



AMERICA ENERGY INC
OIL-LESS CLAW
MEDICAL VACUUM SYSTEMS

**INSTALLATION, OPERATION
AND MAINTENANCE MANUAL**

Manual C-MED.

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INTRODUCTION

This manual contains important safety information that must be read by all personnel responsible for the installation, operation and maintenance of this product. Read this manual carefully before attempting to install, operate or maintain the compressor and / or vacuum pump. AMERICA ENERGY INC reserves the right to make changes and improvements to update products without notice or obligation.

SAFETY

For us at AMERICA ENERGY INC, safety is very important, and always, we keep it in mind. From the process of design, manufacture, distribution and delivery of each product that we commercialize, we want to take care of each person involved as well as the environment and material goods. Please keep in mind at all time the concept of SAFETY and follow the instructions presented in this manual. The following words / symbols are presented to draw attention to aspects that are very important:

DANGER !

Immediate and imminent hazards which will result in serious injury or death.

WARNING !

Possible imminent risk which could cause serious injury or death.

CAUTION !

Hazardous situations or practices which could cause minor personal injury or damage to the product and / or property.

NOTICE

Situations or dangerous practices which could cause damage to the product and / or property.

It is important to keep in mind that there may be local codes or regulations that must be considered when installing the system.

It is necessary to read and understand all the sections of this instruction manual, as well as all the instructions supplied by the manufacturers of the auxiliary components, before starting or activating the equipment. If you have any questions regarding the instructions please call your authorized distributor or the factory of AMERICA ENERGY INC, in this way you can avoid creating a situation that could be dangerous, for people, product and property.

DESIGNATED USE

The machine should only be used in the areas described below:

- Only operate the machine in a technically perfect condition.
- Do not operate the machine when it is only partially assembled.
- The machine must only be operated at an ambient temperature and a suction temperature of between 55 - 104 °F / 12 - 40°C. Please contact us for temperatures outside this range.
- In the design of the machine it is considered to convey, compress or extract air, which may contain moisture (water vapor) but should not contain water or other liquids.

WARNING !

The machine must not be used to aspirate any other fluid that has not been contemplated in the designated use, special care should be taken if the aspiration process may contain any explosive, flammable, toxic or corrosive fluid.

For WAGD applications, AMERICA ENERGY INC suggests an oxygen assured pumps. Please contact the factory for more information.

CAUTION !

The specifications of this machine are valid for a place of work that does not exceed 2,600 ft / 800 m.a.s.l. If you intend to operate the equipment at a higher altitude you should contact your authorized dealer or the AMERICA ENERGY INC, factory as it may be required to adjust the operating parameters.

TRANSPORT AND STORAGE

Immediately upon receipt the machine, make sure it is in perfect condition when you unpack it, if you notice any damage please notify it immediately.

If for any reason you need to store the equipment, keep it in a cool and dry environment, keep all connection points sealed and protect it from dust, dirt and foreign objects.

NOTICE

For long-term storage (more than 3 months), It is useful to use a preservation oil rather than operating pump oil, for those machines that require oil for operation.

WARNING !

When transporting ensures to use suitable forklift, the machine must be lifted from bottom side. Assembled systems cannot be lifted by components eyebolts, as of motors or pumps eyebolts.

Secure the machine to avoid tip and fall.

DANGER !

Do not stop under suspended loads.

GENERAL DESCRIPTION

The AMERICA ENERGY INC vacuum system is designed and manufactured to meet all NFPA 99 standard last edition. The system consists of multiple oil-less claw vacuum pumps coupled to a direct drive electric motor for continuous duty. Each pump is equipped with intake filter with threaded connections, check valve, flex hoses and shutoff valve for system isolation to allow maintenance tasks. A.S.M.E. stamp air receiver with gauge and manual drain valve. The system shall include a 3-way tank bypass with pipes and ball valves in bronze or stainless steel. UL certified electrical control panel mounted and wired, controlled by PLC and HMI. The entire system is 100% tested before leaving the factory.

Claw vacuum pump, electric motor and receiver.

Oil-less rotary non-contacting two claw type vacuum pump, air cooled with no water requirements and direct driven by a C-flange, TEFC electric motor, assuring virtually maintenance-free operation. The suction-pumping chamber is oil free, sealed and separated of the oil lubricated gear box. Each pump shall include a quiet operation check valve to prevent backflow, heavy duty inlet filter, inlet and discharge flex connector, independent anti-vibration bases and shutoff isolation valve. Continuous duty capability at 28" Hg for 2 to 5 hp pumps, 27" Hg for 6.4 and 7.5 hp pumps, 25" Hg for 10 hp pumps and 23.5" Hg for 15hp pumps (at sea level).

High efficiency NEMA rated motor, C-flange TEFC, 1.15 service factor, suitable for electrical service of 208-230/380*/400*/460V, 3 ph, 60 Hz & 190/380 V, 3 ph, 50 Hz. (*optional voltage)

Air receiver A.S.M.E. code stamp, rated for 200 PSIG design pressure, equipped with gauge and manual drain. The receiver counts with a 3-valve by-pass with all pipes and fittings in bronze or stainless steel, as required per NFPA.

Control panel UL

The system include a UL listed centralized control panel wired and tested in a NEMA 4 enclosure, through the door disconnect switch, full voltage starter with motor circuit protector and contactor for each motor. Dual control transformer (@ 120 Vac and 24 Vac) Programming Logic Controller (PLC) with Electronic HMI 3.6" resolution 240 x 80 pixel or full color 7" Touch screen HMI resolution 800 x 400 pixel (optional) for system control. Operation mode Manual-Off-Auto and rotation test function. Automatic alternation based on first-on/first-off principle, provision for simultaneous operation or reserve back-up pump if its required. Minimum run-time operation function, with adjustable value to avoid frequent start-stop. Hour meters, run indicator, overload failure indicator and high temperature indicator for each pump. Back-up transformer failure indicator. Pressure value, audible and visual alarm with dry contact for remote alarm. Back-up vacuum switch for eventual

vacuum sensor failure. Datalogger direct to USB memory to file parameters like pressure trends in Touch HMI (optional).
Web communication (optional) to allow remote internet connectivity to monitoring the system on web-site platform with protected and personalized user and password, accessible from any computer or mobile device for full monitoring.

ADDITIONAL OPTIONS AVAILABLE

- Oxygen assured pumps specially prepared for use in WAGD applications. Each pump is assembled and tested in a clean environment with dedicated tools, using oxygen compatibles cleaner for each part in contact with the vacuum flow and oxygen compatible lubricant in the gear box.
- Variable frequency driver for energy saving.
- Two-component epoxy internal coating for corrosion resistance.

INSTALLATION

When installing the machine is required to comply with at least the following requirements:

- Install the machine in a clean and well-ventilated place, free of dust and protected from the rain.
- Install the machine on a firm and level surface. The foundation must be designed to support the total unit weight.
- The vacuum system must be leveled and secured with anchor bolts, never use wood to shim the unit.
- The surrounding temperature must not exceed 104 °F / 40 °C.
- The cooling air inlets and the cooling air outlets must have a distance of at least 12 in / 30 cm from the walls.
- The outgoing cooling air must not be sucked back.
- For maintenance work, provide at least 36 in / 50 cm distance around the machine.
- Avoid any type of vibration or load that could be transmitted to the equipment through the connections of the intake or discharge pipes.
- Make sure the exhaust piping end connection turned down to avoid introduce any foreign contaminants or rain.
- The intake and discharge connection pipes must be at least the same diameter as the existing ones, in case they are too long the diameter must be increased to avoid losses of performance and / or pressure drops.

NOTICE

NOTICE

- The pump gears are oil lubricated, but there is no lubricant or sealing fluid inside the pumping chamber. All models are shipped with the required oil already in the pumps. The level shall be slightly above the middle of the sight glass.

DANGER !

- The electrical installation must only be done by a qualified electrician observing the local codes and all applicable federal, states and local regulations.

Power supply:

CAUTION !

- The power supply must be constant and stable.
- The electrical conditions at the installation location must match the electrical requirements, shown on the machine data plate and electrical diagram.

Following parameters are allowed:

- 5% voltage deviation.
- 2% frequency deviation.
- The machine must be grounded in accordance with applicable codes.

Rotation:

NOTICE

The correct direction of rotation is essential for the proper functioning of the system. Incorrect direction of rotation can cause permanent damage to the machine.

To verify the correct direction of rotation, identify the arrows that indicate the proper direction, then start the motor briefly (max.2 seconds).

NOTICE

System equipped with Variable Frequency Driver (VFD) require to verify the correct direction of rotation on VFD mode. It is possible for the pump to turn in one direction when started in the "VFD ON" position, and then turn the other direction when started in the "VFD OFF" position. This must be checked prior start the system.

If the pumps are rotating in the wrong direction, rotation can be reversed by switching any two main power leads between the VFD and the motor starter.

START UP

CAUTION !

Hot surface.

When the machine is at operating temperature the surface temperatures on the components may go above 158°F / 70°C. You must avoid touching the hot surfaces (marked with warning plates).

CAUTION !

Noise emission.

When spending a long time in the vicinity of the running machine use ear protectors to avoid permanent damage to your hearing.

PRINCIPLE OF OPERATION.

The oil-less claw medical vacuum systems manufactured by AMERICA ENERGY INC, are designed to function alternately while maintaining a backup pump as required by NFPA. The pumps can also work individually for cases of maintenance, intervention or failure. The pressure of operation is controlled by a vacuum sensor in a range that depends on the altitude above sea level at which the systems operate. In triplex, quadruplex or multiplex systems the necessary equipment will progressively work to satisfy the required demand.

In case of pressure sensor failure, the systems count with a backup vacuum switch which is activated when a low vacuum level is detected and deactivated once the vacuum level setting has been reached. The operating range of the backup vacuum switch also depends on the altitude above sea level at which the systems operate and its setting is done manually according to the following table:

Vacuum operating range according to altitude:

Altitude	Altitude	VACUUM SENSOR				VACUUM SWITCH		VACUUM SWITCH	
		LEAD		LAG		BACK UP 2 – 7.5HP		BACK UP 10 – 15 HP	
(m)	(ft)	OFF	ON	OFF	ON	OFF	ON	OFF	ON
0 - 300	0 - 986	*	*	*	*	-18	-14	-18	-14
301 - 600	987 - 1968	*	*	*	*	-18	-14	-17	-13
601 - 900	1969 - 2953	*	*	*	*	-18	-14	-17	-13
901 - 1200	2954 - 3935	*	*	*	*	-17	-13	-17	-13
1201 - 1500	3936 - 4917	*	*	*	*	-17	-13	-17	-13
1501 - 1800	4918 - 5899	*	*	*	*	-17	-13	C.F.	C.F.
1801 - 2100	5900 - 6881	*	*	*	*	-17	-13	C.F.	C.F.
2101 - 2400	6882 - 7863	*	*	*	*	C.F.	C.F.	C.F.	C.F.

*C.F. Consult Factory.

LEAD: variable, depending of pump model.

LAG: variable, depending of pump model.

BACKUP: Backup range.

SYSTEM OPERATING MODE.

Initial start-up (System pressure of 0 inHg) and all pumps in AUTO.

On the initial **duplex** system start-up, when the system vacuum level is below the LEAD ON set point (reading by the vacuum sensor), the first pump will start immediately. Next pump in the sequence starts after a programmed time delay. The time delay prevents high inrush current, avoiding several motors could starts at same time. During the initial system start-up, the lag alarm may come on, and it is normal at this point. It can be reset once the system reaches its normal operating vacuum.

If the LEAD OFF set point is reached and the minimum operation time for the pump has been satisfied, the PLC will turn off the lead pump. If the minimum operation time for that pump has not been satisfied, the lead pump will continue to run until the timer expires.

When the system vacuum level drops again and below the LEAD ON set point, the control system will automatically sequence the lead role to the other pump and will start it.

If a pump is in operation and occur a failure due to over-current (overload) or high temperature (for systems equipped with temperature sensors), the PLC will activate the LAG pump (reserve pump) and the corresponding failure alarm from the PLC will be displayed on the HMI screen.

In a **triplex** or **quadruplex** systems, when the system vacuum level is below the LEAD ON set point the PLC will progressively activate, all pumps in AUTO mode. When the last available pump in AUTO starts, which is LAG pump (reserve pump), the corresponding failure alarm will be displayed on the HMI screen.

There are situations in which all pumps in the system can operate simultaneously (operation of backup pump):

1. Low vacuum: If the vacuum is less than or equal to the LAG ON value, the LAG pump (reserve pump) will be activated.
2. Backup time: If a pump operates continuously for more than 20 minutes, the reserve pump will be activated. In systems of 7.5 HP and above, this time is 30 minutes. This condition is available in certain systems.

NOTICE

Minimum operation time: this time must be fulfilled to reduce the number of starts per hour, thus prolonging the useful life of the coupling elastomer and electrical parts (motor, contactor and thermal / motor guard). The minimum operating time assigned should be 5 to 10 minutes. The minimum operation time can be modified or deactivated, however, this option is not recommended and should only be applied when the system operates in spaced work cycles (maximum 5 starts per hour).

VARIABLE FREQUENCY DRIVER

In systems equipped with VFD, if the VFD is ON, the first pump to start will be controlled by the VFD, varying the frequency and therefore the rotational speed, depending on the vacuum level, to keep it stable and achieving energy save.

If a higher flow level is required the next pump will start at full voltage, keeping speed control on the first pump. The VFD will control the pump based on the automatic alternating sequence.

HMI SETTING.

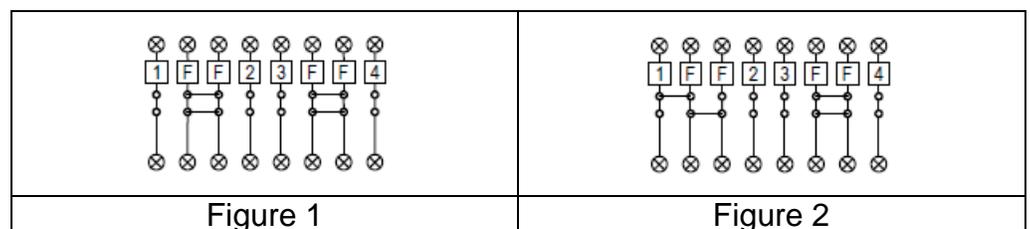
See appendix to obtain detailed information of available HMI types, with its specific settings.

FAIL-SAFE MODE.

NOTICE

Only in the event of “Emergency” if PLC and/or HMI failure, a fail-safe mode allows the system to work bypassing the PLC. The pumps are controlled only by the back-up vacuum switch. The motors and pumps do not count with any protection, for that reason this mode is only an option in case of “Emergency”.

To set the pump 1 in fail-safe operating mode, remove a jumper between two terminal blocks marked with “F” (fig1), and connect between terminal block 1 and terminal block F (fig2).



All pumps set in fail-safe mode will be start at same time.

MAINTENANCE

DANGER !

Before maintenance work disconnect the machine by pressing the main switch or unplugging it and ensure that it cannot be turned on again.

WARNING !

During maintenance work there is the danger of getting burnt on hot components and by the gearbox lubricating oil. Wait for the machine to cool down.

WARNING !

For maintenance work, the use of personal protective equipment such as gloves and masks are mandatory. Subsequently contaminated consumables must be discarded in accordance with local codes or laws.

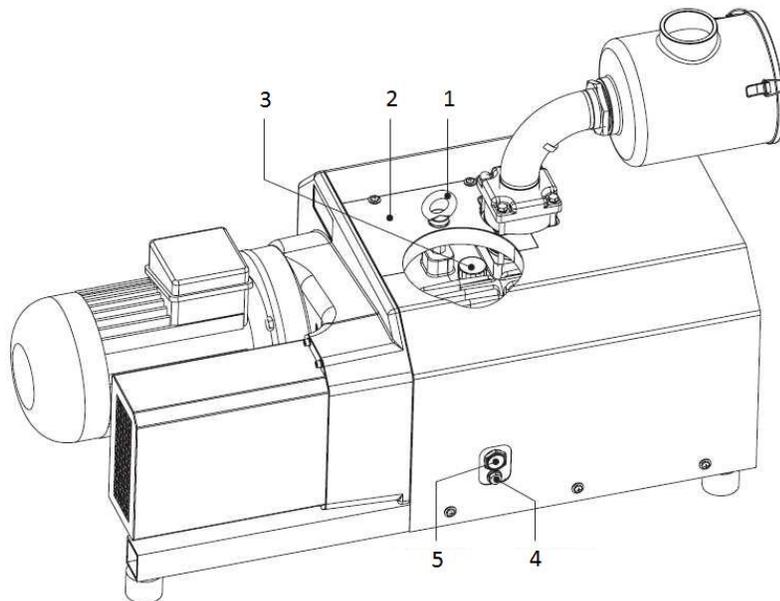
Maintenance intervals depend on the use of the equipment and the environmental conditions. Regular maintenance work must be carried out to ensure proper machine operation.

INTERVAL	DESCRIPTION
WEEKLY	Inspect and clean inlet filters. Check gearbox oil level. If filling is required, turn off the pump and complete as needed.
MONTHLY	Check pipes for leaks and adjust as needed. Check the screws of the pumps and base, adjust as necessary. Check electrical terminals and adjust as needed. Check and clean control panel fan filters. (Only in VFD units)
ANNUALLY	Inspect motor coupling element and replace as needed. Change inlet filters. Re-grease motor bearings.
10.000 HOURS	Change synchronizing gear oil.

CHANGE PROCEDURE FOR SYNCHRONISING GEAR OIL

Make sure that the vacuum pump is shut down and locked against inadvertent start up.

- Remove the eyebolt (1).
- Remove the lid (2).
- Undo the venting valve (3) for venting.
- Place a drain tray underneath the drain plug (4).
- Open the drain plug (4) and drain the oil.
- Make sure that the seal ring on the drain plug (4) is serviceable, replace if necessary.
- Firmly reinsert the drain plug (4) together with the seal ring.
- Remove the venting valve (3) completely.
- Fill in new gear oil until the level is slightly above the middle of the sight glass (5).
- Make sure that the seal ring on the venting valve (3) is undamaged, if necessary, replace the venting valve (3).
- Firmly reinsert the venting valve (3) together with the seal ring.
- Mount the lid (2).
- Reinsert the eyebolt (1).
- Dispose of the used oil in compliance with applicable regulations.



PARTS LIST

SYSTEM PARTS LIST

PUMP MODEL	2 HP 3 HP 4 HP 5 HP	6.4 HP 7.5 HP	10 HP 15 HP
INLET FILER (COMPLETE)	843F-125	851F-200	239F-300
INLET FILTER ELEMENT	843E-125	851E-200	239E-300
CHECK VALVE	VCV-125	VCV-200	VCV-300
FLEX HOSE	HSS-1212	HSS-2012	HSS-3012
VACUUM SWITCH	VS030-SD	VS030-SD	VS030-SD
VACUUM SENSOR	SPT-25-10-V30D	SPT-25-10-V30D	SPT-25-10-V30D
VACUUM GAUGE	VG25-030	VG25-030	VG25-030
BALL VALVE	KTC-125	KTC-200	KTC-300
TEMPERATURE SENSOR*	TC-K-NPT-U-72	TC-K-NPT-U-72	TC-K-NPT-U-72
DRAIN VALVE	KTC-50	KTC-50	KTC-50
COUPLING ELEMENT	C.F	C.F	C.F
SYNCHRONISING GEAR OIL	CLAWLUB-550 **CLAW-FOMBLIN	CLAWLUB-550 **CLAW-FOMBLIN	CLAWLUB-550 **CLAW-FOMBLIN
SYNCHRONISING GEAR OIL (Lts)	0.85	1.0	1.2

* Systems with temperature sensor.

**Systems with O2 assured pumps.

C.F: Consult Factory.

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSES and SOLUTION
System will not turn ON	<ul style="list-style-type: none"> - System is OFF. Turn ON the system. - Disconnect switch OFF. Set ON position. - Power failure or phase missing. Check voltage on each line. - Loose or faulty wires connection due shipment or vibration. Check and tighten all wire connections following the electrical diagram. - Transformer breakers (primary or secondary) in OFF position or tripped. Set in ON position or reset.
Failure to start	<ul style="list-style-type: none"> - Overload tripped. Reset and set according to motor nameplate and operating voltage. Make sure that supply voltage matches motor voltage. - High temperature alarm. Allow unit to cool, check for over temperature condition. - Check pressure sensor and vacuum switch contacts. - No program in PLC. Re-load program, consult factory. - Failure PLC. Change PLC. - Wrong motor wiring. Check according motor wiring schematic.
Pump is not drawing vacuum	<ul style="list-style-type: none"> - Inlet filter clogged. Replace. - The suction pipe is too narrow. Check suction pipe design. - System piping leaks. Repair leaks. - Damage motor-pump coupling. Inspect and replace.
The machine does not reach the maximum vacuum level	<ul style="list-style-type: none"> - Leaks in the pump piping system and / or inlet filter. Check and adjust connections. - Pumps ball valves partial or full close. Open inlet valves. - Check vacuum gauge. Gauge may be faulty. Replace gauge. - Vacuum relief valves need adjusting. Re-calibrate relief valve (6.4-15 Hp only)
Pump overheats	<ul style="list-style-type: none"> - Ambient temperature is too high. - High temperature of the machine room. Check adequate room ventilation. - Cooling ducts blocked. Clean cooling ducts. - The back pressure is too high. Check that the discharge pipe is not obstructed. - Gearbox oil level low or empty. Replenish with new fresh oil.

Overcurrent and / or motor protection tripped	<ul style="list-style-type: none"> - Inadequate or unbalance voltage. Make sure that supply voltage matches motor voltage. - Motor protection switch is not set correctly. Reset and set according to motor nameplate and operating voltage. Make sure that supply voltage matches motor voltage. - Loose or faulty power wires connection. Tighten all power wires connections. - Inadequate motor rotation direction. Set motor rotation according to arrow in motor housing.
The vacuum pump produces a abnormal noise	<ul style="list-style-type: none"> - Inadequate motor rotation direction. Set motor rotation according to arrow in motor housing. - Worn coupling element. Replace. - Defective bearings. Contact factory. - Internal pump damage. Contact factory.
Variable Frequency Driver (VFD) Failure (Only systems equipped with VFD)	<ul style="list-style-type: none"> - VFD overload tripped. Reset and set according to motor nameplate and operating voltage. Make sure that supply voltage matches motor voltage. - Control panel high temperature alarm. Allow control panel to cool, check for over temperature condition. Check control panel fan is working properly. Check control panel grid filters are clean, replace if necessary. Ambient temperature too high.



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Compressed air &
Vacuum systems