EL-0005
EL-0045

A

B

C
### EL-0072

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>1</td>
<td>1</td>
<td>1</td>
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</tbody>
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### A

<table>
<thead>
<tr>
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<th>Output</th>
</tr>
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<tbody>
<tr>
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### B

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### C

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<th>Output</th>
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<td>0</td>
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<tr>
<td>0</td>
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### D

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<th></th>
<th>Output</th>
</tr>
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<tbody>
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<td>1</td>
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<tr>
<td>0</td>
<td>1</td>
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### E

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<th>Output</th>
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<tbody>
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<td>0</td>
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<tr>
<td>1</td>
<td>1</td>
<td>0</td>
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</table>

### F
EL-0093

Emergency Generator Room
Rings on #4

Aft Steering Station
Rings on #7

Engine Room
Rings on #9

Steering Gear Flat
Rings on #6

To other stations

To other stations
Resistors for military use may have a fifth band to indicate reliability in terms of failure rate as follows:

- No color: No test made
- Brown: 1.0 percent per 1000 hours
- Red: 0.1 percent per 1000 hours
- Orange: 0.01 percent per 1000 hours
- Yellow: 0.001 percent per 1000 hours

First digit = 2
Second digit = 0
Multiplier = 5th power of 10
Tolerance = 10%
Two-speed single winding (constant torque)

<table>
<thead>
<tr>
<th>Speed</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Tie together</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>--------------</td>
</tr>
<tr>
<td>High</td>
<td>T6</td>
<td>T4</td>
<td>T5</td>
<td>T1 T2 T3</td>
</tr>
</tbody>
</table>

Two-speed single winding (variable torque)

<table>
<thead>
<tr>
<th>Speed</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Tie together</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>--------------</td>
</tr>
<tr>
<td>High</td>
<td>T6</td>
<td>T4</td>
<td>T5</td>
<td>T1 T2 T3</td>
</tr>
</tbody>
</table>

Two-speed single winding (constant horsepower)

<table>
<thead>
<tr>
<th>Speed</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Tie together</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T6 T4 T5 T5</td>
</tr>
<tr>
<td>High</td>
<td>T6</td>
<td>T4</td>
<td>T5</td>
<td>T1 T2 T3</td>
</tr>
</tbody>
</table>
EL-0134

Dual Voltage Wye Connected Motor

Dual Voltage Delta Connected Motor
Correctly connected system causes receiver to be in correspondence with the transmitter.

S1 and S3 leads reversed

R1 and R2 leads reversed

Stator leads shifted by 1 group

Stator leads shifted by 2 groups

Incorrect connections: properly zeroed, but torque direction reversed.
Correctly connected system causes receiver to be in correspondence with the transmitter.

S1 and S3 leads reversed.

R1 and R2 leads reversed.

Stator leads shifted by 1 group.

Stator leads shifted by 2 groups.

Incorrect connections: 180 degrees out of zero, but torque direction correct.
Correctly connected system causes receiver to be in correspondence with the transmitter.

S1 and S3 leads reversed.

R1 and R2 leads reversed.

Stator leads shifted by 1 group.

Stator leads shifted by 2 groups.

Incorrect connections: 240 degrees out of zero, but torque direction correct.
Correctly connected system causes receiver to be in correspondence with the transmitter.

S1 and S3 leads reversed

R1 and R2 leads reversed

Stator leads shifted by 1 group

Stator leads shifted by 2 groups

Incorrect connections: 120 degrees out of zero, but torque direction correct.
EL-0156

A
From 3-phase power source

Original wiring
L1
L2
L3
L1 to T1
L2 to T2
L3 to T3
T1 to T3

B
From 3-phase power source

T1 and T2 interchanged
L1
L2
L3
L1 to T2
L2 to T1
L3 to T3
T1 to T3

C
From 3-phase power source

T1, T2 and T3 interchanged
L1
L2
L3
L1 to T3
L2 to T1
L3 to T2
T1 to T3

D
From 3-phase power source

T1 and T3 interchanged
L1
L2
L3
L1 to T3
L2 to T2
L3 to T1
T1 to T3
Standard Overload Relays

General Instructions for Selection of Overload Relay Heater Elements:
1. Obtain full load current and service factor from motor nameplate or from motor manufacturer. Do not estimate full-load motor current from horsepower tables.
2. Determine if 1, 2, or 3 overload relays are needed.
3. Select proper heater from appropriate table according to class, size, type of enclosure and number of overload relays being used. Full load motor currents should be within the Min.-Max. ratings shown for the number of overload relays being used.
4. The tables apply only to standard, open type or totally enclosed fan-cooled, continuous duty motors (with a service factor of 1.15 and rated for 40 degrees C rise) in applications where motor and starter are located in the same ambient temperature. For applications of other motors with a service factor of 1, 50-55 degrees C rise, totally enclosed non-ventilated, explosion proof, or for installations where ambient temperatures of motor and starter are different, refer to Chart "A" for selection of overload heater units.

Chart A: Variations by Operating Conditions

<table>
<thead>
<tr>
<th>Motor continuous rating °C rise</th>
<th>Ambient temperature same at starter and motor</th>
<th>Ambient temperature higher at starter than at motor</th>
<th>Ambient temperature lower at starter than at motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.15 service factor 40°C rise</td>
<td>One size larger than specified for each 15°C difference</td>
<td>One size smaller than specified for each 15°C difference</td>
<td></td>
</tr>
<tr>
<td>1.0 service factor 50-55°C rise</td>
<td>One size smaller than for 1.15 service factor as above</td>
<td>One size smaller than for 1.15 service factor as above</td>
<td></td>
</tr>
</tbody>
</table>

Table 24: NEMA Size 6
For all Standard Enclosures
Three Overload Relays per Starter

<table>
<thead>
<tr>
<th>Heater Cat. No.</th>
<th>Motor Current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
</tr>
<tr>
<td>G30T19</td>
<td>142</td>
</tr>
<tr>
<td>G30T20</td>
<td>158</td>
</tr>
<tr>
<td>G30T21</td>
<td>172</td>
</tr>
<tr>
<td>G30T22</td>
<td>189</td>
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<tr>
<td>G30T23</td>
<td>208</td>
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<tr>
<td>G30T24</td>
<td>230</td>
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<td>G30T25</td>
<td>253</td>
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<tr>
<td>G30T26</td>
<td>278</td>
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<td>G30T27</td>
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<td>G30T28</td>
<td>337</td>
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<td>G30T29</td>
<td>369</td>
</tr>
<tr>
<td>G30T30</td>
<td>406</td>
</tr>
<tr>
<td>G30T31</td>
<td>460</td>
</tr>
</tbody>
</table>
Catalog Number Selection Chart

Example Catalog Number

A N 1 9 A N 0 A 5E 005

Device Type
A = Starter
C = Contactor
E = IEC
N = NEMA

Device Assembly Configurations
70 = Multi-speed
1 = Non-reversing
5 = Reversing

OLR Type
5 = Contactor only-no overload relay
6 = Starter w/C306 bi-metallic OLR
9 = Starter w/C440 electronic overload

C440 OLR Designation
5E = Standard feature set
SEL Reset, SEL Class (10A, 10, 20, 30)
5G = Ground fault feature set
SEL Reset, SEL Class (10, 20)

AC Coil Suffix
Suffix | Coil Volts and Hertz
A     | = 120/60 or 110/50
B     | = 240/60 or 220/50
C     | = 480/60 or 440/50
D     | = 600/60 or 550/50
E     | = 208/60
F     | = 277/60
G     | = 208-240/60 **
H     | = 240/50
I     | = 380-415/50
J     | = 550/50
K     | = 24/60, 24/50 **
L     | = 24/50
M     | = 32/50
N     | = 48/50
O     | = 48/50

NEMA Enclosure
N = Open
For Starters
For Contactors only

Starter Mounting Option
0 = Horizontal
V = Vertical

Notes:
* For contactor only orders, add B to end of catalog number if NEMA size 00-2, 6.
** NEMA sizes 00 and 0 only.
*** NEMA sizes 00 and 0 only. Sizes 1-8 are 24/60 only.
**** NEMA sizes 00 and 0 only. Sizes 1-8 are 24/60 only.
Order CN15NN01 contactor 1-5A OL (C440A1A005SAX or C440A2A005SAX) with 60-300A CTS (ZEB-XCT300).
Electronic Overload Relay
EL-0212

Diagram A: Diagram of a multimeter setup. The red and black probes are connected to the circuit.

Diagram B: Another diagram showing a similar setup as Diagram A.
RS-232 Synchronous DB-25 Male Pinout

- Pin 1: Chassis Ground
- Pin 2: Transmit Data
- Pin 3: Receive Data
- Pin 4: Request to Send
- Pin 5: Clear to Send
- Pin 6: Data Set Ready
- Pin 7: Signal Ground
- Pin 8: Carrier Detect
- Pin 11: Receive Clock Out
- Pin 15: Transmit Clock In
- Pin 17: Receive Clock In
- Pin 18: Local Loopback
- Pin 20: Data Terminal Ready
- Pin 21: Remote Loopback
- Pin 24: Transmit Clock Out
- Pin 25: Test Mode

Diagram of pinout:

Voltage V:
- +12 V: 0 level
- -12 V: 1 level

Start bit → Data → Parity bit → Stop bit

RS-232 Signal Levels