



## Centrifugal EC fans with forward curved blades

### Series BL-F



## CONTENTS

<b>1. SAFETY PRECAUTIONS AND INSTRUCTIONS</b>	2
1.1 Hazard level warning notices	2
1.2 Staff qualification	2
1.3 Basic safety guidelines	2
1.4 Electric voltage	2
1.5 Protection and safety functions	3
1.6 Electromagnetic pulse	3
1.7 Mechanical movement	3
1.8 Harmful factors	3
1.9 Hot surface	3
1.10 Transportation, storage and recycling	4
<b>2. INTENDED USE</b>	4
<b>3. TECHNICAL SPECIFICATIONS</b>	4
<b>4. CONNECTION AND COMMISSIONING</b>	5
4.1 Mechanical connection procedure	5
4.2 Electrical connection procedure	5
4.2.1 Necessary conditions before start of works	5
4.2.2 Current at zero rotating speed	5
4.2.3 Residual current circuit breaker (RCCB)	5
4.2.4. Lock protection	5
4.3 Connection	6
4.4 Wiring diagram	6
4.5 Wire connection	7
4.6 Unit activation	7
4.7 Unit deactivation	7
<b>5. INTEGRATED PROTECTION FUNCTIONS</b>	7
<b>6. TECHNICAL MAINTENANCE, FAILURES, POSSIBLE REASONS AND TROUBLESHOOTING</b>	7
6.1. Cleaning	8
6.2. Safety procedure checklist	8

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge.

The single-phase power mains must comply with the acting local electrical norms and standards. The fixed electrical wiring must be equipped with an automatic circuit breaker. The fan must be connected to power mains through an switch integrated into the fixed wiring system with the gap between the breaker contacts on all poles not less than 3 mm.

Mounting sequence:

The appliance is to be fixed to its support. Drill the holes in the

mounting surface to match the fitment holes in the appliance. Fix the appliance with the screws.

## 1. SAFETY PRECAUTIONS AND INSTRUCTIONS

Read this operation manual carefully before using the fan. Follow all the warnings below to prevent injuries or malfunctions. The present user's manual is an essential part of the fan delivery set. Make sure to turn the operation manual over to the receiving party on fan sale or delivery.

This user's manual may be reproduced or handed over to a third party to inform about any potential hazards associated with the fan operation as well as ways of avoiding them.

### 1.1 Hazard level warning notices

This user's manual contains a gradation of hazard levels which correspond to certain potentially dangerous situations and basic safety precautions – in particular:



#### DANGER

May lead to a dangerous situation which may result in serious injury or death unless the specified precautions are taken. Proceed with extreme care.



#### CAUTION

May lead to a dangerous situation which may result in serious injury or death unless the specified precautions are duly taken. Proceed with extreme care.



#### CAUTION

Unprevented situation may lead to a moderate or minor injury.



#### NOTE

The situation poses no hazard to life, but may result in unwanted happenings like material losses.

### 1.2 Staff qualification

The unit must be transported, unpacked, installed, serviced, repaired and otherwise handled only by specially trained and authorized personnel.

Electric equipment operations, unit setup and test runs must require appropriate authorization.

### 1.3 Basic safety guidelines

The risks associated with the unit must be re-assessed upon its installation into the finished product.

Keep the operating space clean and in order.

Failure to fulfil these rules may result in user injury.

During operating the unit consider the following:

- Important note specific to any work on the fan: any reconfiguration or retrofitting of the fan must be authorized by BLAUBERG.

### 1.4 Electric voltage

The electric equipment of the fan requires regular periodic checks (see Chapter 6.2 "Safety procedure checklist").

- Any loose connections and faulty cables must be replaced immediately.

**DANGER****Electrically charged unit.**

Electric shock hazard.

- Always stand on a rubber mat while working on the energized unit.

**CAUTION****The unit terminals and connectors may remain energized even while the unit is off.**

Electric shock hazard.

- After de-energizing all the power leads wait for 5 minutes before opening the unit.

**CAUTION****In the event of an accident the rotor and the impeller are energized.**

The rotor and the impeller have the basic insulation.

- Do not touch the rotor and the impeller during operation.

**CAUTION****The motor restarts automatically after power drop or spike if the control signal remains applied or the rotation speed remains the same.**

Risk of personal injury!

- Keep away from the unit danger area.
- Before doing any work on the unit disconnect it from power mains and install a safety interlock to prevent accidental power-up.
- Wait till the unit comes to a full stop.
- On completing the work remove all the tools or other items used away from the unit.

**1.5 Protection and safety functions****DANGER****No protective device is in service.**

Failure to use proper protective equipment may result in severe injury if a hand gets trapped in an operating unit.

- Do not operate the unit without a stationary insulating protective device and a protecting grille.
- The stationary protective device must be capable of absorbing the kinetic energy of an impeller blade coming loose at maximum rotation speed.
- The unit is a built-in component. Being the operator, the customer shall be liable for ensuring safe operation of the unit.
- The unit must be stopped immediately in case of the protective equipment failure.

**1.6 Electromagnetic pulse**

The unit may generate electromagnetic pulse - for example, when used in combination with control and monitoring devices.

If an assembled unit generates emissions above the permissible level, the operator must provide proper screening before commissioning.

**NOTE****Upon integration with the customer's equipment the unit may become the source of electric or electromagnetic interference.**

- Make sure to check the entire equipment suite for electromagnetic compatibility.

**1.7 Mechanical movement****DANGER****Rotating device.**

Contact of the body parts with the rotor and impeller may result in injury.

- Make sure to provide adequate protection against accidental touch with the unit.
- Wait till all the rotating parts stop before proceeding with any operations.

**CAUTION****Rotating device.**

Long hair, trailing parts of clothing or pieces of jewellery may get caught inside the fan assembly. This may result in an injury.

Do not wear clothing with trailing elements or jewellery while working with rotating machinery parts.

- Long hair should be tucked under suitable headwear.

**1.8 Harmful factors****CAUTION****The noise level may exceed 70 dBA, depending on the installation and operation conditions.**

Noise risk of hearing loss!

- Use engineering safety systems.
- Provide operating staff with respective protection equipment, for instance, with protecting earphones.

**1.9 Hot surface****CAUTION****The electronic module casing may get extremely hot.**

Burning risk!

- Make sure to provide adequate protection against accidental touch with the unit!



### 1.10 Transportation, storage and recycling



#### NOTE

##### Transportation of the unit.

The unit must be transported in the original packing only.

#### Storage

- The fan must be stored completely or partially assembled in the original packing in a dry and clean area protected from weather elements.
- Protect the unit against environmental and dirt impact prior to its final installation.
- Storage of the unit above 12 months ensures no failure-free operation in case of a maximum warranty period applied.
- Keep the respective storage temperature as stated in the unit specification.
- The units designed for outdoor use must be stored in compliance with the respective description.

#### Recycling

The unit must be recycled in accordance with all the applicable administrative requirements and regulations effective in the country of service.

### 2. INTENDED USE

The fan is a built-in component and is exclusively intended for air transportation in accordance with the technical specifications. Any other use shall constitute wrongful misuse.

The engineering design, comprising this unit, must consider mechanical, thermal and other factors that influence durability, such as loads, vibration, etc.

#### The intended use shall also include:

- Discharge of air with the density of 1.2 kg/m<sup>3</sup>.
- Use of the unit in the admissible air temperature conditions.
- Use of the unit with all electrical and mechanical protecting devices.
- Compliance with the requirements stated in the user's manual.

#### The following actions are considered misuse and are prohibited due to the risk of dangerous situations:

- Fan operation with disregard for imbalance caused by unwanted deposits (e.g. accumulation of dirt or icing).
- Handling air which contains abrasive particles.
- Handling air which produces a highly corrosive effect (i.e. salt spray).
- This rule does not apply to the fans specifically designed to handle aggressive environments and have appropriate protection.
- Handling air which contains considerable amounts of dirt (e.g. suction of sawdust).
- Fan operation in close proximity to flammable materials or components.
- Fan operation in explosive environments.
- Fan use as a safety system element or assignment of protection functions.

### 3. TECHNICAL SPECIFICATIONS

Detailed technical data for a definite fan is stated in the technical data sheets.

If the technical data sheet is not available, please refer to the nearest representative of **BLAUBERG MOTOREN** or via the website [www.blauberg-motoren.com](http://www.blauberg-motoren.com).

## 4. CONNECTION AND COMMISSIONING

### 4.1 Mechanical connection procedure



#### CAUTION

**Beware of cuts or finger jamming while unpacking the fan.**



- Hold the impeller while taking the unit out of the packing.
- Avoid any shocks or impacts.
- Wear protective shoes and tight protective gloves.



#### NOTE

**Vibration damage probability.**

Bearing damage decreases the fan service life.

Low-vibration operation in the entire speed range of the unit must be provided.

Vibration may be a result of wrong installation, transportation or component damage.

Speed range with excessive vibration level and resonance frequencies must be determined during commissioning of the fan. Pass the frequencies as soon as possible by means of the speed control or other method.

Operation of the unit with high vibration may lead to premature breakdown.

- Check the unit for transportation damages.
- Do not install damaged units!
- Use reliable fixation for installation of the unit.

### 4.2 Electrical connection procedure



#### DANGER

**Beware of the energized unit.**

- Electric shock hazard.
- Connect the protective grounding wire at all times.
- Check the protective grounding.



#### DANGER

**Insufficient or damaged insulation.**

Risk to life due to electric shock.

- Use only the cables and wires that meet the requirements to voltage, current, insulation material, load, etc.
- The cables and wires must be installed in such a way to avoid contacting the rotating parts.



#### DANGER

**Beware of the electric charge (>50 mC) between the power cable and the protective grounding wire terminal remaining upon disconnection from power mains in the event of parallel connection of more than one unit.**

Electric shock hazard, risk of personal injury.

- Make sure to provide adequate protection against accidental touch.
- Prior to any work on the electric connection bus the outlet ends and the protective grounding (PE) wire together.



#### WARNING!

**Electric voltage.**

The unit is a built-in component and has no electrical cut-out switch.

- Unit connection is only allowed to electric circuits with a cut-out switch which opens all the power contacts.
- Prior to working on the unit engage the safety interlock on the assembly/machine containing the fan to prevent accidental power-up.



#### NOTE

**Beware of water leaks into the cable and wire.**

- Water ingress on the cable end may damage the unit.
- Make sure that the cable end is connected to a dry and clean surface.

Connect the unit only to the wiring diagrams that enable disconnecting all the poles with a circuit breaker.

#### 4.2.1 Necessary conditions before start of works

- Prior to connecting the unit make sure that the power mains voltage match the unit ratings.
- Do not use any cables except those matching the nameplate current rating.
- Proper cross-section should be defined pursuant to EN 61800-5-1.
- The minimum wire cross-section is AWG 26/0.13 mm<sup>2</sup> and operating temperature is 105 °C.
- Certain mounting conditions may require connection of an additional grounding wire via the auxiliary protective wire terminal on the unit.
- The grounding resistance must comply with EN 60335.

#### 4.2.2 Current at zero rotating speed



#### NOTE

The integrated electromagnetic filter ensures electromagnetic compatibility and enables consumption of current below 50 mA during zero speed.

The filter power may reach 2 W in the rated operating mode conditions.

#### 4.2.3 Residual current circuit breaker (RCCB)



#### NOTE

If a differential switch (RCD) must be applied, use the types A or B only.

Differential switch must be applied, if frequency converters have no differential switching function.

Residual current circuit breaker with the rated leakage current 300 mA and turn-off delay (type K) is recommended for use.



4.2.4. Lock protection



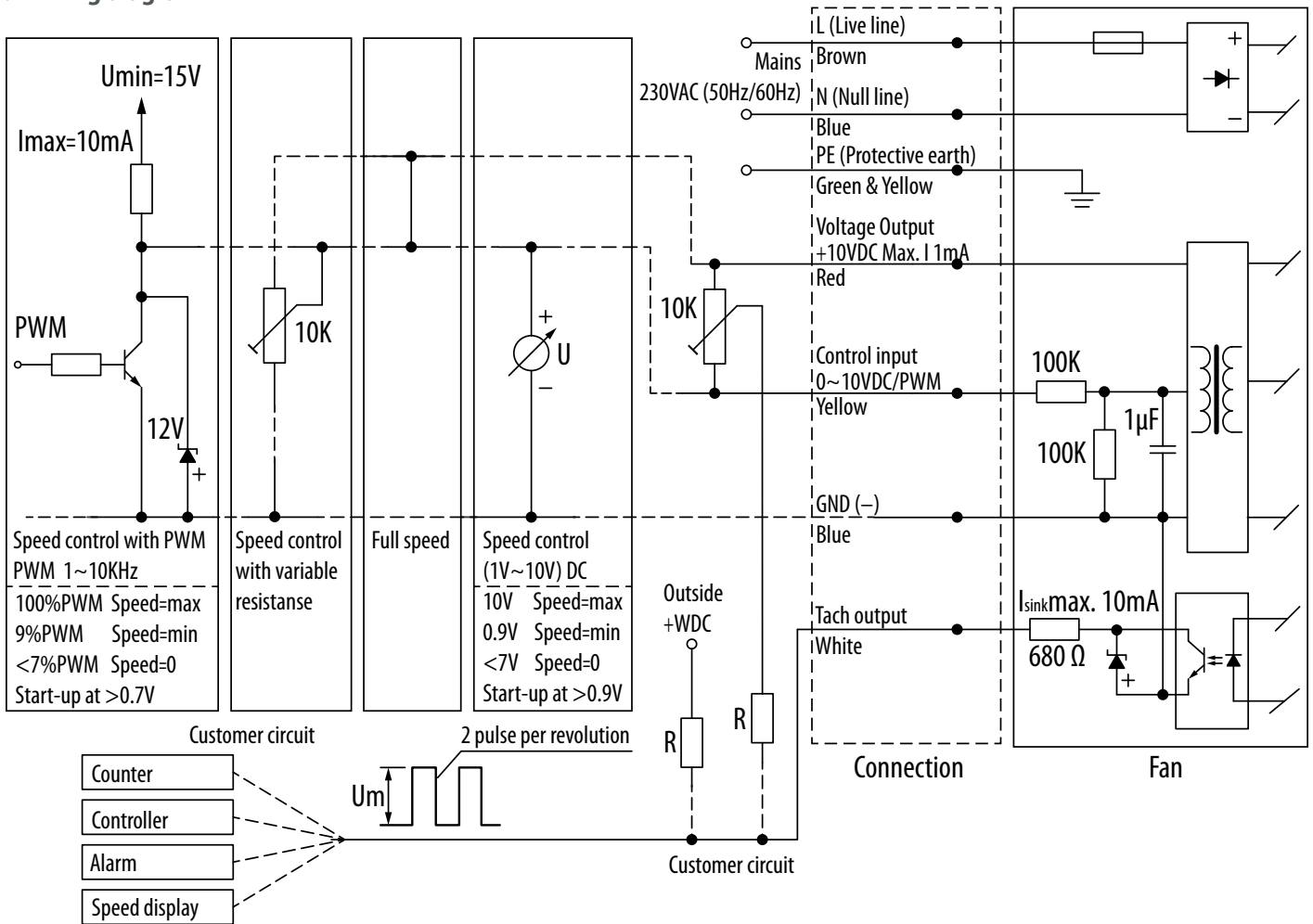
NOTE

Due to the wake lock the starting current is equal to the rated current or may exceed it.

4.3 Connection

The unit has outlet ends.  
First connect the ground wire (PE).  
Connect all the other wires in compliance with the para. 4.4 of the wiring diagram.

4.4 Wiring diagram



Line	Signal	Colour	Assignment/function
1	L	Broun	Mains 50/60 Hz, phase
	N	Blue	Mains 50/60 Hz, neutral
	PE	Green & Yellow	Protective Earth

Line	Signal	Colour	Assignment/function
2	+10VDC	Red	Voltage Output +10VDC max. 1mA
	0-10VDC/PWM	Yellow	Control input
	Tach output	White	Tach output: 2 puls per revolution
	GND	Blue	GND



**4.5 Wire connection**

- Make sure that all the unit phases are de-energized.
- Make steps to prevent accidental power-up.
- Check the wire connection for reliability.

**4.6 Unit activation**

The unit may be turned on only after a proper installation and wiring completed by a qualified engineer. This note also covers appliances equipped with plug connectors, terminal clamps or other connectors on the user side.



**CAUTION**

**The fan casing may get hot.**

Fire hazard.

- Make sure that there aren't any flammable or explosive substances in close proximity to the fan.
- Before powering up the unit check for visible internal damage and reliable operation of the protective devices.
- Check the direction of air flows generated by the fan using foreign objects to be removed on completing the checks.
- Supply nominal voltage to the power source.
- Start the unit by changing the input signal.

**4.7 Unit deactivation**

**Switching the unit off during operation:**

- Switch the fan off via the control input signal.
- Do not switch the unit on or off (e.g. repeatedly) via the power mains.

**Switching the unit off for technical maintenance:**

- Switching the unit off via the control input signal.
- Do not switch the unit motor on or off (e.g. repeatedly) via the power mains.
- Disconnect the unit from the power supply.
- When disconnecting the connectors the protective wire connector must be removed last.

**5. INTEGRATED PROTECTION FUNCTIONS**

The integrated protection functions serve to deenergize the motor in case of any failures.

Problem	Description/ function of the safety device
Registration of the wrong rotor position.	Automatic restart.
Jammed motor.	The motor restarts after troubleshooting of the motor jam.

**6. TECHNICAL MAINTENANCE, FAILURES, POSSIBLE REASONS AND TROUBLESHOOTING**

Do not attempt to repair the fan.

The unit must be handed over to BLAUBERG for any repair or replacement.



**CAUTION**

**The terminal clamps and the connector remain energized even after powering off.**

- Any works with the unit are allowed only in 5 minutes after disconnecting all the poles from power supply.



**CAUTION**

**If the control voltage or the set rotation speed is applied, the unit starts to run automatically, for instance, after turning off and deenergizing.**

- Keep away from the unit danger area.
- Before doing any work on the unit disconnect it from power mains and install a safety interlock to prevent accidental power-up.
- Wait till the unit comes to a full stop.
- On completing the work remove all the tools or other items used away from the unit.



If the unit is out of use, for instance, it is kept in a warehouse, it is recommended to let it run for 2 hours to enable condensate evaporation and warming up of the bearings.



Failure/Fault	Possible reason	Troubleshooting method
Irregular impeller rotation.	Rotating parts out of balance.	Clean the unit. If the imbalance persists after cleaning, replace the unit. Make sure that the clamp-on balance weights remain duly in place after the cleaning.
Motor shaft does not turn.	Mechanical blocking.	Switch off and power off the unit, eliminate the mechanical block.
	Power supply failure.	Check the power mains voltage, re-energize the unit and set the control signal.
	Wrong connection.	De-energize the unit and remedy the connection (see the wiring diagram).
Electronic/motor overheating.	Inefficient cooling.	Restore the proper cooling system operation. Let the unit cool down. To reset the alarm message disconnect the unit from power supply for 60 seconds and turn it in again.
	Abnormally high ambient temperature.	Reduce the ambient temperature. Reduction is performed by means of resetting the control input.
	Invalid setpoint.	Correct the setpoint. Let the unit cool down.

**i** In case of any other malfunctions, please contact a representative of BLAUBERG.

### 6.1. Cleaning

**i** **NOTE**  
**Make sure not to damage the unit while cleaning.**

May affect functionality.

- Do not clean the unit by spraying water or by means of a high-pressure cleaner.
- Do not use any detergents containing acid, alkali and solvents.
- Do not use any pointed or sharp-edged objects for cleaning the unit.

### 6.2. Safety procedure checklist



#### NOTE

#### High voltage test.

The integrated EMC filter has Y capacitors.

Test current increases if variable voltage is applied.

- The tests must be performed by means of high voltage, the voltage value must be according to the standard.

Items to check	Check method	Checking frequency	Troubleshooting
Protective sheeting against accidental touch.	Visual inspection.	Min. every 6 months.	Unit restoration or replacement.
Fan connection to the fixing bracket.	Visual inspection.	Min. every 6 months.	Unit restoration or replacement.
The blades (impeller) and the casing for no damage.	Visual inspection.	Min. every 6 months.	Unit replacement.
Power and control wire connection.	Visual inspection.	Min. every 6 months.	Tightening.
Connecting wires for tightness.	Visual inspection.	Min. every 6 months.	Tightening.
Protective grounding of cables and wires for tightness.	Visual inspection.	Min. every 6 months.	Cable and wire replacement.
Impeller for wear/deposits/signs of corrosion and damage.	Visual inspection.	Min. every 6 months.	Impeller cleaning or replacement.
Condensate hole.	Visual inspection.	Min. every 6 months.	Hole cleaning.
No strange noise generated by bearings.	Visual inspection.	Min. every 6 months.	Unit replacement.