



Descriptive Report and Test Results

MASTER CONTRACT: 0000304130

REPORT: 80177585

PROJECT: 80177585

EDITION

Edition	Issued On	Project	Location	Prepared By	Authorized By
Edition 1	November 21, 2023	80177585	China Shanghai	Lily Li	Lily Li

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PRODUCTS

C421101 MOTORS AND GENERATORS - Motors and Generators
C421181 MOTORS AND GENERATORS - Certified to US Standards

Single-Phase Cage Induction Motor, Capacitor Start-Capacitor Run, with Manual Reset Thermal Protector, Series SY, Output Power 2HP~5HP, 2 poles, 60 Hz, NEMA Frame 56 and 184T, Enclosure ODP, Insulation Class F, Time Rating Continuous, 40 °C max ambient.

Models	Electric Rating	NEMA Frame
SY-2HP-56-SPL-A	2HP, 115/230V,60Hz,15.0/9.0A, 3450RPM	56
SY-3HP-56-A	3HP, 230V,60Hz,12.0A, 3450RPM	56
SY-3.7HP-56-C	3.7HP, 230V,60Hz,17.2A, 3450RPM	56
SY-5HP-184T-SPL-C, SY-5HP-184T-C	5HP, 230V,60Hz,20A, 3450RPM	184T

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Notes:

1. Certified only as a component of other certified equipment, where the suitability of the combination is to be determined in the end use application by CSA International.

APPLICABLE REQUIREMENTS

Standards Used	Description
CSA C22.2 No. 100-14 (Upd.1 April 2017)(Seventh Edition) (R2019)	Motors and generators
CSA C22.2 No. 77-14+Errata:2015(Eighth Edition)(R2019)	Motors with inherent overheating protection - Eighth Edition; Incorporated Errata: February 2015
UL 1004-3-2018(Second Ed.)	Standard for Safety for Thermally Protected Motors
UL 1004-1-2020(Second Ed.)	Standard for Safety Rotating Electrical Machines-General Requirements

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

The following information shall be appeared on a nameplate, be marked in a readily visible location on the frame or enclosure of motor, detailed information referred to Att1-Nameplate:

- Submitter's name and/or CSA Master Contract number "304130"
- Model designation
- Electrical Ratings (voltage,current, HP, RPM, frequency)
- Number of phase
- Continuous or CONT
- Insulation class (F)
- Maximum ambient (40 °C)
- Enclosure Type, ODP
- Thermally Protected
- Suitable connection diagram
- Date code or serial number
- CSA CUS mark

Method of Marking: Appeared on pressure-sensitive printed labels recognized by UL CUS.

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LABEL SERVICE

File No. MH20558, c UL us recognized.

Manufacture: AVERY (CHINA) CO LTD.

Model Designation: 50 Micron MAT WH PET TC/DS017HT

Suitable Printing Inks: Thermal transfer ribbon, ITW B324, in the black color unless otherwise indicated

Application Powder Coated Metal surface: Max.150 °C

ALTERATIONS

Markings as noted above.

FACTORY TESTS

Each motor at the conclusion of manufacture, before shipment, shall be applied following AC voltages between live parts and exposed metal parts (frame or enclosure) for one min without insulation breakdown.

- Between stator winding and frame, apply potential of twice rated voltage plus 1,000 V AC.

As an alternative, 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.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component descriptions marked with either the "(INT)" or "(INT*)" identifiers may be substituted with other components providing the requirements specified under the notes in the "Description" are complied with.

COMPONENT SPECIAL PICKUP

1. Component descriptions marked with the identifier "(CT)" are subject to annual pickup and Conformity Testing.

DESCRIPTION

Notes:

1. Component Substitution
 - a. Critical components (those identified by mfr name, cat no), which are NOT identified with either "INT" or "INT*" are not eligible for substitution without evaluation and report updating
 - b. The term "INT" means a "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, for the same application; providing the applicable country identifiers are included and requirements in item "d" below are complied with.

- c. The Term "(INT*)" means a "Recognized" and/or "Accepted" component may be replaced by a component that is CSA Certified. The applicable country identifiers shall be included, the requirements in item "d" below as well as any "conditions of suitability" for the component (as recorded in this descriptive report) shall be complied with.
- d. Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.
- e. Substitution of a "Certified" and/or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.
- f. Substitution of a "Recognized" and/or "Accepted" component by one that is not CSA Certified is not permitted without a proper evaluation as well as a report update because the Conditions of Acceptance of the original component may be different than the Conditions of Acceptance of the substitute component.

General: The subject products are single-phase cage induction motors, capacitor start-capacitor run, with manual reset thermal protector, ODP Enclosure. The end equipment is compressor. Motors intended to install at factory.

Critical components detail construction information as follow:

Att2 Illustration -Typical drawing of motor

Page 1- Assembly Drawing

Page 2- End Shield (Drive End)

Page 3- End Shield (Non-Drive End)

Page 4- Stator Enclosure

Page 5- Stator core with winding

Page 6- Stator Lamination

Page 7- Rotor Assembly

Page 8- Cast Aluminum Rotor

Page 9- Rotor Lamination

Page 10-Internal Fan

Page 11-Capacitor Housing

1. End Shield (Drive End):

Material: Die-cast aluminum alloy

Ventilation Openings: Details as below

Dimensions: Details as below

Remark: Openings have such size and shape as to prevent the passage of a straight 12.7 mm diameter probe, with a straight cut-off end, from touching a bare live part.

Model	Mi. Thick(mm)	Openings	
		Width(mm)	Drawing No
SY-2HP-56-SPL-A	3	11	Att2 Illustration -Page 2
SY-3HP-56-A	3	11	Att2 Illustration -Page 2
SY-3.7HP-56-C	3	11	Att2 Illustration -Page 2
SY-5HP-184T-C, SY-5HP-184T-SPL-C	3	11	Att2 Illustration -Page 2

2. End shield (Non-Drive End):

Material: Die-cast aluminum alloy

Ventilation Openings: Details as below

Dimensions: Details as below

Remark: Openings have such size and shape as to prevent the passage of a straight 12.7 mm diameter probe, with a straight cut-off end, from touching a bare live part.

Model	Mi. Thick(mm)	Openings	
		Width(mm)	Drawing No
SY-2HP-56-SPL-A	3	11	Att2 Illustration -Page 3
SY-3HP-56-A	3	11	Att2 Illustration -Page 3
SY-3.7HP-56-C	3	11	Att2 Illustration -Page 3
SY-5HP-184T-C, SY-5HP-184T-SPL-C	3	11	Att2 Illustration -Page 3

3. Stator Enclosure:

Material: Sheet Steel

Ventilation Openings: None

Dimension: See below table

Model	Thick(mm)	Inner Diament	Length
		(mm)	(mm)
SY-2HP-56-SPL-A	2	160	167
SY-3HP-56-A	2	160	191
SY-3.7HP-56-C	2	160	210
SY-5HP-184T-C, SY-5HP-184T-SPL-C	2	160	249

4. Stator Core:

Material: Laminated silicon steel, 50WW600

Dimension: See below table

Model	Inner Diament (mm)	Outer Diament (mm)	Length (mm)	Slot Quantity
SY-2HP-56-SPL-A	72	160	55	24
SY-3HP-56-A	72	160	95	24
SY-3.7HP-56-C	72	160	95	24
SY-5HP-184T-C, SY-5HP-184T-SPL-C	72	160	116	24

5. Stator Winding:

Material: Copper or Aluminum, detail see below

Size: See below table

Model	Material	Conductor Size		Winding Turns		Winding Resistance	
		(Φ mm)		(Phase)		(ohm,25 °C)(230V)	
		Main	Auxiliary	Main	Auxiliary	Main	Auxiliary
SY-2HP-56-SPL-A	Aluminum	1.05	0.8	129	105	1.665	2.288
SY-3HP-56-A	Aluminum	0.9+0.95	0.85	89	93	0.9007	2.177
SY-3.7HP-56-C	Copper	0.9	0.9	77	80	0.536	1.105
SY-5HP-184T-C, SY-5HP-184T-SPL-C	Copper	1.04*2+1.08	0.83*2	56	75	0.375	1.418

6. Rotor Assembly:

Core Material: Laminated silicon steel, 50WW600

Conductor Type: Cast Aluminum

Dimension: See below table

Model	Outer Diament (mm)	Stack Length (mm)	Short Ring (ID×OD× Thick*) (mm)	Slot Quantity
SY-2HP-56-SPL-A	71.5	55	35×68×17	24
SY-3HP-56-A	71.5	95	35×68×17	24
SY-3.7HP-56-C	71.5	95	35×68×17	24
SY-5HP-184T-C, SY-5HP-184T-SPL-C	71.5	116	35×68×17	24

Note: * Denoting axial length

7. Insulation System: Accepted

The insulation system class is F, the main insulation material listed as follow:

Item	Designation and /or Material	Size(mm)	Thermal Class or Temperature	Manufacture
Magnet wire	JXMW35A, Aluminium	Φ0.8, Φ0.85, Φ0.9, Φ0.95, Φ1.0, Φ1.05	155 °C	Tongling Jingda Special Magnet Wire Co Ltd.(E248026)
	QZY- 2/180, Copper	Φ0.83, Φ0.9, Φ1.04, Φ1.08	180	Zhejiang Grandwall Electric Intelligent Technology Co Ltd.(E206121)
Stator Insulation Paper	6641DMD	0.22,0.25 thick	Class F	Changzhou Jinlong Insulation Materials Co.,LTD.(E345386)
Sleeving	Grade A silicone resin coated fiberglass sleeving,2760	Φ2- Φ10	600V,200 °C	NANTONG CITY DEMEI ELECTRIC GLASS FIBER CO LTD(E331136)
Tie Cords	High strength polyester filament	Φ1.0	160°C	LinAn GuangDa Motor Accessories Factory
Varnish	R-1140	--	Min.155 °C	ZHEJIANG RONGTAI TECHNICAL INDUSTRY CO LTD(E227128)

Spacing: The stator winding with its slot insulation, and the core are suitably varnished and mechanically secured.

Item	Spacing
Slot Insulation	The insulation extends 2.4 mm min beyond the stator core.
End Windings	2.4 mm min spacing away from the Stator Frame, End Shield (Drive End) and End Shield (None-Drive End).

8. Lead wire: c UL us recognized

Manufacturer: TAIZHOU FUANDA WIRE&CABLE CO LTD(E522166)

Location	UL style	CSA type	Rating
Stator Lead	3289	AWM Class I, Group A	150 °C, 600V AC, Horizontal Flame, AWG 12-16

Note: May be replaced by alternative manufacturer with UL recognized wire with same style and rating.

9. Starting Capacitor: UL CUS Recognized, construction only, dry metallized-polypropylene film type
 Manufacturer: ZHEJIANG SHUANGFENG ELECTRIC CO LTD (E220629)

Cat. No.: CBB60

Mounting: Secured on stator enclosure by screw with an individual protect enclosure without openings

Rating: See below table

Model	Voltage (V AC)	Frequency (Hz)	Capacitance (uF)	Max. Temperature (°C)
SY-2HP-56-SPL-A	250	50/60	300	90
SY-3HP-56-A	250	50/60	300	90
SY-3.7HP-56-C	250	50/60	250	90
SY-5HP-184T-C, SY-5HP-184T-SPL-C	250	50/60	250	90

10. Starting Capacitor Housing:

Material: Sheet Steel, Thick 1.0 mm

Openings: None

Dimension: See below table

Mounting: Secured to stator enclosure by 2 screws.

Model	Length ×Width ×Height (mm)
SY-2HP-56-SPL-A	139.5×59×49
SY-3HP-56-A	
SY-3.7HP-56-C	
SY-5HP-184T-C,	
SY-5HP-184T-SPL-C	

11. Running Capacitor: UL CUS Recognized, construction only, dry metallized-polypropylene film type
 Manufacturer: WENLING CITY ZEGUO YIHAO CAPACITOR FACTORY LTD (E355594)

Cat. No.: CBB60

Mounting: Secured on stator enclosure by screw with an individual protect enclosure without openings

Rating: See below table

Model	Voltage	Frequency	Capacitance	Max. Temperature
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	(V AC)	(Hz)	(uF)	(°C)
SY-2HP-56-SPL-A	450	50/60	45±5%	85
SY-3HP-56-A	450	50/60	45±5%	85
SY-3.7HP-56-C	450	50/60	45±5%	85
SY-5HP-184T-C, SY-5HP-184T-SPL-C	450	50/60	45±5%	85

12. Running Capacitor Housing:

Same as starting capacitor housing, listed in Item 10

13. Centrifugal Switch: UL CUS recognized

Manufacturer: NINGBO ZHENHAI MICRO ELECTRIC MOTORS FACTORY (E302311)

Designation: L18.7-30 2S

Rating: 120/250 VAC, 50/60Hz,22A (break)

Structure: Consist of stationary switch and centrifugal mechanism

Mounting: Stationary switch is secured on end shield (non-drive end) by screws, and centrifugal mechanism is secured on shaft by press-fitting.

Remark: successfully completed 100,000 cycle endurance tests.

14. Thermal Protector: Manual Reset, UL CUS recognized

Manufacturer: Dong Guan Proprotors Electric Co., LTD(E498190)

Rating: See below table

Mounting: Securely fastened on the non-drive end shield by screw.

Motor Model	Protector Model	Open Temperature (°C)
SY-2HP-56-SPL-A	TC4-0-E-1-44-V03	135 ± 5°C
SY-3HP-56-A	TC4-0-E-1-44-V12	135 ± 5°C
SY-3.7HP-56-C	TC4-0-E-1-44-V12	135 ± 5°C
SY-5HP-184T-C, SY-5HP-184T-SPL-C	TC4-0-E-1-44-V26	135 ± 5°C

15. Factory Wiring Compartment:

Construction: Rectangle-shaped, consist electrical insulation board (described in item 17), body (part of non-drive end shield) and cover

Material: Body with Cast aluminum, Cover with sheet metal

Dimension: See below

Remark: Wholly integral with the end shield (non-drive end). The threaded conduit entry also integrally casted with the end shield (non-drive end).

NEMA Frame	Overall Length× Width× Height (mm)	Min. Thickness Body × Cover(mm)	Usable Volume (cm 3)	Conduit Entry* Trade Size
56	80.2×43.2×23.5	2.5×1.5	>48cm3	M22
184T				

Note: * Threaded conduit entry not intended to receive rigid metal conduit. It is for connecting outlet bushing and fitting to protect power supply conductor from mechanical injury or abrasion.

16. Internal Cooling Fan:

Material: Reinforced nylon 1010

Dimension: Details as follow

Mounting: Secured on shaft near the drive-end end shield.

NEMA Frame	ID of Blade (mm)	OD of Blade (mm)	Thick of Blade (mm)	Axial Length of blade (mm)	Blade Quantity
56	45	130	2	20	19
184T					

17. Terminal Board:

Material Manufacturer: SABIC INNOVATIVE PLASTICS US L L C (E121562)

Material Designation: 420SE0(f1) (w)(GG)(rr1)

Flame Rating: V-0, 130°C, HWI PLC2, HAI PLC 0, CTI PLC3, Min 2.0mm thick, all color

Terminal Board Dimensions: 95 mm length by 57.4mm wide by 2.2 mm thick.

Terminals: 6.4 mm by 0.8 mm (Wide x Thick), with PVC insulation material, max. temperature 105 °C.

Mounting: Secured to the Non-drive end bell by rivets.

Remark: Same as the terminal board of centrifugal switch recognized by UL.

Alternative Terminal Board Material:

Material Manufacturer: SHENGYI TECHNOLOGY CO LTD (E109769)

Material Designation: S1130 (FR-4.0)

Flame Rating: V-0, 130°C, HWI PLC0, HAI PLC 0, CTI PLC0, Min 2.0mm thick, NC color

18. Bonding and Grounding:

One M4 machine screw is provided on the non-drive end shield, colored by green. The screw engages a minimum of two threads into the metal of the enclosure, and the grounding symbol is provided beside the screw.

-End of Description-

TEST HISTORY

Project 80177585 (Ed. 1)

Original certification of single-phase cage induction motor, thermally protector, manual reset, output 2HP to 5HP, Poles 2, Continuous, Insulation Class F, Max. ambient 40 °C.

IFE conducted.

Involved in WMTC assessment of client designated test facility of Leo Group Pump(Zhejiang) Co.,Ltd. No. 1, 3rd Street,East Industry Center,Taizhou, Zhejiang 317500.

The following tests were conducted based on standards (CSA C22.2 No. 100-14 (Upd.1 April 2017)(Seventh Edition) (R2019))

W= Waived; P= Passed

Tests Location

Leo Group Pump(Zhejiang) Co.,Ltd., No. 1, 3rd Street,East Industry Center, Taizhou, Zhejiang 317500

Clause Number	Requirement	Comments	Verdict
7	Tests		
7.2	Temperature Test		P
7.3	Rating		P
7.4	Dielectric strength test		P
7.8	Water tests		P
8	DC machines and AC machines		
8.4.2	Rating – AC motors		P
8.4.4	Temperature test		P

The following tests were conducted based on standards (CSA C22.2 No. 77-14+Errata:2015(Eighth Edition)(R2019))

W= Waived; P= Passed

Tests Location

Leo Group Pump(Zhejiang) Co.,Ltd., No. 1, 3rd Street,East Industry Center, Taizhou, Zhejiang 317500

Clause Number	Requirement	Comments	Verdict
6	Tests		
6.3	Running heating temperature		P
6.4	Locked rotor Temperature	see test pack	P
6.5	Dielectric Strength		P
6.6	Locked rotor Endurance		P

Clause Number	Requirement	Comments	Verdict
6.7	Manual reset Protectors		P

The following tests were conducted based on standards (UL 1004-1-2020(Second Ed.))

W= Waived; P= Passed

Tests Location

Leo Group Pump(Zhejiang) Co.,Ltd., No. 1, 3rd Street,East Industry Center,
Taizhou, Zhejiang 317500

Clause Number	Requirement	Comments	Verdict
30-42	Performance		
31.2	Motor rating test		P
32	Temperature Test		P
37	Dielectric Voltage-Withstand Test		P

The following tests were conducted based on standards (UL 1004-3-2018(Second Ed.))

W= Waived; P= Passed

Tests Location

Leo Group Pump(Zhejiang) Co.,Ltd., No. 1, 3rd Street,East Industry Center,
Taizhou, Zhejiang 317500

Clause Number	Requirement	Comments	Verdict
6-11	Performance		
8	Locked Rotor Temperature Test	see test pack	P
9	Locked Rotor Endurance Test	see test pack	P
10	Running Heating Temperature Test		P

Construction review performed with satisfactory results.