SIN+, SIN-, COS+, COS- ENCODER OUTPUT WAVEFORMS

$\frac{P}{4}$

P

1.0 VOLT

SIN+

SIN-, COS-

COS+

2.5 VOLT SIGNAL OFFSET WITH RESPECT TO COMMON

WAVEFORMS PER CW SHAFT ROTATION VIEWING
MOTOR MOUNTNG FACE

**RADIAL LOAD CAPACITY (Kgs) -**
**NO AXIAL LOAD - FOR L10 LIFE OF 10,000 HOURS**
**Radial Load Capacity at the End of the Shaft (Kgs)**

| 2500 RPM | 1750 RPM | 1150 RPM | 850 RPM |
|----------|----------|----------|---------|
| 350 | 390 | 450 | 500 |

**AXIAL THRUST CAPACITY (Kgs) -**
**NO RADIAL LOAD - FOR L10 LIFE OF 10,000 HOURS**
**Horizontal Mounting Load Capacity at the End of the Shaft (Kgs)**

| 2500 RPM | 1750 RPM | 1150 RPM | 850 RPM |
|----------|----------|----------|---------|
| 250 | 290 | 330 | 360 |

| REV | ECN | BY | REVISION DESCRIPTION | CHKR | DATE |
|-----|-----|-----|----------------------|------|------|
| | | | | | |
| | | | | | |
| | | | | | |
| 01 | 1020346 | VS | RELEASED | | |

| PREPARED BY | DATE | DESIGN ENGINEER | DATE |
|-------------|------|-----------------|------|
| VS | 1/11/2006 | | |

TITLE

ES, ELEC, HPK-B1611E-MA42AA

Allen-Bradley

PART NO.

L16M5178ESE

A SIZE | SHEET 1 OF 4

Notes:    Print or enlarge waveforms for improved clarity.
          For additional specifications see L16M5178ESM.

Specifications:

1. Motor type:  4 pole, 3 phase, asynchronous, ventilated
2. Base speed:  2975 RPM.
3. Maximum speed:  5000 RPM.
4. Continuous stall torque: 183  Nm (1619 lb-in) max at 155C winding temperature in a 40C
5. Peak stall torque: 400 Nm ( 3540 lb-in) max.
6. Continuous output rating:  57 kW ( hp) max at 2970 RPM.          Continuous current @ 2970 RPM  149 Amps 0 to peak max.(105.7 Amps.RMS)
7. Operating voltage:  460 VAC RMS Ref. (Not for direct connection to AC line).
8. Continuous stall current:   149  Amps 0 to peak max.(105.7 Amps.RMS)
9. Magnetizing current: 47.6 Amps. RMS ref.
10. Peak stall current: 338.4 Amps 0 to peak max.( 240 Amps. RMS)
11. Insulation class:  180 (H).
12. Housing temperature:  125C max.
13. Winding resistance: .041 Nom. Ohms, phase to phase at 20C to 30C.
14. Winding inductance: 3.3 mH, phase to phase Ref.
15. Dielectric rating of motor power connections (U,V,W), and thermostat connections
    (TS+, TS-) to ground:  2350 VAC RMS 50/60 Hz for 1 second.
16. Rotor inertia: .177 kg-m$^2$  Ref.
17. Rotor balancing:  Quality grade G-6.3.
18. Product weight:  244 kg (538 lb) Ref.
19. Operating ambient temperature:  0C to 40C (32F to 104F).
20. Storage ambient temperature:  -30C to 70C (-22F to 158F).
21. Relative humidity:  5% to 95% non-condensing.
22. Liquid / dust protection:  IP54 with blower installed.
23. Shock:  10 g peak max, 6 msec duration (18 occurances tested).
24. Vibration:  2.5 g peak max, 30 to 2000 Hz.
25. Shaft material:  Steel, grade 1040/1045.
26. Paint:  Black.  Shaft, key (if provided), flange mounting surface, and connectors are
    not painted.

Equivalent circuit parameters

X1:  .167   Ohms/phs Ref at 20C to 30C.
X1:   .219  Ohms/phs Ref at 20C to 30C.
Xm : 4.82 Ohms/phs Ref at 20C to 30C
R1:  .0205 Ohms/phs Ref at 20C to 30C
R2:  .0152 Ohms/phs Ref at 20C to 30C

not painted.

Notes:       "Ref" denotes untoleranced specifications, provided for reference only.

             Speed, torque and current specifications are for motor operation with
             Allen Bradley drives.

| 01 | TITLE |
| --- | --- |
| REV | ES, ELEC, HPK-B1611E-MA42AA |

| Allen-Bradley | PART NO. |
| --- | --- |
| | L16M5178ESE |
| A SIZE | SHEET  2  OF  4 |

Feedback Specifications:

Electrical Hardware:
1. SIN, COS waveform output:  1024 sinusoids/rev.
2. SIN, COS waveform amplitude:  0.9 to 1.1 Volts peak to peak.
3. SIN -, COS - voltage offset with respect to power input common:  2.2 to 2.8 VDC.
4. +5VDC voltage input:  4.5 to 12.0 VDC.
5. +5VDC current input:  125 mA DC max continuous, 1.0 A DC max inrush.
6. TS+, TS- thermostat operating voltage:  250 Volts max.
7. TS+, TS- thermostat operating current:  1.6/2.5 Amps max at 0.6/1.0 power factor.


Serial Communication:
1. DATA+, DATA- signal type, rate:  RS 485, 9600 baud, asynchronous.
2. Communication hierarchy:  Encoder is slave, communication is externally initiated.
3. Single turn absolute position value range:   0 to 32,767 steps (12 bit).
4. Multi-turn absolute shaft revolution value range: 0 to 32,767 revolutions (12bit).
5. Absolute position data:  Binary, value increases with CW shaft rotation viewing motor mounting face.
6. Data (byte) format:  Start bit, 8 data bits, parity bit, stop bit.
7. Memory storage capacity:  128 bytes, EEPROM.
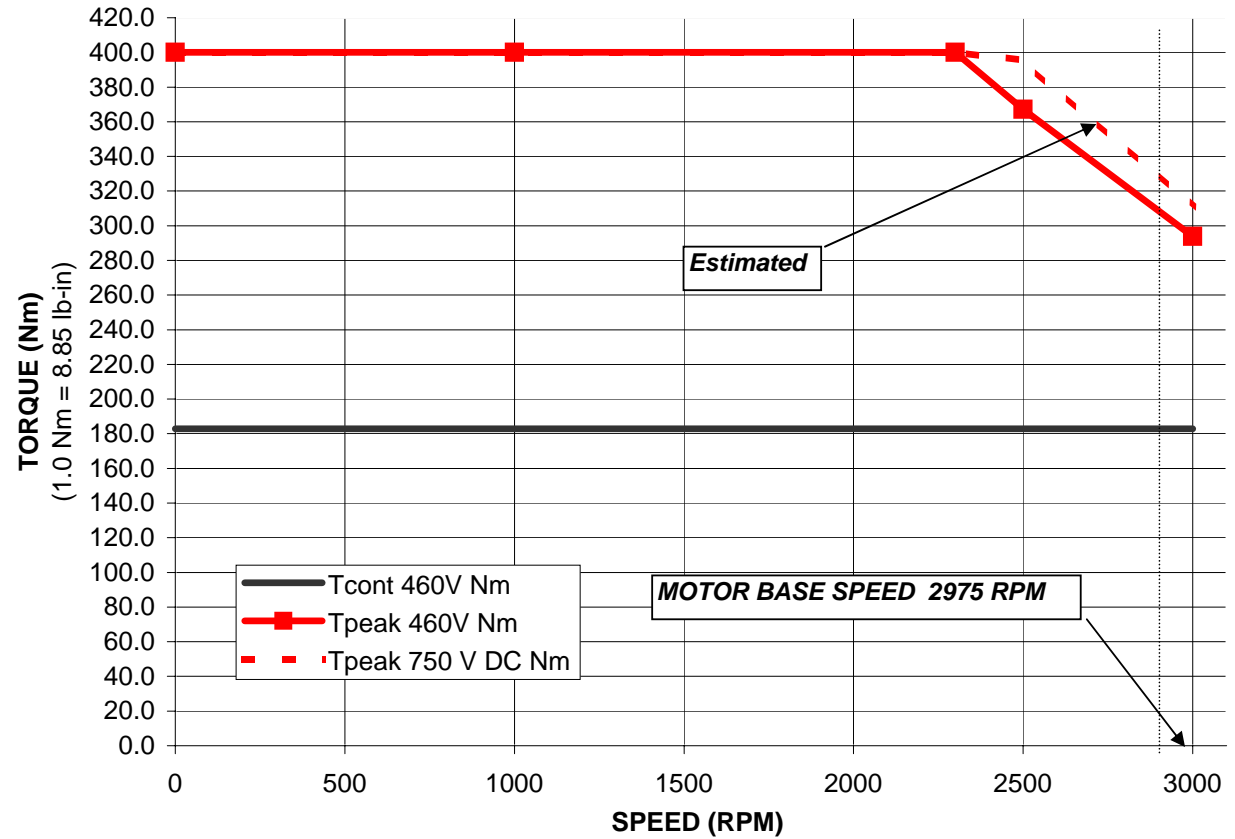8. Encoder temperature data: Binary value of encoder temperature in degrees C.

Note:  "Ref" denotes untoleranced specifications, provided for reference only.

| 01 | TITLE | |
|----|-------|--|
| REV | ES, ELEC, HPK-B1611E-MA42AA | |
| Allen-Bradley | PART NO. | |
| | L16M5178ESE | |
| | A SIZE | SHEET 3 OF 4 |

| SPEED RPM | TORQUE | | |
|---|---|---|---|
| | Tcont 460V | Tpeak 460V | Tpeak 750 V DC |
| | Nm | Nm | Nm |
| 0 | 182.9 | 400.0 | 400.0 |
| 1000 | 182.9 | 400.0 | 400.0 |
| 2300 | 182.9 | 400.0 | 400.0 |
| 2500 | 182.9 | 367.2 | 395.5 |
| 3000 | 182.9 | 293.8 | 310.7 |

| SPEED RPM | TORQUE | | |
|---|---|---|---|
| | Tcont 460V | Tpeak 460V | Tpeak 750 V DC |
| | lb-in | lb-in | lb-in |
| 0 | 1619.0 | 3540 | 3540 |
| 1000 | 1619.0 | 3540 | 3540 |
| 2300 | 1619.0 | 3540 | 3540 |
| 2500 | 1619.0 | 3250 | 3540 |
| 3000 | 1619.0 | 2600 | 2750 |

**HPK-B1611E-MA42AA  Performance with 2099-BM11**
**at 460 VAC and 750 V DC Drive Input, 40C Motor Ambient**



Chart legend:
- Tcont 460V Nm
- Tpeak 460V Nm
- Tpeak 750 V DC Nm

*Estimated*

*MOTOR BASE SPEED  2975 RPM*

Axis labels: TORQUE (Nm) (1.0 Nm = 8.85 lb-in), SPEED (RPM)

Note:  Nm torque values shown are converted from tested lb-in data.

| 01 | TITLE |
|---|---|
| REV | ES, ELEC, HPK-B1611E-MA42AA |

| Allen-Bradley | PART NO. |
|---|---|
| | L16M5178ESE |
| A SIZE | SHEET 4 OF 4 |