

Operating instructions

F-CEVF 3718-3(29)(A002)(31)(45)(55)(90)
F-CEVF 3718-4(29)(A002)



F-Serie
F-Series

Radial
Radial



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1.1 Content of this document

These operating instructions:

- Is a component of the suction blower:

Series	F-CEVF	
Types	F-CEVF 3718-3(29)	F-CEVF 3718-4(29)
	F-CEVF 3718-3(A002)	F-CEVF 3718-4(A002)
	F-CEVF 3718-3(31)	
	F-CEVF 3718-3(45)	
	F-CEVF 3718-3(55)	
	F-CEVF 3718-3(90)	

- describe the safe, proper and efficient use in all phases of its service life.
- must always be available to personnel at the place of use.
- Arranged in the main sections:
 - About these instructions
 - Safety and responsibility
 - Product identification
 - Transportation and storage
 - Mounting
 - Electric power connection
 - Commissioning
 - Operation
 - Troubleshooting
 - Maintenance, repairs and spare parts
 - Decommissioning
 - Technical data

The main section on “Safety and responsibility” must always be observed. The subsequent main sections can be used as a reference and can be read independently from each other. Cross references provided must be observed.

1.2 Target group

These instructions are intended for operating personnel, qualified personnel, electricians, operators and planners. See also Staff qualifications and training [→ 9].

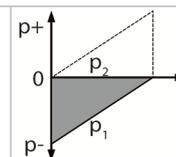
1.3 Explanation of the terms and symbols

In these instructions symbols and terms will be used to mean the following.

Symbol	Explanation
!	Requirement, pre-requisite
①	One-step handling instructions
1 2 3	Multi-step handling instructions
✓	Result
[→ 54]	Cross reference with page reference
	Additional information, tips
	Direction of rotation arrow
	Direction of conveyance arrow
	General warning sign (warning of risk of injury)

Symbol	Explanation
	F-CEVF can start without warning
	Electrical voltage warning
	Hot surface warning
	Disconnect prior to maintenance or repair
	Earth prior to use
	Observe the instructions

Term	Explanation
Plant	Part provided by the user in which the F-CEVF is installed.
F-CEVF = Suction blower	Ready-to-connect blower for suction operations, for high-volume flow rates with small pressure differences. The suction blower consists of a suction component and motor, as well as any further accessories.
Drive	Asynchronous motor and drive control, where applicable
Impeller	Rotating component for generating pressure within the inner chamber of the compressor.
Gas inlet	Position for gas inlet
Gas outlet	Position for gas outlet
Substructure	Mounting plate, base frame or foundation on which the F-CEVF is constructed.
Elastic / rigid	When the lowest normal frequency of the system, consisting of the F-CEVF and substructure, is less than 25% above the rotary frequency of the F-CEVF per measurement direction, then the substructure is considered to be rigid. All other substructures are considered to be elastic.
Assembly environment	Space in which the side-channel compressor is set up and operated (this may differ from the suction environment).
Suction/discharge environment	Chamber from which the media to be conveyed is suctioned or in which the media to be conveyed is expelled (this may differ from the assembly environment).
Reference conditions	<ul style="list-style-type: none"> ▪ Ambient temperature and suction temperature: +15°C (+59°F) ▪ Ambient pressure: 1013 mbar abs. (14.7 psi abs.) ▪ Conveyed media: air ▪ Speed: 3600 min⁻¹ (60 Hz) in continuous operation ▪ Maximum pressure difference according to rating plate ▪ Level assembly on the foot
Volume flow	Volume of air or gas that is conveyed per unit of time.
Vacuum operation	Operation with - pressure at gas inlet $p_1 < p_{\text{atm.}}$ and - pressure at gas outlet $p_2 = p_{\text{atm.}}$
Reverse operation	Operation with change in direction of rotation.



1.4 Changes in comparison to the previous version

Changes compared with version 01.2016

- Explanation of the terms and symbols [→ 4]
- Safety and responsibility [→ 7]
- Rating plate [→ 12]
- Design of the machine [→ 13]
- EC/EU declaration of conformity [→ 15]
- General installation regulations [→ 20]
- deleted
- Connect the motor to the mains [→ 22]
- Measures after a long shut-down period [→ 23]
- Checking the direction of rotation [→ 23]
- Ground [→ 28]
- Tightening torques deleted

The manufacturer is not liable for damage caused by the failure to observe these instructions and the related documents.

2.1 Explanation of warning signs

Warning sign	Explanation
 DANGER	Danger that failure to observe the measures could lead to death or serious physical injuries.
 WARNING	Danger that failure to observe the measures could lead to death or serious physical injuries.
 CAUTION	Danger that failure to observe the measures could lead to minor physical injuries.
NOTICE	Danger that failure to observe the measures could lead to material damage.

2.2 Correct use of the equipment

The F-CEVF is a machine that is suited for heavy-duty operation and optimised for vacuuming up materials that fall into printing machines.

The CEVF (29), (A002) and (45) may be used to vacuum up paper powder and dusts.

The CEVF (31), (55) and (90) may be used to vacuum up paper or foil in the form of strips or shreds larger than 3 mm.

The F-CEVF may only be operated in buildings. The protection class is stated on the Rating plate [→ 12].

The F-CEVF:

- should only be used within the limits defined in this documentation:
 - Mounting conditions [→ 18]
 - Permitted conditions for use [→ 28]
 - Electrical data [→ 29]
- only operate when fully assembled and in a technically perfect condition.
- Can deliver the following conveyed media:
 - Air with a relative humidity of up to 90%
 - All non-explosive, non-combustible, non-abrasive and non-toxic gasses and gas/air mixtures, after consultation with the manufacturer
- May only be operated for short periods of time at full throttle or when not connected to a system.

Other operating conditions must be agreed with the manufacturer.

2.3 Unauthorised operation

It is forbidden to:

- Operating in a potentially explosive area (ATEX).
- Connecting to a potentially explosive area (ATEX).
- Transporting explosive, flammable, aggressive, unstable, oxydative or poisonous materials.
- Using non-commercial facilities without making adjustments for the additional requirements.
- Operating in reverse with sudden/abrupt changes in the direction of rotation.
NOTICE! This results in high drive loads and alternating stresses. The machine can be destroyed.
- Use in areas with ultrasound and ionising or non-ionising radiation.
- Operating outside of the limits defined in this document:
 - Mounting conditions [→ 18]
 - Permitted conditions for use [→ 28]
 - Electrical data [→ 29]

2.4 Working in a safety-conscious manner

Work at a standstill and de-energised **Work on running or energised vacuum pumps/compressors can lead to serious injuries due to body parts being drawn in or crushed or death due to electric shock.**



Work on the F-CEVF at a standstill only and in a de-energized condition.

1. Switch off and disconnect from the power supply.
2. Wait for impeller and external fan to stop.
3. Secure to prevent it from being switched back on.
4. Make sure that it is de-energised.
5. Earth it and short-circuit it.
6. Cover or block off adjacent parts that are still supplied with voltage.

Not fully assembled or damaged **Operation with exposed or damaged parts can lead to serious injuries due to body parts being drawn in and severed or crushed.**

1. Replace damaged parts prior to beginning operation.
2. Re-attach safety and protective devices and put them back into operation immediately after completion of work.
3. F-CEVF should only be put into operation when fully assembled.

Changes, additions and conversions **Changes, additions and conversions may lead to unforeseeable risks and thus to serious injuries or death.**

Modifications, additions and conversions not described in the general documentation are the sole responsibility of the operator.

Only use original parts or parts and auxiliary materials (grease, sealant) recommended by the manufacturer.

Keep all notices attached to the F-CEVF in a clearly legible condition:

- Labelling of connections
- rotation arrows
- Rating plate
- Warning signs

2.5 Requirements for personnel

2.5.1 Staff qualifications and training



All those who will work on the F-CEVF must have read and understood these instructions and the related documents.

Personnel in training may only work on the F-CEVF under supervision of personnel who have the **required knowledge**.

Only personnel with the following knowledge may carry out the work described in these instructions:

Work task	Personnel	Required knowledge
Transportation, storage	Shipper, dealer, fitter	<ul style="list-style-type: none"> ▪ Safe handling with lifting gear such as hoists and fork lift trucks
Assembly, start-up, correcting faults, shut down, dismantling	Fitter	<ul style="list-style-type: none"> ▪ Safe handling of tools ▪ Laying and connecting pipes and hoses ▪ Mounting mechanical components ▪ Knowledge of suction blowers
Working on the electrical system	Electrician	<ul style="list-style-type: none"> ▪ Understanding and safe implementation of circuit diagrams ▪ Lay and connect electrical lines ▪ Connection of electrical machines, switches, sensors, circuit breakers ▪ Analysing and testing electrical systems ▪ Assessing the effectiveness of electrical protection measures
Operation	Operating personnel	<ul style="list-style-type: none"> ▪ Instructions for occupational safety and for handling suction blowers
Maintenance Repair	Maintenance staff	<ul style="list-style-type: none"> ▪ Safe handling of tools and materials ▪ Assembling and disassembling suction blowers ▪ Assessing damage to suction blowers
Disposal	Disposal specialist, fitter	<ul style="list-style-type: none"> ▪ Decontaminating polluted materials ▪ Re-use of materials and substances ▪ Correct and environmentally-friendly disposal of materials and substances

2.5.2 Personal protective equipment

 **WARNING**

Danger of crushing and cutting!

Crushing and cutting of body parts due to sharp edges or falling parts on the open F-CEVF.

1. Wear protective gloves, safety footwear and safety goggles for all assembly and disassembly, troubleshooting and maintenance work.
2. In addition, wear head protection for transportation and overhead work.

 **WARNING**

Risk of injury!

Serious injuries due to body parts and hair being sucked or drawn in (vacuum) or due to projected particles (pressure).

1. Wear eye protection and tight clothes for all work when in operation.
2. Wear a hair net for long hair.
3. Remove jewellery and rings.

 **WARNING**

Hearing damage!

Hearing damage due to time spent in noisy area under adverse operating conditions or due to noise caused by conveyed media being discharged from the gas outlet or piping.

- ① Wear ear protection when remaining in the excessive noise area.

2.6 Requirements of the operator



WARNING

Destruction due to bursting or exploding!

Any machine that is operated at a pressure or speed that is beyond that which is permitted can explode or burst and cause serious injuries due to parts flying off and conveyed media being suddenly ejected.

1. The operator must ensure that the pressure differences [→ 29] that affect F-CEVF are not exceeded.
2. The operator must ensure that the revolutions [→ 28] are not exceeded.

The operator ensures that:

- All work on the F-CEVF is carried out by:
 - personnel that have the necessary Staff qualifications and training [→ 9]
 - personnel that have been sufficiently informed of these instructions and all related documents
- Assignment, responsibility and supervision of personnel is regulated.
- The content of these and locally applicable instructions are always available to personnel.
- Personnel are informed of possible dangers related to conveyed material and the necessary safety precautions.
- All local and plant-specific safety measures are complied with:
- The free drawing in or emission of the conveyed media does not place any personnel in danger.
- Dangers due to electrical energy are not possible.

3.1 Rating plate

Rating plate of the compressor (item 2000, [→ 13])

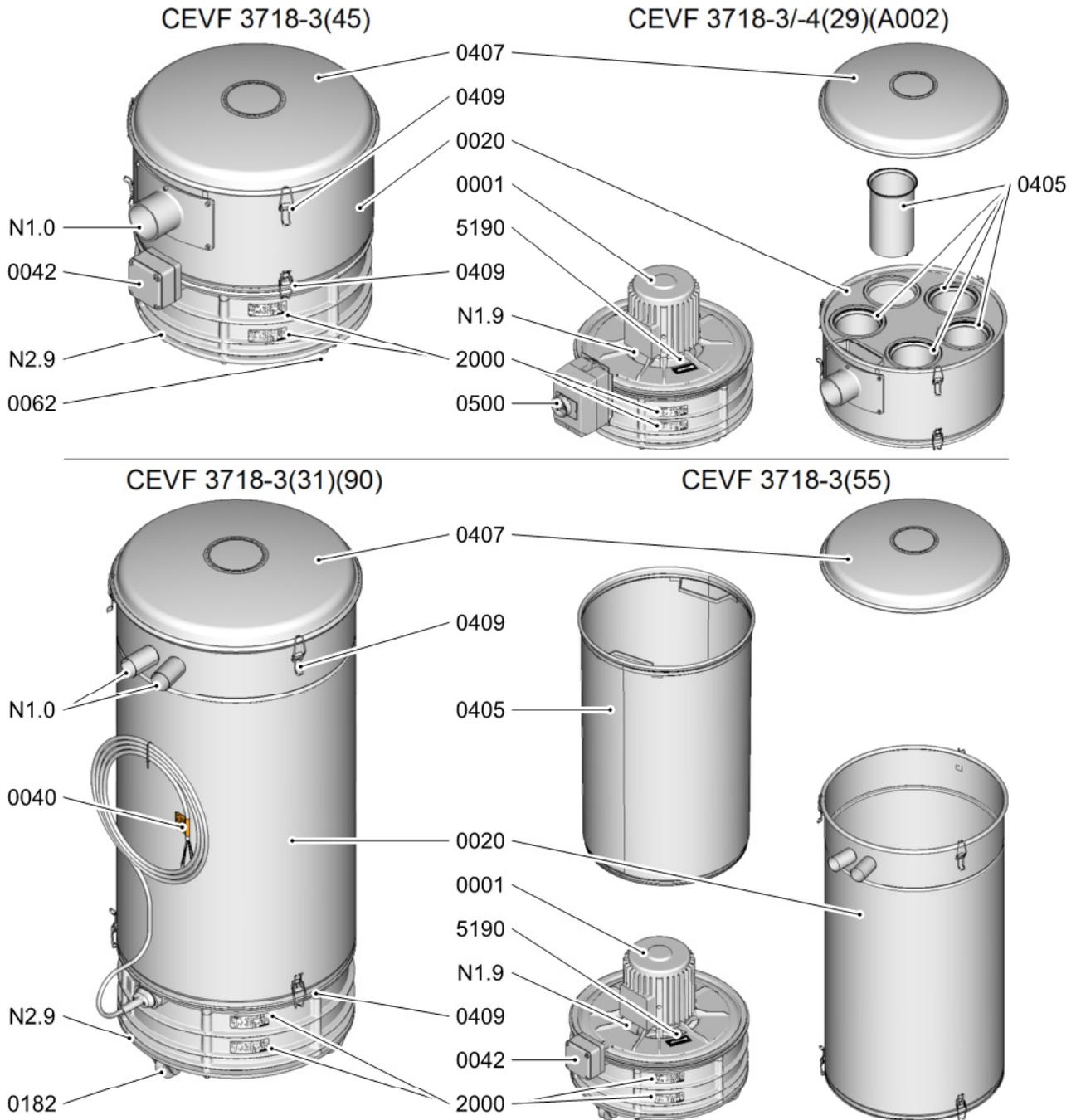
Gardner Denver vacuum pump								A F-CEVF B 3718-3(XX) SN: BN XXXXXXXX XXX /MMYY C D IEC/EN 60034 3~ Motor TH.CL.F IP 54 S1	
f [Hz]	P ₂ [kW]	U _N [V]	I _N [A]	cos φ	rpm [1/min]	Δp [mbar]	V [m ³ /h]		
50	F ₁	G	H ₁	J	K	p ₁	L		
60									
M N								Made in Germany / Industriestraße 26 D-97616 Bad Neustadt	

Gardner Denver vacuum pump								A F-CEVF B 3718-3(XX) No. BN XXXXXXXX XXX /MMYY C D IEC/EN 60034 S1 IP 54	
[Hz]	[kW]	V	A	P.F.	rpm	Δp [mbar]	V [m ³ /h]		
50	F ₁	G	H ₁	J	K	p ₁	L		
60									
M N								Made in Germany / Industriestraße 26 D-97616 Bad Neustadt	

Rating plate of the motor (Pos. 2000, [→ 13])

Gardner Denver								3 ~ Motor B DXXXXX-XXXX-X C BN XXXXXXXX XXX /MMYY IEC/EN 60034 S1 IP 54	Q NES1XXXX S T CC XXX
[Hz]	[kW]	r.p.m	V	A	P.F.	nom. eff.	CODE		
50	F ₂	K	G	H ₂	J	O	R		
60									
NEMA MG1-12 XXXX XXXX XXXX U.XXXX XXXXX XXXXX								Made in Germany	

- | | |
|---|--|
| A Series | p Pressure differences |
| B Type | p ₁ values with a negative sign apply to vacuum-
ing and vacuum operations |
| C Serial number/year of manufacture | L Volume flow |
| D Machine type, protection class, thermal class | M Manufacturer's recommendations (optional) |
| E Frequency | N Customer information (optional) |
| F ₁ Maximum power | O Nominal efficiency |
| F ₂ Measured power output | Q Serial number/year of manufacture as DMC
code |
| G Voltage | R Ratio of breakaway starting current to apparent
power |
| H ₁ Maximum current | S Family type number for CC registration |
| H ₂ Rated current | T CC registration |
| J Power factor | U NEMA rating |
| K Rated rpm | |

3.2 Design of the machine


- | | | | |
|------|------------------|------|---|
| 0001 | Drive motor | 0409 | Quick-release clamp (on top) |
| 0020 | Filter body | 0409 | Quick-release clamp (on bottom) |
| 0040 | Connection cable | 0500 | Motor protection circuit breaker |
| 0042 | Junction box | 2000 | Rating plate |
| 0062 | Feet | 5190 | Adhesive label with direction of rotation arrow |
| 0182 | Castors | N1.9 | Gas inlet |
| 0405 | Filter bag | N2.9 | Gas outlet |
| 0405 | Filter cartridge | | |
| 0407 | Filter hood | | |

3.3 Function principle

The F-CEVF suction blower is a multi-stage blower that works according to the dynamic compressing principle and operates with a non-contact rotating impeller. It has a gas inlet (item N1.0, [→ 13]). The drive and the fan form a single unit. A shaft seal is arranged between the storage chamber and the compression chamber. The impellers are overhung and are located on the extended, vertical shaft of the motor.

Variants (45) and (55) are equipped with a terminal box and variants (31) and (90) are equipped with a connection cable. Variants (29) and (A002) are equipped with a motor protection circuit breaker and variant (A002) has an additional RC circuit.

3.4 EC/EU declaration of conformity

Manufacturer: Gardner Denver Deutschland GmbH
Industriestraße 26, 97616 Bad Neustadt, Germany

Representative for the compilation of technical documents: Holger Krause, Gardner Denver Deutschland GmbH
Industriestraße 26, 97616 Bad Neustadt, Germany

Designation of the machine: Vacuum Pump

Gardner
Denver

Series	F-CEVF	
Types	F-CEVF 3718-3(29)	F-CEVF 3718-4(29)
	F-CEVF 3718-3(A002)	F-CEVF 3718-4(A002)
	3718-3(31) F-CEVF	
	3718-3(45) F-CEVF	
	3718-3(55) F-CEVF	
	3718-3(90)	

The manufacturer bears sole responsibility for issuing this declaration of compliance. The machine described above complies with all applicable harmonisation legislation of the Community:

2006/42/EC Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC

harmonised standards and other technical specifications on which the declaration of compliance is based:

EN 1012-1:2010 Compressors and vacuum pumps - Safety requirements - Part 1: Compressors

EN 1012-2:1996 +A1:2009 Compressors and vacuum pumps - Safety requirements - Part 2: Vacuum pumps

EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

EN 60204-1:2006/ A1:2009/ AC:2010 Safety of machinery; electrical equipment for machinery part 1: General requirements IEC 60204-1:2005 (amended)

EN 60034-1:2010/ AC:2010 Rotating electrical machines - Part 1: Rating and performance IEC 60034-1:2010 (amended)

Signed for and on behalf of: Gardner Denver Deutschland GmbH
Bad Neustadt, 16.02.2017
(Place and date of issue)



Caroline Seit, Operations/Authorised signatory
(Name and function)

664.00181.40.000

4.1 Unpacking and checking the condition of delivery

The F-CEVF is secured onto a pallet and protected by a cardboard box for delivery.

1. Remove the packaging.
NOTICE! First remove the transport protection on the connection openings before connecting the pipes and hoses.
2. Check F-CEVF for transport damage.
NOTICE! Report any transport damage to the manufacturer immediately.
3. Check whether the delivered F-CEVF matches the order.
4. Check that accessories delivered with it are complete.
5. Remove the bands.
6. Dispose of packaging material in accordance with the valid local regulations.

4.2 Lifting and transporting

Transportation by crane

 **WARNING**

Danger of crushing and cutting!

Danger of crushing and cutting of body parts due to tipping or falling loads during transportation.

1. The load-bearing capacity of the lifting gear and load-handling devices must correspond to the Weight [→ 28].
2. Secure against tipping over or falling.
3. Do not remain under supported loads.
4. Set up the F-CEVF on a stable and level surface.

NOTICE

Mechanical damage!

F-CEVF can be damaged during transportation.

! The F-CEVF is designed for transport with a crane or forklift.

- ① The F-CEVF should not be exposed to impacts and blows during transportation.
1. Lifting and transporting the F-CEVF.
2. Set F-CEVF down on its feet (item 0062, [→ 13]) or castors (item 0182, [→ 13]).

4.3 Storage

NOTICE

Mechanical damage and corrosion!

Failure to adhere to the storage conditions can lead to mechanical damage and corrosion.

1. Seal all openings so that no dirt or solid particles can enter.
2. Avoid storage for more than 6 months.
3. Adhere to storage and standstill conditions.

Storage and standstill conditions	Permitted values	
Ambient pressure	Atmospheric	
Composition of the environment	Dry, dust-free environment (relatively humid < 80%)	
Ambient temperature	-10°C to +60°C	14°F to +140°F
Static loads	None	
Abrupt impacts	None	
Speed of oscillation V_{eff}	<1,5 mm/s	<0.059 in/s

5.1 Measures after long-term storage

Measuring the motor insulation resistance

- ① Measure the insulation resistance of the motor at 500V DC voltage between the conductors of the main circuit and protective conductive system.
 - ✓ Value $\geq 1 \text{ M}\Omega$: no measures necessary.
 - ✓ Value $< 1 \text{ M}\Omega$: Dry winding.

5.2 Reduction of oscillations and noises

Noise emissions and vibrations can be reduced by the following measures.

- Do not set up the F-CEVF in set-up areas that conduct or radiate sound.
- Equip installation surfaces with intermediate layers of noise damping material.

5.3 Mounting conditions

For safe operation, comply with the following installation conditions

- Always place the F-CEVF on a level mounting surface or base frame. The dimensions and load bearing capacity must be designed for F-CEVF.
- When installing outdoors, take protective measures against the effects of weather.
- When installing in enclosed spaces, ensure that there is sufficient ventilation. For conveyed media other than air, leaks from the F-CEVF must be taken into account (e.g. forced ventilation, gas monitoring).
- No exhaust air from other machines in the suction area of the motor fan.
- External oscillations, abrupt loads and accelerations are not permitted.
- External mechanical loads are not permitted on the F-CEVF and its attachments (e.g. piping without a support, climbing the F-CEVF and its attachments).
- If there is a risk of condensation forming in the interior of the F-CEVF, take protective measures (e.g. heating, moisture separators).
- When loading the conveyed goods statically, ground the connection cables.

5.4 Set up

Only set up the F-CEVF in an upright position on its feet (item 0062, [→ 13]) or castors (item 0182, [→ 13]).

NOTICE

Risk of injury!

With swivel castors, the F-CEVF can rotate when starting up and make unpredictable movements.

- ① Do not use swivel castors.

When setting up on ground-level, no securing is necessary.

! When not setting up on ground-level:

1. Secure the F-CEVF from falling down.
2. Secure the F-CEVF with castors (item 0182, [→ 13]) additionally from rolling away.

5.5 Connecting pipelines and hoses

WARNING

**Risk of injury due to prohibited system-side loads!
Suddenly ejected conveyed media such as impurities and solid particles or pressure surges can lead to serious injuries.**

1. Dimension pipes and hoses, securing elements, fittings and containers sufficiently and align them to the maximum pressures.
2. Connect the F-CEVF and the system de-energised and flexibly (e.g. using hoses or compensators).
3. Do not fit pipes, hoses, securing elements, fittings and containers to the F-CEVF and secure from damage.
4. Protect the F-CEVF from non-permitted pressure levels from the plant (e.g. pressure limiting valve, pressure switch).
5. After switching off, ensure that no conveyed media can flow through the F-CEVF (external drive through conveyed media), install a check valve if necessary.

WARNING

**Risk of injury due to uncased gas inlet!
Severe injuries to body parts, drawing in of hair.**

- ! Operating without piping (free suction) is solely permitted under the following conditions:
- ① Take protection measures on the gas inlet to prevent body parts and hair from being sucked in.

NOTICE

Pressure loss due to reduced cross section of the pipes and hoses!

- ① As possible, make the cross section of the pipes and hoses the same length or longer than the connections of the F-CEVF.
- ! On delivery, all connection openings are closed with a transport protection. This prevents foreign objects from entering.
1. Remove the transport protection from the connection openings.
 2. Connect the pipe or hose of the system suction line to the gas inlet (item N1.0, [→ 13]).
 3. In the case of F-CEVF with a second gas inlet (item N1.0, [→ 13]), connect the pipe or hose of the system suction line to the second gas inlet.

6.1 General installation regulations

NOTICE

Destruction of the drive!

Incorrect operation or incorrect control can destroy the drive.

1. The F-CEVF is equipped with an **asynchronous motor**.
2. Operating on a grid with a non-earthed start point is not permitted.

The electrical installation must correctly fulfil the requirements of IEC 60204-1, IEC 60204-11 and IEC 61010-1 in accordance with the ambient and operating conditions.

The electrical installation must also be implemented according to the applicable national, local and plant-specific stipulations, as well as the requirements of the power supply company.

The conditions at the operating site must comply with the information on the Rating plate [→ 12]. The following conditions are permitted during mains operation:

- $\pm 15\%$ variation in voltage from EN 60034-1 without loss of performance (range A) for standard motors
- $\pm 5\%$ variation in voltage without loss of performance according to EN 60034-1 (range A) for IE3 motors
- $\pm 10\%$ variation in voltage with a loss of performance according to EN 60034-1 (range A) for IE3 motors
- $\pm 2\%$ deviation in frequency
- The electrical data are provided on the rating plate (item M, [→ 12])

The electrical installation must:

- Be correctly attached and protected.
- Be kept away from hot surfaces.
- Be electrically isolated to a sufficient degree.
- Be constructed and fitted in such a way that the following faults do not lead to damage:
 - short circuits
 - mechanical impacts
 - power supply failures or surges
 - electromagnetic fields
 - earth connections

The electrical equipment and control must not put the protective devices of the drive system and the motor protection (e.g. PTC resistor, bimetal switch, frequency inverter current limit) out of operation.

When the power supply fails or surges, the control must prevent the F-CEVF from remaining in operation or starting up.

Protective devices and switches must fulfil the failure safety conditions.

Overcurrent protection

The power supply of the motor must be equipped with an overcurrent protection device (e.g. a motor protection circuit breaker) according to IEC 60204-1, 7.2.

Separator for the electrical energy supply

A separator for the electrical energy supply must be:

- Provided according to IEC 60204-1, 5.3 and 5.5.
- Clearly and visibly labelled.

6.2 Controls

Controls and instruments must be constructed and arranged in such a way that:

- They are easily visible and accessible, and can also be operated without excessive effort.
- The operator understands the functions.
- Operating faults are prevented.

A control system must correspond to ISO 12100, 4.11; IEC 60204-1, 9.4 and ISO 13849-1.

When the power supply fails, a "system with oriented failure mode" according to ISO 12100, 6.2.12.3 must be used.

Start and stop devices must be clearly marked in accordance with ISO 13850 and IEC 60417.

EMERGENCY OFF function

An EMERGENCY OFF function must be provided when a dangerous situation can occur that must be rectified manually (see ISO 12100, 6.3.5.2)

- Implement the EMERGENCY off function according to EN 418 and EN 50099.
- Implement a manual EMERGENCY OFF function according to ISO 13849-1, 5 (in particular 5.2.1).
- The stop category and colour of the EMERGENCY OFF function must correspond to ISO 13850.
- If a risk assessment determines that the normal switch can fulfil the EMERGENCY OFF function, this should be labelled accordingly.

After an EMERGENCY OFF, start-up is only possible via a deliberate, manually-triggered procedure.

Manual reset

A manual reset after a stop command must correspond to ISO 13849-1, 5.5.2 and IEC 60204-1, 9.2.5.3 and 9.2.5.4.

Start and new start

The requirements of a start and new start, must correspond to ISO 13849-1, 5.2.3.



If the F-CEVF is equipped with an automatic or remote-controlled start control, it must be labelled with the sign to the left.

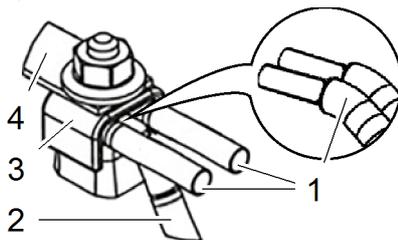
It is necessary to prevent an automatic or remote-controlled start during maintenance or repair.

6.3 Connect the motor to the mains

F-CEVF with junction box (item 0042, [→ 13]) or motor protection circuit breaker (item 0500, [→ 13])

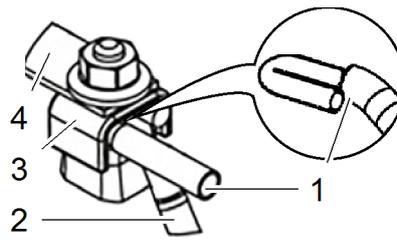
1. Open junction box cover or motor protection circuit breaker.
2. Open access points for cable glands.
3. Screw in or insert cable glands and secure with locknut. Screw in fit reducer if necessary.
4. Insert cable to be connected into cable glands.
5. Tighten cable glands according to manufacturer's specifications.
6.  Provide cable to be connected with cable lugs or eyelets.
7.  Connect the protective cable to the designated position with the symbol to the left.
 - ✓ M4: **4.0 – 5.0 Nm** (2.95 – 3.70 ft lbs)
 - ✓ M5: **7.5 – 9.5 Nm** (5.55 – 7.00 ft lbs)
8. Attach mains connecting line and connecting rails according to the circuit diagram in the junction box (item 0042, [→ 13]) or motor protection circuit breaker (item 0500, [→ 13]) and the following figures.
 - ✓ M4: **0.8 – 1.2 Nm** (0.60 – 0.90 ft lbs)
 - ✓ M5: **1.8 – 2.5 Nm** (1.35 – 1.85 ft lbs)
9. If available, connect PTC resistor, bimetal switch and electric band heater according to the circuit diagram in the junction box (item 0042, [→ 13]) and the follow figures. Use a PTC resistor evaluation unit to evaluate the PTC resistor.
10. Remove any unused connecting rails from the junction box.
11. Close junction box cover or motor protection circuit breaker.
 - ✓ M4: **4.0 – 5.0 Nm** (2.95 – 3.70 ft lbs)
 - ✓ M5: **7.5 – 9.5 Nm** (5.55 – 7.00 ft lbs)

Connecting two equally thick (single-wire) conductors with terminal clip



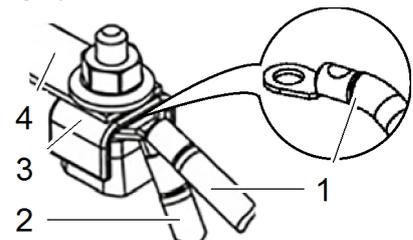
1 = Mains connecting line
4 = Connecting rail

Connecting one (single-wire) conductor with terminal clip (U-shape)



2 = Motor connection cable

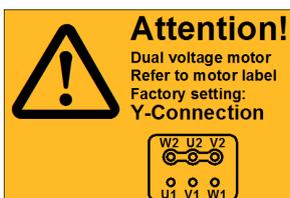
Connecting one (fine-stranded wire) conductor with cable lug/eyelet



3 = Terminal clip

F-CEVF with connection cable (item 0040, [→ 13])

- ① Attach connection cable according to the information sign on the cable.



7.1 Measures after a long shut-down period

Measuring the motor insulation resistance

- ① Measure the insulation resistance of the motor at 500V DC voltage between the conductors of the main circuit and protective conductive system.
 - ✓ Value $\geq 1 \text{ M}\Omega$: no measures necessary.
 - ✓ Value $< 1 \text{ M}\Omega$: Dry winding.

7.2 Tests during commissioning or re-commissioning

Prior to commissioning or re-commissioning of the F-CEVF, test that

- Is the F-CEVF properly fitted and aligned?
- All filter bags (item 0405, [→ 13]) are undamaged, empty, and installed?
- Are the filter hood (item 0407, [→ 13]) and the filter body (item 0020, [→ 13]) fastened securely with the Quick-release clamps (item 0409, [→ 13]) above and below?
- all pipes and hoses are correctly connected and sealed?
- all fixing screws, connecting elements and electrical connections are fixed at the given tightening torques?
- Do the operating conditions match the data plate details given above?
- Have all protection measures been completed?
- Cooling air supply not affected?

7.3 Checking the direction of rotation

1. Open upper seals (item 0409, [→ 13]) and remove filter hood (item 0407, [→ 13]).
2. Remove filter bag (item 0405, [→ 13]) or filter cartridge (item 0405, [→ 13]) so that the direction of rotation arrow (item 5190, [→ 13]) is visible.
3. Switch on the F-CEVF briefly and then switch it off again.
4. Check that the direction of rotation of the impeller on the gas inlet (item N1.9, [→ 13]) matches the direction of rotation arrow.
 - ✓ Direction of rotation matches the direction of rotation arrow: no measures
 - ✓ Direction of rotation does not conform with direction of rotation arrow: Change direction of rotation by interchanging two phases of electrical supply line
5. Insert filter bag or filter cartridge.
6. Place the filter hood on top and close the upper seals.

When operating the F-CEVF, comply with the Permitted conditions for use [→ 28].

8.1 Switch on

1. If fitted, open the shut-off devices in the suction line.
2. Switch on current supply.
 - ✓ The F-CEVF begins to suction conveyed media.

8.2 Switch off

1. Switch off current supply.
 - ✓ The F-CEVF interrupts the suction of the conveyed media. The pressure will be slowly reduced.
 - ✓ The F-CEVF slowly shuts down.
2. If fitted, close the shut-off devices in the suction line.

8.3 Switch off in emergency

1. The F-CEVF can be switched off in emergency without any particular precautions.
 - ✓ The F-CEVF slowly shuts down.
2. Determine the cause.
3. Rectify the risk.
4. Put the F-CEVF back into operation [→ 23].

Voiding of the warranty!

The opening of the F-CEVF by the operator within the warranty period can lead to voiding of the warranty.

Fault	Cause	Corrective measure	To be carried out by
F-CEVF does not start up and does not make any noise	The power supply of the F-CEVF was interrupted	Correct the break in fuses, terminals or power supply lines	Electrician
F-CEVF does not start up and makes noises	Break in one of the power supply lines	Correct the break in fuses, terminals or power supply lines	Electrician
	Impeller grinds or rotor is jammed	Open F-CEVF, remove foreign objects, clean or replace parts	Service*
	Faulty impeller	Replace impeller	Service*
	Rolling bearing is faulty	Replace rolling bearing	Service*
Overcurrent protection triggered again after switching motor on; power consumption too high	Motor overloaded. Settings deviate from details on rating plate	Reduce settings	Fitter
	Short-circuit in the winding	Check winding	Electrician
	Filter bags (item 0405, [→ 13]) or filter cartridge (item 0405, [→ 13]) are dirty or full.	Empty and clean filter bags or filter cartridge	Operating personnel
	F-CEVF aspirates freely	Connect system	Fitter
	Impeller grinds or rotor is jammed	Open F-CEVF, remove foreign objects, clean or replace parts	Service*
Suction power too low	Incorrect direction of rotation	Check [→ 23] the direction of rotation	Electrician
	Suction line too long or cross-section too small	Check suction line	Fitter
	Fluctuating density of conveyed media	Take into account recalculation of pressure values; consult the manufacturer	Manufacturer
	Filter bags (item 0405, [→ 13]) or filter cartridge (item 0405, [→ 13]) are dirty or full	Empty and clean filter bags or filter cartridge	Operating personnel
	Second gas inlet (item N1.0, [→ 13]) is not connected to the system	Connect second gas inlet	Fitter
	Leaks in the F-CEVF or system	Seal F-CEVF or system	Fitter
F-CEVF becomes too hot	Ambient temperature or suction temperature is too high	Adhere to the Permitted conditions for use [→ 28]	Fitter
	F-CEVF aspirates too little air	Check the direction of rotation and the cross-sections of the lines	Fitter
	Filter bags (item 0405, [→ 13]) or filter cartridge (item 0405, [→ 13]) are dirty or full	Empty and clean filter bags or filter cartridge	Operating personnel
Abnormal running noises or oscillations	Feet (item 0062, [→ 13]) or castors (item 0182, [→ 13]) are defective	Replace feet or castors	Fitter
	Rolling bearing in the motor or in the blower component is defective	Replace rolling bearing	Service*

* To be corrected by maintenance staff if the maintenance manual is available.

10.1 Maintenance

For the safe operation of the F-CEVF, the following maintenance intervals are recommended. They are dependent on the operating conditions and must be adjusted by the user as necessary.

Maintenance interval	Maintenance measure	To be carried out by
Depending on the concentration of contaminant particles (daily to monthly)	<p>Checking and emptying the filter bags / filter cartridge</p> <ol style="list-style-type: none"> 1. Open upper seals (item 0409, [→ 13]) and remove filter hood (item 0407, [→ 13]). 2. Remove, empty and beat filter bags (item 0405, [→ 13]) or filter cartridge (item 0405, [→ 13]). 3. Every two to three times the bags or cartridge are emptied, check and clean the interior of the filter body, if necessary. To do this, open the lower seals (item 0409, [→ 13]) and remove the filter body (item 0020, [→ 13]). NOTICE! Do not rip out grounding cable. 4. Put down the filter body and close the upper seals. 5. Insert filter bags or filter cartridge. 6. Place the filter hood on top and close the upper seals. 	Operating personnel
Depending on the concentration of contaminant particles (at least monthly)	<ol style="list-style-type: none"> ① Check gas outlet (item N2.9, [→ 13]) and cooling ribs of the motor for deposits and clean if necessary (e.g. using pressurised air). 	Operating personnel

10.2 Repairs and complaints

Please consult the service department regarding repairs and complaints before sending them to the manufacturer.

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97616 Bad Neustadt
Tel.: +49 9771 6888 2000
Fax: +49 9771 6888 11 2000
E-mail: er.service-nes@gardnerdenver.com
Internet: www.gd-elmorietschle.com

11.1 Decommissioning

! The F-CEVF can remain in the unit or be dismantled for storage.

1. Disconnect the F-CEVF from the power supply.
2. Depressurise the pipes.

11.2 Disassembly

1. Disconnect the F-CEVF from all electrical connections.
2. Dismantle the piping and hoses.
3. Close connections that are open.
4. Loosen the F-CEVF from the installation surface.
5. Store [→ 17] or dispose of [→ 27] F-CEVF.

11.3 Disposal

 **WARNING**

Burns, chemical burns or poisoning!

Risk of injury due to contact with residual hazardous substances in the F-CEVF.

① Decontaminate the F-CEVF as instructed by the manufacturer of the hazardous substances.

1. Dismantle the F-CEVF.
2. Collect solvents, residual lacquer and grease and dispose of them in accordance with the valid local regulations.
3. Dispose of components according to the valid local regulations or recycle them.

12.1 Mechanical data

12.1.1 Weight

Type	[kg]	[lbs]
F-CEVF 3718-3(29)(A002) (45) 1.1 kW	40	89
F-CEVF 3718-3(45) 1.3 kW	40	89
F-CEVF 3718-3(31)(55)(90) 2.2 kW	53	117
F-CEVF 3718-3(55) 1.5 kW, KD version	53	117
F-CEVF 3718-3(29)(A002) 2.6 kW	40	89
F-CEVF 3718-4(29)(A002) 1.5 kW	44	97

12.1.2 Fitting dimensions for hose

Connection dimensions for gas inlet (item N1.0, [→ 13])

Type	Hose connection	
	[mm]	[in]
F-CEVF 3718- . (29)(A002) (45)	Ø 80	Ø 3.15
F-CEVF 3718-3(31)(55)(90)	2x Ø 40	2x Ø 1.57

For further dimensions, see dimensional drawing.

12.2 Permitted conditions for use

Any deviations from the following **permissible operating conditions** must be agreed with the manufacturer.

12.2.1 Installation height

The maximum installation height is **1000 m above sea level. NHN** (3280 ft above sea level) provided no other installation height is specified on the rating plate [→ 12] under item M.

12.2.2 Rotational speeds

For speed, see rating plate (item K), [→ 12].

12.2.3 Temperatures

For deviating temperatures, see the rating plate item M, [→ 12].

Temperature of the conveyed media

Minimum		Maximum	
[°C]	[°F]	[°C]	[°F]
-20	-4	+40	+104

Ambient temperature

Minimum		Maximum	
[°C]	[°F]	[°C]	[°F]
-20	-4	+40	+104

12.2.4 Pressure differences

Pressure differences generated in operation by F-CEVF

Vacuum mode, maximum [mbar]
Item p ₁ , [→ 12]

The pressure differences specified on the rating plate serve as reference conditions [→ 5] and have a tolerance of ±10%.

Loss of piping must be considered.

12.2.5 Relative humidity

Ambient relative humidity

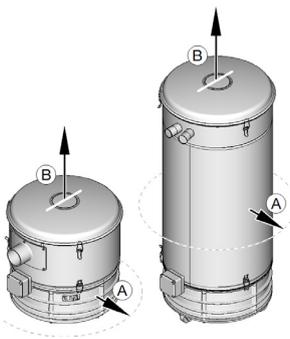
Maximum **60%** at **+40°C** (+104°F)

Relative humidity of conveyed media

Condensate formation is not permitted in the internal space of the F-CEVF.

12.2.6 Minimum distances

Adhere to the following minimum intervals for removing and installing the filter bags (item 0405, [→ 13]), the filter cartridge (item 0405, [→ 13]) and for dissipating the heat:



Type	A		B	
	[mm]	[in]	[mm]	[in]
F-CEVF 3718-3(29)(A002) (45)	100	4	250	10
F-CEVF 3718-4(29)(A002)	100	4	250	10
F-CEVF 3718-3(31)(55)(90)	100	4	800	32.5

12.3 Electrical data

Any deviations from the following **electrical data** must be agreed with the manufacturer.

The electrical data are provided on the Rating plate [→ 12].

12.3.1 Increased operating cycle frequency

The F-CEVF is designed for heavy-duty operation. Consultation with the manufacturer is necessary for increased operating cycle frequency.

12.4 Acoustic emissions

Emission sound pressure level L_{pA} according to noise test code ISO 2151 with reference to the basic standard ISO 3744. Measured at a distance of 1 m for 70% Δp_{max} and connected supply lines, tolerance ± 3 dB(A).

Type	50 Hz	60 Hz
	[dB(A)]	[dB(A)]
F-CEVF 3718-3(29)(A002) (45) 1.1 kW	75	76
F-CEVF 3718-3(45) 1.3 kW	75	76
F-CEVF 3718-3(31)(55)(90) 2.2 kW	76	77
F-CEVF 3718-3(29)(A002) 2.6 kW	77	78
F-CEVF 3718-4(29)(A002) 1.5 kW	76	77



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