



Certificate of Compliance

Certificate Number: LR 110186-1

Revision: LR 110186-4

Date Issued: February 17, 1999

Issued to: **ZPA Canada Inc.**
180-8208 Swensen Way
Nordel Business Park
Delta, BC V4G 1J6

*The products listed below are eligible to bear the CSA Mark shown,
with adjacent indicator NRTL/C.*



Issued by: Sebastian George, P. Eng.
Vancouver, BC Canada

Signature: _____

PRODUCTS

CLASS 3221 02 - VALVES - Actuators

CLASS 3221 82 - VALVES - Actuators

VALVE ACTUATORS AND CONTROL PACKAGES

Electrical Motor Operated Valve Actuator Models MO and MOK Series, including accessories and control packages. Enclosure rated Type 4 with ambient temperature -25°C to +55°C for MOK and MO Series and enclosure rated Type 6 for MO Series.

The "NRTL/C" indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ANSI/UL and CSA Standards, for use in the U.S. and Canada. NRTL, i.e. Nationally 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.



Model No	Type No	Adjustment time (s)	Torque (Nm)	1 - phase motor (120 Vac, 60 Hz)		
				Power (W)	rpm	In (A)
MOK 63	52325	9	25-50	20	3200	0.6
		18	25-80	20	3200	0.6
		32	25-80	20	3200	0.6
MOK 125	52326	8	63-125	110	3470	1.6
		16		70	3330	1
		32		90	1690	1.75
		64		90	1690	1.75
MOK 250	52327	16	125-250	110	3470	1.6
		32		70	3330	1
		64		90	1690	1.75
		128		90	1690	1.75
				3-phase motor (208 V ac, 60 Hz)		
MOK 125	52326	8	63-125	70	3350	0.46
		16		70	3350	0.46
		32		25	1730	0.35
		64		25	1730	0.35
MOK 250	52327	16	125-250	70	3350	0.46
		32		70	3350	0.46
		64		25	1730	0.35
		128		25	1730	0.35
MOK 500	52328	16	250-500	145	1625	0.75
		32		110	3350	0.56
		64		70	3350	0.46
MOK 1000	52329	32	500-1000	145	1625	0.75
		64		110	3350	0.56
		128		70	3350	0.46



Revision: LR 110186-4

Model No.	Type No.	Torque (Nm)	Speed (rpm)	Motor (208 V ac, 3 ph, 60 Hz)			
				Power (kW)	rpm (rpm)	In (A)	
				3 - phase motor (208 V ac, 60 Hz)			
MO 4/7-9	52030	75	9	0.11	780	1	
MO 4/8-12		85	12	0.11	1090	1	
MO 4/6-20		60	20	0.145	1070	1.2	
MO 4/6-30		60	30	0.22	1660	1.2	
MO 4/7-50		75	50	0.44	1725	2.1	
MO 8/14-9		140	9	0.145	830	1.35	
MO 8/14-12		145	12	0.22	1105	1.5	
MO 8/12-20		125	20	0.3	1110	1.9	
MO 8/13-30		130	30	0.44	1725	2.1	
MO 8/14-50		145	50	0.66	1670	3	
MO 12/17-9		170	9	0.22	840	1.6	
MO 12/21-12		210	12	0.3	1110	1.9	
MO 12/17-20		170	20	0.44	1115	2.5	
MO 12/24-30		240	30	0.66	1670	3	
MO 10/14-9		52031	140	9	0.145	830	1.35
MO 10/14-12			145	12	0.22	1105	1.5
MO 10/17-20	170		20	0.44	1110	2.5	
MO 10/16-30	165		30	0.66	1130	3.4	
MO 10/15-45	155		45	0.66	1670	3	
MO 10/13-80	135		80	0.9	1700	3.3	
MO 10/17-120	170		120	1.8	1705	8.3	
MO 16/24-9	245		9	0.3	840	2.15	
MO 16/21-12	210		12	0.3	1110	1.9	
MO 16/26-20	260		20	0.66	1130	3.4	
MO 16/32-30	320		30	0.9	1120	4.9	
MO 16/22-45	220		45	0.9	1700	3.3	
MO 16/27-80	270		80	1.8	1705	8.3	
MO 16/25-120	250		120	1.8	840	8.3	
MO 25/60-9	52032		600	9	0.45	840	2.8
MO 25/43-12			430	12	0.66	1130	3.4
MO 25/50-20		495	20	0.9	1120	4.9	
MO 25/32-30		320	30	0.9	1120	4.9	
MO 25/44-45		440	45	1.8	1705	8.3	
MO 50/75-20	52033	750	20	1.3	835	7.3	
MO 50/94-25		940	25	1.8	1130	9.4	
MO 50/86-50		860	50	4.8	1130	23	
MO 50/70-75		700	75	3.6	1710	15.5	
MO 50/65-120		650	120	6.6	1740	26	
MO 63/94-20	52034	940	20	1.8	825	10.5	
MO 63/94-25		940	25	1.8	1130	9.4	
MO 63/86-50		860	50	4.8	1160	23	
MO 63/86-75		860	75	4.8	1740	19.5	
MO 63/100-120		1000	120	9	1740	35	
MO 100/135-55	52035	1350	55	6.6	1150	31	
MO 100/140-80		1400	80	9	1740	35	
MO 80/100-120		1000	120	9	1740	35	
MO 250/475-16	52036	4750	16	6.6	1150	31	
MO 250/300-25		3000	25	6.6	1740	26	
MO 250/335-35		3350	35	9	1740	35	

Note: The motors contain Class F insulation.

Certificate No: LR 110186-1



Date: February 17, 1999

Revision: LR 110186-4

APPLICABLE REQUIREMENTS

- | | | |
|--------------------------|---|------------------------------|
| CAN/CSA-C22.2 No. 94-M91 | - | Special Purpose Enclosures |
| 139-1982 | - | Electrically Operated Valves |
| UL Std No. 429 | - | Electrically Operated Valves |



Supplement to Certificate of Compliance

Certificate Number: LR 110186-1

Issued to: **ZPA Canada Inc.**
180-8208 Swensen Way
Nordel Business Park
Delta BC V4G 1J6

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

Issued By: Sebastian George, P. Eng.
Vancouver, BC Canada

Signature: 

Product Certification History

Revision	Date	Description
LR 110186-1	May 19, 1998	Original Certification.
LR 110186-3	November 26, 1998	Addition of thermal protection motors.
LR 110186-4	February 17, 1999	Addition of MOK Series of Actuators.



Descriptive and Test Report

Vancouver • Edmonton • Toronto • Montréal • Cleveland • Los Angeles • Guangzhou • Shanghai • Hong Kong • Tokyo • Bangalore

REPORT NO: LR 110186-1

- Edition 1: May 19, 1998; Application No LR 110186-1 - Pacific Region
Issued by Dinarte Bairos, P. Eng.
- Edition 2: November 26, 1998; Application No LR 110186-3 - Pacific Region
Issued by Sebastian George, P. Eng.
- Edition 3: February 17, 1999; Application No LR 110186-4 - Pacific Region**
Prepared by Catherine Maurice, Technical Assistant
Reviewed by Sebastian George, P. Eng.

Pages Replaced: All (Report Updated and Re-issued)

Figures Added: 1-4

Illustrations Added: 1-8, 26, 27

Attachment Added: Attachment 1 (14 pages)

Contents: Certificate of Compliance - Pages 1 to 4
Supplement to Certificate of Compliance - Page 1
Description and Tests - Pages 1 to 30
Figures - 1 to 14
Illustrations - 1 to 29
Attachment 1 (14 pages)
Attachments 2 (17 pages)

SUBJECT

CLASS 3221 02 - VALVES - Actuators

CLASS 3221 82 - VALVES - Actuators

VALVE ACTUATORS AND CONTROL PACKAGES

Electrical Motor Operated Valve Actuator Models **MO and MOK** Series, including accessories and control packages. **Enclosure rated Type 4 with ambient temperature -25°C to +55°C for MOK and MO Series and enclosure rated Type 6 for MO Series.**

Model No	Type No	Adjustment time (s)	Torque (Nm)	1 - phase motor (120 Vac, 60 Hz)		
				Power (W)	rpm	In (A)
MOK 63	52325	9	25-50	20	3200	0.6
		18	25-80	20	3200	0.6
		32	25-80	20	3200	0.6
MOK 125	52326	8	63-125	110	3470	1.6
		16		70	3330	1
		32		90	1690	1.75
		64		90	1690	1.75
MOK 250	52327	16	125-250	110	3470	1.6
		32		70	3330	1
		64		90	1690	1.75
		128		90	1690	1.75
				3-phase motor (208 V ac, 60 Hz)		
MOK 125	52326	8	63-125	70	3350	0.46
		16		70	3350	0.46
		32		25	1730	0.35
		64		25	1730	0.35
MOK 250	52327	16	125-250	70	3350	0.46
		32		70	3350	0.46
		64		25	1730	0.35
		128		25	1730	0.35
MOK 500	52328	16	250-500	145	1625	0.75
		32		110	3350	0.56
		64		70	3350	0.46
MOK 1000	52329	32	500-1000	145	1625	0.75
		64		110	3350	0.56
		128		70	3350	0.46

Model No.	Type No.	Torque (Nm)	Speed (rpm)	Motor (208 V ac, 3 ph, 60 Hz)			
				Power (kW)	rpm (rpm)	In (A)	
				3 - phase motor (208 V ac, 60 Hz)			
MO 4/7-9 MO 4/8-12 MO 4/6-20 MO 4/6-30 MO 4/7-50	52030	75	9	0.11	780	1	
		85	12	0.11	1090	1	
		60	20	0.145	1070	1.2	
		60	30	0.22	1660	1.2	
		75	50	0.44	1725	2.1	
MO 8/14-9 MO 8/14-12 MO 8/12-20 MO 8/13-30 MO 8/14-50			140	9	0.145	830	1.35
		145	12	0.22	1105	1.5	
		125	20	0.3	1110	1.9	
		130	30	0.44	1725	2.1	
		145	50	0.66	1670	3	
MO 12/17-9 MO 12/21-12 MO 12/17-20 MO 12/24-30			170	9	0.22	840	1.6
		210	12	0.3	1110	1.9	
	170	20	0.44	1115	2.5		
	240	30	0.66	1670	3		
MO 10/14-9 MO 10/14-12 MO 10/17-20 MO 10/16-30 MO 10/15-45 MO 10/13-80 MO 10/17-120	52031	140	9	0.145	830	1.35	
		145	12	0.22	1105	1.5	
		170	20	0.44	1110	2.5	
		165	30	0.66	1130	3.4	
		155	45	0.66	1670	3	
		135	80	0.9	1700	3.3	
		170	120	1.8	1705	8.3	
MO 16/24-9 MO 16/21-12 MO 16/26-20 MO 16/32-30 MO 16/22-45 MO 16/27-80 MO 16/25-120			245	9	0.3	840	2.15
		210	12	0.3	1110	1.9	
		260	20	0.66	1130	3.4	
		320	30	0.9	1120	4.9	
		220	45	0.9	1700	3.3	
	270	80	1.8	1705	8.3		
	250	120	1.8	840	8.3		
MO 25/60-9 MO 25/43-12 MO 25/50-20 MO 25/32-30 MO 25/44-45	52032	600	9	0.45	840	2.8	
		430	12	0.66	1130	3.4	
		495	20	0.9	1120	4.9	
		320	30	0.9	1120	4.9	
		440	45	1.8	1705	8.3	
MO 50/75-20 MO 50/94-25 MO 50/86-50 MO 50/70-75 MO 50/65-120	52033	750	20	1.3	835	7.3	
		940	25	1.8	1130	9.4	
		860	50	4.8	1130	23	
		700	75	3.6	1710	15.5	
		650	120	6.6	1740	26	
MO 63/94-20 MO 63/94-25 MO 63/86-50 MO 63/86-75 MO 63/100-120	52034	940	20	1.8	825	10.5	
		940	25	1.8	1130	9.4	
		860	50	4.8	1160	23	
		860	75	4.8	1740	19.5	
		1000	120	9	1740	35	
MO 100/135-55 MO 100/140-80 MO 80/100-120	52035	1350	55	6.6	1150	31	
		1400	80	9	1740	35	
		1000	120	9	1740	35	
MO 250/475-16 MO 250/300-25 MO 250/335-35	52036	4750	16	6.6	1150	31	
		3000	25	6.6	1740	26	
		3350	35	9	1740	35	

Note: The motors contain Class F insulation.

MARKINGS

Each actuator is permanently marked with,

- submittor's identification (name, logo or type number);
- model designation or equivalent;
- complete electrical rating;
- time rating if not continuous;
- date code or equivalent;
- CSA Monogram and "NRTL/C".
- **Enclosure "Type 4" rated for MO and MOK Series**
- **Enclosure "Type 6" rated for MO Series**

appear on a metal nameplate rivetted to each unit.

ALTERATIONS

Markings as noted above appear.

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 temperature. As an alternative, a potential 20 percent higher may be applied for one sec.

As an alternative, a potential 20 percent higher may be applied for one sec.

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.

GENERAL: The following are the general requirements of the Canadian Standards Association concerning the use of certified and non-certified components:

Internal Wiring: All insulated conductors are certified, Type TEW, TR-64, TR-32, AWM SR-PVC or AWM XL-PVC, or suitable for the service intended, rated min 60°C, 300 V ac and not smaller than 24 AWG. All wiring is suitably routed and secured away from sharp edges. Alternatively, additional insulation is provided where the wiring passes over sharp edges and through holes. Wires connected to electrical equipment mounted on a hinged door are flexible or extra-flexible construction. That portion of flexing wire liable to come in contact with grounded metal parts, is provided with additional protection such as wrappings of tape, nonmetallic flexible tubing or equiv.

Electrical Spacings: All spacings between bare live parts of opposite polarity and between bare live parts and grounded metal parts conform to Table 6 of CSA Standard No 14.

Crimp Connectors: All crimp-type connectors used in shock/energy hazardous circuits and grounding circuits are certified and appropriately sized for the gauge of conductors used, vinyl insulated (optional for grounding), rated min 90°C, 250 V ac.

Connectors: All connectors used in shock and energy hazardous circuits are certified, appropriately sized for the number and gauge of conductors used, rated min 250 V ac.

Printed Wiring Boards (PWB): All pwb's are made of paper phenolic, paper epoxy or glass epoxy, min 1.6 mm thick, flammability rated 0.6V-1 or better.

Grounding and Bonding: All accessible metal parts liable to become energized are acceptably connected together, and to the grounding means, by straps and/or conductors, bolts, screws and starwashers (to ensure surface coating penetration), in conformance to Clause 3.4 of CSA Standard C22.2 No. 0.4.

GENERAL DEFINITIONS: Representative samples of the subject product were examined and are described in the body of this report. Unless specifically stated otherwise, the following general definitions, terminology and construction details apply:

Dimensions: (dim) All dimensions specified are approximations only. Unless stated otherwise, the least significant digit is uncertain by plus or minus one unit.

Certified Equivalent: (equiv) The notation "or equiv" denotes that CSA Certified alternative device that:

- (a) Is designed for the intended application.
- (b) Has electrical ratings meeting or exceeding those of the described component.
- (c) Has internal electrical spacings meeting or exceeding those of the described component.
- (d) Is physically the same as the described component in shape, size, terminal location and terminal type.

DESCRIPTION

General: Series MO and MOK valve actuators are for use with butterfly valves used in sewage plants, power generation plants, or water treatment plants, etc. These actuators are mainly for rotary application, although through a mechanical gear box, various applications could also be achieved.

The MO and MOK Series are rated for Enclosure Type 4 and the MO Series is rated for Enclosure Type 6.

CONSTRUCTION DETAILS

MOK 63 Type 52325, Illustrations 1 to 8, Figures 1 to 4 and Attachment 1

1. Enclosure:

- (a) Cover: Aluminum 6.20 mm thick, with the following dimensions 125 mm x 185 mm x 155 mm. Painted orange, fastened to actuator base with 4 steel screws (M5 x 25 mm long) with a rubber gasket 2.14 mm thick and 9.2 mm wide between cover and base.
Opening at the Top: 38 mm dia.
The opening is covered with a plastic bubble with OD: 40.73 mm and ID: 29.43 mm.
Approx. 5 mm thick and threaded. Plastic material. LEXAN 920A, transparent, flame-proof VO/3.

The bubble is secured to the cover by a threaded aluminum nut with a hexagonal S=36 and ID 28.50 mm, 8.92 mm thick.

A gasket with an OD: 44.25 mm and ID: 35 mm, 1.75 thick is placed between the enclosure and the bubble.

The O-rings and radials are manufactured of medium nitrile rubber (Buna N) 70 Shore hardness.

- (b) **Actuator Base:** Aluminum, outer dimensions are approx. 165 mm x 89 mm x 187 mm, painted grey.

Mounting Plate: Plated steel (MOK 500 and 1000: Aluminum) 135 mm x 165 mm. The plate is fastened to the base by 5 steel screws (M4 x 14) with a flat washer in between.

Grounding: 3 full threads provided on mounting plate. A CSA certified doughnut crimp connector along with the lockwasher, flat washer and a thread steel screw (M4 x 13 mm long).

Conduit Entry:

- 1/2" NPT with 11 threads - MOK 52325 ✓
- 3/4" NPT with 12 threads - MOK 52326
- 3/4" NPT with 13 threads - MOK 52328-9
- 1" NPT with 14 threads - MOK 52328-9

2. **Terminal Box:** Aluminum, 131.3 mm x 66.75 mm x 36.84 mm, 4.12 mm thick. Painted grey. Secured to actuator base by 4 screws (M5 x 14 mm long) with a gasket 1.06 mm thick and 5.15 mm wide between the terminal box and actuator base.

Conduit Opening: 1/2" NPT with 4 threads.

Cover: Aluminum, 131.3 mm x 66.75 mm x 14.51 mm, 4.12 mm thick. Painted grey. Secured to the cover by 4 steel screws (M4 x 25 mm long) with 1.06 mm thick gasket between terminal box and cover.

Bonding: 18 AWG wire is with a CSA crimp wire connector on each end, or connected between the box and cover with a lockwasher and flat washer with a thread steel screw (M4 x 11 mm long) or soldered to microswitches, capacitors, etc.

3. (a) **Motors:** CSA/UL, MOK 125-1000 52326-52329 Flender ATB-LOHER, (LR 12638) Class F insulation. Series MOK for S2-10 min, 50% duty cycle, 60% Torque or S4-25%, 1200 cycles per hour. See table No. 1 and Figs 5, 6 and 7 for Duty cycle.

Model No	Type No	Adjustment time (s)	Torque (Nm)	1 - phase motor (120 V ac)			
				Power (W)	rpm	In (A)	Type
MOK 63	52325	9	25-50	20	3200	0.6	FCJ2B52-00
		18	25-80	20	3200	0.6	FCJ2B52-00
		32	25-80	20	3200	0.6	FCJ2B52-00
MOK 125	52326	8	63-125	110	3470	1.6	ERB 0.09/2-71
		16		70	3330	1	ERB 0.09/2-71
		32		90	1690	1.75	ERB 0.09/4-71
		64		90	1690	1.75	ERB 0.09/4-71
MOK 250	52327	16	125-250	110	3470	1.6	ERB 0.09/2-71
		32		70	3330	1	ERB 0.09/2-71
		64		90	1690	1.75	ERB 0.09/4-71
		128		90	1690	1.75	ERB 0.09/4-71
				3 - phase motor			
MOK 125	52326	8	63-125	70	3350	0.46	ER 0.06/2-71
		16		70	3350	0.46	ER 0.06/2-71
		32		25	1730	0.35	ER 0.06/4-71P
		64		25	1730	0.35	ER 0.06/4-71P
MOK 250	52327	16	125-250	70	3350	0.46	ER 0.06/2-71
		32		70	3350	0.46	ER 0.06/2-71
		64		25	1730	0.35	ER 0.06/4-71P
		128		25	1730	0.35	ER 0.06/4-71P
MOK 500	52328	16	250-500	145	1625	0.75	ER 0.09/4-71P
		32		110	3350	0.56	ER 0.06/2-71
		64		70	3350	0.46	ER 0.06/2-71
MOK 1000	52329	32	500-1000	145	1625	0.75	ER 0.09/4-71P
		64		110	3350	0.56	ER 0.06/2-71
		128		70	3350	0.46	ER 0.06/2-71

(b) **Motor:** Accepted. See Figure 11 and Illustrations 26 and 27.
 MOK 63-52325 ATAS Náchod, CR

Enclosure:

Type: Totally enclosed.

Material: Permanent split capacitor motor (7 uF) of IP20 enclosure. Alu Shields are fixed directly on laminated steel and contracted with 2 steel bolts 3.5 dia.

Overall Dimensions: 75 mm/110.5 mm length shaft end 6/22 mm incl.

Endbells:

Material: A1

Casted aluminum shields, min thickness 2 mm on sides and 2.5 mm on the front.

Stator: Laminated steel, inside dia 32.5 mm, length 35 mm.

Stator Winding:

Material: CuI, W200; Y-Card E172071 (M)
PRAKAB a.s. PRAHA CZ
No 30 AWG, 0.265 mm.

Rotor: Laminated steel, 32 mm dia by 35 mm stack.
Type: Squirrel cage.

Insulation:

Stator: Class 155°C system.

Enamelled winding: 200°C

Slot Insulation:

Material: Trivoltherm P-20, 30 Y-CARD E177281 (M) Krempel, Wien, Austria
Temperature Rating: 155°C

Wedge Insulation:

Material: Trivoltherm P-20, 30 Y-CARD E177281 (M)
Temperature Rating: 155°C

Impregnation:

Material: Dolphon CC-1105 Y-CARD 51047 (M)
Temperature Rating: 220°C

Motor Leads: CSA/UL

Manufacturer: 'Huber+Suhner AG', Pfaffikon, Schweiz

Type: Radox CSACL1503, No. 20 AWG, 150°C insulation temperature rating. UL approval E63332; CSA approval 69581, 39507.

Grounding: Internal in Terminal box. CSA certified doughnut crimp connector along with a lockwasher, flat washer and thread brass screws M5 x 10 mm (nickel).

Soldering Terminal: Slip washer with zinc plated - zinc plated screw M4x6 located on N shield side signed Alu shield surface is under the terminal protected against corrosion with neutral grease.

4. **Capacitor:** Accepted, 'Tesla', Model TL851 7 microF, 250 V.
5. **Terminal Block:** CSA/UL, 'Wieland', Model No 4E DS 21305.1253.0-1.5 mm² for MOK 52325, 6E DS 21.311.1253.0 for MOK 52326-9.
6. **Limit Switch:** CSA/UL, 'Cherry', Type DB1G-A1LC, 250 V ac, 2 A.
7. **Selector Switch:** Accepted, OBZOR VD ZLIN'. Model No VS10, 400 V ac 10/(8) A, 3 position p/n, 2 position p/n. See figures 12 to 14 and Illustrations 28 to 29.

Base:

Material: Phenolic laminated sheet, min 1.96 mm thick.
Manufacturer: 'OBZOR VD ZLIN'

Moveable Contact:

Material: Silver plated brass, 0.63 mm thick.
Dimensions: 13 mm long by 3.7 mm wide.

Stationary Contact:

Material: Silver plated brass 0.75 mm thick (3.10 mm x 2.75 mm) embedded into a galvanized steel plate 1.00 mm thick.

Terminal:

Material: Threaded steel plate 1.00 mm thick (13.5 mm by 7.8 mm) with a curved tin plated brass washer. Washer 1.00 mm thick (7.12 mm by 7.8 mm) and a threaded machine brass screw with a 3.35 mm diameter and 9.44 mm long.

8. **Resistor:** Accepted, 'Tesla', Model No TR551, 10 W, 750 V.
9. **Encoder:** Accepted, ELV 'Dicont', Model No CPT1A, 28 V dc max, 560 mW/max.
10. **Grounding:** See Item b.
11. **Wires:** UL-AWM-Style 1007 + 1569, 80°C; CSA TEW TR64, 90°C, AWG 18, 300 V.

MO-Type 52 030 - 52 035, Illustrations 9 to 17, Figures 5 to 8 and Attachment 2

1. **Enclosure:**

- (a) **Base Gearbox:** Aluminum, dim 172 mm x 164 mm x 160 mm height, 6.3 mm thick. Painted grey.
- (b) **Control Box:** Aluminum, dim 195 mm x 217 mm x 98 mm height, 5 mm thick, sealed with O-ring 130 x 3 mm. Painted grey.
- (c) **Control Box Cover:** Aluminum, dim 211 mm x 211 mm x 66 mm height, 5 mm thick. Sealed with O-ring 130 x 3 mm. Painted grey.
- (d) **Terminal Box:** Aluminum, dim 194 mm x 194 mm x 31.5 mm height, 5 mm thick. Sealed with O-ring 125 x 5 mm. Conduit 3 x 1/2" NPT with 3 threads and nut. Painted grey.
- (e) **Terminal Box Cover:** Aluminum, dim 194 mm x 194 mm x 31 mm, 5 mm height, 5 mm thick. Sealed with O-ring 180 x 3 mm. Painted grey.
- (f) **Local Control:** Aluminum, dim 131 mm x 79 mm x 18 mm height, 5 mm thick, sealed with O-ring 105 x 3 mm. Painted grey.
- (g) **Counter Shaft Box:** Aluminum, dim 146 mm x 150 mm x 58.5 mm, 5 mm thick. Sealed with 2 x O-ring 125 x 3 mm.
- (h) The O-rings and radials are manufactured of medium nitride rubber (Buna N) 70 Shore hardness.

2. Mounting Plate: Aluminum, 2.5 mm thick, fastened to the base by 3 bolts M5 x 8 mm, with lock-washer in between.
3. Grounding: Internal in Terminal box. CSA certified doughnut crimp connector along with a lockwasher, flat washer and thread brass screws M5 x 10 mm (nickel).
4. Bonding: 16/18 AWG wire with CSA crimp wire connector on each end, or connected with a lockwasher and flat washer with a thread steel bolt M5 x 10 mm or soldered to microswitches, capacitors, etc.
5. Motor: CSA/UL
MO Type 52030 - 52036 Motors Flender ATB-LOHER, (LR 12638)
Class Insulation F.
Duty Cycle: S2 - 10 min, 60% Torque
 S4 - 25%, 40% Torque and 1200 cycles per hour up to 4 kW motors or 600 cycles/hour,
 over 4 kW motors.

Model No	Type No	Torque (Nm)	Speed (rpm)	Rev./Stroke	Motor (208 V ac, 3 ph, 60 Hz)			
					Power (W)	rpm	In (A)	Type
MO 4/7-9 MO 4/8-12 MO 4/6-20 MO 4/6-30 MO 4/7-50	52030	7.59e+0.9	9	2-250	0.11	780	1	R0.25/8-7 A63/6B-71 A63/6B-71 A63/4B-7 R0.37/4-7
MO 8/14-9 MO 8/14-12 MO 8/12-20 MO 8/13-30 MO 8/14-50		1.40e+14	9		0.145	830	1.35	R0.37/8-7 R0.25/8-7 R0.37/6-7 R0.37/4-7 A80/4A-11
MO 12/17-9 MO 12/21-12 MO 12/17-20 MO 12/24-30		1.70e+11	9		0.22	840	1.6	A80/8A-11 R0.37/6-7 A80/6A-11 A80/4A-11
MO 10/14-9 MO 10/14-12 MO 10/17-20 MO 10/16-30 MO 10/15-45 MO 10/13-80 MO 10/17-120	52031	140	9	2-250	0.145	830	1.35	R0.37/8-7 R0.25/8-7 A80/6A-11 A80/6C-11 A80/4A-11 A80/4B-11 A90L/41-11
MO 16/24-9 MO 16/21-12 MO 16/26-20 MO 16/32-30 MO 16/22-45 MO 16/27-80 MO 16/25-120		245	9		0.3	840	2.15	A80/8C-11 R0.37/6-7 A80/6C-11 A90S/6B-11 A80/4B-11 A90L-41-11 A90L/41-11
MO 25/60-9 MO 25/43-12 MO 25/50-20 MO 25/32-30 MO 25/44-45	52032	600	9	2-250	0.45	840	2.8	A90L/8B-12 A80/6C-11 A90S/6B-11 A90S/6B-11 A90L/41-11
MO 50/75-20 MO 50/94-25 MO 63/86-50 MO 50/70-75 MO 50/65-120	52033	750	20	2-240	1.3	835	7.3	A100L/8C-12 A100L/6A-11 A132M/6B-11 A100L/4R-12 A132S/4A-11
MO 63/94-20 MO 63/94-25 MO 63/86-50 MO 63/86-75 MO 63/100-120	52034	940	20	2-240	1.8	825	10.5	A112M/8A-11 A100L/6A-11 A132M/6B-11 A112M/4A-11 A132M/48-11
MO 100/135-55 MO 100/140-80 MO 80/100-120	52035	1350	55	2-240	6.6	1150	31	A132M/6C-11 A132M/4B-11 A132M/4B-11
MO 250/475-16 MO 250/300-25 MO 250/335-35	52036	4750	16	1-110	6.6	1150	31	A132M/6C-11 A132S/4A-11 A132M/4B-11

6. Terminal Block: CSA/UL, 'Phoenix Contact', Model MBK 2.5 E, 300 V, 20 A for control, MBK 3/E-Z, 600 V, 20 A for motor.
7. Limit Switch: CSA/UL, 'Cherry',
Model: ZD 432-BGAA, 250 V ac, 5 A Torque.
D 433-B8LD 250 V ac, 5 A for Position and Signal.
DB1G-A1LC 250 V ac, 2 A for Blinker.
8. Selector Switch: **See Item 7 MOK.**
9. Resistor: Accepted, 'Tesla', Model No. TR 551, 10 W, 750 V.
10. Encoder: Accepted, ELV 'Dicont', Model CPT1A, 28 V dc max, 560 mW max.
11. Grounding: Inside: see Item 3.
12. Wires: CSA-TEW 105°C, 600 V, AWG 16 'Helukabel'. UL 3289 and CSA CL 1503, 150°C, 600 V, AWG 18 'Radox'.

OPTIONAL: To be used with all actuators.

Regulator: Accepted, 120 Vac max. See Figures 9 and 10 and Illustrations 18 to 25.

Transformer: CSA, UL, 'HANN', Model No. BV EI 302 2777.
Temp. Class 70/F, 1.5 W, 120/18 V, 67 mA on output.

Terminal Block: CSA, UL, 'Phoenix Contact', Model MSTBVA, MSTBT, 250 V, 12 A.

Fuse: CSA, UL, 'Raychem', Model No. RXE010, 250 V, 1.6 A ($I_1 = 50$ A).

TESTS

Representative sample of the subject Models MOK and MO series were tested as per the following:

Sample Tested: MOK 52328.0021, Serial No. 6280271

1. Rating: CSA 139-1982, Cl 6.3.
2. Temperature: CSA 139-1982, Cl 6.4
3. Operation: UL 429, Cl 6.5
4. Dielectric Strength: CSA 139-1982, Cl. 6.6
5. Endurance: (6000 operations). CSA 139-1982, Cl 6.8
6. Hosedown: CSA 94-M91, Cl. 6.8.2

Rating Test: (CSA 139-1982, Cl 6.3.1)

Model No: MOK 52328.0021

Sample: 1

Marked Rating: 208 V, 0.75 A, 145 W, 60 Hz, 500 Nm.

Test Conditions - actuator is loaded at 500 Nm tripping torque
- actuator is loaded at 208 V at 60 Hz

Results:

<u>Test</u>	<u>Volts</u>	<u>Amps</u>	<u>Watts</u>
1	208	0.66	135

Compliance: Yes

Temperature Test: (CSA 139-1982, Cl 6.4)

Model No. MOK 52328.0021

Sample: 1

Marked Rating: 208 V, 0.66 A, 60 Hz, 250 Nm (Torque)
500 Nm (Tripping)

Motor ATB Loher

Serial No: 251348-001

TP 160°C, Insulation F

0.20 HP

208/120 V, 0.75/1.3 A, 60 Hz

Test Conditions: Same as Rating Test

- 17 sec CW, 17 sec CCW, 20°C, 208 V ac, 60 Hz. 12 sec still
(S4-25%, 0.75s oper. time 2.25 sec. still.)

Results:

<u>TC No</u>	<u>Location</u>	<u>Temp Deg C</u>
1	Supply conductor insulation	26
2	Resistor body	23
3	Motor surface enclosure	42-50
4	Limit switch	26
	Initial ambient (thermometer)	16
	Final ambient (thermometer)	20.5

Test Duration (hr): 2

Compliance: Yes

Operation Test: (UL 429, Sec. 26)

Model No: 52328.0021

Sample: 1

Marked Rating: 208 V, 0.75 A, 60 Hz, 500 Nm (Torque) Tripping T.
250 Nm oper. T.

Test Conditions: Immediately after the temperature test at Thermal equilibrium at rated conditions the actuator shall operate at 10% above rated voltage and at 85% of rated voltage.

Compliance: Yes

Endurance Test: (CSA 139-1982, Cl 6.8)

Model No: 52328.0021

Sample: 1

Marked Rating: 208 V, 0.75 A, 145 W, 60 Hz, 500 Nm Torque Tripping T.
250 Nm operation T.

Test Conditions: Same as Temperature Test. If the temperature test does not result in 6000 operations, extend duration until 6000 operations are reached.

6000 cycles operation 30 sec CW, 30 sec CCW, 20°C, 208 V ac, 60 Hz.

Results: 0.69 A, 136 W, 46 - 50°C Motor surface temp.

Compliance: Yes

Dielectric Strength Test: (CSA 139-1982, Cl 6.6)

Model No: 52328.0021

Sample: 1

Marked Rating: 208 V, 0.75 A, 60 Hz, 500 Nm Torque tripping T.

Temperature: 20°C.

Test Conditions:

- Immediately after the Temperature Test or Endurance Test.
- 1000 V ac plus twice the maximum rated voltage for one minute between live parts and the enclosure with the contacts of any switching device open and closed.

Results: Tested with 1416 V, Satisfactory. Test lasted 1 min.

Compliance: Yes

Hosedown (Type 4 Enclosure), CSA 94-M91, Cl 6.8.2

Model No: 52326.0221

Serial No: 72605132

Test Conditions: 25 mm inside diameter nozzle, 240 L of water per minute, 5 min., 3-3-5 m from the enclosure, moved rate 6 mm/s.

Compliance: Yes

Sample Tested: MO 52030.22A3P, Serial No. 730 0003 75 Nm, 25 rev./min,
Motor: EAM 71-4S, 400/230 V, 0.77/1.34 A, 250 W.

1. Rating: CSA 139-1982, Cl 6.3.
2. Temperature: CSA 139-1982, Cl 6.4
3. Operation: UL 429, Cl 6.5
4. Dielectric Strength: CSA 139-1982, Cl. 6.6
5. Endurance: (6000 operations). CSA 139-1982, Cl 6.8
6. Hosedown: CSA 94-M91, Cl. 6.8.2
7. Submersion (Type 6 Enclosure), CSA 94-M91, Cl 6.9.1

Rating Test: (CSA 139-1982, Cl 6.3.1)

Model No: 52030.22AEP

Sample: 1

Marked Rating: 400 V, 0.8 A, 60 Hz, 75 Nm (Torque) Tripping T. 20 Nm Operation T.

Test Conditions - actuator is loaded at 75 Nm (rated torque).
- actuator is loaded at 400 V at 50 Hz

Results:

<u>Test</u>	<u>Volts</u>	<u>Amps</u>	<u>Watts</u>
1	400	0.8	--

Compliance: Yes

Temperature Test: (CSA 139-1982, Cl 6.4) See Endurance test.

Operation Test: (UL 429, Sec. 26)

Model No: 52030.22AEP

Sample: 1

Marked Rating: 400 V, 0.8 A, 50 Hz, 75 Nm (Torque)

Test Conditions: Immediately after the Temperature Test at Thermal Equilibrium at rated conditions the actuator shall operate at 10% above rated voltage and at 85% of rated voltage.

Compliance: Yes

Endurance Test: (CSA 139-1982, Cl 6.8)

Model No: 52030.22AEP

Sample: 1

Marked Rating: 400 V, 0.8 A, 50 Hz, 75 Nm (Torque).

Test Conditions: Same as Temperature Test. If the temperature test does not result in 6000 operations, extend duration until 6000 operations are reached.

6000 cycles operation 19 sec CW, 19 sec CCW, 20°C, 400 V ac, 50 Hz.

Compliance: Yes

Dielectric Strength Test: (CSA 139-1982, Cl 6.6)

Model No: 52030.22AEP

Sample: 1

Marked Rating: 400 V, 0.8 A, 50 Hz, 75 Nm (Torque).

Temperature: 20°C

Test Conditions:

- Immediately after the Temperature Test or Endurance Test.

- 1000 V ac plus twice the maximum rated voltage for one minute between live parts and the enclosure with the contacts of any switching device open and closed.

Results: Tested with 1800 V, 1 min, Satisfactory.

Compliance: Yes

Hosedown (Type 4 Enclosure), CSA 94-M91, Cl 6.8.2

Model No: 52030.22AEP

Test Conditions: 25 mm inside diameter nozzle, 240 L of water per minute, 5 min., 3-3-5 m from the enclosure, moved rate 6 mm/s.

Compliance: Yes

Submersion Test (Type 6 Enclosure), CSA 94-M91, Cl 6.9.1

A complete enclosure was submerged to a depth of 1.8 m from the highest point on the enclosure. After 30 minutes the enclosure was removed from the water, and the excess water was removed from the surface. There was no signs of water in the enclosure.

Compliance: Yes

SWITCH TEST

A representative sample of the switch described below was tested as per CSA Std. C22.2 No. 14-95 at the Submitter's factory with satisfactory results.

Device: Switch "OBZUR VD1 ZLIN"

OVERLOAD TEST & ENDURANCE TEST

	Circuit Voltage open (max) V	Current A Locked Rotor	Cycle	on s	off s	Number Cycles
Overload required tested	120	6		1	1	50
Endurance required tested	120	Full load A 2.3		1	1	1000

DIELECTRIC TEST

Immediately after the endurance test, an AC potential of 1500 Vac was applied for one minute between live parts and case (wrapped in foil).

Result: Dielectric breakdown: No

Edition: 2 (Application LR 110186-3)

To include the test results of motors. The following motors were tested as representative samples.

DESCRIPTION

Manufacturer: ZPA

Product: Motor

Model: EAMC56N02L

Rating: 208/120 V, 60 Hz, 3 ph, 0.56/0.97 FLA, 110 W, 3350 RPM, Insulation Class F (225°C)

Type of protection (automatic reset)

Protector operating temperature: 160°C

The clause numbers refer to CSA Standard C22.2 No. 77-1988.

Locked Rotor Temperature: Clause 5.4

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions vertically with shaft facing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different for motor: 120 V
- Ambient temperature: 22°C
- Test frequency: 60 Hz
- Motor tested with capacitor in the circuit of short-circuited: N/A
- Protector intended for use in the motor starter coil circuit: No
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

b) Automatic Reset Protector:

Operated for 72 hours

Test started with motor at room temperature.

Maximum motor windings temperature during first test hour: 184°C

Maximum motor windings temperature after first test hour: 183°C

Average motor windings temperature after first test hour:

Max after 2nd test hour: 183°C

Max after 72nd test hour: 183°C

Min after 2nd test hour: 132°C

Min after 72nd test hour: 131°C

Average: 183°C

Average: 132°C

Average: 158°C

Cycling rate: 12/hr

Test repeated on polyphase motor under single-phasing conditions

Repeated test started with motor at room temperature

Repeated test: 2 hours minimum

The protector cycled during repeated test: Yes

Under single-phasing conditions for polyphase motors:

Maximum motor windings temperature during first test hour: 175°C

Maximum motor windings temperature after first test hour: 175°C

Average motor windings temperature after first test hour:

Max after 2nd test hour: 175°C -----

Average: 175°C

Max after 72nd test hour: 175°C -----

Min after 2nd test hour: 130°C -----

Average: 130°C

Min after 72nd test hour: 130°C -----

Average: 153°C

Cycling rated: 16 /hr

Maximum motor winding temperature exceed Table 2 values: No

Series injury to motor: No

Excessive deterioration of the insulation: No

Flashover to the frame: No

3 A fuse blew: No

Dielectric Strength (Clause 5.5): No

Voltage Used: 1000 V ac

Breakdown: No

Test Equipment and Instrumentation Used: A, B, C and D

Dielectric Strength: Clause 5.5

Protector intended to be connected to external control circuit: Yes

If yes:

- (a) protector circuit was connected to motor frame during motor winding dielectric strength tests.

Voltage used: 1000 V ac

Breakdown: No

- (b) motor windings and other metal parts were connected to the frame during protector circuit dielectric strength tests.

Voltage used (see Table 4): 1500 V ac

Breakdown: No

Serious injury to motor: No

Excessive deterioration of the insulation: No

Flashover to the frame: No

3 A fuse blew: No

Test Equipment and Instrumentation Used: D

Endurance: Clause 5.6

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions, vertically with shaft facing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different than for motor: 120 V
- Ambient temperature: 22 °C
- Test frequency: 60 Hz
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

a) Automatic Reset Protector:

Operated for 15 days additional to the 72 hours required in the locked rotor temperature test (18 days total)

Motor rated more than 1 hp (764 W): No

If no, test continued for 2000 cycles minimum with:

- protector and substitute load or: No
- protector and motor: No

Note: substitute load had current equal to LRA of motor at 0.4-0.5 power factor and cycling rate was the same as when used in motor.

Serious injury to motor: No

Excessive deterioration of the insulation: No

Flashover to the frame: No

3 A fuse blew: No

Dielectric Strength (Repeated clause 6.6.8): No

The lowest between 1000 V plus the rated voltage and twice the maximum respective rated circuit voltage for 1 minute.

Voltage used: 1500 V ac

Breakdown: No

Test Equipment and Instrumentation Used: D

DESCRIPTION

Manufacturer: ZPA

Product: Motor

Model: EAMC63N06

Rating: 208/120 V, 60 Hz, 3 ph, 1.2/2.05 FLA, 145 W, 1070 RPM, Insulation Class F (225 °C)

Type of protection (automatic reset)

Protector operating temperature: 160 °C

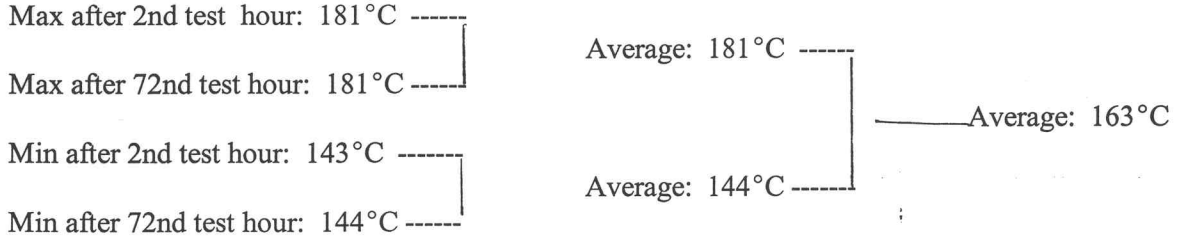
The clause numbers refer to CSA Standard C22.2 No. 77-1988.

Locked Rotor Temperature: Clause 5.4

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions vertically with shaft pointing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different for motor: 120 V
- Ambient temperature: 21 °C
- Test frequency: 60 Hz
- Motor tested with capacitor in the circuit of short-circuited: N/A
- Protector intended for use in the motor starter coil circuit: No
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

b) Automatic Reset Protector:
Operated for 72 hours
Test started with motor at room temperature.

Maximum motor windings temperature during first test hour: 181°C
Maximum motor windings temperature after first test hour: 181°C
Average motor windings temperature after first test hour:



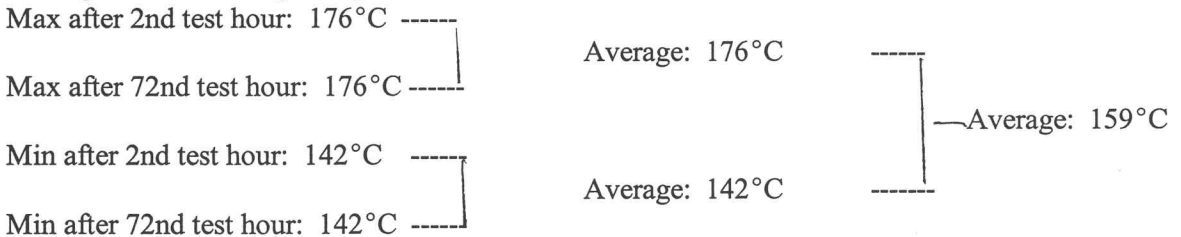
Cycling rate: 10/hr

Test repeated on polyphase motor under single-phasing conditions
Repeated test started with motor at room temperature
Repeated test: 2 hours minimum

The protector cycled during repeated test: Yes

Under single-phasing conditions for polyphase motors:

Maximum motor windings temperature during first test hour: 176°C
Maximum motor windings temperature after first test hour: 176°C
Average motor windings temperature after first test hour:



Cycling rated: 12 /hr

Maximum motor winding temperature exceed Table 2 values: No
Series injury to motor: No
Excessive deterioration of the insulation: No
Flashover to the frame: No
3 A fuse blew: No
Dielectric Strength (Clause 5.5): No
Voltage Used: 1000 V ac
Breakdown: No

Test Equipment and Instrumentation Used: D, A, B, C

Dielectric Strength: Clause 5.5

Protector intended to be connected to external control circuit: Yes

If yes:

- (a) protector circuit was connected to motor frame during motor winding dielectric strength tests.
Voltage used: 1000 V ac
Breakdown: No
- (b) motor windings and other metal parts were connected to the frame during protector circuit dielectric strength tests.
Voltage used (see Table 4): $2 \times V_r + 1000$ V ac: 1500 V ac
Breakdown: No

Serious injury to motor: No
Excessive deterioration of the insulation: No
Flashover to the frame: No
3 A fuse blew: No

Test Equipment and Instrumentation Used: D

Endurance: Clause 5.6

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions, vertically with shaft pointing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different than for motor: 120 V
- Ambient temperature: 22°C
- Test frequency: 60 Hz
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

- a) Automatic Reset Protector:
Operated for 15 days additional to the 72 hours required in the locked rotor temperature test (18 days total)

Motor rated more than 1 hp (764 W): No

If no, test continued for 2000 cycles minimum with:

- protector and substitute load or: No
- protector and motor: No

Note: substitute load had current equal to LRA of motor at 0.4-0.5 power factor and cycling rate was the same as when used in motor.

Serious injury to motor: No
Excessive deterioration of the insulation: No
Flashover to the frame: No
3 A fuse blew: No

Dielectric Strength (Repeated clause 6.6.8): No

The lowest between 1000 V plus the rated voltage and twice the maximum respective rated circuit voltage for 1 minute.

Voltage used: 1500 V ac

Breakdown: No

Test Equipment and Instrumentation Used: D

DESCRIPTION

Manufacturer: ZPA
Product: Motor
Model: EAMC71N06
Rating: 208/120 V, 60 Hz, 3 ph, 1.9/3.3 FLA, 300 W, 1110 RPM, Insulation Class F (225°C)
Type of protection (automatic reset)
Protector operating temperature: 160°C

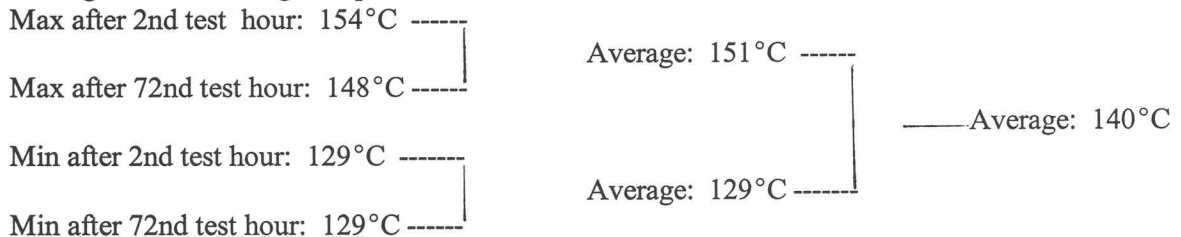
The clause numbers refer to CSA Standard C22.2 No. 77-1988.

Locked Rotor Temperature: Clause 5.4

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions vertically with shaft facing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different for motor: 120 V
- Ambient temperature: 21°C
- Test frequency: 60 Hz
- Motor tested with capacitor in the circuit of short-circuited: N/A
- Protector intended for use in the motor starter coil circuit: No
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

b) Automatic Reset Protector:
Operated for 72 hours
Test started with motor at room temperature.

Maximum motor windings temperature during first test hour: 190°C
Maximum motor windings temperature after first test hour: 154°C
Average motor windings temperature after first test hour:



Cycling rate: 39/hr

Test repeated on polyphase motor under single-phasing conditions
Repeated test started with motor at room temperature
Repeated test: 2 hours minimum

The protector cycled during repeated test: Yes

Endurance: Clause 5.6

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions, vertically with shaft facing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different than for motor: 120 V
- Ambient temperature: 22°C
- Test frequency: 60 Hz
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

a) Automatic Reset Protector:

Operated for 15 days additional to the 72 hours required in the locked rotor temperature test (18 days total)

Motor rated more than 1 hp (764 W): No

If no, test continued for 2000 cycles minimum with:

- protector and substitute load or: No
- protector and motor: No

Note: substitute load had current equal to LRA of motor at 0.4-0.5 power factor and cycling rate was the same as when used in motor.

Serious injury to motor: No

Excessive deterioration of the insulation: No

Flashover to the frame: No

3 A fuse blew: No

Dielectric Strength (Repeated clause 6.6.8): No

The lowest between 1000 V plus the rated voltage and twice the maximum respective rated circuit voltage for 1 minute.

Voltage used: 1500 V ac

Breakdown: No

Test Equipment and Instrumentation Used: D

DESCRIPTION

Manufacturer: ZPA

Product: Motor

Model: EAMC80N08L

Rating: 208/120 V, 60 Hz, 3 ph, 1.7/2.95 FLA, 220 W, 830 RPM, Insulation Class F (225°C)

Type of protection (automatic reset)

Protector operating temperature: 160°C

The clause numbers refer to CSA Standard C22.2 No. 77-1988.

Locked Rotor Temperature: Clause 5.4

- The motor, with its integral parts (mounting brackets, gear unit or base, if any) was mounted in a manner representing the field conditions vertically with shaft facing upward.
- Test voltage for motor: 208 V
- Test voltage for protection circuit, if different for motor: 120 V
- Ambient temperature: 21°C
- Test frequency: 60 Hz
- Motor tested with capacitor in the circuit of short-circuited: N/A
- Protector intended for use in the motor starter coil circuit: No
- The enclosure of the combination was grounded through a 3 A fuse.
- The rotor was locked.

Under single-phasing conditions for polyphase motors:

Maximum motor windings temperature during first test hour: 181°C

Maximum motor windings temperature after first test hour: 145°C

Average motor windings temperature after first test hour:

Max after 2nd test hour: 145°C -----

Average: 146°C

Max after 72nd test hour: 146°C -----

Min after 2nd test hour: 129°C -----

Average: 129°C

Min after 72nd test hour: 129°C -----

Average: 138°C

Cycling rated: 55 /hr

Maximum motor winding temperature exceed Table 2 values: No

Series injury to motor: No

Excessive deterioration of the insulation: No

Flashover to the frame: No

3 A fuse blew: No

Dielectric Strength (Clause 5.5): No

Voltage Used: 1000 V ac

Breakdown: No

Test Equipment and Instrumentation Used: A, B, C and D

Dielectric Strength: Clause 5.5

Protector intended to be connected to external control circuit: Yes

If yes:

(a) protector circuit was connected to motor frame during motor winding dielectric strength tests.

Voltage used: 1000 V ac

Breakdown: No

(b) motor windings and other metal parts were connected to the frame during protector circuit dielectric strength tests.

Voltage used (see Table 4): $2 \times V_r + 1000$: 1500 V ac

Breakdown: No

Serious injury to motor: No

Excessive deterioration of the insulation: No

Flashover to the frame: No

3 A fuse blew: No

Test Equipment and Instrumentation Used: D