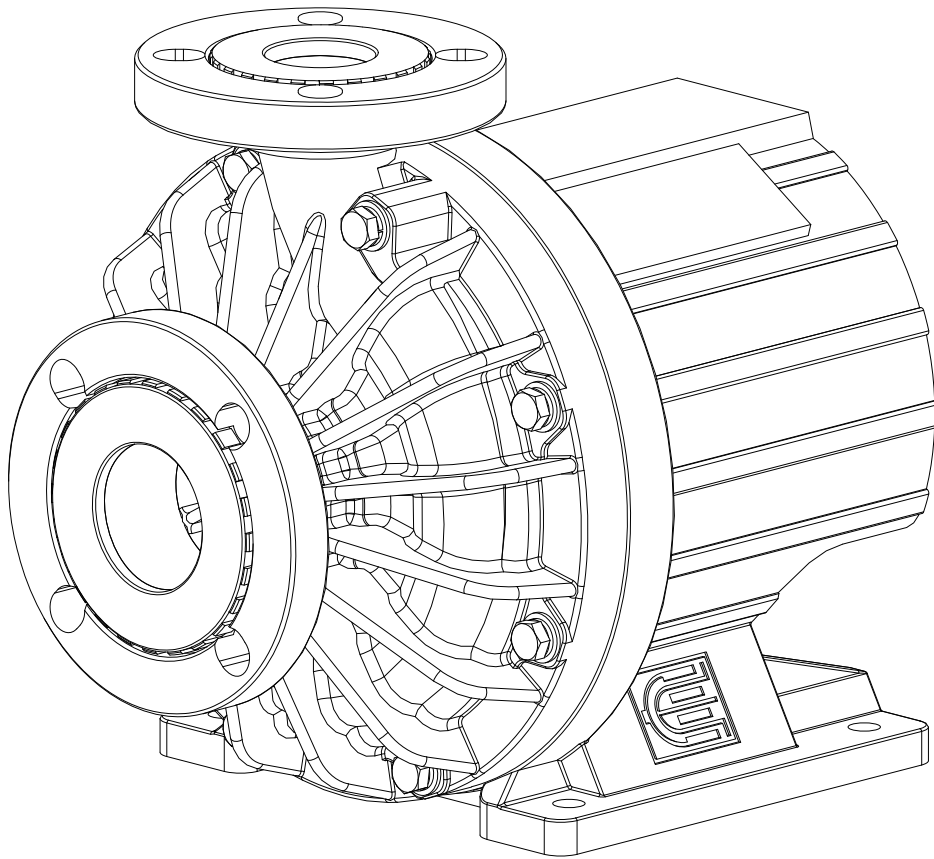




ASSOMA INC

User Manual



Variable Frequency Canned Motor Centrifugal Pump

AVF-C Series

www.assoma.com

This manual references the following safety symbols:






	<p>Failure to follow these instruction(s) would most certainly result in serious bodily injury or death.</p>
	<p>Failure to follow these instruction(s) could result in serious bodily injury or death.</p>
	<p>Failure to follow these instruction(s) could result in bodily injury and/or equipment damage.</p>
	<p>Failure to follow these instruction(s) could result in bodily injury or burns.</p>
	<p>Pumps installed in a potentially explosive environment must adhere to these instructions (marked with the Ex symbol). Failure to follow these instructions would almost certainly result in serious bodily injury or death.</p>

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1. Foreword

Thank you for purchasing an ASSOMA AVF-C pump. This manual provides the safety instructions and requirements for installation, wiring, operation and maintenance. Installation and operation personnel are recommended to study this manual prior to operation and keep it in an accessible location for quick reference.

2. Safety Requirements

The AVF-C Series includes the pump and the motor. This section lists general safety information. The relevant safety requirements for installation, wiring, operation and maintenance are described in the relevant sections. ASSOMA INC. may not be held liable for personal loss or property damage resulting from failure to follow the safety instructions contained herein.

 <p>DANGER</p>	<ul style="list-style-type: none"> (1)The explosion proof capability of the AVF-C Series pump is very limited. If the pump is to be used in an explosive environment, temperature sensors and controllers must installed to prevent temperature rise above safety limits. (2)Make sure the power is turned off before connecting, disconnecting or making any changes to the wiring. (3)Do not modify the pump under any circumstances. Doing so may result in unexpected damages or injuries. ASSOMA INC., its distributors and agents shall not be held liable for accidents or losses resulting from unauthorized equipment modifications. (4)The AVF-C Series pump must be coupled with an inverter capable of driving permanent magnet motors. DO NOT connect the pump directly to the power supply or drive the pump using a general use inverter. (5)The inverter and any accompanying accessories must satisfy local legal requirements and standards. (6)Appropriate precautionary measures must be implemented when handling hazardous, potentially explosive, or flammable chemicals. (7)Strong magnetic field warning: The magnet capsule of the AVF-C Series pump uses strong permanent magnets which may affect certain medical devices (such as pacemakers). Personnel with such devices are advised to consult their physician and device manufacturer to determine a safe distance from the pump.
 <p>WARNING</p>	<ul style="list-style-type: none"> (1)Pump operators must have sound knowledge of the pump and its operations. Unqualified personnel must not be allowed to operate the pump. (2)If the inverter receives remote signals for controlling the pump, please switch off the pump during power failure to prevent abnormal starts when the power is restored. (3)Do not operate a damaged pump. Doing so may result in property damage or personnel injuries. (4)Do not expose the pump to heat source or open flame. Do not keep flammable objects near the pump.
 <p>CAUTION</p>	<ul style="list-style-type: none"> (1)To prevent the risk of electric shocks, injury or fire, transportation, installation, piping connections, wiring connections, operation, adjustment, maintenance and inspection must be carried out by qualified personnel only. (2)Do not remove any nameplate or warning labels. Warning labels must be fully visible.

	<p>(3) Do not stand or place heavy objects on the pump. Doing so may result in injuries or equipment damage.</p> <p>(4) Decommissioned pumps and parts must be disposed of in accordance with local laws and regulations.</p>
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3. Inspection Prior to Installation

- (1) Check the packaging exterior for any physical damage incurred during transportation.
- (2) Perform a visual check of the pump for visible signs of damage, loose bolts and screws.
- (3) If the pump was damaged during transportation, contact your ASSOMA representative, authorized distributor or agent immediately to arrange for replacement parts and to allow for timely communication with the logistics company to determine liability.
- (4) Make sure the pump specifications (such as the suction and discharge sizes, motor power and voltage) comply with the intended purchase specifications by checking the nameplate.
- (5) The pump and motor nameplates contain important baseline information that should be referenced for daily operation and preventive maintenance. Recording and maintaining a copy of the nameplate information is recommended.

Table 3.1 Electrical Specification

Model		AVF-C221	AVF-C441	AVF-C543 AVF-C553	AVF-C545 AVF-C555	AVF-C653	AVF-C655
Specification							
Power (kW)		1.1	1.1	2.2	4	2.2	4
Rated Current (A)	220 V	3.8	3.8	7.3	13	7.3	13
	380 V	2.2	2.2	4.2	7.5	4.2	7.5
Motor Model	220 V	AVF-084-2*	AVF-084-2*	AVF-224-2	AVF-404-2	AVF-224-2	AVF-404-2
	380 V	AVF-084-3*	AVF-084-3*	AVF-224-3	AVF-404-3	AVF-224-3	AVF-404-3
Speed (RPM)		1500 – 3000 **					
IP Rating		66					

Notes:

* AVF-C221/441 models are coupled with motor model AVF-084 which is designed to be 1.5 hp (1.1 kW). However, the pump is designed for a maximum hydraulic power of 1.1 hp (0.85 kW).

** The speed range of 1500-3000 RPM is for reference only. The speed can be increased as long as the motor loading does not exceed its rated current. The speed can also be reduced as long as the minimum flow recommendations for the pumps are met.

AVF Pump Identification



AVF	-C	6	5	5	F	G	A	C	V	-	3
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
① Series	AVF-C Series					⑥ Casing Material	E : ETFE+CF G : PP+GF				
② Suction Size	2: 25 A (1") 4: 40 A (1 1/2") 5: 50 A (2")					⑦ Shaft Material	A : 995 Al ₂ O ₃ S : SSiC				
						⑧ Bearing	A : 995 Al ₂ O ₃				

	6: 65 A (2 1/2")	Material	C : CARBON R : PTFE+CF S : SSiC
③ Discharge Size	2: 25 A (1") 4: 40 A (1 1/2") 5: 50 A (2")		
④ Motor Power	1: 1.5 hp (1.1 kW) 3: 3 hp (2.2 kW) 5: 5.5 hp (4 kW)	⑨ Seal Material	E : EPDM V : FKM
⑤ Type of Connection	F: Flange U: Union D: Double O-Ring	⑩ Rated Voltage Of Inverter	2 : 200 V-240 V 3 : 380 V-480 V

AVF-C Motor Identification

AVF - 22 4 - 3
① ② ③ ④



① Series	AVF-Series	③ No. of Pole	4: 4 Pole
② Rated Power	08: 1.1 hp (0.85 kW) 22: 3 hp (2.2 kW) 40: 5.5 hp (4 kW)	④ Rated Voltage	2: 220 V 3: 380 V

 WARNING	This pump is designed and manufactured according to specifications agreed upon between ASSOMA and the customer. Such specifications include but are not limited to the following: chemical composition, operating temperature, working pressure, environmental factors, and other operating conditions. The operation of the pump must adhere to such specifications. If operating conditions are to be changed, please contact your ASSOMA representative, authorized distributor or agent to obtain written approval prior to changing the operation(s).
 CAUTION	Use proper hoisting or support equipment during unpacking and installation to avoid personal injury and damage to the pump.

4. Installation, Piping, and Wiring

4.1 Installation Location

- (1) The pump should be close to the ground and located near the inlet tank.
- (2) Adequate space should be reserved around the pump to facilitate maintenance and repairs.
- (3) The motor and wiring should be protected from possible flooding.
- (4) Please ensure installed location is well ventilated to facilitate proper cooling of the motor. The recommended minimum distance between pumps is 15 cm, and a minimum distance of 10 cm is required between the motor and the closest wall.
- (5) The ambient temperature should be kept below 40 °C or above 0 °C.
- (6) The pump should be attached securely to the ground or to a sturdy support structure using anchor bolts.
- (7) The pump should not be used at altitudes above 1000 m.

 WARNING	<p>(1) Use the attached eye bolt (where applicable) to hoist the pump. Lifting from other parts of the pump may damage the pump. <u>Never walk under a raised pump.</u> Serious injuries or death may occur if the pump is accidentally dropped.</p> <p>(2) Before any hoisting activity, make sure the weight rating of the hoisting equipment is appropriate for lifting the pump. Make sure no one is within proximity of the pump while lifting or transporting.</p>
 CAUTION	<p>(1) Please consult with your ASSOMA representative, authorized distributor or agent if the pump is to be installed under any of the following environments:</p> <ol style="list-style-type: none"> Potentially explosive gas, dust or material is present Corrosive vapor is present Ambient temperature is above 40 °C or below 0 °C <p>(2) The pump should not be kept idle for extended periods of time, as the motor could be damaged from a humid environment. If the pump is to be idle or stored for over a year, please contact your ASSOMA representative, authorized distributor or agent to check the motor prior to use.</p>

4.2 Piping System

- The AVF-C Series pump uses adjustable RF flanges adaptable to mating flange configuration.
- AVF-C pump uses either M16 or 5/8" flange bolts. Recommended tightening torque is 10~12 N · m (100~120 kgf · cm).
- Refer to Table 4.1 for the allowable loading on the pump.

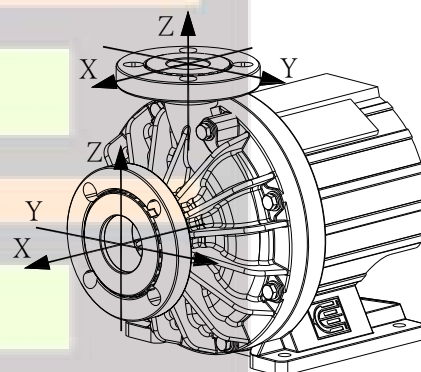


Table 4.1

Model	Suction							
	Force (N)				Moment (N · m)			
	F _x	F _y	F _z	ΣF	M _x	M _y	M _z	ΣM
AVF-C221	100	80	80	150	15	25	15	50
AVF-C441	120	100	100	180	20	30	20	60
AVF-C543/545/553/555	120	100	100	180	30	50	30	75
AVF-C653/655	150	120	120	200	30	50	30	75

Model	Discharge							
	Force (N)				Moment (N · m)			
	F _x	F _y	F _z	ΣF	M _x	M _y	M _z	ΣM
AVF-C221	80	100	80	150	15	25	15	50
AVF-C441	100	120	100	180	20	30	20	60
AVF-C543/545/553/555	120	150	120	200	30	50	30	75
AVF-C653/655	120	150	120	200	30	50	30	75

Note: The values presented here are applicable for operating temperatures within 40 °C.

4.3 Notes for Installing the Piping System

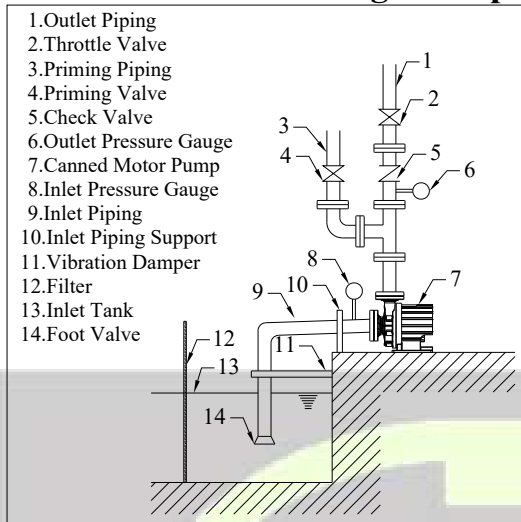


Fig. 4.1

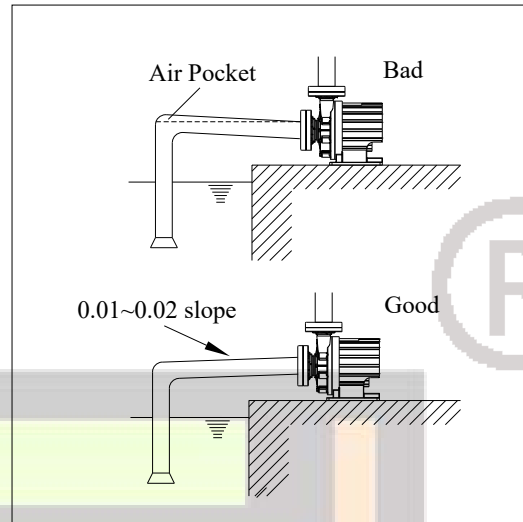


Fig. 4.2

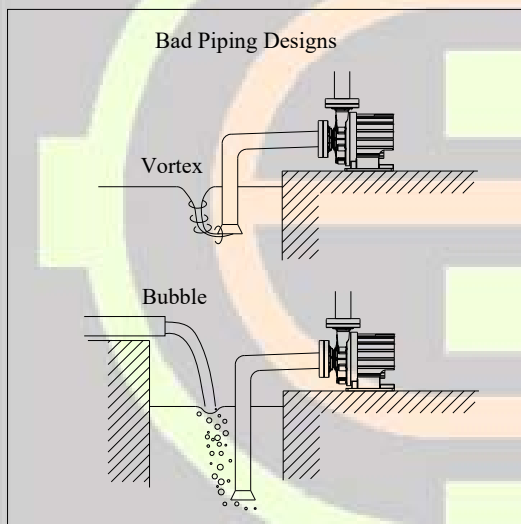


Fig. 4.3

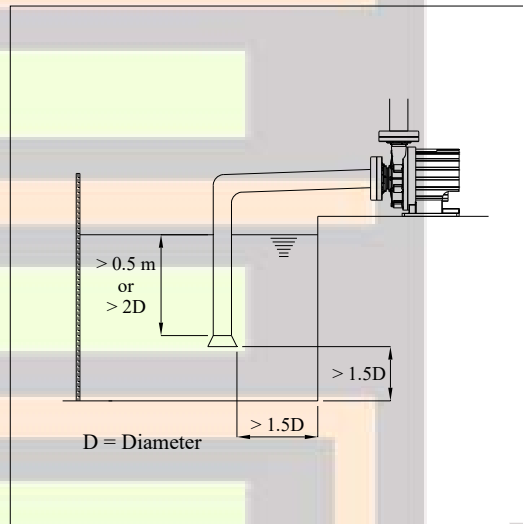




Fig. 4.4

Component		Installation Notes
Suction System	General requirements	(1) Suction condition must satisfy $NPSHa > NPSHr + 0.5 \text{ m}$. (2) Minimize suction piping loss by using straight and short piping. (3) The piping should be supported adequately (see Fig. 4.1). The pump should not be used for piping support. (4) Effects of temperature changes should be factored into the support structure design to prevent thermal stress buildup. (5) Suction piping and connectors should be hermetically sealed to prevent drawing in air during operation. (6) The suction piping should not be allowed to collect air. There should be a 0.01~0.02 upward slope towards the pump (see Fig. 4.2). (7) There should not be any elbows within 5D (5 times diameter) distance from the pump opening. The elbow closest to the pump suction should be a long radial elbow.

Component	Installation Notes
Suction piping	<p>(1) There should be at least a 1.5D distance between the suction pipe inlet and the closest tank wall to prevent circulation (see Fig. 4.4).</p> <p>(2) The submerge depth of the suction pipe inlet should be at least 0.5m or at least 2D below the liquid surface (see Fig. 4.4).</p> <p>(3) There should be a distance of at least 1.5D between the bottom of the tank and the suction pipe inlet (see Fig. 4.4).</p> <p>(4) If there are two or more inlet piping in the same tank, they should be placed at least 3D apart to prevent mutually disrupting each other's flow.</p>
Foot valve	<p>Install a foot valve if negative suction or upward suction is used (see Fig. 4.1).</p>
Self-priming cylinder	<p>(1) For upward suction applications, install a self-priming cylinder to protect the pump from running dry due to a faulty foot valve.</p> <p>(2) The self-priming cylinder should provide a minimum liquid level that is at least 0.5 m above the pump opening.</p>
Control valve	<p>(1) A control valve should be installed on the suction piping to facilitate maintenance or repairs. This valve should be open at all times and should only be closed when there is a need to remove the pump from the system.</p> <p>(2) A valve with a low piping loss, such as a gate valve, is recommended as the control valve.</p>
Filter	<p>(1) Filters can introduce an unpredictable increase in piping resistance in the suction system. Therefore, unless absolutely necessary, filters should not be installed on the suction system.</p> <p>(2) If filters have to be used, make sure they are cleaned regularly to maintain an unobstructed flow to the pump.</p>
Vacuum gauge	<p>(1) The vacuum gauge material should be resistant to the pumped liquid; otherwise, a pressure gauge diaphragm should be used.</p> <p>(2) If the vacuum gauge reading fluctuates during operation, either cavitation has occurred or air bubbles are being sucked into the system.</p>
Discharge System	<p>(1) The discharge piping should be properly secured and supported to prevent placing excessive stress on the pump.</p> <p>(2) For systems with a negative suction, priming piping is recommended (see Fig. 4.1).</p> <p>(3) The flow velocity of the liquid should not exceed 3 m/s.</p> <p>(4) For safe operation, discharge piping components must be able to withstand the pressure generated by the pump.</p>
	<p>Upward suction systems without a self-priming cylinder should have priming piping installed.</p>

Component	Installation Notes
Pressure gauge	(1) Pressure gauge selected should be able to measure above the maximum operating pressure of the pump. (2) The pressure gauge material should be resistant to the pumped liquid; otherwise, a diaphragm should be used. (3) A valve can be installed to cut off pressure to the pressure gauge to facilitate pressure gauge maintenance and to prolong the gauge's service life. (4) If the pressure gauge reading fluctuates during operation, either cavitation has occurred or air bubbles are being sucked into the system.
Check valve	The AVF-C Series pumps are driven using inverters, which has the added function of gradual starts and stops. This can prevent damage to the pump from water hammer. However, a check valve is recommended under the following circumstances: (1) Two or more pumps installed in parallel, sharing the same discharge piping. (2) Backflow can occur when the power is cut unexpectedly.  When the chemical is allowed to flow back into the pump, the impeller will turn in reverse, effectively turning the pump into a generator. This may result in an "Over Voltage" error when restarting the pump.
Control valve	(1) AVF-C Series pumps are driven by inverters. The duty point can be altered by changing the speed of the pump instead of using the control valve, thus, minimizing energy use. (2) The control valve should remain open at all times and should only be closed if the pump is to be removed for inspection.
Exhaust valve	An exhaust valve or a vent should be installed if the discharge piping travels horizontally for a great distance.

	When using the pump to handle dangerous liquids, extra caution should be taken to monitor the pump and its piping system for leaks to prevent personal injury, explosion and/or fire. The following are characteristics of dangerous liquids: (1) Potentially explosive or flammable liquid (2) Corrosive or toxic chemicals (3) Chemicals harmful to humans or detrimental to health (4) Chemicals that could trigger chain reactions (5) High temperature chemicals, resulting in surface temperatures exceeding explosion proof safety limits
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5. Wiring

Wiring must be conducted by qualified personnel, using proper equipment, and in accordance with applicable rules and standards.

The AVF-C pumps are driven by inverters. Make sure the wire length between the pump and the inverter does not exceed 50 meters. Use the proper wire size and follow the tightening torque recommended (see Table 5.1, Table 5.2, and Table 5.3). Most inverters will also provide recommend specifications for auxiliary components such as fuses, signal filters, and reactors. Please refer to the inverter manufacturer's user manuals for details.

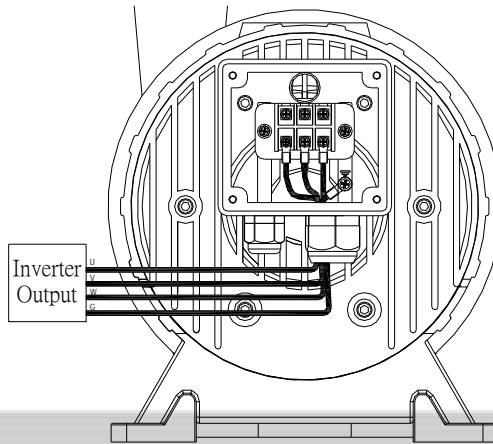


Table 5.1 Wire Size



Specification		Recommended Min. Wire Size (mm ²)
1.1 kW	220/380 V	2.0
2.2 kW	220/380 V	2.0
4.0 kW	220 V	3.5
	380 V	2.0
7.5 kW	220 V	5.5
	380 V	3.5


Table 5.2 Terminal Screw and Torque

Screw Size	Recommended Torque (N · m)
M4	1.5
M5	2.5
M6	4.5
M8	8.0
M10	12.0

Table 5.3 Grounding Wire Recommendations

Power Supply Wire Cross Sectional Area S mm ²	Minimum Cross-Section of Grounding Copper Conductors S _P mm ²
$S \leq 16$	S
$16 < S \leq 35$	16
$S > 35$	S / 2


 DANGER	(1) Never perform wiring operations with the power still on. (2) Wiring should only be performed by qualified personnel. (3) Do not connect the AVF-C pump directly to the mains power.
 WARNING	(1) Recommended ground resistance: a) 380 V – below 10 Ω b) 220 V – below 100 Ω (2) After wiring, replace the terminal box cover to prevent accidental contacts.

	(3) Each pump should have a separate grounding wire connected directly to the common ground terminal, and must not form closed loop between wires.
 CAUTION	<p>(1) The correct direction of rotation for the AVF-C pump is achieved by matching the wiring correctly. Please make sure the U, V, and W output terminals are connected to the corresponding U, V, and W terminals on the motor. Please also disable the reverse rotation function on the inverter.</p> <p>(2) The AVF-C should not be installed or used in areas where the environmental temperature is above 40 °C.</p> <p>(3) When wiring the pump, make sure to use the correct gauge wire (according to local electrical code), and tighten the wiring properly to prevent loosening.</p> <p>(4) If the wiring between the AVF-C pump and the inverter exceeds 30 m, reduce the carrier frequency or add a reactor (refer to inverter user manual for details).</p>

6. Operation Notes

6.1 Starting up the AVF-C Pump

- (1) Before start up:
 - a. Recheck the piping and make sure valves are open.
 - b. Check that wiring and grounding is completed.
 - c. Recheck inverter parameters are correct.
- (2) Test-run: Start from a slow speed and increase gradually to meet desired duty point.
- (3) Operation: Switch to desired control method and make sure the pump is responding correctly to instructions.
- (4) Observe to make sure the pump is functioning properly.

 WARNING	<p>(1) Replace and secure the terminal case cover before starting up the pump to prevent accidental electric shocks.</p> <p>(2) When using remote signal to control the inverter, make sure personnel operating around the AVF-C pump are safe.</p>
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6.2 Dry-Run Prevention and Minimum Flow

- (1) The seal-less pump uses the transfer media as its cooling system. Without cooling the internal parts becomes over-heated quickly resulting in severe pump damage. Therefore, dry-running must be avoided.
- (2) If dry-running is detected, shut down the pump immediately. DO NOT attempt to cool the pump by opening the valve or priming the pump. The rapid cooling will result in thermal shock which will crack the parts. Allow the pump to cool for at least one hour before priming the pump for operation.
- (3) A low flow rate could result in insufficient lubrication and improper cooling, causing the temperature to rise within the pump. Furthermore, vibration, axial and radial forces will be higher than normal, impacting the service life of the pump. Therefore, minimum flow values are recommended for each of the pump models as shown in Table 6.1.



Table 6.1 Minimum Flow

Unit: l/min

Temperature	20 °C	40 °C	60 °C	80 °C
Model				
AVF-C221	10	10	15	20
AVF-C441	15	15	20	30
AVF-C543/553	20	20	30	40


AVF-C545/555/653	30	30	40	50
AVF-C655	60	60	70	80

Note: Values provided in Table 6.1 is based on water. For volatile or viscous fluids, please consult your ASSOMA representative, authorized distributor or agent.

 CAUTION	Do not run the pump with a shut-off discharge valve for more than 1 minute. Heat build-up during extended shut-off operation may damage the pump.
	Introducing liquid into the pump immediately after dry-running could cause the liquid temperature to rise above the temperature class due to contact with the overheated pump parts.

6.3 Operating Temperature

- (1) Operating temperature may affect the chemicals viscosity, vapor pressure, and corrosiveness. Please state clearly the intended operating temperature to ensure proper pump selection.
- (2) Allowable temperature range (based on clean water):
Casing material PPG: 0~80 °C
Casing material ETFE+CF: 0~95 °C
- (3) Allowable operating temperatures for various chemicals may deviate from the above recommendations. Please consult your ASSOMA representative, authorized distributor or agent for details.
- (4) Ideal environmental temperature: 0~40 °C


 HIGH TEMPERATURE	<ol style="list-style-type: none"> (1) When pumping hot chemicals, do not come in contact with the pump casing or piping to prevent burns. (2) Any exposed hot surfaces, including the pump, motor, and piping should have warning signs prominently displayed. If possible, hot surfaces should be isolated to prevent accidental contact.
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6.4 Concentration, Viscosity, and Specific Gravity

- (1) The concentration of the chemical will affect its viscosity, specific gravity, and corrosiveness. Therefore, chemical concentration must be clearly specified for proper pump selection.
- (2) If the chemical concentration is to change, the specific gravity, and viscosity will change, affecting the shaft power, capacity, and head. Therefore, please check with your ASSOMA representative, authorized distributor or agent to make sure the pump is suitable for the new application.

6.5 Chemicals with Fine Particles

- (1) The magnetic drive seal-less pump is not designed to handle chemicals containing particles. Therefore, depending on the size, concentration and hardness of the particles, the service life of the pump may be reduced.
- (2) For particle concentration less than 5%, particle size smaller than 50 µm, and hardness within 80 Hs, SSiC parts may be used. However, a shorter-than-normal service life can still be expected.

 CAUTION	Foreign particles could cause damage to pump parts resulting in failure. Shut down the pump immediately and remove the foreign particle to prevent extensive damage.
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6.6 Pump Pressure Limits

The pump's design pressure is based on material characteristics at ambient temperature. At elevated operating temperatures, changes in material strength will change the pressure limitation placed on the pump. Please refer to Fig 6.1 and Fig 6.2 for the pressure limits for the AVF-C pumps. (1 kgf/cm² = 1 bar)

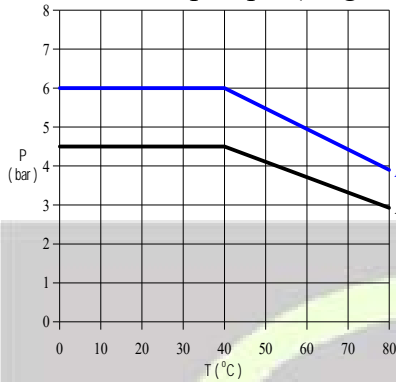


Fig. 6.1 (PPG)

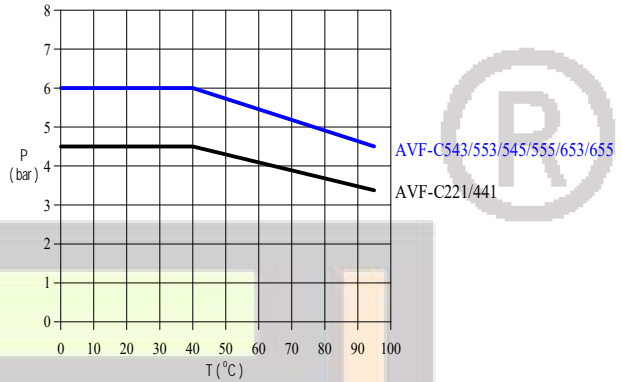


Fig. 6.2 (ETFE+CF)

6.7 Pump Noise

Pump operators should follow local regulations for noise protection, or wear effective protective equipment such as ear-plugs or earmuffs when the average 8-hour sound pressure level exceeds 85 decibels (dB).

The sound level upper limit for AVF and AVF-C series, tested at a distance of 1 m from the pump and operated between 75% ~ 110% of the rated point, shall not exceed 75 dB, and the tolerance is ±3 dB.

7. Maintenance and Inspection

7.1 Daily Inspection

Table 7.1

Appearance	(1)Check the pump exterior (casing, bracket, and base) for signs of oxidation or corrosion. (2)Check the pump and piping system for leaks.
Operation	(1)Check the pump for irregular noise and vibration. (2)Check the suction tank liquid level and the suction and discharge pressures. (3)Make sure the operating current and motor loading is within limits. (4)Check stand-by pumps regularly to make sure they are functional when needed.


7.2 Scheduled Maintenance

- (1)The items in Table 7.2 should be checked on a quarterly basis.
- (2)Please refer to Annex A for assembly and disassembly notes, and see Annex B for a list of the pumps parts.

Table 7.2 Inspection Items

Part	Inspection	Remedy
Pump Casing & Containment Shell	(1)Cracks (2)Scratch marks (except when pumping particle laden fluids) (3)Crystallization or sludge	(1)Replace (2)Seek advise** (3)Clean
Gasket / O-Ring	(1)Deformed (2)Corroded or swollen	(1)Replace (2)Seek advise**
Impeller wear ring assembly & Magnet capsule	(1)Cracks or scratch marks (2)Damaged bearing or crystallization (3)Worn bearing and wear ring (4)Crystallization or sludge on the impeller surface (5)Foreign object clogging the impeller (6)Deformed impeller	(1)Seek advise** (2)Seek advise** (3)Refer to Table 7.3. Replace if worn excessively (4)Clean (5)Clean (6)Seek advise**
Shaft & Thrust Rings	(1)Scratch marks (2)Cracks (3)Loosened	(1)Seek advise** (2)Replace (3)Seek advise**

*Contact your ASSOMA representative, authorized distributor or agent.

 CAUTION	<p>The Gasket or O-Rings should be replaced even if they don't display any signs of corrosion or deformation. Prolonged use may reduce the elasticity of the Gasket or O-Rings, resulting in future failure.</p>
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7.3 Replacement Limits and Recommendations for Wear Parts

Table 7.3 Replacement Limits for Wear Parts

Unit: mm

Model	Part	Dimension	New Part	Usage Limit
AVF-C221/441	Shaft (Outer Diameter)		18	17.5
	Bearing (Inner Diameter)		18	18.5
	Thrust Ring (Thickness)		6	5
	Wear Ring (Thickness)		6	5
AVF-C543/553/545/555/653/655	Shaft (Outer Diameter)		28	27.5
	Bearing (Inner Diameter)		28	28.5
	Thrust Ring (Thickness)		7	6
	Wear Ring (Thickness)		7	6

Note: Table 7.3 provides the recommended replacement dimensions for the individual parts. It should be noted that relative dimensions should also be considered. The total wear between the shaft and the bearing should not exceed 0.5 mm. Total wear between thrust ring and wear ring should not exceed 1 mm. The part with more wear should be replaced.

 <p>DANGER</p>	<p>(1) Strong magnetic field warning: The AVF-C Series pump uses strong permanent magnets for the magnet capsule, which may affect certain medical devices (such as pacemakers). Personnel with such devices are advised to consult their physician and device manufacturer to determine a safe distance from the pump.</p> <p>(2) Turn off the power prior to performing any maintenance work or inspection. Take precautionary measures to make sure others do not accidentally re-establish power to the equipment. If the work environment is noisy or has poor visibility, place a sign on the power supply notifying other that work is “In Progress” to prevent accidental operations that may lead to injuries.</p>
 <p>WARNING</p>	<p>(1) Only handle toxic or volatile chemicals in a well ventilated environment. Make sure all personnel exposed to the environment wear proper protective gear (such as protective vests, face shield, safety goggles, and protective gloves, etc.)</p> <p>(2) Modification: Modifying the pump could result in equipment damage, electric shock or personal injuries. Do not attempt to modify the pump. Contact your ASSOMA representative, authorized distributor or agent for advice if the pump no longer meets your operational needs.</p> <p>(3) Strong Magnet Warning: This pump contains strong magnets. Be careful when handling the magnets to prevent injuries to the hand or fingers. Keep magnetic cards and other sensitive electronic equipment away from the pump to prevent damage.</p>
 <p>CAUTION</p>	<p>(1) Use the right tools for the assembly or disassembly of the pump.</p> <p>(2) Hazardous Chemical Warning: If the pump is being used for handling hazardous chemicals, be cautious when disassembling the pump. Make sure to rinse the pump and parts thoroughly and be aware of remnant chemicals that may be present on the parts after cleaning.</p>

8. Repair and Warranty

When a problem arises, please use this manual for initial troubleshooting. If the issue cannot be found or if pump or motor is suspected to be damaged, contact your ASSOMA representative, authorized distributor or agent for further instructions. Have the following information ready when you make the call:

- (1) Pump model and serial number indicated on the pump name plate
- (2) Pump’s designed operating condition
- (3) Operating condition prior to failure

Standard warranty period for the pump is 12 months from the pump delivery date as stated on the warranty card. Replacement of parts designed for wear, such as bearings and Gasket/O-Rings are not covered under the warranty. Warranty covers failure due to manufacturing or part defects under normal operation and under the intended operating condition as stated on the pump specification sheet.

Annex A. AVF-C Series Assembly and Disassembly Notes

A.1 Prior to Disassembly

- (1) Prior to disassembly, be sure to wear corrosive-resistant protective gear (clothing, gloves, goggles, etc.) suitable for the corrosive or toxic media to prevent injuries from accidental spillage.
- (2) The AVF-C Series pump uses strong magnets. Be careful when assembling and disassembling to prevent injuries to the hand or fingers. Keep magnetic cards and other sensitive electronic equipment away from the pump to prevent damage and data loss.

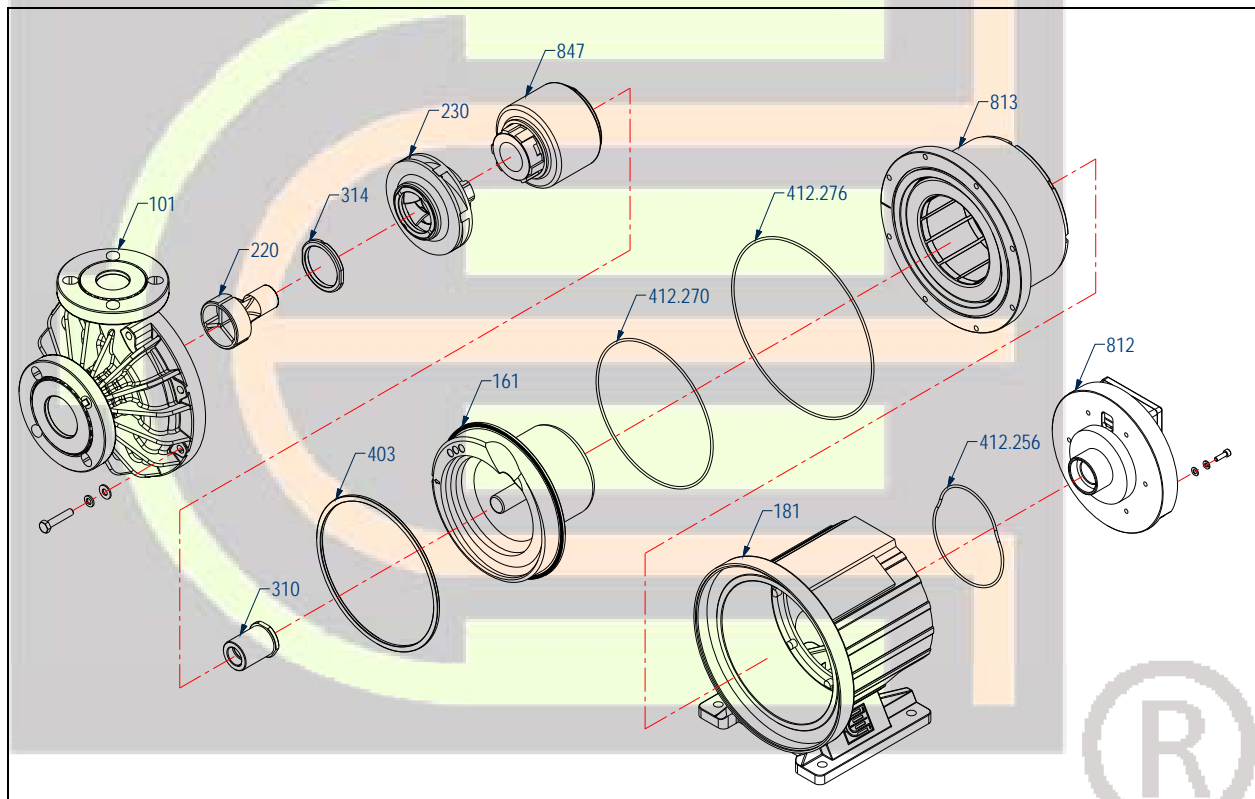
A.2 Prior to Assembly

- (1) When reassembling the pump, simply reverse the steps used for disassembling.
- (2) When inserting the bearings into the impeller assembly, take care to make sure the edges align with corresponding edges within the impeller.
- (3) Wipe the parts down thoroughly and take special care to make sure no metal filings adhere to the magnet capsule or the drive magnet.
- (4) When tightening the screw sets, make sure to tighten opposite pairs to ensure even compression.
- (5) Tightening torque recommendations for AVF-C Series Front casing:
Material PPG : $12 \pm 0.5 \text{ N} \cdot \text{m}$ ($120 \pm 5 \text{ kgf} \cdot \text{cm}$)
Material ETFE+CF : $10 \pm 0.5 \text{ N} \cdot \text{m}$ ($100 \pm 5 \text{ kgf} \cdot \text{cm}$)

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Annex B. AVF-C Exploded View and Parts List

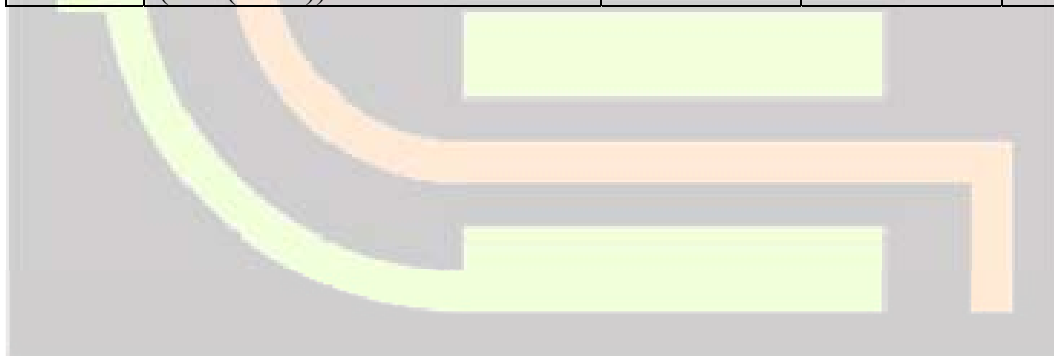
Part No.	Part Name	Part No.	Part Name
101	Pump Casing Ass'y	403/412+NO.	Gasket / O-Ring
220	Front Shaft Support	161	Containment Shall Shaft Thrust Ring Ass'y
314	Thrust Ring		
230	Impeller Wear Ring Ass'y	813	Stator
847	Magnet Capsule	181	Bracket
310	Bearing	812	Rear Frame



Annex C. AVF-C Motor Specifications

AVF-C Series pumps must be driven by an inverter. When initializing the inverter, make sure the following parameters are correctly inputted into the inverter.

Item		Model	AVF-C221 AVF-C441	AVF-C543 AVF-C553 AVF-C653	AVF-C545 AVF-C555 AVF-C655
Motor Power (kW)			1.1	2.2	4.0
Number of Poles			8	8	8
Frequency (Hz)			200	200	200
Rated Voltage 220 V	Rated Current (A)		3.8	7.3	13
	Stator Phase Resistance (Ω)		0.5	0.12	0.063
	DC Inductance (mH)		6.53	4.33	1.68
	AC Inductance (mH)		6.97	4.53	1.78
	Electromotive Force (mV/(r/min))		55.7	61.1	59.2
Rated Voltage 380 V	Rated Current (A)		2.2	4.2	7.5
	Stator Phase Resistance (Ω)		1.5	0.36	0.19
	DC Inductance (mH)		19.6	13.0	5.03
	AC Inductance (mH)		20.9	13.6	5.33
	Electromotive Force (mV/(r/min))		96.2	105.8	102.6





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Annex D. Description of ATEX-Specific Marking

The ATEX-specific marking of this pump is described below:

AVF-C Pump ATEX Mark:

 II 3 G Ex e IIA T1~T4 Gc

	Distinctive Community mark
II	Equipment group: All except for underground mines
3	Equipment category: Category 3 indicates equipment providing a normal level of protection when used in areas where an explosive atmosphere is unlikely to occur (Zone 2).
G	Explosive atmosphere: Flammable gases
Ex	Explosion Protection
e	Protection type: Increased safety
IIA	Gas subdivision: Surface above ground industries with less easily ignited gases, e.g. propane
T1~T4	Temperature class: temperature range of 135~450 °C
Gc	Equipment protection level: Gc indicates the equipment does not contain any effective ignition source in normal operation.

 	<p>(1) When using the AVF-C Series pump in a potentially explosive environment, the requirements must be clearly specified in the pump specification sheet. Special care must be made to make sure the pump is suitable for the environment.</p> <p>(2) When using the pump in a potentially explosive environment, a suitably rated cable gland must be used.</p> <p>(3) Both the pump and motor must be properly grounded to limit the risk of static electricity discharge. The AVF-C Series pump with a plastic bracket can only be used in a category 3 environment.</p> <p>(4) Pumps with plastic bracket can only be used in EPL Gc.</p> <p>(5) If the pump casing material is non-conductive, the conductivity of the pumped fluid must be greater than 10^{-8} S/m to prevent static charge accumulation.</p> <p>(6) Dry-running is absolutely forbidden. Do not run the pump at below minimum flow for more than one (1) minute to prevent temperature build-up within the pump.</p> <p>(7) Temperature sensors are recommended to monitor pump and motor surface temperatures.</p>
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ASSOMA[®]

Variable Frequency Canned Motor Centrifugal Pump

Magnetic Drive Seal-less Pump

Cartridge / Bag Filters



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