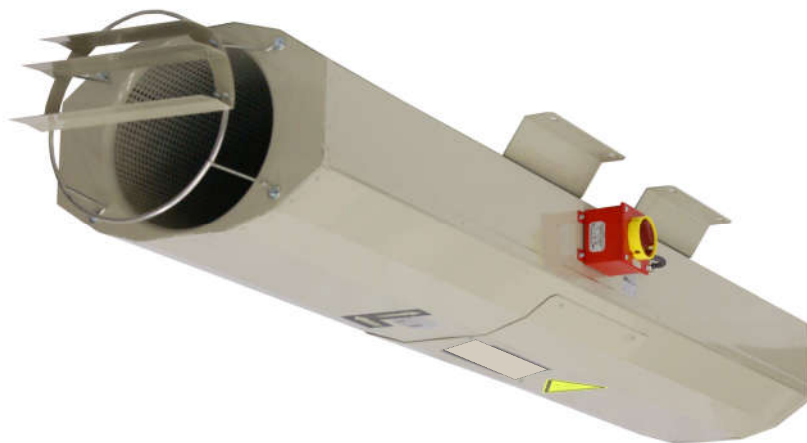


OPERATIONAL AND MAINTENANCE MANUAL

Jet fan

mcr Bora



Revision 19.06.27.4

TABLE OF CONTENTS:

1. FOREWORD	3
2. MANUFACTURER'S DISCLAIMER	3
3. SUBJECT	4
4. INTENDED USE	4
4.1. Application	4
4.2. Fire resistance	4
4.3. Versions.....	5
5. IDENTIFICATION MARKINGS	5
6. DESIGN AND OPERATING PRINCIPLE.....	5
6.1. Design	5
6.2. Function.....	5
6.3. Dimensions and technical features	5
7. INSTALLATION.....	7
7.1. Pre-assembly inspection.....	7
7.2. Location and assembly	7
7.3. Electrical connections	7
7.4. Commissioning	8
8. TRANSPORT & STORAGE CONDITIONS.....	8
9. SAFETY MANUAL.....	9
10. MAINTENANCE & SERVICING.....	8
11. WARRANTY TERMS & CONDITIONS	9
FAN MEASUREMENT REPORT	11

NOTE

All previous issues of this O&M Manual expire on the date of issue hereof.
This Operating and Maintenance Manual does not apply to any fans manufactured prior to this Manual's date of issue.

1. FOREWORD

This Operating and Maintenance Manual is addressed to users/operators of type mcr Bora jet fans. This document is intended to provide guidelines on the application, design, commissioning and operation of the product.



Read this manual thoroughly before installing this equipment at its operating site and commissioning.



If the equipment is found malfunctioning or defective, contact the manufacturer or their authorised representative.



Due to the continuous product improvement policy, we reserve the right to change the product design in order to improve its performance and safety.

The design of the fans complies with the essential requirements of PN-EN 12101-3:2004 for smoke exhaust fans. The design also meets the state of the art in technology, while assuring health and safety protection.

2. MANUFACTURER'S DISCLAIMER

- The manufacturer shall not be liable for any consequences of non-intended use or misuse of the equipment.
- DO NOT install any components that are not included in the equipment composition or accessories.
- Unauthorised modifications or alteration of this equipment is strictly prohibited.
- Protect the equipment enclosure (casing) from mechanical damage.
- Before attempting to install this equipment, verify the load bearing capacity of the structural members to which the equipment is to be fastened. Unreliable fastening may result in damage or failure of the equipment and/or be hazardous to all nearby personnel.
- This fan is not intended for forcing air with viscous pollutants that may settle on the equipment, and especially on its rotor.
- This fan is not intended for forcing air with corrosive pollutants that may be detrimental to the equipment.
- The maximum actual rotor RPM must never exceed the nominal (rated) RPM speed in operation.
- The manufacturer shall not be liable for any injuries, trauma or other bodily harm caused by misuse of this equipment.

3. SUBJECT

The subject of this Operating and Maintenance Manual is:

- Jet fan mcr Bora F400
- Jet fan mcr Bora F300
- Jet fan mcr Bora F200
- Jet fan mcr Bora BO – without fire resistance

4. INTENDED USE

4.1. Application

The mcr Bora jet fans are intended to remove smoke and heat generated in indoor rooms in case of fire. The equipment facilitates evacuation of persons from the area on fire, protect the building structure and its furnishing from high temperature, facilitate fire fighting, and inhibit spreading of fire to adjacent fire zones. The mcr Bora without fire resistance jet fans are intended to ventilate rooms in case of no fire occurrence.

The available versions include:

- single direction fans, with dual-speed motor
- reversible fans, with dual-speed motor

The fans can be installed indoors on suitable consoles with the motor in the horizontal orientation.



The operating temperature range for fans in general purpose ventilation systems is -20°C to + 40°C.

The fan may force dry air only, with a maximum particulate content of 0.3 g/m³.



This fan is not intended for forcing air with viscous pollutants that may settle on the equipment, especially on its rotor.



This fan is not intended for forcing air with corrosive pollutants that may be detrimental to the equipment.



The maximum actual rotor RPM must never exceed the nominal (rated) RPM speed in operation.



Following operation in actual fire conditions, the fan will not be fit for further use.

4.2. Fire resistance

- Class F400 – fire resistance at 400°C for 120 minutes
- Class F300 – fire resistance at 300°C for 60 minutes
- Class F200 – fire resistance at 200°C for 120 minutes
- Without fire resistance

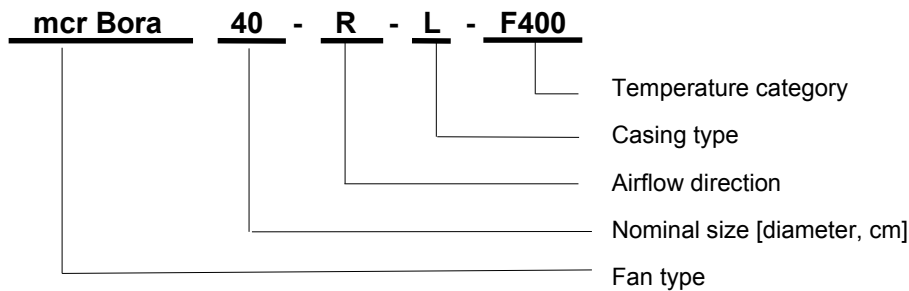
4.3. Versions

- dual speed jet fans, single-direction - U
- dual speed jet fans, reversible - R

Versions

- Polygonal, painted casing – O
- Polygonal, steel casing – L

5. IDENTIFICATION MARKINGS



6. DESIGN AND OPERATING PRINCIPLE

6.1 Design

The mcr Bora jet fan comprises an electrical motor with a suitable insulation class, an axial rotor, a blade assembly, an outer casing assembly and silencers.

The motor is coupled directly to an aluminium rotor on bearings, and on the rotor the profiled blades are installed. The angle and number of blades depend on the required thrust and capacity of the fan. The motor bearings are high temperature resistant and maintenance free. On the inlet and outlet side the engine is connected to silencers. The medium, which is fire gases and air with smoke, flows through the casing, the motor, the rotor blades and the silencer.

The mcr Bora fans in O and L versions have a connection box located on the casing.

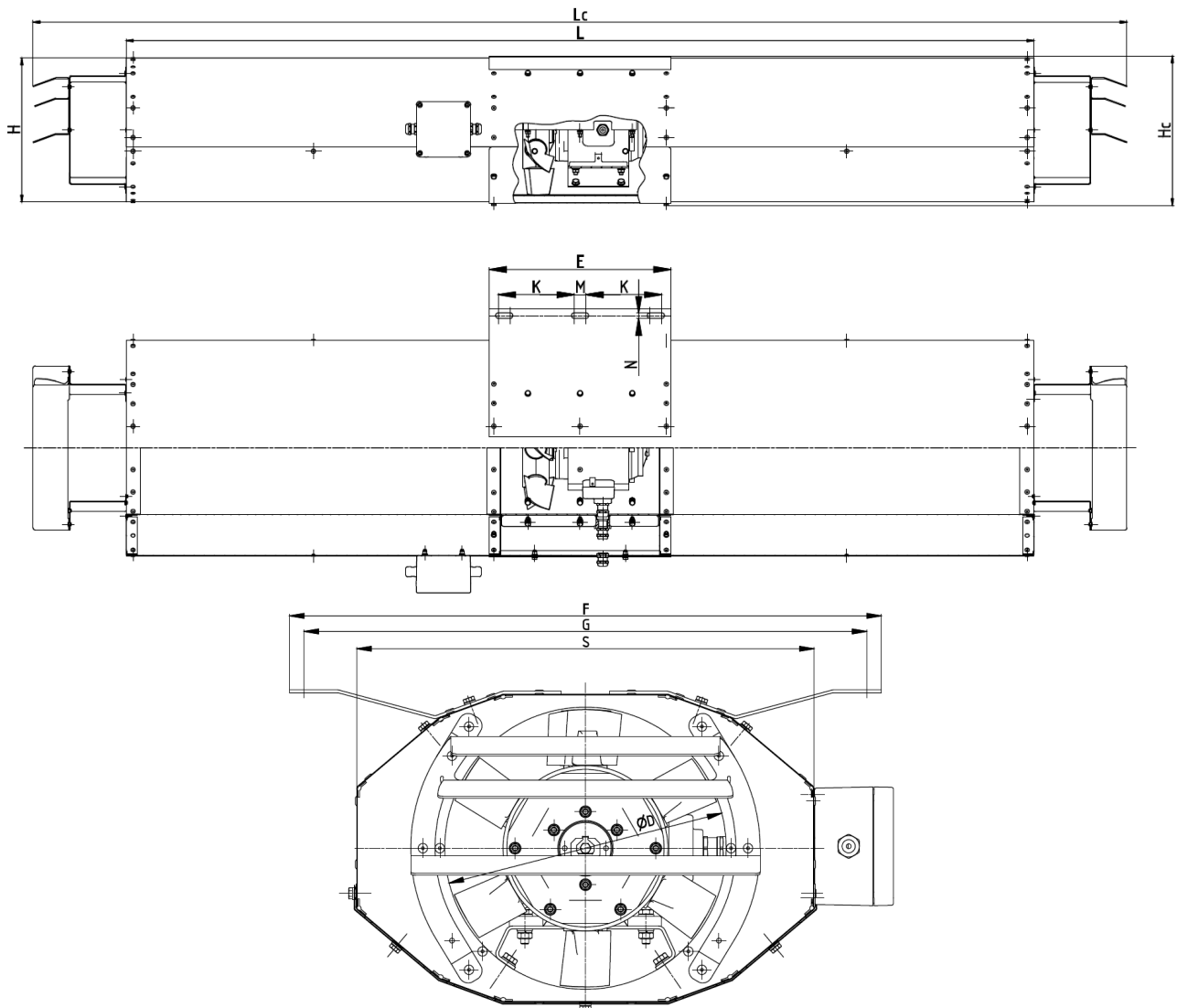
All types of fans have fasteners or assembly frames, depending on the fan size.

6.2 Function

The fan does not run while in standby. When 3-phase voltage is present on the terminal box terminals, the fan is started and running.

6.3 Dimensions and technical features

The basic dimensions of fans as well as their technical parameters are given below.



Drawing 1 mcr BORA L, O

Fan	ØD [mm]	L [mm]	Lc [mm]	H [mm]	Hc [mm]	S [mm]	E [mm]	F [mm]	G [mm]	K [mm]	M [mm]	N [mm]
mcr Bora 290	290	2000	2410	317	329	472	400	610	580	167	26	12
mcr Bora 315	315	2000	2410	342	354	472	400	610	580	167	26	12
mcr Bora 355	355	2000	2410	377	389	517	400	644	614	167	26	12
mcr Bora 380	380	2000	2410	407	419	557	400	644	614	167	26	12
mcr Bora 400	400	2000	2410	427	440	607	400	694	664	167	26	12
mcr Bora 450	450	2000	2410	482	495	657	400	750	720	167	26	12
mcr Bora 500	500	2650	3060	533	547	708	480	780	750	200	30	14
mcr Bora 560	560	2650	3060	608	622	798	650	950	920	255	30	14

7. INSTALLATION

The mcr Bora smoke exhaust jet fan is intended for use in rooms designed for moving air and fire gases (in the fire zone).

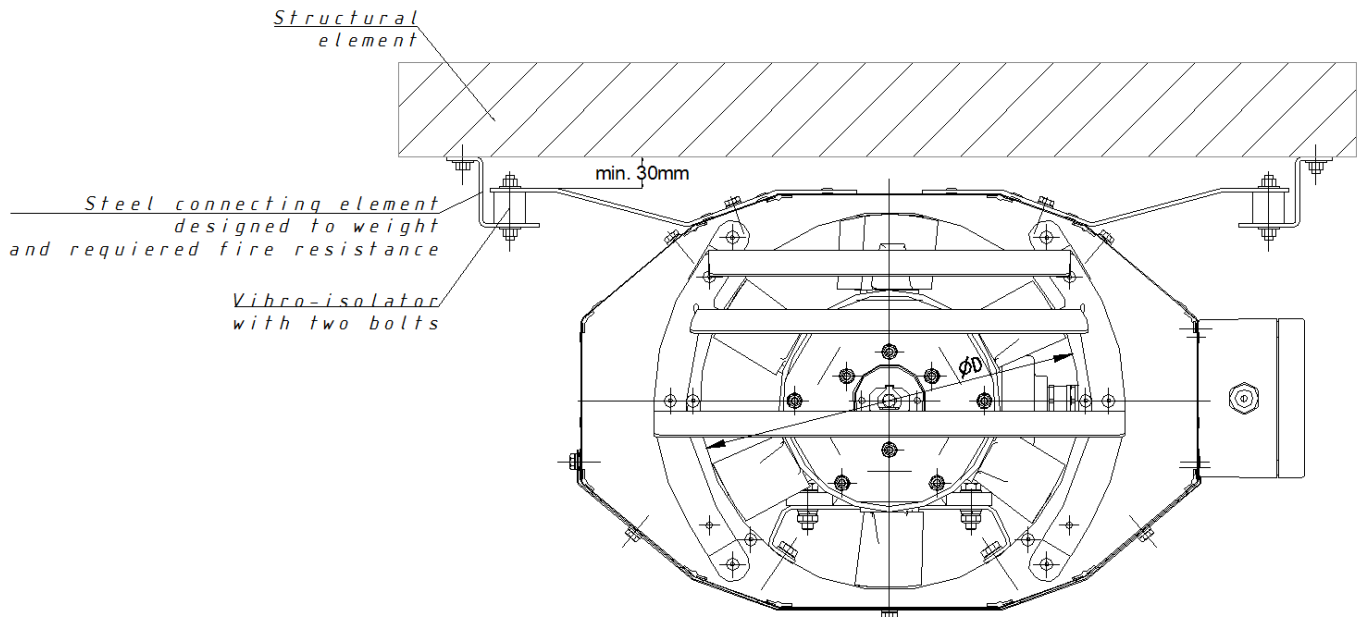
7.1. Pre-assembly inspection

Each smoke exhaust fan is factory inspected by the manufacturer prior to packing and shipping. Upon unpacking the delivered smoke exhaust fan, visually examine it for any damage in transport. The motor shaft should rotate with the rotor without evident resistance or scraping.

7.2. Location and assembly

The mcr Bora fan is designed for horizontal installation. Prior to installation of the fan, verify the load bearing capacity of the ceiling or other structural element where the equipment is to be suspended. Use the mounting frame (part of the fan itself) or the fasteners supplied with the fan. Using the above mentioned element, the device is fitted to the structural elements using bolts or using hangers (not supplied).

Fan due to his construction, does not require vibration isolation between the structural elements and the device. In case of demanded by bulining project assembly by means of vibration insolation, the manufacturer recommend to instal the device according to drawing 2. Other assembly may be provided, providing that the device is safe and undisturbed, in normal operation and fire condtions. Screws, anchors, suspensions (diameter, length) and other assembly elements must be selected for the size of the device and the required fire resistane.



Drawing 2 Example illustrating how to install the mcr Bora with vibration isolation elements.

7.3. Electrical connections

Having properly located, placed and fastened the smoke exhaust fan, connect the equipment to the relevant electrical system wiring. Lead the wiring through the gland and into the terminal box on the fan casing; then connect the wiring to the terminals in accordance with the diagram shown in the box. The electrical wire with the proper fire resistance rating is installed in standard by the manufacturer between the fan motor and the terminal box. Each fan motor must be connected to the electrical power system through an overcurrent switch. The safety level must be set in accordance with the nominal current draw of the fan motor. The protective earth shall be made in accordance with relevant electrical engineering standards.

Once the smoke exhaust fan has been commissioned as a part of the system, measure the current draw and verify that it meets the motor rating plate data. The smoke exhaust fan current draw in steady operation must not exceed 1.1 times the rated current.

The electrical power supply from the control cabinet to the fan power junction box must guarantee uninterrupted operation in the case of a fire. This can be achieved with high temperature resistant wiring or with protective tubing and proper safe routing of the electrical power system. No external service/maintenance switches are to be used, which is to prevent inadvertent shutdown of the smoke exhaust fan (with the sole exception of the fan-dedicated service switch with remote indication of current circuit switching). The smoke exhaust fan control cabinets must be powered directly from main switchboards with guaranteed uninterrupted power supply, even if the entire building is cut off from the power grid. If a main fireman's switch is installed to isolate power from the entire building, the smoke

exhaust fan power supply must be independent from that solution and assure normal operation in the case of a fire.

7.4. COMMISSIONING

Before commissioning your installed smoke exhaust fan do the following:

- Check that the smoke exhaust fan is properly and firmly fastened.
- Check all seals for tightness.
- Check that all electrical wiring is properly and firmly connected.
- Check that the phase connection sequence and PE/neutral wiring is properly connected.
- Check that the smoke exhaust fan is free of foreign objects.
- Check that all protective/safety components have been installed.
- If the checks are positive, start the fan and do a functional test.
- When starting the smoke exhaust fan, verify the motor direction of rotation against the direction arrow on the enclosure.

8. TRANSPORT & STORAGE CONDITIONS

The mcr Bora smoke exhaust fans are placed on pallets during transport and storage. Do not topple or throw the packaging during loading and transport. The smoke exhaust fans can be handled and shipped using any means of transport, provided that they are secured against weather. The smoke exhaust fans must be secured against shifting while on transport vehicles. Visually inspect each piece of equipment following transport and handling.

Store in sheltered rooms, where:

- there is no exposure to particulates, gases, corrosive vapours and other aggressive chemical emissions detrimental to insulation parts and structural components of the fan and/or its motor;
- the maximum relative humidity is 80% at +20°C;
- the ambient temperature is between -20°C and + 40°C;
- no vibrations are present.

9. SAFETY MANUAL

Read and understand this Operating and Maintenance Manual before commissioning and servicing the product.

The smoke exhaust fan is not hazardous when firmly attached to a ventilation system and the fan support structure.

Make the electrical connections in accordance with the enclosed electrical wiring diagram and the guidelines in Section 7.3. Electrical connections shall be made by personnel with relevant qualifications which have been certified as required by current laws.

Inspect the PE wire connection of the smoke exhaust fan during the operating life.

Disconnect the smoke exhaust fan from electrical power before any inspections or checks.

CAUTION:

1. Do not clean smoke exhaust fans of deposits with pressure or steam washers.
2. Loss of seal at the fan connections or flexible ends may result in hazards due to release of the forced medium and requires immediate replacement of leaking components.

If the equipment is malfunctioning (e.g. excessive noise, vibration and/or erratic operation is found), disconnect the fan from electrical power supply, and call the manufacturer's technical service or an inspection and repair contractor authorised by the manufacturer.

10. MAINTENANCE & SERVICING

The equipment from "Mercor" SA requires periodic technical inspection and maintenance at least every 12 months throughout its operating life, i.e. during the warranty and post-warranty period. Inspection and maintenance may only be carried out by the manufacturer or contractors authorised by "MERCOR" SA to service its products.

The obligation to carry out regular service inspections of fire protection devices results from the Art. 3(3) of the Regulation by the Minister of Internal Affairs and Administration of 7 June 2010 on fire protection of buildings, other civil structures and areas (Journal of Laws 2010 no. 109 item 719):

Do these recommended actions in the inspection intervals:

- Check the electrical connections, especially for all mechanical damage.
- Check the equipment casing, especially for any mechanical damage.
- Check for any obstructions to proper operation of the equipment.

To facilitate the activities under service inspection, servicing and warranty claim response, e.g. visual inspection or repairs, the equipment user/operator shall provide physical access to the equipment by removing thermal insulation, suspended ceilings, and other installations, as required and applicable to warrant unobstructed access.

If the equipment is only operated for smoke exhaust during fire, test run it for ca. 10 minutes every 3 months.

Refer all matters related to technical inspection, maintenance and servicing of this equipment to the "Mercor" SA Service Department, serwis@mercor.com.pl, tel. +48 58 341 42 45 ext. 170, fax: +48 58 341 39 85, from 8 AM to 4 PM (Mo-Fri).

11. WARRANTY TERMS & CONDITIONS

1. "MERCOR" SA grants 12 months of warranty for the equipment quality from the date of purchase, unless the sales contract states otherwise.
2. Submit each warranty claim to "MERCOR" SA in 7 days from the date of discovery of a warranty eligible defect
3. Submit warranty claims by calling at: tel. +48 58 341 42 45, by fax: +48 58 341 39 85, by e-mail: reklamacje@mercor.com.pl or by traditional mail: "MERCOR" SA, ul. Grzegorza z Sanoka 2, 80-408 Gdańsk, Poland.
4. If physical defects of equipment are found during the warranty period, "MERCOR" SA warrants and represents to remove them in shortest possible time from serving the written warranty claim with the proof of purchase or sales contract, subject to Item 10.
5. "MERCOR" SA has the right to extend the time of repair if the defect removal is complicated or requires purchase of custom components or spare parts.
6. The warranty liability only covers all defects arising from causes present in the equipment at the date of sale.
7. Defects caused by improper operation or otherwise as listed in Item 10 herein, the buyer / warranty beneficiary will be charged with the costs of their removal.
8. Condition for rectifying defects is that the applicant makes the site/localisation where devices are installed available, in particular, ensuring: the lift in the case of devices mounted at a height above 3m, free access to the rooms where the devices were installed and necessary revisions, dismantling thermal insulation, disassembling suspended ceilings, disassembling other installations, if they prevent free access to the device.
9. If the device can not be repaired at the place of its installation, "MERCOR" SA reserves the necessity of its disassembly, possible delivery to the address indicated by "MERCOR" SA and re-assembly. The cost of this operation lies with the buyer / holder of the guarantee.
10. The warranty does not cover:
 - Any damage or failure of the equipment caused by improper operation, tampering, failure to conduct periodic technical inspection and/or maintenance established in the Operating and Maintenance Manual, section "SERVICING AND MAINTENANCE".
 - Any damage beyond reasonable control of "MERCOR" SA, and specifically: caused by force majeure, such as torrential rainfall, flooding, hurricanes, inundation, lightning strike, power grid overvoltage, explosion, hail, collision with aircraft, fire, avalanche, landslide and indirect damage due to those causes. Torrential rainfall is understood as any rainfall with the effectiveness factor of 4 or higher in accordance with the definition of the Polish Institute of Meteorology and Water Management - National Research Institute (IMGW-PIB). If the effectiveness factor value specified in the preceding sentence cannot be reasonably established, the actual condition and extent of damage shall be considered at the site of their origin as the action of torrential rain. Hurricane is understood as any wind with a minimum

speed of 17.5 m/s (and damage shall be recognised as caused by hurricanes if the effects of such weather phenomenon has been found in the direct vicinity of the damaged property).

- Damage due to failure to immediately report any defect found.
 - Deterioration in the quality of coatings due to natural weathering/ageing.
 - Defects caused by abrasive or aggressive cleaning agents.
 - Damage caused by aggressive external influence, specifically chemical or biological in nature, or when the origin of which is related to the production processing or activity carried out within the facility protected by the equipment or in its direct vicinity.
 - Wearing parts and consumables (e.g. gaskets/seals), unless they have defects of workmanship and/or material.
 - Damage caused by improper transport, handling, unloading and/or storage of the equipment.
 - Damage caused by installation of the equipment in violation of this Operating and Maintenance Manual and/or good construction practice.
 - The equipment and/or parts thereof with removed or damaged nameplate (rating plate) and/or warranty seals.
11. The buyer/warranty rights holder is required to operate the equipment properly and carry out technical inspection and maintenance in accordance with the section "MAINTENANCE AND SERVICING" in the following Operating and Maintenance Manual.
12. This warranty shall be made immediately void and null if:
- The buyer/warranty rights holder modifies the product design without prior authorisation from "MERCOR" SA.
 - Periodic technical inspection and/or maintenance is not carried out per schedule and/or is carried out by unauthorised personnel or service providers not authorised to do so by "MERCOR" SA and/or the equipment has not been properly operated.
 - Unauthorised personnel attempts any intervention in the product outside of the normal operation and maintenance of this equipment.
13. Any circumstances listed in Item 10 will relieve "MERCOR" SA from the obligation of surety.

The relevant provisions of the Polish Civil Code shall apply to all matters not regulated in these Warranty Terms & Conditions.

FAN MEASUREMENT REPORT

FAN TYPE	
SERIAL NUMBER	
INSTALLATION SITE	
RATED CURRENT	

Once the fan has been installed at its intended operating site and all electrical connections have been made, immediately measure the current draw in steady-state operation of the equipment.

MEASUREMENT RESULTS [A]

U1	V1	W1	U2	V2	W2

NOTES:

Full name of the measuring technician	Date measured	Signature

Return this Report immediately after completion of measurements to:

“MERCOR” SA
Fire Ventilation Systems
ul. Grzegorza z Sanoka 2
80-408 Gdańsk

and not later than within 8 weeks from the date of equipment purchase (equivalent to the date of the VAT sales invoice).

THE EQUIPMENT WARRANTY BECOMES ENFORCEABLE UPON RETURN OF THIS MEASUREMENT REPORT