ELMO S.R.L.
V.le Certosa 8/b – 27100 Pavia Italy
Tel.: +39 0382 529564 - 422372
Fax: +39 0382 527041
E-mail: info@elmoitaly.com
Website: www.elmoitaly.com

MOTORI ELETTRICI IMMERSI PER ASCENSORI IDRAULICI

SUBMERSIBLE ELECTRIC MOTORS FOR HYDRAULIC LIFTS

UNTERÖLMOTOREN (TAUCHMOTOREN) FÜR HYDRAULISCHE AUFZÜGE

MOTEURS IMMERGÉS DANS L'HUILE POUR ASCENSEURS HIDRAULIQUES

TNPA
Created: 27-Sep-07
Update: 21-Nov-11

IMPORTANT NOTES FOR THE PRACTICAL APPLICATION AND MOTORS RELIABILITY

ENG

WHEN DESIGNING AND MANUFACTURING THE ABOVE M0TOR SERIES A PARTICULAR CARE WAS DEVOTED TO:

1) PERFORMANCES

OPTIMIZATION OF MAIN PARAMETERS:

- MAX TORQUE
- ELECTRICAL CURRENT AND RPM AT RATED TORQUE
- ELECTRICAL CURRENT AND RPM AT 130% OF RATED TORQUE
- OVERLOAD THERMAL CAPACITY (MINIMUM 45 SECONDS IN OIL AT 45 °C) WITH 130% OF RATED TORQUE
- STARTING CURRENT, EFFICIENCY η, POWER FACTOR COS φ

2) RELIABILITY

2.1) BASED ON HIGH QUALITY LEVEL OF MATERIALS/COMPONENTS REGULARLY SUBJECT TO LONG LIFE TESTS,

2.2) SECURED BY SEVERE TESTS, MADE ON 100% (HUNDRED PERCENT) OF THE MANUFACTURED MOTORS BEFORE LEAVING THE FACTORY AS FOLLOWS:

- SURGE TEST AT 3700÷4000 VOLT IMPULSIVE VOLTAGE (TURN TO TURN INSULATION OF THE WINDING)
- MEASUREMENT OF THE PARTIAL DISCHARGE INCEPTION VOLTAGE (PDIV TEST)
- HIGH VOLTAGE DIELECTRIC STRENGTH TEST AT 2400 VOLT (WINDING TO GROUND/PHASE TO PHASE)
- WINDING AND PTC RESISTANCES
- CHECK OF THE MARKING OF THE LEADS AND CHECK OF THE RIGHT DIRECTION OF THE ROTATION
- LOCKED ROTOR AND SQUIRREL CAGE TESTS
- NO LOAD CURRENT AT NOMINAL VOLTAGE OF THE MOTOR WHEN NORMALLY ROTATING (IN AIR)
- CHECK OF VIBRATION LEVEL

RELIABILITY CONSIDERATIONS

THE ABOVE PROCEDURES ASSURE A HIGH LEVEL OF RELIABILITY TO MOTORS LEAVING THE ELMO FACTORY.
IT HAS HOWEVER TO BE CLEARLY POINTED OUT THAT AN UNCORRECT UTILIZATION OF THE MOTOR, EVEN FOR A SHORT PERIOD OF TIME, MY JEOPARDIZE ALL THE ABOVE AND CONSIDERABLY REDUCE THE LIFE OF THE WINDING/MOTOR.
ACCORDING TO A LONG EXPERIENCE ACHIEVED IN THE DIELD WITH PRACTICAL APPLICATIONS OF THESE MOTORS, IT WAS NOTED THAT MAJOR FAILURES ARE DUE TO:

A) MOTORS WORKING WITHOUT THERMAL PROTECTION:

IF WINDING TEMPERATURE IS NOT DETECTED BECAUSE THERMISTORS (PTC) ARE NOT USED OR ARE NOT PROPERLY CONNECTED TO THE AMPLIFIER SENSITIVE TO THEIR RESISTANCE, SUDDEN PICKS OF WINDING TEMPERATURE MAY DEMAGE WINDINGS OR DRAMATICALLY REDUCE THEIR LIFE.
THAT USUALLY HAPPENS WHEN THE THERMAL PROTECTION IS EXCLUDED, AND WHEN FOR WHATEVER REASON, THE MOTOR IS PREVENTED TO START EITHER DUE TO A LOCKED ROTOR OR TO A MISSED PHASE IN THE SUPPLY LINE.
WHEN THAT HAPPENS IT CAN BE EASILY CHECKED THAT THE COMPLETE WINDING (IN CASE OF LOCKED ROTOR) OR 1/3 OF THE WINDING COILS (IN CASE OF MISSED PHASE WITH DELTA CONNECTION) OR 2/3 OF THE WINDING COILS (IN CASE OF MISSED PHASE WITH STAR CONNECTION) ARE UNIFORMELY BURNED OR OVERHEATED.
AS A CONSEGUENCE OF THAT THE ENAMELED WIRE OR INSULATION MAY BE DAMAGED AND LOCAL SHORT-CIRCUIT MAY OCCUR (IN THOSE RARE CASES WERE THE SHORT CIRCUIT IS DUE TO AN ORIGINAL MANUFACTURING DEFECT OF THE INSULATION, NO SIGN OF OVERHEATING CAN BE FOUND ON THE REMAINING PART OF THE WINDING).
THOSE SHORT-CIRCUITS VERY OFTEN DO NOT HAPPEN AND BECOME EVIDENT AT THE MOMENT OF THE ABOVE UNPROPER UTILIZATION, SINCE THE TODAY'S VERY RELIABLE INSULATING MATERIALS CAN WITHSTAND ANOMALOUS WORKING CONDITIONS, BUT THEIR LIFE IS CONSIDERABLY SHORTED.
FOR THAT REASON THE DEMAGED INSULATION OFTEN ORIGINATE A SHORT-CIRCUIT AFTER A LONG PERIOD OF TIME. EVEN, SEVERAL MONTHS OF NORMAL USE WHEN AT THAT TIME PERHAPS THE UTILIZATION APPEARS TO BE CORRECT SINCE THE ANOMALOUS WORKING CONDITIONS WERE REMOVED AND THE THERMAL PROTECTION WAS IN THE MEANTIME PROPERLY CONNECTED.

B) A WRONG UTILIZATION OF THERMISTORS (PTC)

A PROPER AMPLIFIER IS NECESSARY BETWEEN PTC THERMISTORS AND THE MAIN REMOTE SWITCH. WHEN PTC THERMISTORS ' RESISTANCE RAISES, DUE TO THE HIGH TEMPERATURE, THE POWER IS SWITCHED-OFF BY THE REMOTE SWITCH CONTROLLED BY THE AMPLIFIER. WHEN THAT HAPPENS THE CABIN MUST GO DOWN TO A LOWER LEVEL BY A PROPER HYDRAULIC DEVICE, WITHOUT USING THE MOTOR. IN FACT IF THE MOTOR IS REQUESTED TO DRIVE THE CABIN TO AN UPPER LEVEL, PERHAPS IN THE SAME OVERCHARGING CONDITIONS THAT ACTIVATE THE PROTECTION, THE WINDING TEMPERATURE MAY EXCEED THE MAXIMUM ADMITTED VALUES.
THE MAX VOLTAGE AT THE THERMISTORS MUST NOT EXCEED 2.5 VOLT.
IF AN HIGHER VOLTAGE IS GIVEN TO THERMISTORS THEY BURN-OUT AND MAY DAMAGE THE WINDING.
THAT FOR SURE HAPPENS WHEN THERMISTORS ARE CONNECTED DIRECTLY TO THE AUXILIARY LINE AND TO THE COIL OF THE REMOTE SWITCH WITHOUT HAVING A PROPER AMPLIFIER IN BETWEEN.

C) HYDRAULIC OIL/FLUID

SERIOUS FAILURE MAY BE ORIGINATED BY AN HYDRAULIC OIL/FLUID WHERE THE MOTOR IS SUBMERSED INTO, WHICH CONTAINS WATER, METALLIC PARCELS OR AGGRESSIVE CHEMICAL COMPONENTS.
ALSO IN THIS CASES INSULATING MATERIALS MAY BE DAMAGED AND SHORT-CIRCUITS MAY OCCUR.

FROM THE ABOVE IT IS CLEAR THAT THE HIGH LEVEL OF RELIABILITY, WHICH IS REQUIRED TO THESE MOTORS, CAN BE REACHED JUST BY AN ACCURATED DESIGN/PRODUCTION, BY SEVERE TESTS AN BY A PROPER UTILIZATION OF THE SAME MOTORS IN THEIR APPLICATION.