
BJ-BKO-10

- Break out for J12-14, J16

BJ-BKO-25

- Break out for J11

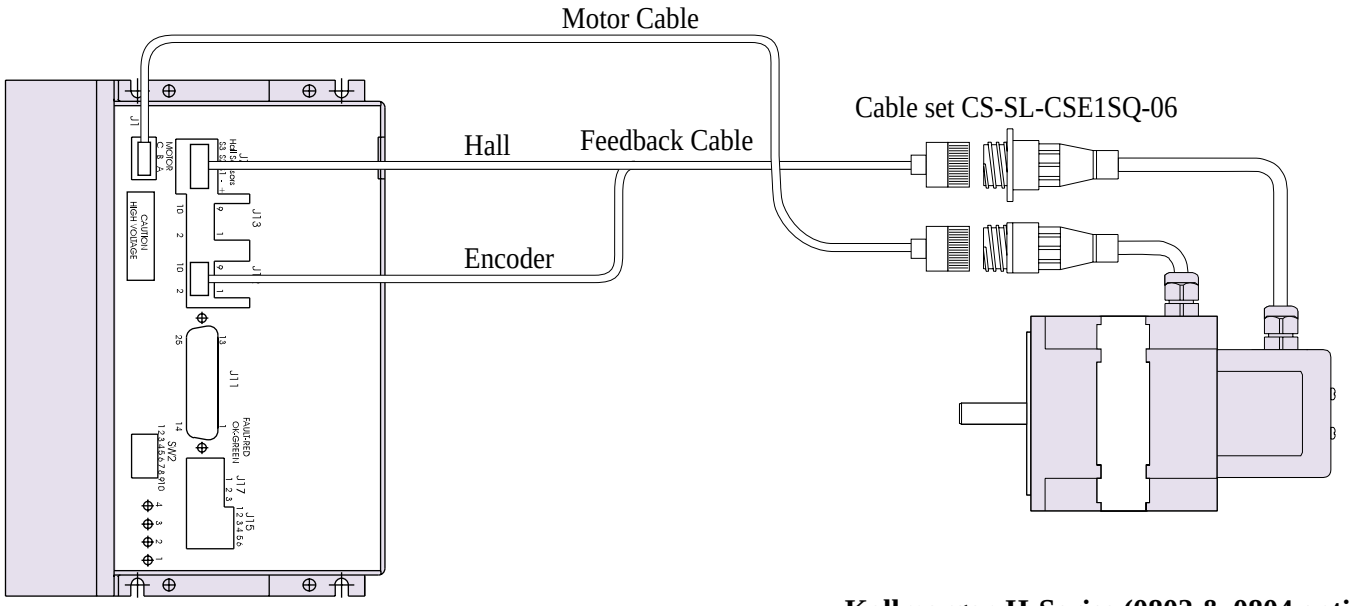
SYSTEM INTERCONNECT DIAGRAMS



Kollmorgen H-Series (0802 & 0804 options)

ROL Amplifier

*A customer supplied +5 VDC power supply is required



Kollmorgen H-Series (0802 & 0804 opti

BJRL Amplifier

Kollmorgen enjoys a reputation of excellence based on constant endeavors to update products. Information in this brochure is subject to change.

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