

Certificate of Compliance

Certificate: 1475630

Master Contract: 216806

Project: 1475630

Date Issued: May 21, 2004

Issued to: **UNI-D Corporation**
No 406, Shejung St.,
Shrlin Chiu,
Taipei, Taiwan

*The products listed below are eligible to bear the CSA Mark shown
with adjacent indicators 'C' and 'US'*



PRODUCTS

Authorized by:  Fred Mark
Director, Far East Operation

CLASS 3221 02 - VALVES - Actuators
CLASS 3221 82 - VALVES - Actuators - CERTIFIED TO U.S. STANDARDS

Motor control units for electrically operated valves, indoor, intermittent duty, one cycle in 3 minutes, Class A insulation, thermally protected, rated 220 V ~ 240 V ac, 60 Hz.

- Part A: Models UM-1-0-230-NN, rated 0.38 A, 91 W, 10 sec per cycle (open or close).
- Part B: Models UM-1-0-230-AA, rated 0.38 A, 91 W, 10 sec per cycle (open or close).
- Part C: Models UM-2-0-230-NN, rated 0.38 A, 91 W, 20 sec per cycle (open or close).
- Part D: Models UM-2-0-230-AA, rated 0.38 A, 91 W, 20 sec per cycle (open or close).
- Part E: Models UM-3-0-230-NN, rated 0.72 A, 135 W, 8 sec per cycle (open or close).
- Part F: Models UM-3-0-230-AA, rated 0.72 A, 135 W, 8 sec per cycle (open or close).
- Part G: Models UM-3-1-230-NA, rated 0.72 A, 135 W, 8 sec per cycle (open or close).
- Part H: Models UM-3-1-230-AA, rated 0.72 A, 135 W, 8 sec per cycle (open or close).

The 'C' and 'US' indicators adjacent to the CSA Mark signify that the product has been evaluated to the applicable CSA and ANSI/UL Standards, for use in Canada and the U.S., respectively. This 'US' indicator includes products eligible to bear the 'NRTL' indicator. NRTL, i.e. National Recognized Testing Laboratory, is a designation granted by the U.S. Occupational Safety and Health Administration (OSHA) to laboratories which have been recognized to perform certification to U.S. Standards.



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Part I: Models UM-4-1-230-NA, rated 0.72 A, 135 W, 30 sec per cycle (open or close).

Part J: Models UM-4-1-230-AA, rated 0.72 A, 135 W, 30 sec per cycle (open or close).

Part K: Models UM-5-1-230-NA, rated 0.75 A, 153 W, 30 sec per cycle (open or close).

Part L: Models UM-5-1-230-AA, rated 0.75 A, 153 W, 30 sec per cycle (open or close)

Part M: Models UM-6-1-230-NA, rated 0.8 A, 160 W, 30 sec per cycle (open or close).

Part N: Models UM-6-1-230-AA, rated 0.8 A, 160 W, 30 sec per cycle (open or close).

Note: Certified only as a component of other certified equipment where the suitability of the combination is to be determined by CSA International.

APPLICABLE REQUIREMENTS

| | |
|------------------------|--------------------------------|
| CSA C22.2 No. 139-1982 | - Electrically Operated Valves |
| CSA C22.2 No. 100-95 | - Motors and Generators |
| UL 429, Fifth Edition | - Electrically Operated Valves |
| UL 1004, Fifth Edition | - Electric Motors |



Supplement to Certificate of Compliance

Certificate: 1475630

Master Contract: 216806

*The products listed, including the latest revision described below,
are eligible to be marked in accordance with the referenced Certificate.*

Product Certification History

| Project | Date | Description |
|----------------|--------------|-------------------------|
| 1475630 | May 21, 2004 | Original Certification. |



Descriptive and Test Report

MASTER CONTRACT NO: 216806
REPORT NO: 1475630

Edition 1: May 21, 2004; Project No 1475630 - Toronto
Prepared by Jessie Tsai, Issued by Sebastian George, P. Eng.

Contents: Certificate of Compliance - Pages 1 to 2
Supplement to Certificate of Compliance - Page 1
Description and Tests - Pages 1 to 22
Figures - Figs. 1 to 2
Illustrations - Ill. 1 to 21
Attachment A - Instruction Manual (Ill- 22 to 23)

SUBJECT

CLASS 3221 02 - VALVES - Actuators
CLASS 3221 82 - VALVES - Actuators - CERTIFIED TO U.S. STANDARDS

Motor control units for electrically operated valves, indoor, intermittent duty, one cycle in 3 minutes, Class A insulation, thermally protected, rated 220 V ~ 240 V ac, 60 Hz.

Part A: Models UM-1-0-230-NN, rated 0.38 A, 91 W, 10 sec per cycle (open or close).

Part B: Models UM-1-0-230-AA, rated 0.38 A, 91 W, 10 sec per cycle (open or close).

Part C: Models UM-2-0-230-NN, rated 0.38 A, 91 W, 20 sec per cycle (open or close).

Part D: Models UM-2-0-230-AA, rated 0.38 A, 91 W, 20 sec per cycle (open or close).

Part E: Models UM-3-0-230-NN, rated 0.72 A, 135 W, 8 sec per cycle (open or close).

Part F: Models UM-3-0-230-AA, rated 0.72 A, 135 W, 8 sec per cycle (open or close).

Part G: Models UM-3-1-230-NA, rated 0.72 A, 135 W, 8 sec per cycle (open or close).

Part H: Models UM-3-1-230-AA, rated 0.72 A, 135 W, 8 sec per cycle (open or close).

Part I: Models UM-4-1-230-NA, rated 0.72 A, 135 W, 30 sec per cycle (open or close).

Part J: Models UM-4-1-230-AA, rated 0.72 A, 135 W, 30 sec per cycle (open or close).

Part K: Models UM-5-1-230-NA, rated 0.75 A, 153 W, 30 sec per cycle (open or close).

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Part L: Models UM-5-1-230-AA, rated 0.75 A, 153 W, 30 sec per cycle (open or close)

Part M: Models UM-6-1-230-NA, rated 0.8 A, 160 W, 30 sec per cycle (open or close).

Part N: Models UM-6-1-230-AA, rated 0.8 A, 160 W, 30 sec per cycle (open or close).

Note: Certified only as a component of other certified equipment where the suitability of the combination is to be determined by CSA International.

APPLICABLE REQUIREMENTS

CSA C22.2 No. 139-1982 - Electrically Operated Valves
CSA C22.2 No. 100-95 - Motors and Generators
UL 429, Fifth Edition - Electrically Operated Valves
UL 1004, Fifth Edition - Electric Motors

MARKING

The following markings shall be made via CSA Certified adhesive type nameplate (compatible with mounting surface), affixed to the enclosure:

Details

- CSA Mark and the "C-US" indicator.
- Submitter's identification; and/or contract "216806"
- Model designation
- Complete electrical rating in Volts, Hz, Amperes
- Date code or equivalent
- Time rating (the maximum ON period and the minimum Off period)
- "THERMALLY PROTECTED"
- A suitable wiring diagram to indicate the connections.
- Grounding symbol adjacent to the grounding means.

Instruction Manual

An instruction manual containing information regarding safety instructions, operation of the unit, and servicing, as III-22, 23 is provided with each unit. The instructions shall be essentially as illustrated or employ equivalent wording.

ALTERATIONS

Markings as noted above.

FACTORY TESTS

The equipment at the conclusion of manufacture, before shipment, shall withstand for one min, without breakdown, the application of 1000 V ac plus twice the max rated voltage between live parts and exposed non-current-carrying metal parts. The factory test may be made at existing room temp. As an alternative a potential 20% higher may be applied for one second.

WARNING: The factory test(s) specified may present a hazard of injury to personnel and/or property and should only be performed by persons knowledgeable of such hazards and under conditions designed to minimize the possibility of injury.

DESCRIPTION

NOMECLATURE

Model XX - X - X - XXX - XX
 I II III IV

I - Series

II - Structure of Base Enclosure

0: No provided with a handle for operating of Valve in case of power shutdown.

1: With a handle for operating of Valve in case of power shutdown.

III - Rating Voltage

230: 220Vac~240Vac

IV - Material of Enclosure

NN: plastic (for enclosure cover and base)

AA: metal (for enclosure cover and base)

NA: plastic (for enclosure cover) and metal (for enclosure base)

See Attached Figures 1 to 2 and Illustration 1 to 21

PART A: Model UM-1-0-230-NN

1. Enclosure: Consists of two sections

(a) Cover:

Material: Moulded ABS

Material Manufacturer: 'Chi Mei Corp.'

Material Designation: PA-765

Colour: Orange

Material Properties:

| Flame Rating | RTI with Imp. | HWI | HAI | CTI |
|------------------------------|---------------|-------|-------|-------|
| UL 94-5VA at 2.5 mm thick | 80°C | PLC 2 | PLC 0 | PLC 1 |

Note: Tested acceptably for CSA A00.

Dimensions: 3 mm min, shaped as shown, refer to Ill-1 for details.

Observation Opening: Provided with a 3 mm high extruded portion having a 46 mm dia opening covered by a 1.6 mm thick, 28.6 mm dia with 4 mm wide flange clear polymethyl methacrylate (PMMA) plastic, with flammability rating of HB at 1.5 mm thick, designated MF by "Mitsubishi Rayon Co., Ltd.". The PMMA is secured to the opening together with a rubber gasket by trap fit only.

(b) Base:

Same as above (a) except for the dimension and construction.

Dimensions: 3 mm min, shaped as shown, refer to Ill-3 for details. The Base is provided as housing for part of gears in the enclosure. Provided with an integral, 1.7 mm thick, 23.4 mm by 11.8 mm by 31.5 mm compartment for the passage of supply lead and to prevent the supply leads from contact with gears in Base enclosure.

Conduit Opening: Provided with one threaded conduit openings, 18 mm ID with 6.35 mm(1/4 in) of threaded length on the wall of lower chamber. The threads of the conduit opening are NPT. The opening has smooth, well-rounded surfaces upon which conductors may bear.

Mounting: Cover and Base are secured to each other by four screws. Separated into Cover and Base enclosure by Component Mounting Plate.

2. Component Mounting Plate:

Material: Plated steel

Dimensions: Refer to Ill-5 to Ill-6 for details. 2.5 mm thick, 96 mm by 96 mm, provided with a cut-out opening of 28 mm by 11.6 mm for the passage of supply leads, the opening through which conductors pass has smooth, well-rounded surfaces upon which conductors may bear.

Mounting: Secured to enclosure by four screws and nuts

3. Motor:

Manufacturer: 'Shang Yi Motor'

Type: UM1-UM2, 2P 10W.

Insulation: Class 105°C.

Type: Induction motor.

Mounting: Secured to the Component Mounting Plate in the upper chamber in Enclosure by four screws and washers.

The description of this motor is as follows:

(a) Drive Endbell:

Material: Painted Die cast aluminum.

Dimensions: 2.8 mm thick, shaped as shown, overall 49 mm by 49 mm by 26 mm high.

Remarks: Provided with a bushed opening for the passage of motor leads.

(b) Non Drive Endbell:

Material: Painted Die cast aluminum.

Dimensions: 2.8 mm thick, shaped as shown, overall 48 mm dia, 21.5 mm high.

Mounting: Secured to the drive endbell with three screws.

(c) Stator:

Material: Laminated steel.

Dimensions: 42 mm OD, 25 mm stack, 32 mm ID.

Winding: Enamelled copper wire, two sets provided, 0.11 mm dia, 980T x 4 turns

Slot Insulation: PETP film, 0.2 mm thick min, one layer, extending 2.4 mm min beyond the stator core.

Impregnation: Varnish.

- (d) Stator Leads: CSA Certified/UL Recognized
Type: AWM/UL 1007
Size: No. 22 AWG, 80°C, 300 V.
Method of Connection to Coil Ends: Mechanically secured and soldered and covered by certified silicone coated fibre glass sleeving.
Remarks: Leads and sleeving are secured to the coils by nylon cable ties.
- (e) Sleeving Over Stator Lead Connection: CSA Certified/UL Recognized
Material: Silicone coated fibreglass tubing.
Rating: 105°C, 300 V.
Dimensions: 0.25 mm thick min.
- (f) Rotor:
Material: Laminated steel.
Dimensions: 21.4 mm OD, 26 mm stack.
Method of Securement to Shaft: Press fitted.
End Rings: Aluminum, approx 1.6 mm thick, approx 4.3 mm wide.
- (g) Bearings: Two provided, sleeve type.
- (h) Bearing Bracket: Two provided, integral with endbell.
- (i) Shaft: Steel, max 8 mm dia, 77 mm long.
- (j) Thermal Protector: CSA Certified/UL Recognized
Manufacturer: 'SEKI CONTROLS Co.'
Designation: ST-22
Rating: 120 V ac, 8 A, 125°C, 6000 cycles.
Mounting: The protector is insulated with 0.15 mm thick PETP film, extending min 2.4 mm beyond ends of protector and held to winding by a nylon cable tie.
Location: On the top of motor winding.

4. Capacitor: Accepted
Manufacturer: 'CAP Tech'
Rating: 2 uF, 350 V ac, 85°C
Integral Lead: CSA Type TEW/UL style 1015, 18 AWG, 105C, 600 V
Terminations: Epoxy-embedded lead emerged from capacitor body
Mounting: Secured to the Component Mounting Plate by a screw.
Remarks: Minimum 6.4 mm spacing is maintained from the terminal of the capacitor to the enclosure.

5. Terminal Block: CSA Certified/UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Great Dragon Electrical Corporation'
Designation: Cat. No. GGB-90-01
Rating: 300 V, 15 A
Mounting: The terminal block is secured to a L-shaped plated steel mounting bracket, 1.5 mm thick, with two screws and then secured to the Component Mounting Plate by two screws.
Remarks: Suitable for use with 14-22 AWG stranded conductors. Minimum 6.4 mm over surface spacing is maintained between the contact of the terminal block and the steel bracket. A CSA Certified and UL Recognized tubing is provided to entirely sleeve the Internal Wiring from the Component Mounting Plate to Terminal Block body.

6. Micro Switch: Two provided, CSA Certified/UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Omron'.
Designation: Cat. No. SS-5
Rating: 125 V ac, 5 A
Type: Momentary contact, SPST.
Mounting: Secured along with 6.4 mm thick phenolic board to the Component Mounting Plate with two screws. The phenolic board is to act as a barrier between live parts and the Mounting Plate.

Remarks: Minimum 6.4 mm spacing is maintained between terminals and the Component Mounting Plate. A CSA Certified and UL Recognized heat shrinkable tubing is provided to sleeve the switch terminals.
7. Internal Wiring: CSA Certified/UL Recognized.
Type: CSA type AWM/ UL style 1007
Rating: No. 22 AWG, 300 V, 80°C.
Remarks: All wires are properly routed away from sharp edge and secured together by cable tie.
8. Wire Connector: CSA Certified and UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Heavy Power'
Designation: CE-1 (crimp type) or U2
Type: Crimp type(CE-1) or twist-on type(U2)
Rating: 105°C, 300 V
Remarks: Two turns of insulated tape are secured on the termination between connector body and wiring if twist-on type connector is used.
9. Gasket:
Material: Made of NBR rubber.
Dimensions: 2.4 mm dia, 104 mm by 104 mm.
Location: Provided in grooves between upper and lower chambers of enclosure
10. Gasket:
Material: Made of NBR rubber.
Dimensions: 3 mm thick, 14 mm high, 37 mm dia.
Location: Provided for the observation opening.
11. Grounding and Bonding:
A green/yellow CSA Certified/UL Recognized 16 AWG leads secured to a CSA Certified/UL Recognized closed loop, ring terminal and then secured together with lock washer to the Component Mounting Plate by a min No. 6 screw and the screw engage at least two threads into the body. A free length of 6 in (153 mm) or more is left for field termination. A grounding symbol is appeared adjacent to the grounding screw. All other non-current-carrying metal parts are reliably bonded together by mechanical means (tooth lockwasher, screw, nut, ...).

PART B: Model UM-1-0-230-AA

General: Model UM-1-0-230-AA is similar in construction to Model UM-1-0-230-NN described in PART A above except for the enclosure material and observation opening. Refer to Ill-2 and Ill-4.

Enclosure: Refer to Ill-2

(a) Cover:

Material: Die-cast aluminum

Observation Opening: Same as above except for have a plated steel ring, shaped as show, refer to Ill-18.

The PMMA is secured to the opening together with a rubber gasket by trap fit, and further secured to enclosure by a plated steel rings as described below. The plated steel ring measured 0.7mm thick, overall 58mm dia, 28.6 mm ID is placed over the PMMA to provide an 642 mm square in area for observation opening and to secure the PMMA to the enclosure by three screws.

(b) Base: Refer to Ill-4

Material: Die-cast aluminum

PART C: Model UM-2-0-230-NN

General: Model UM-2-0-230-NN is similar in construction to Model UM-1-0-230-NN described in PART A above except for the gear ratio.

PART D: Model UM-2-0-230-AA

General: Model UM-2-0-230-AA is similar in construction to Model UM-1-0-230-AA described in PART B above except for the gear ratio.

Part E: Model UM-3-0-230-NN

1. Enclosure: Consists of two sections

(a) Cover:

Material: Same as Model UM-1-0-230-NN of ABS

Dimensions: 3 mm min, shaped as shown, refer to Ill-7 for details.

Observation Opening: Same as Model UM-1-0-230-NN described in PART A

(b) Base:

Same as above (a) except for the dimension and construction.

Dimensions: 3 mm min, shaped as shown, refer to Ill-9 to for details. The Base enclosure is provided as housing for part of gears in the enclosure. Provided with an integral, 1.7 mm thick, 19.6 mm by 10.3 mm by 38.5 mm compartment for the passage of supply lead and to prevent the supply leads from contact with gears in Base enclosure.

Conduit Opening: Provided with two threaded conduit openings, 18 mm ID with 16 mm of threaded length on the wall of Base enclosure. The threads of the conduit opening are NPT.

The openings were smooth, well-rounded surfaces upon which conductors may bear.

Mounting: Cover enclosure and Base enclosure enclosures are secured to each other by four screws. Separated into Cover enclosure and Base enclosure by Component Mounting Plate.

2. Component Mounting Plate:

Material: Plated steel

Dimensions: Refer to Ill-12 for details. Overall 146 mm dia, 3 mm thick, provided with two cut-out openings, each measured 22 mm by 12 mm for the passage of supply leads, the opening through which conductors pass has smooth, well-rounded surfaces upon which conductors may bear.

Mounting: Secured to enclosure by four screws and nuts.

3. Motor:

Manufacturer: 'Shang Yi Motor'

Type: UM-3, 4P 25W

Insulation: Class 105°C.

Type: Induction motor.

Mounting: Secured to the Component Mounting Plate in the upper chamber in Enclosure by four screws and washers.

The description of this motor is as follows:

(a) Drive Endbell:

Material: Painted Die cast aluminum.

Dimensions: 1.8 mm thick, shaped as shown, overall 77.5 mm by 77.5 mm by 30 mm high.

(b) Non Drive Endbell:

Material: Painted Die cast aluminum.

Dimensions: 1.8 mm thick, shaped as shown, overall 77.5 mm dia, 77.5 mm by 30 mm high .

Mounting: Secured to the drive endbell with four screws.

Remarks: Provided with a bushed opening for the passage of motor leads.

(c) Stator:

Material: Laminated steel.

Dimensions: 82 mm OD, 30 mm stack, 63 mm ID.

Winding: Enamelled copper wire, two sets provided, 0.27 mm dia, 420T x 8 turns

Slot Insulation: PETP film, 0.2 mm thick min, one layer, extending 2.4 mm min beyond the stator core.

Impregnation: Varnish.

(d) Stator Leads: CSA Certified/UL Recognized

Type: TEW/UL 1015

Size: No. 18 AWG, 105°C, 600 V.

Method of Connection to Coil Ends: Mechanically secured and soldered and covered by certified silicone coated fibre glass sleeving.

Remarks: Leads and sleeving are secured to the coils by nylon cable ties.

(e) Sleeving Over Stator Lead Connection: CSA Certified/UL Recognized

Material: Silicone coated fibreglass tubing.

Rating: 105°C, 300 V.

Dimensions: 0.25 mm thick min.

(f) Rotor:

Material: Laminated steel.

Dimensions: 43.5 mm OD, 29 mm stack.

Method of Securement to Shaft: Press fitted.

End Rings: Aluminum, approx 3.0 mm thick, approx 8 mm wide

- (g) Bearings: Two provided, ball type.
 - (h) Bearing Bracket: Two provided, integral with endbell.
 - (i) Shaft: Steel, max 12 mm dia, 93 mm long.
 - (j) Thermal Protector: CSA Certified/UL Recognized
Manufacturer: 'SEKI CONTROLS Co.'
Designation: ST-22
Rating: 120 V ac, 8 A, 125°C, 6000 cycles.
Mounting: The protector is insulated with 0.15 mm thick PETP film, extending min 2.4 mm beyond ends of protector and held to winding by a nylon cable tie.
Location: On the top of motor winding.
4. Capacitor: Accepted
Manufacturer: 'CAP Tech'
Rating: 3.5 uF, 350 V ac, 85°C.
Integral Lead: CSA Type TEW/UL style 1015, 18 AWG, 105C, 600 V
Terminations: Epoxy-embedded lead emerged from capacitor body
Mounting: Secured to the Component Mounting Plate by a screw.
Remarks: Minimum 6.4 mm spacing is maintained from the terminal of the capacitor to the enclosure.
5. Terminal Block: CSA Certified/UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Great Dragon Electrical Corporation'
Designation: Cat. No. GGB-90-01
Rating: 300 V, 15 A
Mounting: The terminal block is secured to a L-shaped plated steel mounting bracket, 1.5 mm thick, with two screws and then secured to the Component Mounting Plate by two screws.
Remarks: Suitable for use with 14-22 AWG stranded conductors. Minimum 6.4 mm over surface spacing is maintained between the contact of the terminal block and the steel bracket.
A CSA Certified and UL Recognized tubing is provided to entirely sleeve the Internal Wiring from the Component Mounting Plate to Terminal Block body.
6. Micro Switch: Two provided, CSA Certified/UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Omron'.
Designation: Cat. No. V-155-1A5
Rating: 125 V ac, 15 A, 1/2 HP
Type: Momentary contact, SPST.
Mounting: Secured along with 6.4 mm thick plated steel to the Component Mounting Plate with two screws. The phenolic board is to act as a barrier between live parts and the Mounting Plate.
Remarks: Minimum 6.4 mm spacing is maintained between terminals and the Component Mounting Plate. A CSA Certified and UL Recognized heat shrinkable tubing is provided to sleeve the switch terminals.
7. Internal Wiring: CSA Certified/UL Recognized.
Type: CSA type AWM/ UL style 1015
Rating: No. 18 AWG, 600 V, 105°C.
Remarks: All wires are properly routed away from sharp edge and secured together by cable tie.

8. Wire Connector: CSA Certified and UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Heavy Power'
Designation: CE-1 (crimp type) or U2
Type: Crimp type(CE-1) or twist-on type(U2)
Rating: 105°C, 300 V
Remarks: Two turns of insulated tape are secured on the termination between connector body and wiring if twist-on type connector is used.
9. Gasket:
Material: Made of NBR rubber.
Dimensions: 2.9 mm thick, 158 mm by 158 mm.
Location: Provided between Enclosure and Gear Housing
10. Gasket:
Material: Made of NBR rubber.
Dimensions: 5 mm thick, 11.5 mm high, 48 mm dia.
Location: Provided for the observation opening.
11. Grounding and Bonding:
A green/yellow CSA Certified/UL Recognized 16 AWG leads secured to a CSA Certified/UL Recognized closed loop, ring terminal and then secured together with lock washer to the Component Mounting Plate by a min No. 6 screw and the screw engage at least two threads into the body. A free length of 6 in (153 mm) or more is left for field termination. A grounding symbol is appeared adjacent to the grounding screw. All other non-current-carrying metal parts are reliably bonded together by mechanical means (tooth lockwasher, screw, nut, ...).

PART F: Model UM-3-0-230-AA

General: Model UM-3-0-230-AA is similar in construction to Model UM-3-0-230-NN described in PART E above except for the enclosure material, enclosure base construction and component mounting plate.

1. Enclosure :
 - (a) Cover:
Material: Dia-cast aluminum
Dimensions: 3 mm min, shaped as shown, refer to Ill-8 for details.
Observation Opening: Same as Model UM-1-0-230-AA described in PART B
 - (b) Base:
Material: Dia-cast aluminum
Dimensions: 3 mm min, shaped as shown, refer to Ill-10 to for details. The Base enclosure is provided as housing for part of gears in the enclosure. Provided with an integral, 1.7 mm thick, 19.6 mm by 10.3 mm by 38.5 mm compartment for the passage of supply lead and to prevent the supply leads from contact with gears in Base enclosure.
Material: Die-cast aluminum
Dimensions: 3 mm min, shaped as shown, refer to Ill-8 to for details. Base is no provided as housing for part of gears in the enclosure.

2. Component Mounting Plate:

Dimensions: overall 146 mm dia, 3 mm thick, 2.5 mm thick, provided with two cut-out openings, each measured 22 mm by 12 mm for the passage of supply leads, the opening through which conductors pass has smooth, well-rounded surfaces upon which conductors may bear. Also two plates, each measured 0.8 mm thick, overall 18.6 mm by 9.6 mm 28 mm bent to provide a U-shaped channel, secured to Mounting Plate by one screw to prevent the supply leads from contact with gears in the lower chamber.

PART G: Model UM-3-1-230-NA

General: Model UM-3-1-230-NA is similar in construction to Model UM-3-0-230-NN except for enclosure base and component mounting plate. Model M-3-1-230-NA is provided with a handle for operating of Valve in case of power shutdown.

1. Enclosure base:

Material: Die-cast aluminum

Height: 113 mm high, shaped as shown, refer to Ill-11 to for details.

Dimensions: 3 mm min, shaped as shown, refer to Ill-11 to for details. Base is no provided as housing for part of gears in the enclosure.

2. Component Mounting Plate: Same as model UM-3-0-230-AA described in PART F

PART H: Model UM-3-1-230-AA

General: Model UM-3-1-230-AA is similar in construction to Model UM-3-1-230-NA except for enclosure cover material.

Enclosure cover: Same as Model UM-3-0-230-AA described in PART F

PART I: Model UM-4-1-230-NA

General: Model UM-4-1-230-NA is similar in construction to Model UM-3-1-230-NA except for the gear ratio, enclosure base dimension and component mounting plate.

1. Enclosure base dimension: 3 mm min, shaped as shown, refer to Ill-13 to for details.

2. Component Mounting Plate:

Material: Plated steel

Dimensions: Refer to Ill-14 to Ill-15 for details. Also two plates, each measured 0.8 mm thick, overall 18.6 mm by 9.6 mm 28 mm bent to provide a U-shaped channel, secured to Mounting Plate by one screw to prevent the supply leads from contact with gears in the lower chamber.

Mounting: Secured to enclosure by four screws and nuts.

PART J: Model UM-4-1-230-AA

General: Model UM-4-1-230-AA is similar in construction to Model UM-3-1-230-AA except for the gear ratio and enclosure base dimension and component mounting plate.

1. Enclosure base dimension: 3 mm min, shaped as shown, refer to Ill-13 to for details.

2. Component Mounting Plate: Same as Model UM-4-1-230-NA of PART I

PART K: Model UM-5-1-230-NA

1. Enclosure:

(a) Cover:

Material: Same as Model UM-1-0-230-NN of ABS

Dimensions: 3 mm min, shaped as shown, refer to Ill-16 for details.

Observation Opening: Same as Model UM-1-0-230-NN described in PART A

(b) Base:

Material: Die-cast aluminum

Dimensions: 3 mm min, shaped as shown, refer to Ill-17 for details.

Conduit Opening: Same as Model UM-3-1-230-NA described in PART G

2. Component Mounting Plate:

Same as UM-4-1-230-NA described in PART I

3. Motor:

Manufacturer: 'Shang Yi Motor'

Type: UM-5, 4P 40W

Insulation: Class 105°C.

Type: Induction motor.

Mounting: Secured to the Component Mounting Plate in the upper chamber in Enclosure by four screws and washers.

The description of this motor is as follows:

(a) Drive Endbell:

Material: Painted Die cast aluminum.

Dimensions: 1.8 mm thick, shaped as shown, overall 77.5 mm by 77.5 mm by 30 mm high.

(b) Non Drive Endbell:

Material: Painted Die cast aluminum.

Dimensions: 1.8 mm thick, shaped as shown, overall 77.5 mm dia, 77.5 mm by 30 mm high .

Mounting: Secured to the drive endbell with four screws.

Remarks: Provided with a bushed opening for the passage of motor leads.

(c) Stator:

Material: Laminated steel.

Dimensions: 82 mm OD, 40 mm stack, 63 mm ID.

Winding: Enamelled copper wire, two sets provided, 0.29 mm dia, 340T x 8 turns.

Slot Insulation: PETP film, 0.2 mm thick min, one layer, extending 2.4 mm min beyond the stator core.

Impregnation: Varnish.

(d) Stator Leads: CSA Certified/UL Recognized

Type: TEW/UL 1015

Size: No. 18 AWG, 105°C, 600 V.

Method of Connection to Coil Ends: Mechanically secured and soldered and covered by certified silicone coated fibre glass sleeving.

Remarks: Leads and sleeving are secured to the coils by nylon cable ties.

- (e) Sleeving Over Stator Lead Connection: CSA Certified/UL Recognized
Material: Silicone coated fibreglass tubing.
Rating: 105°C, 300 V.
Dimensions: 0.25 mm thick min.
- (f) Rotor:
Material: Laminated steel.
Dimensions: 43.5 mm OD, 40 mm stack.
Method of Securement to Shaft: Press fitted.
End Rings: Aluminum, approx 3.5 mm thick, approx 8.5 mm wide.
- (g) Bearings: Two provided, ball type.
- (h) Bearing Bracket: Two provided, integral with endbell.
- (i) Shaft: Steel, max 12 mm dia, 103 mm long.
- (j) Thermal Protector: CSA Certified/UL Recognized
Manufacturer: 'SEKI CONTROLS Co.'
Designation: ST-22
Rating: 120 V ac, 1/2 hp, 125°C, 6000 cycles.
Mounting: The protector is insulated with 0.15 mm thick PETP film, extending min 2.4 mm beyond ends of protector and held to winding by a nylon cable tie.
Location: On the top of motor winding.

4. Capacitor: Accepted
Manufacturer: 'CAP Tech'
Rating: 4 uF, 350 V ac, 55°C.
Integral Lead: CSA Type TEW/UL style 1015, 22 AWG, 105C, 600 V
Terminations: Epoxy-embedded lead emerged from capacitor body
Mounting: Secured to the Component Mounting Plate by a screw.
Remarks: Minimum 6.4 mm spacing is maintained from the terminal of the capacitor to the enclosure.

5. Terminal Block: CSA Certified/UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Great Dragon Electrical Corporation'
Designation: Cat. No. GGB-90-01
Rating: 300 V, 15 A
Mounting: The terminal block is secured to a L-shaped plated steel mounting bracket, 1.5 mm thick, with two screws and then secured to the Component Mounting Plate by two screws.
Remarks: Suitable for use with 14-22 AWG stranded conductors. Minimum 6.4 mm over surface spacing is maintained between the contact of the terminal block and the steel bracket.
A CSA Certified and UL Recognized tubing is provided to entirely sleeve the Internal Wiring from the Component Mounting Plate to Terminal Block body.

6. Micro Switch: Two provided, CSA Certified/UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Omron'.
Designation: Cat. No. SS-155-1A5
Rating: 125 V ac, 15 A, 1/2 HP
Type: Momentary contact, SPST.
Mounting: Secured along with 6.4 mm thick plated steel to the Component Mounting Plate with two screws. The phenolic board is to act as a barrier between live parts and the Mounting Plate.
Remarks: Minimum 6.4 mm spacing is maintained between terminals and the Component Mounting late. A CSA Certified and UL Recognized heat shrinkable tubing is provided to sleeve the switch terminals.
7. Internal Wiring: CSA Certified/UL Recognized.
Type: CSA type AWM/ UL style 1015
Rating: No. 18 AWG, 600 V, 105°C.
Remarks: All wires are properly routed away from sharp edge and secured together by cable tie.
8. Wire Connector: CSA Certified and UL Recognized or CSA C-US Certified equivalent
Manufacturer: 'Heavy Power'
Designation: CE-1 (crimp type) or U2
Type: Crimp type(CE-1) or twist-on type(U2)
Rating: 105°C, 300 V
Remarks: Two turns of insulated tape are secured on the termination between connector body and wiring if twist-on type connector is used.
9. Gasket:
Material: Made of NBR rubber.
Dimensions: 2.9 mm thick, 158 mm by 158 mm.
Location: Provided between Enclosure and Gear Housing
10. Gasket:
Material: Made of NBR rubber.
Dimensions: 5 mm thick, 11.5 mm high, 48 mm dia.
Location: Provided for the observation opening.
11. Grounding and Bonding:
A green/yellow CSA Certified/UL Recognized 16 AWG leads secured to a CSA Certified/UL Recognized closed loop, ring terminal and then secured together with lock washer to the Component Mounting Plate by a min No. 6 screw and the screw engage at least two threads into the body. A free length of 6 in (153 mm) or more is left for field termination. A grounding symbol is appeared adjacent to the grounding screw. All other non-current-carrying metal parts are reliably bonded together by mechanical means (tooth lockwasher, screw, nut, ...).

PART L: Model UM-5-1-230-AA

General: Model UM-5-1-230-AA is similar in construction to Model UM-5-1-230-NA except for enclosure cover.

Enclosure cover:

Material: Die-cast aluminum

Dimensions: Same as Model UM-3-0-230-AA of PART E., refer to Ill-8 for details.

Observation Opening: Same as Model UM-1-0-230-AA described in PART B

PART M: Model UM-6-1-230-NA

General: Model UM-6-1-230-NA is similar in construction to Model UM-5-1-230-NA except for followings:

1. Motor:
Manufacturer: 'Shang Yi Motor'
Type: UM-6, 4P 60W
Insulation: Class 105°C.
Type: Induction motor.
Mounting: Secured to the Component Mounting Plate in the upper chamber in Enclosure by four screws and washers.
2. Shaft: Steel, max 12 mm dia, 113 mm long.
3. Capacitor: Accepted
Manufacturer: 'CAP Tech'
Rating: 6 uF, 350 V ac, 85°C.
Integral Lead: CSA Type TEW/UL style 1015, 18 AWG, 105C, 600 V
Terminations: Epoxy-embedded lead emerged from capacitor body
Mounting: Secured to the Component Mounting Plate by a screw.
Remarks: Minimum 6.4 mm spacing is maintained from the terminal of the capacitor to the enclosure.

PART N: Model UM-6-1-230-AA

General: Model UM-6-1-230-AA is similar in construction to Model UM-6-1-230-NA except for enclosure cover material.

Enclosure cover: Same as Model UM-5-1-230-AA described in PART L

TESTS

The following tests were conducted on representative sample(s) with satisfactory results.

Edition: 1 (Project No. 1341960)

Model Tested: Model UM-1-0-230-NN was tested as representative of Model UM-1-0-230-AA, UM-2-0-230-NN and UM-2-0-230-AA

Marked Rating: 220 / 240 V, 60 Hz, 0.38 A (2 uF capacitor)

Rating: CSA C22.2 No. 100, Cl 6.3/UL 1004

Compliance
Yes

| <u>Test</u> | <u>Volts</u> | <u>Hz</u> | <u>Amps</u> | <u>Watts</u> | <u>Conditions</u> |
|-------------|--------------|-----------|-------------|--------------|-----------------------------|
| 1. | 220 / 240 | 60 | 0.3 / 0.33 | 76 / 89 | Max normal load (Close) |
| 2. | 220 / 240 | 60 | 0.3 / 0.35 | 74 / 87 | Max normal load (Open) |
| 3. | 220 / 240 | 60 | 0.38 / 0.38 | 84 / 91 | Rated (Normal) load (Close) |
| 4. | 220 / 240 | 60 | 0.38 / 0.38 | 84 / 91 | Rated (Normal) load (Open) |
| 5. | 220 / 240 | 60 | 0.3 / 0.35 | 70 / 85 | Locked rotor |

Temperature Test: CSA C22.2 No 100, Cl 6.2/UL 1004

Compliance
Yes

Condition: 240 V ac, 60 Hz Intermittent duty 10 sec per cycle, 1 cycle in 3 minutes.

| <u>Thermocouple Location</u> | <u>Deg C</u> <u>Rated Load</u> |
|------------------------------|-----------------------------------|
| Motor casing | 47 |
| Motor core | 47 |
| Capacitor | 36 |
| Terminal block | 34 |
| Micro switch | 34 |
| Internal wiring | 32 |
| Enclosure (outside) | 29 |
| Ambient | 24 |
| *Stator winding (R of R) | 47 |
| **Stator winding (R of R) | 48 |

* t1: 23 °C, t2: 24 °C, R1: 555 ohm, R2: 607 ohm

** t1: 23 °C, t2: 24 °C, R1: 558 ohm, R2: 611 ohm

Dielectric Strength: CSA C22.2 No 100, Cl 6.4/UL 1004

Twice max rated voltage plus 1000 V ac.

Compliance
Yes

Locked-Rotor Temperature: CSA C22.2 No 77, Cl 5.4/UL 2111, Para. 14

Compliance
Yes

Maximum winding temperature during the 1st hr: 165°C (ambient 23°C)

Maximum winding temperature after 1st hr: 165°C (ambient 23°C)

Maximum average winding temperature during the 2nd hr: 131°C (ambient 24°C)

Maximum average winding temperature during the 72th hr: 131°C(ambient 24°C)

Dielectric Strength: CSA C22.2 No 77, Cl 5.5/UL 2111, Para. 15

Twice max rated voltage plus 1000 V ac.

Compliance
Yes

Endurance: CSA C22.2 No 77, Cl 5.6/UL 2111, Para. 16

Compliance

The motor operated for 15 days, with the rotor locked, additional to the 72 hours locked-rotor temperature (18 d total). The enclosure of the combination grounded through a 3 A fuse.

3 A fuse to ground was intact.

Dielectric Strength Repeated, 480 V ac applied for one minute between live parts and ground.

Threaded Conduit Opening: CSA C22.2 No 100, Cl 6.5

Not applicable, same construction as Model UM-1 covered in Submittor's Report 1341960.

Resistance to Impact: CSA C22.2 No 100, Cl 6.10

Not applicable, same construction as Model UM-1 covered in Submittor's Report 1341960.

Model Tested: Model UM-3-0-230-NN was tested as representative of Model UM-3-0-230-AA, UM-3-1-230-NA, UM-3-1-230-AA, UM-4-1-230-NA and UM-4-1-230-AA.

Marked Rating: 220 / 240 V, 60 Hz, 0.72 A (3.5 uF capacitor)

Rating: CSA C22.2 No. 100, Cl 6.3/UL 1004

Compliance
Yes

| <u>Test</u> | <u>Volts</u> | <u>Hz</u> | <u>Amps</u> | <u>Watts</u> | <u>Conditions</u> |
|-------------|--------------|-----------|-------------|--------------|-----------------------------|
| 1. | 220 / 240 | 60 | 0.4 / 0.52 | 89 / 105 | Max normal load (Close) |
| 2. | 220 / 240 | 60 | 0.54 / 0.67 | 97 / 124 | Max normal load (Open) |
| 3. | 220 / 240 | 60 | 0.72 / 0.72 | 124 / 135 | Rated (Normal) load (Close) |
| 4. | 220 / 240 | 60 | 0.72 / 0.72 | 124 / 135 | Rated (Normal) load (Open) |
| 5. | 220 / 240 | 60 | 1.0 / 1.0 | 232 / 232 | Locked rotor |

Temperature Test: CSA C22.2 No 100, Cl 6.2/UL 1004

Compliance
Yes

Condition: 240 V, 60 Hz Intermittent duty 30 sec per cycle, 1 cycle in 3 minutes.

| <u>Thermocouple Location</u> | <u>Deg C</u> <u>Rated Load</u> |
|------------------------------|-----------------------------------|
| Motor casing | 34 |
| Motor core | 35 |
| Capacitor | 30 |
| Terminal block | 29 |
| Micro switch | 30 |
| Internal wiring | 28 |
| Enclosure (outside) | 28 |
| Ambient | 23 |
| *Stator winding (R of R) | 38 |
| **Stator winding (R of R) | 40 |

* t1: 23 °C, t2: 23 °C, R1: 87 ohm, R2: 92 ohm

** t1: 23 °C, t2: 23 °C, R1: 87 ohm, R2: 93 ohm

Dielectric Strength: CSA C22.2 No 100, CI 6.4/UL 1004
Twice max rated voltage plus 1000 V ac.

Compliance
Yes

Locked-Rotor Temperature: CSA C22.2 No 77, CI 5.4/UL 2111, Para. 14

Representative of Model UM-1-0-230-NN. No tested.

Dielectric Strength: CSA C22.2 No 77, CI 5.5/UL 2111, Para. 15

Representative of Model UM-1-0-230-NN. No tested.

Endurance: CSA C22.2 No 77, CI 5.6/UL 2111, Para. 16

Representative of Model UM-1-0-230-NN. No tested.

Threaded Conduit Opening: CSA C22.2 No 100, CI 6.5

Not applicable, same construction as Model UM-3 covered in Submittor's Report 1341960.

Resistance to Impact: CSA C22.2 No 100, CI 6.10

Not applicable, same construction as Model UM-1 covered in Submittor's Report 1341960.

Model Tested: Model UM-5-1-230-NA was tested as representative of Model UM-5-1-230-AA.

Marked Rating: 220 / 240 V, 60 Hz, 0.75 A (4 uF capacitor)

Rating: CSA C22.2 No. 100, CI 6.3/UL 1004

Compliance
Yes

| Test | Volts | Hz | Amps | Watts | Conditions |
|------|-----------|----|-------------|-----------|-----------------------------|
| 1. | 220 / 240 | 60 | 0.55 / 0.73 | 120 / 150 | Max normal load (Close) |
| 2. | 220 / 240 | 60 | 0.52 / 0.59 | 117 / 134 | Max normal load (Open) |
| 3. | 220 / 240 | 60 | 0.75 / 0.75 | 143 / 153 | Rated (Normal) load (Close) |
| 4. | 220 / 240 | 60 | 0.75 / 0.75 | 143 / 153 | Rated (Normal) load (Open) |
| 5. | 220 / 240 | 60 | 1.25 / 1.25 | 284 / 284 | Locked rotor |

Temperature Test: CSA C22.2 No 100, Cl 6.2/UL 1004

Compliance
Yes

Condition: 240 V, 60 Hz Intermittent duty 30 sec per cycle, 1 cycle in 3 minutes.

| <u>Thermocouple Location</u> | <u>Deg C</u> <u>Rated Load</u> |
|------------------------------|-----------------------------------|
| Motor casing | 56 |
| Motor core | 58 |
| Capacitor | 39 |
| Terminal block | 36 |
| Micro switch | 38 |
| Internal wiring | 35 |
| Enclosure (outside) | 36 |
| Ambient | 21 |
| *Stator winding (R of R) | 57 |
| **Stator winding (R of R) | 61 |

* t1: 21 °C, t2: 21 °C, R1: 70 ohm, R2: 80 ohm
 ** t1: 21 °C, t2: 21 °C, R1: 69 ohm, R2: 80 ohm

Dielectric Strength: CSA C22.2 No 100, Cl 6.4/UL 1004
Twice max rated voltage plus 1000 V ac.

Compliance
Yes

Locked-Rotor Temperature: CSA C22.2 No 77, Cl 5.4/UL 2111, Para. 14

Representative of Model UM-1-0-230-NN. No tested.

Dielectric Strength: CSA C22.2 No 77, Cl 5.5/UL 2111, Para. 15

Representative of Model UM-1-0-230-NN. No tested.

Endurance: CSA C22.2 No 77, Cl 5.6/UL 2111, Para. 16

Representative of Model UM-1-0-230-NN. No tested.

Threaded Conduit Opening: CSA C22.2 No 100, Cl 6.5

Not applicable, conducted on Model UM-3 as being representative

Resistance to Impact: CSA C22.2 No 100, Cl 6.10

Not applicable, conducted on Model UM-3 as being representative

Model Tested: Model UM-6-1-230-NA was tested as representative of Model UM-6-1-230-AA.

Marked Rating: 220 / 240 V, 60 Hz, 0.8 A (6 uF capacitor)

Rating: CSA C22.2 No. 100, Cl 6.3/UL 1004

Compliance
Yes

| <u>Test</u> | <u>Volts</u> | <u>Hz</u> | <u>Amps</u> | <u>Watts</u> | <u>Conditions</u> |
|-------------|--------------|-----------|-------------|--------------|-----------------------------|
| 1. | 220 / 240 | 60 | 0.54 / 0.64 | 110 / 138 | Max normal load (Close) |
| 2. | 220 / 240 | 60 | 0.5 / 0.76 | 106 / 127 | Max normal load (Open) |
| 3. | 220 / 240 | 60 | 0.8 / 0.8 | 152 / 160 | Rated (Normal) load (Close) |
| 4. | 220 / 240 | 60 | 0.8 / 0.8 | 152 / 160 | Rated (Normal) load (Open) |
| 5. | 220 / 240 | 60 | 1.46 / 1.46 | 332 / 332 | Locked rotor |

Temperature Test: CSA C22.2 No 100, Cl 6.2/UL 1004

Compliance
Yes

Condition: Intermittent duty 30 sec per cycle, 1 cycle in 3 minutes.

| <u>Thermocouple Location</u> | <u>Deg C</u> |
|------------------------------|--------------|
| Motor casing | 64 |
| Motor core | 68 |
| Capacitor | 44 |
| Terminal block | 46 |
| Micro switch | 42 |
| Internal wiring | 38 |
| Enclosure (outside) | 40 |
| Ambient | 21 |
| *Stator winding (R of R) | 69 |
| **Stator winding (R of R) | 70 |

* t1: 21 °C, t2: 21 °C, R1: 53 ohm, R2: 63 ohm

** t1: 21 °C, t2: 21 °C, R1: 52 ohm, R2: 62 ohm

Dielectric Strength: CSA C22.2 No 100, Cl 6.4/UL 1004
Twice max rated voltage plus 1000 V ac.

Compliance
Yes

Locked-Rotor Temperature: CSA C22.2 No 77, Cl 5.4/UL 2111, Para. 14

Representative of Model UM-1-0-230-NN. No tested.

Dielectric Strength: CSA C22.2 No 77, Cl 5.5/UL 2111, Para. 15

Representative of Model UM-1-0-230-NN. No tested.

Endurance: CSA C22.2 No 77, Cl 5.6/UL 2111, Para. 16

Representative of Model UM-1-0-230-NN. No tested.

Threaded Conduit Opening: CSA C22.2 No 100, Cl 6.5

Not applicable, conducted on Model UM-3 as being representative

Resistance to Impact: CSA C22.2 No 100, Cl 6.10

Not applicable, conducted on Model UM-3 as being representative

Flame Test: Cl 6.13/-

Flammability Test: CSA Std. C22.2 No. 0.6, Clause 5 (Test A: Non-metallic Enclosure Materials).

Sample/Material: ABS, PA-765A, `Chi Mei`

Colour: Orange

Thickness : 2.5 mm

Not applicable, same construction as Submitter's Report 1341960.