NL/AE Series

Vane Compressor's End

User Manual

NAILI Group

Catalog

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1. General Information

1.1 General Information

This manual can help the user to correctly operate such machine with safety and arrange maintenance. it is necessary for the service life of machine if the Maintenance be made by maintenance schedule, if the compressor is working under terrible environment, as the interval of service should be shorten appropriately, and time to replace the air filter, oil filter, oil, and the working period of oil separator should be reduced.

Maintenance and adjustment should be conducted by the professionals, and the spare parts must be used from NAILI Group or its authorized agents to provide.

PURPOSE OF THE MANUAL

The Company NAILI GROUP. (from here on NAILI) reserves the right to subject the supply of further copies to the repayment of charges and the acceptance of special provisions with respect to the legitimate defense of intellectual, patent, and executive identity and functional property of the product and/or its parts.

It is understood that forwarding all or part of this manual to third parties is not tolerated unless with the prior written consent of NAILI for both the text, the illustrations and the diagrams attached.

Any change, supplement or suppression of elements, components, functions or cycles of the machine, not previously agreed upon with NAILI releases the manufacturer from any responsibility whatsoever.

NAILI reserves the right to make changes without prior notice.

For simplicity's sake, this manual will also always refer to the product as "machine", even though it could be "partly completed machinery".

This manual is for the installer, the user and the service engineer of the machine, and it aims at supplying them with the basic technical data typical of the system, a technical description of the several operating groups that form it as well as the essential use procedures and the information necessary to perform preventive and corrective maintenance.

The manual is intended for staff with appropriate knowledge of mechanics, electrical engineering and pneumatics. The information, requirements and recommendations in the Manual, together with the experience and professionalism of staff involved, guarantee personal safety and machine efficiency in the installation, during use and subsequent waste disposal. Should the machine be incorporated by the installer into a more complex system, the latter must guarantee compliance with the requirements supplied and the safety and use conditions ensuing incorporation. For a correct use of the machine, it is assumed that the working environment is adequate to current regulations concerning safety and hygiene at the workplace.

Directives AND Technical Standards Applied.

The machine has been designed, made, and inspected in compliance with the "essential safety and health requirements" stated in Annex I to the European Directive 2006/42/EC.

The list below gives the reference Standards used by to design, build and to make the final inspection of the machine.

- MACHINERY DIRECTIVE 2006/42/EC
- EN ISO 12100:2010,EN 60204-1:2018,EN 1012-1:2010
- ELECTROMAGNETIC COMPATIBILITY DIRECTIVE 2004/108/EC
- ISO 9001:2015 - ISO 14001:2015- ISO 45001:2018

Documentation Supplied WITH THE product

The machine is delivered with the:

– Use and maintenance manual compliant with the Machinery Directive 2006/42/EC;

– EC Declaration of conformity or of incorporation;

– Maintenance register

General Notes on Delivery

Upon receipt of the machine please check that the supply complies with the order specification and the machine has not suffered any damage due to transportation or other reasons.

In the event of damage or missing parts, report it immediately and in detail to the forwarding agent and NAILI AIWAYS STATE THE MACHINE SERIAL NUMBER AS WELL AS THE NUMBER PRINTED IN THIS MANUAL WHEN MAKING A REQUEST TO NAILI GROUP OR ONE OF THEIR SERVICE CENTRES.

Final Inspection

Unless there are specific indications or agreements when placing the order, the final inspection of the machine is carried out at the end of the production phase, in compliance with the company quality system.

NAILI (or vendor) is responsible for the machine under its original configuration. NAILI (or vendor) refuses any responsibility for improper use of the machine, for damage due to operations which are not described in this manual or unreasonable jobs

DEFINITIONS

Machine

Machine means a group of components, at least one of which mobile, connected one to another, equipped with drivers, control circuits, etc. and firmly connected to a well determined application, therefore capable of performing work with a force of a nature other than human.

Working area

Working area means the protected volume limited by guards to prevent injuries and aimed at operation during the machine processing.

Authorized staff

Authorized staff means personnel duly trained and appointed to perform the activities listed below and that make up the operating instructions for the machine.

Appointed staff

Appointed staff means the personnel who, although not participating materially in the work, supervise the work of others, for example, the responsible engineer.

Transport

Transportation means all those operations regarding the handling of the machinery or a part of it.

Installation

Installation means the mechanical, electrical, and fluid plant engineering integration of the machine within a production reality, in compliance with the specified requirements.

Commissioning

Commissioning means the functional check of the machine installed.

Operation

Operation means the mode in which the machine produces compressed air according to regulations, settings, and commands inserted by the control device.

Decommissioning

Decommissioning means the mechanical and electrical removal of the machine from a production area.

Dismantling

Dismantling means the dismantling and discarding of machine components.

Maintenance and repair

Maintenance and repair means the regular check and/or replacement of parts or components of the machine and any action aiming at identifying the origin of a failure that concludes with the resetting of the machine to the functional design conditions.

Improper use

Improper use is the use of the machine outside the limits specified in this manual and in the technical documents available.

DESCRIPTION OF PICTOGRAMS

Pictograms have been applied on the machine indicating situations of:

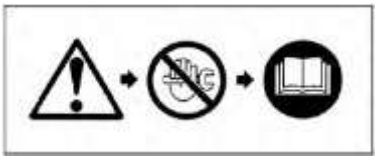
– Danger

– Obligation

– Prohibition

 **Rotation direction**  **Lifting point**  **Possibility to carry out work**

The combination of pictograms shown above means:



Warning! Please refer to the Instruction Manual

Before starting any activity.

1.2 Safety Precaution

1.2.1 Forward

The installation of the Compressor, start-up, operation, running, should be in strict accordance with the safety operation procedures; Installation, operation and maintenance must be training fully by qualified personnel from the manufacturer to provide;

The compressor shall be taking care of adequate maintenance by the owner of it, it is very important for safe operation, all that the old, incorrect, damaged and related safety parts should be replaced immediately.

The safety of the machine and users is not guaranteed if the safety devices on the machine are removed, bypass or tampered with.

It could be necessary to perform some operations with protective devices reduced or disabled by qualified staff, trained in operating in these conditions, aware of the risks for persons and for the machine caused by that indicated above. The person in charge of machine management and/or safety must make sure that no unauthorized personnel may access the machine in the conditions described above.

The machine is NOT suitable to be used in a potentially explosive atmosphere.

Do not operate the compressor in the areas where fumes or toxic or flammable vapors cannot be suctioned.

The air delivered directly by the compressor, filtered and purified from oil, cannot and must not be used for breathing or to come into contact with foodstuff without filtering specifically compliant with the requirements of the safety standards.

Before performing any operation on the compressor, make sure to have:

– impaired its start-up;

– disconnected the pneumatic supply;

– waited that there is no more internal pressure;

– in case of supply systems equipped with inverter or capacitor, wait for residual voltage to be completely discharged. This stage could require several minutes depending on the devices and their size;

– taken the precautions described in this Manual and required by Safety standards in force.

– non-pressured chamber of compressor in free running long time can harm the RSU inside.

1.2.2 Transportation and Handling

Air compressor, during of loading, lifting, transporting, should be handled with care in the direction shown by the arrow, prohibited to put it upside down and slanted, to prevent oil overflow from the air inlet and cause damaging; it should be dangerous from collision and impact, When machine is being handled and lifted, and keep up the stability of the machine's center of gravity; machine ought to be firmly fixed previous Transportation, when lifting compressor, beware of damaging the bearing structure and shell.

1.3 Responsibility

The manufacturer or NAILI's sales representatives not liable for personal injury and property lost caused by the following reasons:

– improper use of compressed air or of the compressor in general;

– non-observance of ordinary safety rules or domestic rules in the work place;

– non-observance of instructions during handling and transportation of the compressor;

– incorrect installation of the compressor;

– defects due to type of power supply or the motive power;

– lack of regular maintenance;

– unauthorized changes or interventions;

– use of non-original spare parts or not explicitly for the model;

– non-observance, even if only partial, of the instructions;

– possible inefficiency caused by the non-use or the malfunction of the compressor.

Warning!!!
It is recommended to use compressed air, directly output from compressors, only for production processes. For any other use, FIRST and ALWAYS contact the manufacturer.

SAFETY REQUIREMENTS: OBLIGATIONS FOR THE FINAL CUSTOMER

The machine manager and/or final user must:

– carefully read this Manual and any technical documentation supplied with the machine;

– know which protections and safety devices are available on the machine, their location and operation;

– instruct all staff accordingly on the risk of accidents, on general standards and rules regarding prevention and protection;

– follow the instructions for the correct installation of the machine;

– perform correct use and maintenance of all machine components, including the safety devices;

– comply with legal requirements in force.

If the safety requirements contained in this Manual do not agree with those foreseen by legislation in force, the more restrictive ones must be applied.

The operator must be aware of the position and operation of all the controls and features of the machine.

Only qualified engineers should carry out the interventions for maintenance after having duly prepared the machine.

Any unauthorized tampering or replacing of one or more parts of the machine, adopting accessories that change the use of the machine and the use of spare parts other than those recommended in this manual, can be potential accident risks.

It is strictly prohibited that two or more persons operate the machine simultaneously (especially with reduced safety devices) without start-up being impaired.

DANGERS AND RESIDUAL RISKS

During design, all the risks which NAILI considers at the origin for the product have been assessed. Therefore all of the necessary precautions have been taken to avoid risks to people and damage to the machine components.

In case of incorporation, the installer must complete the risk analysis for the final configuration of the machine prepared by him.

In order to guarantee both the health and safety of those exposed, the machine has been provided with safety devices (see section 2-1) and specific protections:

– fixed guards of moving parts: located in the areas only accessed for routine maintenance; they are fastened with systems which require specific tools to be removed or blocked with screws;

– (if included) protection and segregation of electric/ electronic control equipment of the machine with container to avoid accidental contact with live equipment if opened.

Though having adopted the safety systems listed, the following residual risks remain: bruises, laceration, burns, cutting due to the use of tools and/or handling of machine parts during maintenance operations. Dangers and residual risks are also hindered by strict compliance with the requirements and recommendations listed in this Manual and by the use of PPE.

HANDLING THE MACHINE

The whole area for the machine handling, including the space between the parking area for transport means and the machine installing area should be identified and inspected beforehand, to detect the presence of dangerous areas for the persons involved. Verify the total mass of the machine and use a forklift truck or an adequate lifting means. Specific pictograms indicate the lifting points.

When handling, lifting and transporting the machine, pay the utmost attention in order not to damage objects or persons or the machine itself.

INSTALLATION AND INCORPORATION

The installation or incorporation and commissioning of the machine can only be carried out by authorized staff.

Incorporation of the product into a more complex system takes for granted that the requirements regarding safe operation of the Machine provided in this Manual have been taken into consideration, especially regarding cooling, the protection of moving or hot parts, and the risks caused by operating pressure.

During the installation phases, handle the parts making up the machine as indicated in this manual; if they need to be lifted, make sure that the lifting devices are secured properly and use appropriate harnesses and equipment. As far as possible, the installation area of the machine must be clear of materials which could hinder or limit the view. If present, remove any fixing brackets or blocking and lifting devices installed previously for transportation of the item. Check that all the safety devices of the machine are intact and properly secured and that there are no movable or loosened parts; also check the integrity of the components of the control unit (if included).

The compressor develops heat. Therefore it will perform best when installed in a suitable environment, properly ventilated and away from other sources of heat. The oil used to lubricate the compressor also acts as a coolant; for

units not equipped with a built-in radiator, it is essential to connect the machine to an external cooling system, capable of disposing of the thermal output generated. Be careful to avoid dangerous recirculation of hot air.

The compressor must be protected against atmospheric agents when installed outdoors and when specific surface protective treatments are not required.

The electrical connections must be carried out compliant with standards. The machines must be earthed and protected against possible short circuits. A mains isolator must always be installed upstream of the electric system of the machine. When using an electric motor, before connecting the machine to the power mains, check that the isolating device is locked at the open position.

Check that the safety protections are properly installed and in perfect working order.

Connect the pneumatic system of the machine to the air distribution network and carefully check the correct calibration of the pressure value and any leaks in the system.

When installing one or more compressors on a single pneumatic line, each of them must be equipped with a shut-off gate valve and an intentional discharge point between machine and gate valve.

OPERATION AND MANAGEMENT OF THE MACHINE

The machine may only be managed by authorized and appropriately trained staff (Second level operator, see section 1-3). Staff in charge of operating the system must be aware that knowledge and application of the safety standards is an integral part of their work. Unqualified staff must not have access to the operating area and to the control panel of the machine when the system is running. Guards and safety devices should be kept in perfect condition so as to allow for their correction functioning. In the event of failure, they should be immediately repaired or replaced. It is forbidden to either disconnect or partially remove the guards and the safety devices, except in the conditions specified in the previous paragraph. The same regulation applies to the danger signals in particular areas of the machine.

The operator must use the personal protective equipment. Use the compressor only for the kind of application for which it has been designed (air compression for industrial use). Before starting, ensure that the compressor has oil. For the oil type to be used, please refer to Section 8 of this manual. Never operate the compressor at pressures higher than those indicated on the ID plate (see section 1-4). If hoses are used to distribute air, ensure that they are of a proper size and adequate to the working pressure and that they are neither damaged nor worn. Please remember that rubber hoses should be replaced at regular intervals. Please note that the machine, although it has an acceptable sound pressure level, can produce a much higher noise if the room for its installation is narrow and reverberating.

It should be noted that the machine does not require the continuous presence of an operator. For protection against noise, in compliance with local laws in force, if necessary, specific warning signs should be placed near the machine and the staff should be equipped with suitable personal protective equipment.

MAINTENANCE

Maintenance, troubleshooting and repairs are only allowed for authorized staff. The person in charge of operating the machine should regularly check that all the operating instructions regarding operation and maintenance are followed correctly.

Should there be any doubts regarding proper operation of the compressor and of its components, please contact the service center of NAILI is highly recommended to fill out the specific "Maintenance register" supplied with the machine.

Those machine parts that, due to improper use, wear and tear, do not guarantee the safe operation should be timely replaced with original parts with the same code. Using non-original or unsuitable parts could jeopardize proper operation of the machine or personal safety; it also makes standard warranty terms and conditions null and void.

Maintenance and repairs in progress must be signaled with a specific sign indicating the "service status" on the control panel of the control unit until the operation is over, even if temporarily suspended.

Maintenance or parts replacement on the machine or control unit must be carried out with the system off and disconnected from the power mains. Before intervening, the maintenance engineer must check that pressure has been completely discharged from piping, tanks, hoses and other components, making sure that environmental pressure has been reached. If servicing requires the presence of more than one person, it is absolutely necessary that all be aware of the risks resulting from activities not perfectly agreed upon. If during troubleshooting, interventions must be carried out with the control unit and machine powered, all precautions required by safety standards must be taken in order to operate in the presence of dangerous voltage and moving parts. Any deactivated safety devices must be restored at the end of servicing and troubleshooting.Maintenance, repairs and troubleshooting must conclude by checking proper operation of the machine and all its safety devices. The following must also be taken into account:

– use only tools suited to the type of intervention;

– do not use solvents or flammable products to clean the machine or the individual parts;

– never carry out welding or other operations that require considerable heat near the machine, especially near the electrical equipment and the oil circuit;

– do not make modifications or carry out welding on pressure vessels;

– never leave tools, cloths and other loose items on either the motor or the compressor;

– lubricating oil, especially if old, can damage some people's skin. Protect your hands with gloves or with specific protective products for the skin.

– never wear clothing contaminated with lubricating oil;

– avoid contaminating the ground with lubricating oil;

– to prevent pollution, store the old lubricating oil in suitable containers and in a safe place. To discard, observe the recommendations set out by internal regulations and by current laws.

– In case of oil additions, use the same type as the one already contained in the machine. Mixtures are harmful for the life span of both the oil and the compressor;

– after any maintenance, start the machine and check that all the devices for control, stop or alarm work correctly. Also verify that temperature and pressure values are those foreseen;

DECOMMISSIONING AND DISMANTLING

Decommissioning and removal of the machine is only allowed for authorized staff. Before decommissioning, it is mandatory to block and disconnect any type of the electric, pneumatic or fuel supply. Disconnect the pneumatic system of the machine from the air distribution network, making sure there is no residual pressure. Drain oils and fluids and remove movable parts.

Remove the machine from the working area according to the requirements indicated in this manual. Before performing lifting, check the correct use of the lifting devices and only use suitable equipment. Waste disposal must be carried out in compliance with legislation in force in the country where the machine is installed.

INSTRUCTIONSON HOW TO ORDER SPARE PARTS

However, any enquiries should be made in clear terms, with references to this Manual and always stating the data on the machine ID plate. please always indicate information as below is in need, which help identify every machine and, whenever possible, specify the nature of the detected problem or the defect indicated by the machine such as: of an electrical, mechanical kind or in terms of work quality, while describing the problem on the machine may over a period of time require the replacement of those parts subject to wear. To this purpose, the purchaser can order the parts to be replaced. It is compulsory to always buy original spare parts.

To order spare parts always indicate with the maximum accuracy the following:

– Type and model of machine

– Serial number

– Exact name of the part in question

– Code and/or reference (if available)

To simplify and speed up the delivery of spare parts, it is recommended to forward orders by the part codes according to the latest version of part manual sent by the vendor and it will help us to get your parts as early as possible.

Kits with components for preliminary maintenance

1.4 Compressor Label

The label of compressor can be easily found on the surface of it, the ladder number represents the motor power, unit: KW

1.5 Model states

Airend model/H.Efficiency Air filter	**Airend/H.E.A.F with Oil Radiator**	KW/HP
NL30/NLG30	AE30/AE30G	4-5.5 / 5-7
NL40/NLG40	AE40/AE40G	7.5-11 / 10-15
NL50/NLG50	AE50/AE50G	15-22 / 20-30
NL60/NLG60	AE60/AE60G	30-45 / 40-60

Example:

Airend Model: NL"G" or AE"G"

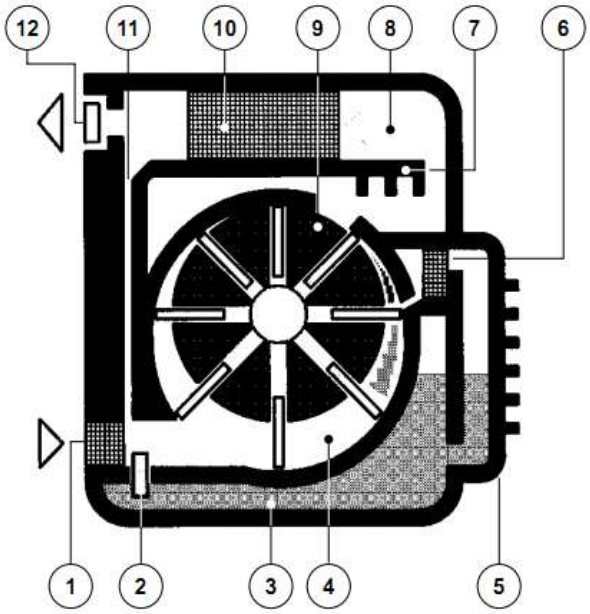
Importance of "Serial No."

2. Brief introduction of Compressor's End

2.1 Operation Principles

2.1.1 Structure

AH sliding vane compressor is mainly composed of compressor, motor, cooler, chassis. The compressor and the cooler with elastic connector are being coupled and installed directly on the motor flange, and whole system installed in a chassis.



2.1.2 Working Principles

1) air filter, 2) intake regulator, 3). The oil chamber, 4). Compression chamber,
5). Oil cooler, 6). Oil filter, 7). Labyrinth separation chamber, 8). Compressed air, 9). Rotor, 10). Oil and air separator, 11). The oil return valve, 12). The minimum pressure non return valve.

2.1.2.1 Compressed Principle

Air passes through the air cleaner filter and intake valve into the compressor. The valve can control the air compressor according to the requirements of air supplies, to maintain the stability of work pressure. Rotor is eccentric rotating in the stator, the surface has the vertical groove, sliding vane placed in the tank, and under the action of centrifugal force, close to the lining of the stator, in this way, the stator, rotor and slide to form a series of air chamber - compression chamber, the air is compressed in the compression chamber. In the process of compression of the lubrication and cooling is an efficient injection system to complete, the system can guarantee good to complete the process control under the low oil consumption level. of the rotor system to avoid the contact of On the inner wall and metal parts because of oil film, thereby eliminating the wear phenomenon. With rotating of the rotor, the compression chamber formed by two closed sliding vane and stator volume decreases, and completes the compression process. The compressed mixture air after multiple separated oil content is less than 2.5 PPM. After the separation of pure air cooler, and released through drain valve.

2.1.2.2 Lubricants

Oil seal, cooling and lubrication is to rely on the internal loop circulated of compressor to guarantee. This process is to rely on the differential pressure between the oil chamber and the compression chamber and do not need to pump. Intake regulating system (servo valve, inlet valve) also are controlled by Oil circulation.

2.1.2.3 Separation of Oil and Air

The air mixture compressed through the labyrinth path from the discharged in the rotor and stator unit, most of the oil in the labyrinth structure is separated by changing direction. Oil/air mixing by airway holes into the Oil separator and to separate in a collision again, attention to watch the end when disassembling airway logo, may not be installed backwards. The rest of the oil into the oil and air separator filter, is separated out under the role of agglomeration effects.

2.1.2.4 Minimum pressure/non-return valve

The compressed air leaves the compressor through a minimum pressure valve. This valve has a double function: to guarantee inside the air-oil separator a minimum pressure such as to ensure a correct operation of the machine during its life and to prevent the compressed air, already contained in the system, to return into the machine.

2.1.2.5 Oil cooling

Heat produced by air compression is transferred to the oil, which is cooled by passing through a radiator, which is struck by an air flow generated by a fan.

2.1.2.6 Intake valve

The intake valve, which is controlled by a special servo valve via a hydraulic circuit that uses the same oil as the one used for lubrication, is capable of adapting the amount of air taken in by the compressor to the demand.

2.1.2.7 Main parts of Intake and controlling system

The intake system of compressor is using premium air filter which is flitting dust and something mixture from Air compressed with high precision. The dust on surface of filter Separator can be removed by low pressure air blowing it softly up, if it's blocked or damaged please to replace in time.

Intake port using servo-valve to adjust, when air delivery decreased, the pressure is rising in machine, servo-valve system adjusted intake regulator decreased to shut down completely, as compressor is in discharge statue. When air increasing and pressure in machine is decreasing, intake regulator opened up in automatically so as to keep in stably between Air supply and Air consumed; The pressure of servo-valve had been set up already in factory. Normally adjusted to 0.95-1.0Mpa, but usually not allowed to be adjusted by Users.

Oil filter device of the machine has high quality wire mesh filter, and will be able to filter the impurity of a diameter of 2.5 microns and oil oxide, thus ensuring a good lubrication condition with friction pair in the compressor, to extend the using life of separation elements of oil and air, however oil filter should be replaced periodically.

Compressed air oil mixture were separated by many times mechanical collision course when passed through in the essence of oil and air separator, and separated oil returned into the chamber through the oil filter and oil return hole under the action of gravity and pressure. and users to use gas oil content 2.5 PPM or less. Users should be used in accordance with the provisions and working conditions to replace oil separator on a regular basis.

The minimum pressure valve of the machine installed at the exit of compressed air, it works on keeping minimum working pressure of the machine within 5/ 6 Bar, to ensure ideal result of lubrication and cooling cycle and better oil and gas separation. Minimum pressure valve with internal unloading system cooperated as to effectively prevent the reversed flow of compressed air and automatic discharging exhaust when it closing down, there has no pressure in the compressor when it restarted again.

PERFORMANCE AND SET UP

Performance and operation of the compressor depend on the selection of the product and the set up in relation to the actual operating conditions.

A wrong choice or an excessively severe operating condition not only reduce performance or reliability but are also dangerous for persons in contact with the machine. NAILI is available to help the final customer to choose the best configuration for the product and for installation.

OPTIONAL SUPPLY

The machine can be customized according to different requirements by purchasing specific accessories, such as:

– High efficiency filter kit;

– Temperature probe (PT100, KTY, NTC150)

– Off-load solenoid valve

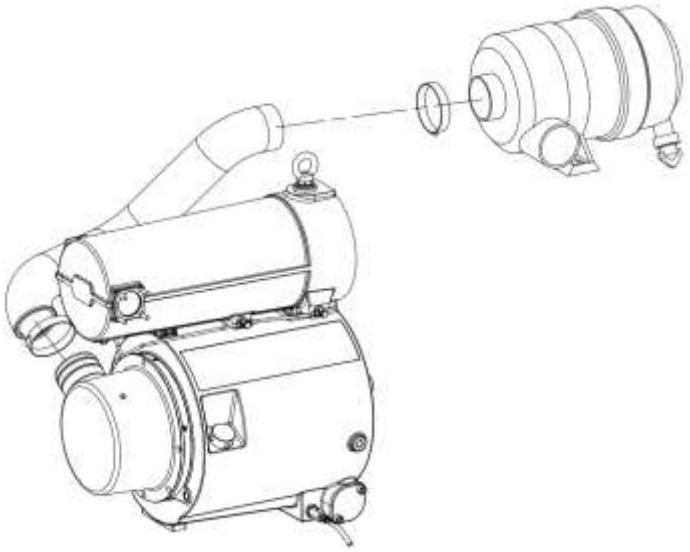
– Level switch

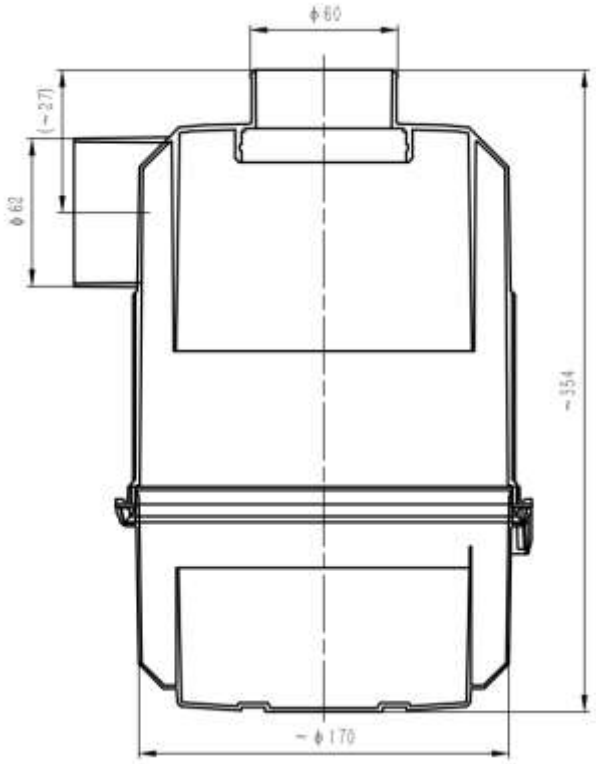
See the specific price lists for further details.

Most of the components and/or assemblies mentioned below can be accessed once the end cover and intake filter have been removed (NL-AE). Pay attention to the gaskets to avoid the risk of lubricant leaking after maintenance and/or calibration operations. Do not lubricate the threads to tighten the screws, if not requested.

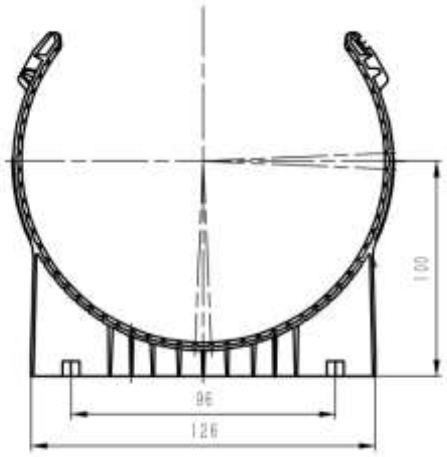
HIGH EFFICIENCY FILTER

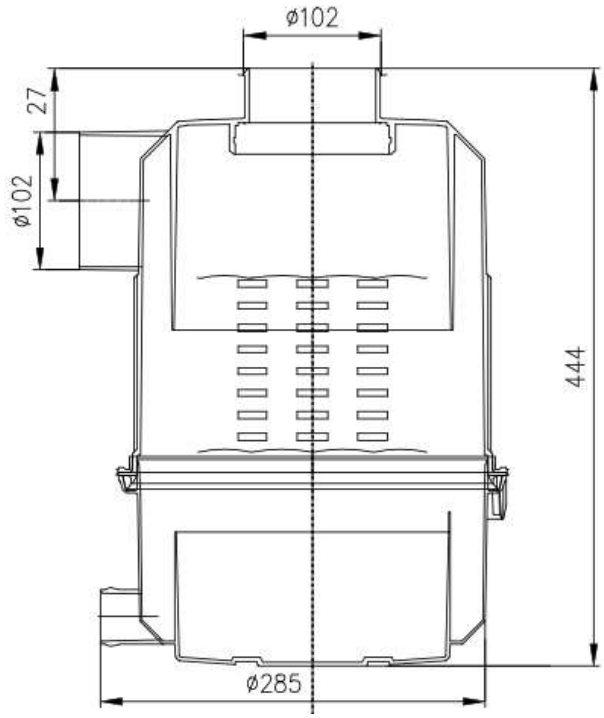
High Efficiency Air filter is optional for easy installation and maintenance required on site and please check and confirm such scheme with our factory or your local dealer and the Air hose can be customized in length for the need!



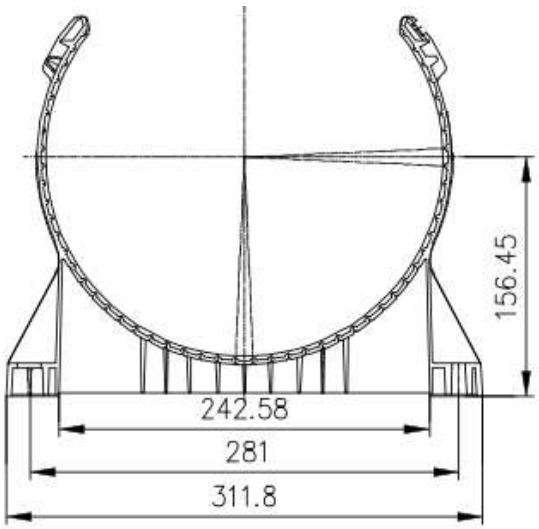


4kw-11kw

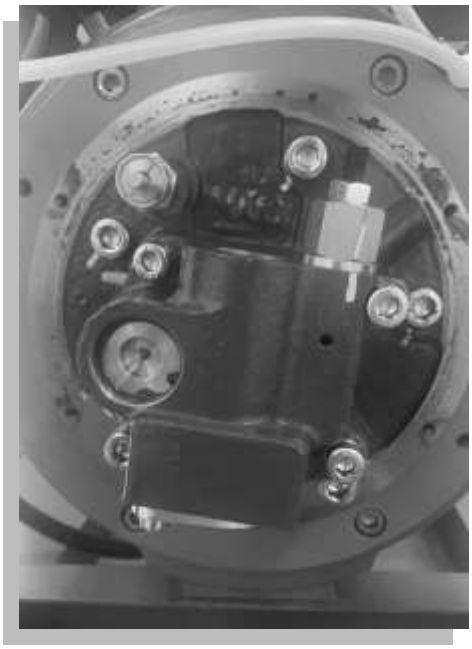




15kw-30kw



VENTING VALVE



A "venting valve" protects the compressor in case of air overpressure inside the pressurized parts, limiting its value to the calibration level. The venting valve is available at different calibrations depending on the maximum operating pressure foreseen for the compressor.

VENTING VALVE CALIBRATIONS		
	p ≤ 10 bar	p ≤ 13 bar
30 - 40 - 50	12 bar	15 bar
60	10,5 bar	15 bar

COMPRESSOR HIGH TEMPERATURE PROTECTION

– Thermostat

If not otherwise specified and agreed with NAILI, the compressor is always equipped with a thermostat protecting against the high temperature of the air-oil mixture, detected at the outlet of the rotor-stator assembly. This protective device must be connected to a system capable of stopping the compressor when the temperature of the air/oil mixture exceeds the calibration value (normally 110°C). The cause of overheating must be found before restarting the compressor. The device has a 10 A NC contact and withstands a voltage of 230 V. The electrical system the thermostat is connected to must never be short-circuited as this would deactivate the thermal protection of the machine.

–Temperature probe

Several temperature detection probes are available which must be connected to specific converters/controllers to monitor the status of the compressor (consult us for further details).

Among those available:

– PT100

– KTY

– NC110

VISUAL OIL LEVEL INDICATOR

When the compressor is off and there is no pressure in the chamber, the oil level must exceed the specific visual indicator. When the compressor is on and loaded, the oil level must be about halfway up the indicator.

INTAKE FILTER

The filter keeps excessively large solid particles from entering the compressor, thus jeopardizing the status of the lubricant and increasing the wear of moving parts. NAILI installs filters with different features depending on the type of product. If there are no specific indications by the Customer, NAILI supplies NL-AE with a filter for industrial environment installed (15 micron). For applications in heavy-duty environments, it is recommended to use a high efficiency filter ($ micron). See in section 5-2, "high efficiency filter".

INTAKE VALVE

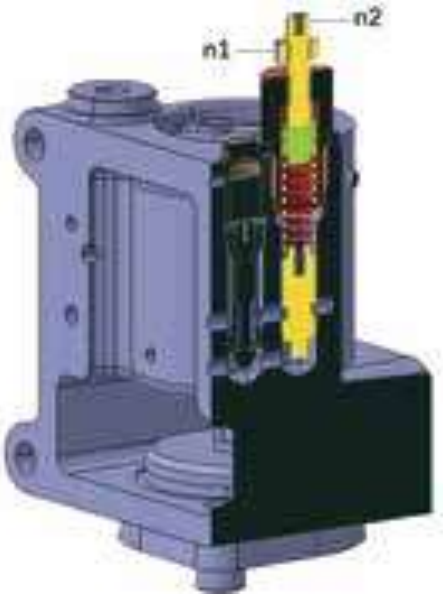
The intake valve regulates the flow rate suctioned from the compressor depending on the actual demand of compressed air by the network; in machines equipped with flow rate modulation system, it can be commanded by a specific **servo-valve** by means of a hydraulic system which uses the same oil used for lubrication. The valve, driven by the servo-valve, regulates the flow rate continuously, from 0 to 100%, as the working pressure of the compressor changes. This regulation mode is called **Modulation**. The phase in which the intake valve is fully closed and therefore the flow rate reduced to zero is called **VACUUM** mode. In this phase and with this mode, the compressor absorbs power reduced to approximately 70% that absorbed at **FULL LOAD**.

SERVO-VALVE

The pressure inside the compressor is practically the same as the network and when the compressed air demand changes, so does the pressure. The servo-valve reacts to this variation by acting on the intake valve, modulating its position to maintain operating pressure constant. The working range of the servo-valve is typically 0.3 bar and the maximum pressure value (which corresponds to flow rate equal to zero) is calibrated during final inspection at its ideal value and requires no further adjustments.

Proper operation of the compressor depends on the set values. We recommend only requesting to modify calibrations when actually needed. Remember that the higher the operating pressure at FULL LOAD, the greater the power absorbed and the need of disposing of heat generated by the compressor. The maximum operating pressure must be calibrated before definitive use and requires no further adjustments. Proper operation of the compressor depends on the set values. We recommend only modifying calibrations when actually needed and knowing what you are doing. The calibration must only be carried out by qualified staff.

SERVOVALVE CALIBRATION



If a variation must be made, it must never exceed the values indicated in the table below. Leave the machine running by closing the delivery gate valve slowly. If a tank is connected to the compressor, close the valve downstream of the tank. The compressor reaches the maximum pressure at zero capacity. As shown in the figure, loosen the lock nut (N1) and tighten (to increase pressure) or loosen (to decrease pressure) the screw (N2), until you reach the desired pressure, checking it on the pressure gauge on the separator body. The delivery shut-off gate valve should be opened and closed slowly to stabilize and verify the calibration made. Block the screw (n2) by tightening the lock nut (N1).

MAXIMUM SERVOVALVE PRESSURE CALIBRATIONS			
pressure at full load	7,5 bar	9,5 bar	12,5 bar
servovalve	8 bar	10 bar	13 bar

OFF-LOAD VALVE (VMV) /OPTIONAL OFF-LOAD SOLENOID VALVE (EV)

The off-load valve (VMV) closes the intake valve following an external command, regardless of the maximum internal pressure value determined by calibration of the servo-valve. The valve therefore acts if driven with pressurized air, the command, normally picked up clean by the separator by means of the solenoid valve (EV). Which this off-load mode, the compressor is decompressed, reducing power absorption to approximately 25% that absorbed at full load. The solenoid valve (EV) can originally be installed as an option and is available in different voltages and frequency. Depending on the voltage available, the solenoid valve (EV) can be normally closed (NC) or normally open (NO). The installer must select the appropriate activation mode to achieve the desired functioning. It is recommended to always empty the compressor before stopping it. For a correct stop, the solenoid valve must be activated a few seconds (approximately 30 sec.) before the actual stop to discharge pressure and to correctly separate air from oil. The solenoid valve can be used as **all-nothing** adjustment of the flow rate and can be activated when the maximum intended line pressure is reached. The offload system (VMV+ EV) can be activated conveniently during start-up to reduce the resistant torque until reaching standard operating pressure and speed.

Warning!!!
Do not extend this operating condition more than a few seconds keeping in mind that in vacuum operation with decompression the lubrication flow is reduced respect to nominal conditions.

PRESSURE DISCHARGE VALVE (VSP)

The valve, located between the valve block and the rotor-stator unit cover, is intended to automatically discharge internal pressure when the compressor is stopped.

During operation, it remains closed due to the pressure difference established on the piston; when stopped, the balance of pressures opens the discharge gap which occurs in the intake cover.

Depending on the operating conditions and the type of stop, the type and level of the oil used and the temperature, oil and smoke could come out from the valve which are generally reduced by the intake filter.

SECONDARY SEPARATION

Air with residual oil (oil normally represents less than 0,5 parts per thousand in weight in this stage) enters the final filter, where by coalescence most of the oil aerosol is dandified into larger droplets and gathered in the lower duct of the separator. The final residue is generally less than 3 mg/m. The separation process varies depending on the speed of the air through the filter. Therefore the greater the flow rate (or the lower the operating pressure) the more oil which can escape. The size of the oil chamber is designed so that no top-up is necessary between one oil change and the next but extreme operating conditions could Affect it and therefore the user must regularly check the oil level.

OIL RETURN VALVES (VRO)

The oil collected by the separator is drained and re-suctioned by the compressor through the oil return valves, equipped with sintered filters protecting the orifice specifically calibrated to reduce leakage of already compressed air to a minimum.

MINIMUM PRESSURE AND NON-RETURN VALVE (VMP - VNR)

This valve guarantees a minimum pressure inside the oil chamber such to assure correct operation when the compressor dispenses air. The valve also prevents compressed air in the system from returning to the compressor. For units of the series 111 and 135 the valve can be adjusted by a screw-lock nut system, though it is recommended not to change the original calibration to avoid damaging the compressor.

PRESSURE GAUGE

Indicates the internal pressure of the compressor. The pressure gauge is installed downstream of the final separator. It is recommended to wait for the pressure gauge to indicate the absence of pressure before acting on thecompressor.

THERMOSTATIC VALVE

The thermostatic valve acts when the oil temperature does not reach the minimum value pre-established for correct operation of the machine, thus sending the lubricant flow directly to the compressor chamber and mixing it with the cold return flow from the external circuit which passes through the radiator. It also prevents the formation of condensation.

OIL FILTER

The oil circuit cannot be contaminated by excessively large particles which would downgrade reliability of the compressor. Therefore an oil filter is provided on the circuit just before the oil reaches the injection duct.

POSITIONING

Section 11 "overall dimensions and weight" displays the overall dimensions, total weight and other significant data relative to the various models.

The machine must be installed in consideration of its nominal or specific features, described in this Manual.

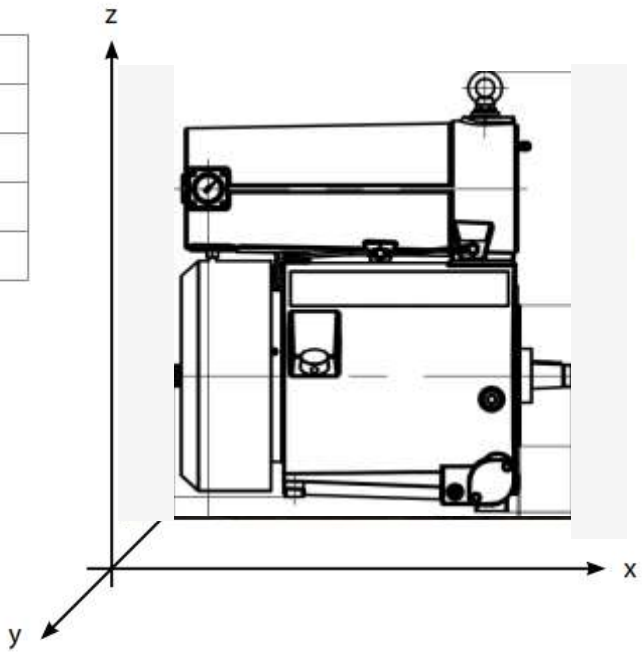
The maximum inclination of the two main axes must be less than 15°. For greater inclination, even temporary, consult NAILI. Remember that the dynamic effects are added to the static effects and that the shocks resulting from movement of the system the machine is connected to can change the actual operating conditions.

BLOWS AND VIBRATIONS

The machine withstands a maximum vibration level less than degree 2.5 ISO and blows as displayed in the table.

COMPRESSOR	X AXIS	Y AXIS	Z AXIS
NL30	3g	2g	2g
NL40	3g	2g	2g
NL50	3g	2g	3g
NL60	3g	2g	3g

The installation on elastic supports (if specifically chosen) can greatly reduce the negative effects of movement of the support system, the vibrations transmitted and noise generated by the machine.



COOLING

During the air compression process, a significant part of the power absorbed (approximately 80%) is converted into heat and must therefore be dissipated; this is carried out by cooling of the oil. MC products (frame 30 - 40 - 50) have a built-in cooling system, consisting of a radiator and centrifugal fan suited to the various operating conditions in terms of pressure, speed and ambient temperature. MC units can also work well with environments at 60°C with pressure and speed values within the limits indicated by the basic speed range (see tables and section 11).

The table supplies indicative values of the cooling capacity of the integrated system depending on the main operating conditions. The table is useful to estimate the temperature rise (the delivery compressed air temperature will be 5-10 K lower than that of the oil).

The NL set ups must be completed with an external cooling system. The elements to proceed with dimensioning are supplied below.

A less relevant part of the absorbed power (approximately 15%) heats the compressed air and can in turn need to be dissipated. Remember that cooling moist compressed air generally determines the formation of condensation which could be harmful for the circuit downstream of the compressor.

WARNING!!!
Both for built-in systems and external systems installed by the final customer, it must be avoided that hot air exiting the radiator be re-suctioned by the fan thus jeopardizing the intended cooling conditions.

Typical nominal operating conditions:

– min-max ambient temperature: -10 / +60 °c (without specific measures);

- humidity: 90% (consult NAILI for higher values); – min-max oil temperature: 80 / 110 °c;

- operating pressure: 6 / 13 bar.

THERMAL POWER TO DISSIPATE

As shown in section 5-1, "OPERATING PRINCIPLE", oil is injected in the compression unit and, mixing with air, removes the heat generated. The oil flow is established in the design stage for each compression group. The flow is moved by the pressure difference and only depends on operating pressure, not on rotation speed of the machine.

The operating temperature of the oil must remain as far as possible in the established range to guarantee cooling, correct lubrication and to avoid formation of condensation inside the compressor. The ideal range is between 80°c and 110°c; consult for different values.

The power to be disposed of in the cooling oil circuit can be calculated once the mechanical output absorbed at the compressor shaft is known (see performance curves in this manual), by multiplying by 0.8: for example, if 15 kW is the absorbed power, 12 kW must be disposed of by the cooling system. The thermal power that can be disposed of on the compressed air circuit is less than that of the oil circuit, in fact following the diagram indicated, the coefficient by which to multiply the mechanical power absorbed at the shaft is approximately 0.15. Needing to cool the compressed air produced by the compressor in the previous example, we will have approximately 2-2.5 kW to be discarded.

DIMENSIONING OF THE COOLING SYSTEM (RADIATOR OR HEAT EXCHANGER FOR OIL)

A radiator is normally used for air cooling which must be suitable to withstand both the thermal stress and that due to the pressure of the circuit. Vice versa water cooling is provided with a brazed plate heat exchanger.

In both cases (and only for the M versions) the devices must be positioned below the surface of the oil in the compressor chamber to avoid needing to check reflux of the liquid with resulting negative effects on the levels

and on mechanical parts. The connections for the external circuit are positioned in the bottom part of the oil chamber adjacent to the coupling flange. The couplings are threaded and the dimensions are available in the overall drawings together with the INLET/OUTLET destination: outlet at the thermostatic valve, inlet at the oil filter.

The radiator (or heat exchanger) and the pipes used to connect it must be chosen to limit the total pressure drop of the circuit to a less than 1.5 bar. This limit is normally met by using devices with connections having a diameter equal to or greater than those provided on the chamber and limiting the length of the external circuit to approximately 1 m for 30-40 units and 1.5 m for 50 and 60.

The amount of oil circulating in the compressor depends on many parameters, but to dimension a cooling system, approximately 2 liters per minute for each kW of power absorbed at the shaft is calculated. For example, for the compressor in the previous case, which absorbs a power of 15 kW, the amount of oil circulating is approximately 30 L per minute.

The air or water flow suitable to maintain the oil temperature constant cannot be given without knowing the configuration of the external system installed. However purely as an example, it is possible to indicate that for each kW absorbed by the compressor, approximately 120-150 m/h of air or 30-40 liters/h of water are necessary. NAILI can supply cooling systems suitable for the chosen compressor or provide support in designing specific systems.

To dimension the devices, a supplier of radiators or heat exchangers requires the following parameters:

	Notes
thermal power to dissipate	calculating according to supplied indications
cooling oil flow rate	idem
coolant flow rate	idem
oil inlet temperature	nominal 80¡ãC
ambient temperature	nominal 20¡ãC
water inlet temperature	installation note
maximum allowed pressure drop	approximately 1 bar (0.5 on circuit)

WARNING!!!
With the same type of compressor, the absorbed power increases as operating pressure and rotation speed increase.
The oil flow does not increase as rotation speed increases.
Pay the utmost attention to the performance curves provided in this manual.
See the relative chapter for the features of the lubricants.

COMPRESSOR-MOTOR COUPLING

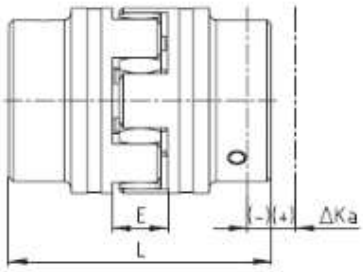
The machine is the basic set up with a direct coupling with the motor by means of a flexible joint. It can be equipped with coupling assemblies intended for most electric motors found on the market, to be selected based on model and operating conditions. Couplings with hydraulic motors are also available. Direct coupling always ensures proper alignment, no power absorption, quiet operation and reduced need of maintenance.

The coupling system (junction body, two hubs and an elastic element) provide a limited degree of misalignment and relative inclination between compressor shafts and motor.

Coupling between half joints must be carried out according to the tolerances provided below.

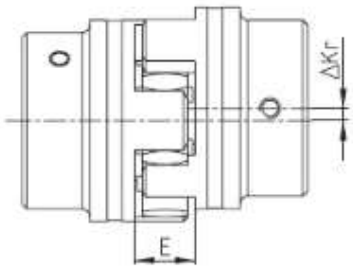
JOINT COUPLING TOLERANCES

Axial tolerance ΔKa

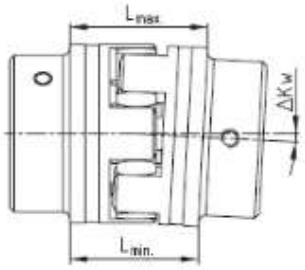


$L_{max} = L + \Delta Ka$

Radial tolerance ΔKr



Angular tolerance ΔKw [degrees]



ΔKw [mm] = Lmax

Joint tolerance 92, 95/98 Shore-A							
Size	28	38	42	48	55	65	75
Max axial toleranceΔKa [mm]	-0.7 +1.5	-0.7 +1.8	-1.0 +2.0	-1.0 +2.1	-1.0 +2.2	-1.0 +2.6	-1.5 +3.0
Max radial tolerance at 1500 rpm ΔKr [mm]	0.25	0.28	0.32	0.36	0.38	0.42	0.48
Max angular tolerance at 1500 RPM ΔKw [degrees]	0.9	1.0	1.0	1.1	1.1	1.2	1.2
ΔKw [mm]	1.05	1.35	1.70	2.00	2.30	2.70	3.30

VERSION SUPPLIED WITH ELECTRIC MOTOR

For most set ups supplied with electric motor, it is asynchronous, three-phase, 4 poles, with short-circuited winding.

The typical features are:

- Rated voltage/frequency (normally 230D-380Y / 50 Hz);
- Isolation class F;
- Protection degree IP 55;
- Service S1.

WARNING!!!

The configuration of the machine does not allow for the use of transmissions which stress the shaft of the compressor with cross loads, For example belts or cogwheels, without installing a specific support system external to the free component of the system (consult NAILI)..

CONNECTION TO AIR NETWORK

The purpose of air distribution is to bring compressed air from the machine to the utilities with a minimum pressure drop, therefore reducing a waste of energy.

The segment of the piping connecting to the system downstream of the machine must be flexible and have a diameter no smaller than the outlet; it must be placed between the shut-off gate valve to isolate the machine from the air network when performing maintenance. To avoid leakage and waste, regularly check all the pipes of the distribution system and all the accessories which must be regularly subject to appropriate maintenance.

The air suctioned by the compressors contains a certain amount of water, as it is variable and depends on environmental conditions, indicated as relative humidity. Cooling of the air produces condensation of most of the water contained in it. This condensation can cause corrosion and damage the system. Therefore it should be separated and drained. Though filtered in the compressor, the compressed air produced also contains residual oil.

Separator/condensation dischargers Ad filters are available suitable to standards in force regarding pollution requirements or process requests. *"Pressure drops (bar) per 10m of straight pipe" as below:*

Remember that condensation must be collected and eliminated according to current legislation.

PIPE DIAMETER (")	NOMINAL FLOW RATE (m^3/min)	PRESSURE (bar)				
		6	7	8	9	10
1/2	0.125	0.008	0.007	0.006	0.005	0.005
	0.25	0.027	0.024	0.021	0.019	0.017
	0.5	0.099	0.086	0.077	0.069	0.063
3/4	0.5	0.013	0.011	0.010	0.009	0.008
	0.75	0.027	0.024	0.021	0.019	0.017
	1	0.047	0.041	0.036	0.033	0.030
	1.25	0.071	0.062	0.055	0.049	0.045
1	1	0.011	0.010	0.009	0.008	0.007
	2	0.040	0.035	0.031	0.028	0.025
	3	0.085	0.074	0.066	0.059	0.054
	4	0.144	0.126	0.112	0.101	0.092
1 1/2	3	0.011	0.010	0.009	0.008	0.007
	4	0.019	0.017	0.015	0.013	0.012
	6	0.040	0.035	0.031	0.028	0.026
	8	0.068	0.060	0.053	0.048	0.044
	10	0.103	0.091	0.080	0.072	0.066
2	4	0.005	0.004	0.004	0.003	0.003
	8	0.016	0.014	0.013	0.011	0.010
	16	0.059	0.051	0.046	0.041	0.037
	24	0.124	0.109	0.096	0.087	0.079
3	8	0.002	0.002	0.002	0.001	0.001
	16	0.008	0.007	0.006	0.005	0.005
	32	0.028	0.024	0.022	0.019	0.018
	64	0.100	0.088	0.078	0.070	0.064

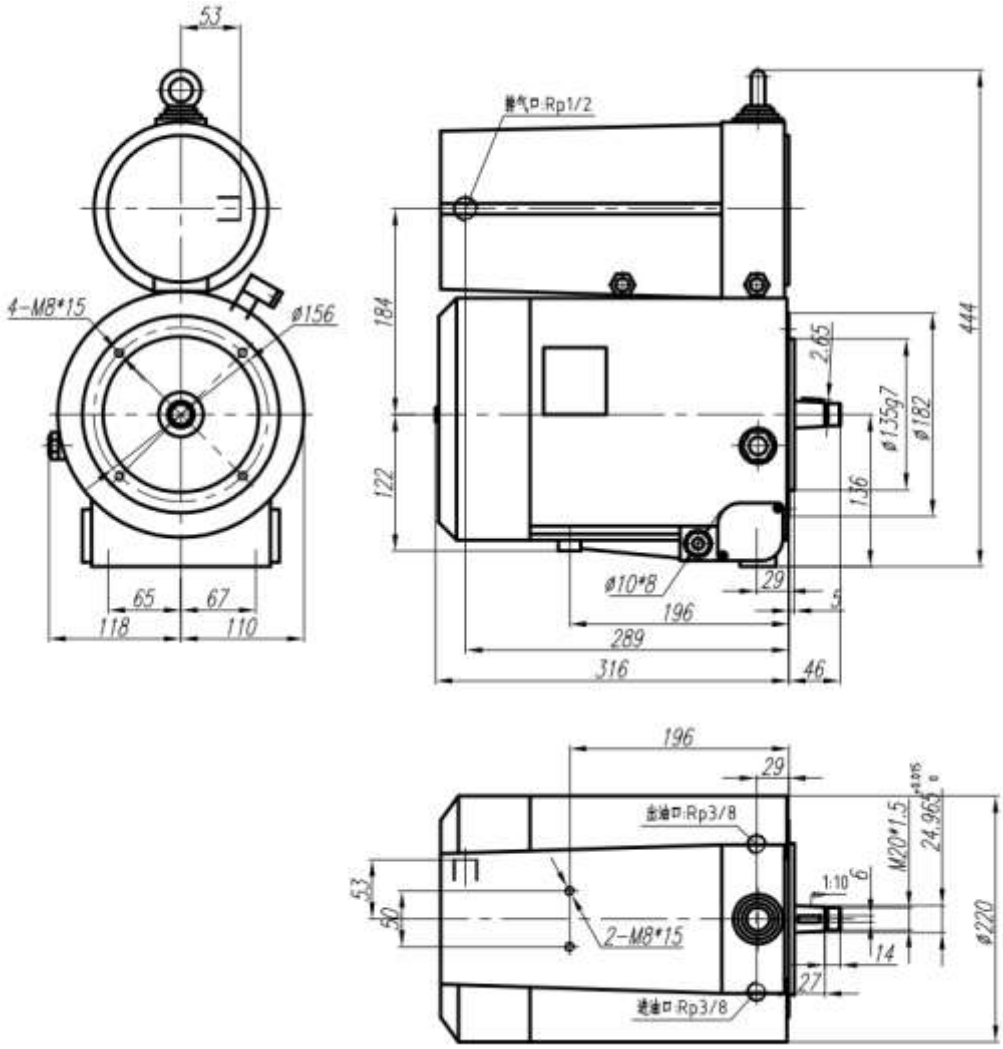
3. Installation and Operation

Special reminding: please read this manual before machine installed and following below safety operation requirements:

3.1 Installation

The dimensions of installation of NL or AE Airend for the Automotive or other machinery as following:

1. Please check the driving (Hydraulic or electric) motor dimensions in shaft and flange!
2. Please check the rated power on that shaft to drive the compressor with limited Rotary per Min in speed, continuously operating under 2500rpm to 3000rpm not acceptable;
3. The Solenoid valve 24DVC has been fitted on the Airend for all no more than 3-5 seconds.
4. Long periodically operation or high rotary speed in No-load with below pressure 1.5bar is dangerous and harm to compressor, please keep unless 3.5~4bar if it is required to be working under No-load;



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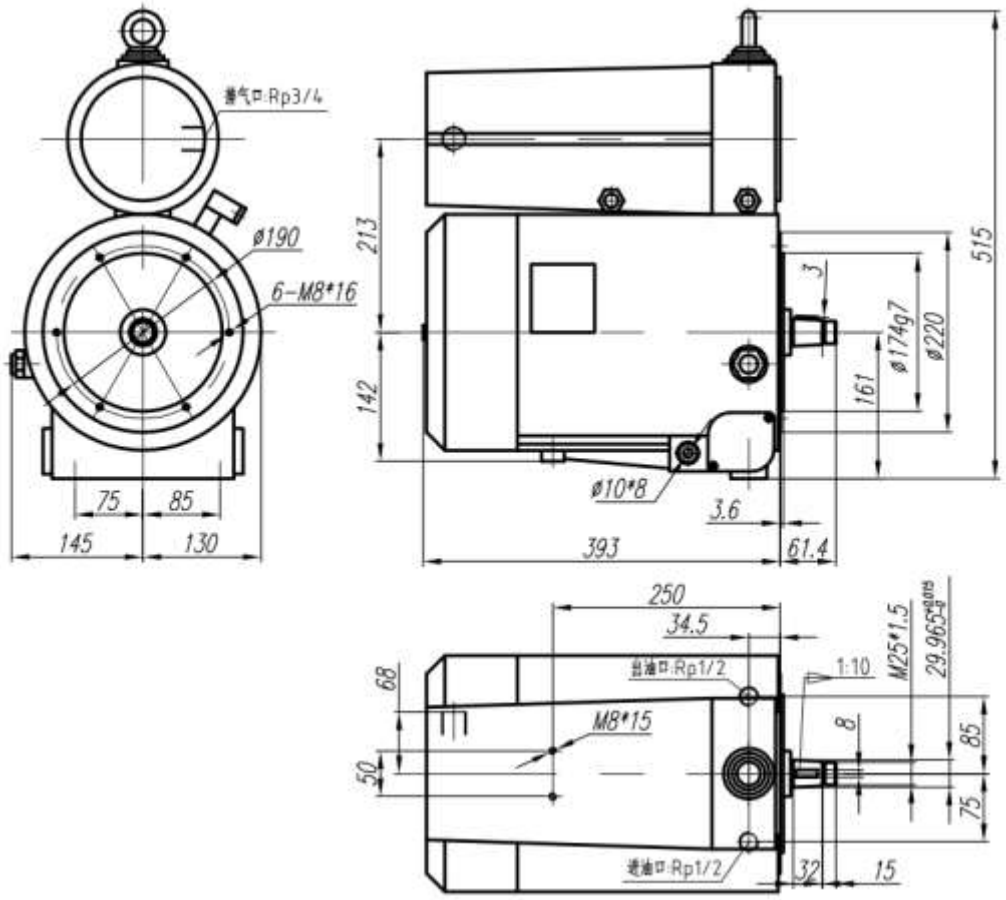

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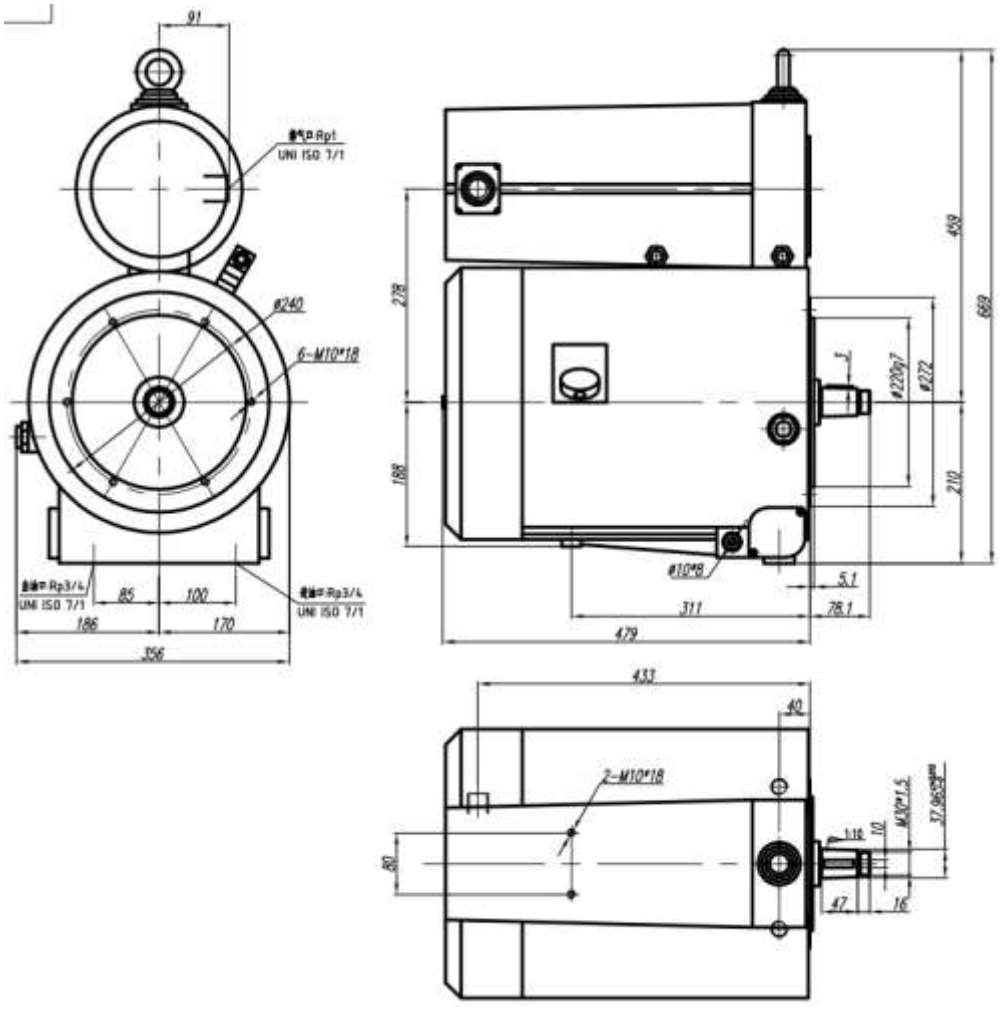
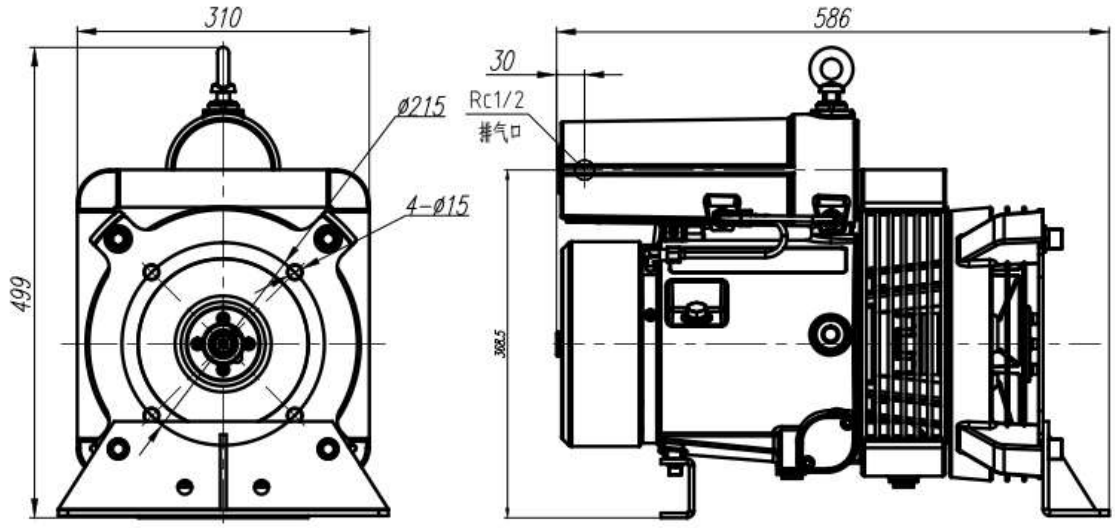


NL15-22



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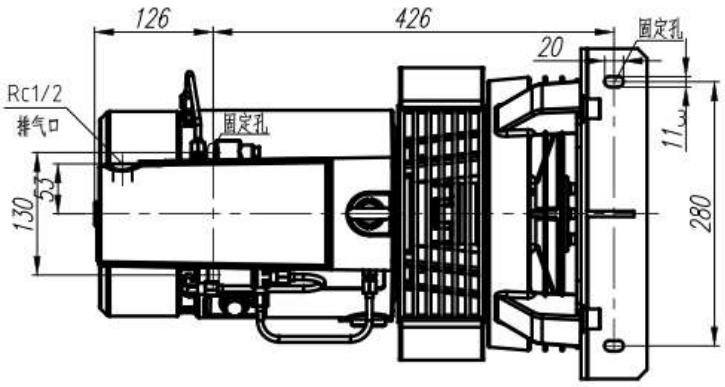

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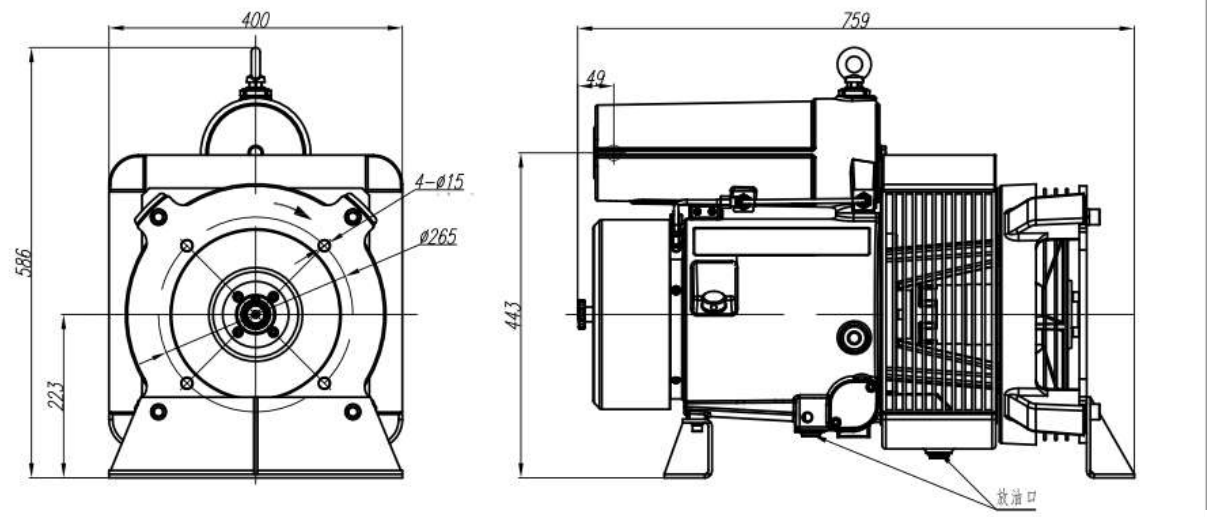
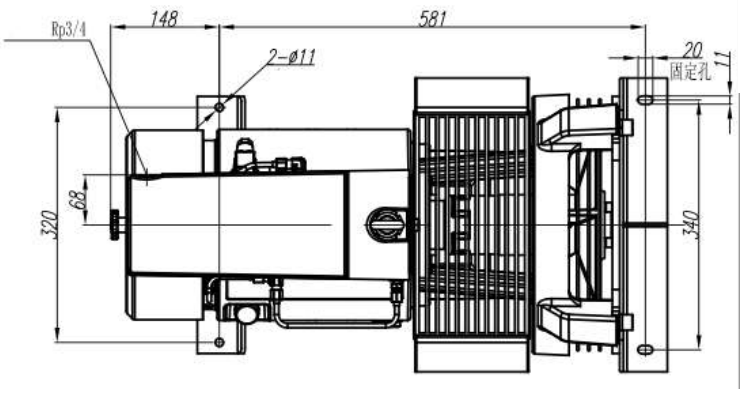




AE7.5-11

Note: such term which is recommended to be installed and we can fix the dimensions that comply with customer's requests!

3.1.1 The compressor must not be operated in areas where smoke, toxic and/or flammable vapors' could be aspirated, to prevent the water of rain dropping on the machine and temperature should be in -25~45°C.

Note: Pressure Switch should be installed at air exhausted port of compressed air of machine.

3.1.3 Install the machine on a solid and level floor;

3.1.4 The Air tubes must be connected by professional staff, and he dimensions of those tubes shall be matched with the F.A.D and exhausted air pressure of such air compressor, and exhausted tube should be lower than exhausted entrance in position so as to release the cooled water and easier to be replaced.

3.1.5 Installation of compressor should be consider the convenience of changing Oil and detect the Oil level and pressure indicator.

3.1.6 The compressor should be vertical installation in connection tighten, also needed 100mm between both sides for convenient maintains

3.2 Operation

FOREWORD

The user must appoint a qualified person responsible both for proper operation and maintenance of the machine. The appointed person must have operators trained so that they become aware of all the measures necessary to prevent accidents and damage to objects and persons. The start and stop as well as emergency procedures must be known. To this purpose, see current safety laws in the work environment. This Manual must always be available in the vicinity of the machine; should it be lost or damaged, other copies can be purchased at NAILI sales distributors.

3.2.1 That needs to check such machine to make sure that dust or objectives from outside had been removed and turn the fan around one circle without any interference before it starts up.

3.2.2 Make sure that the compressor is filled with oil before start up.

3.2.3 The electrical wires are sized properly; as the compressor could be seriously damaged if direction is opposite to the one shown by the arrow

3.2.4 If the machine prepares to be start up since long time after delivered, should discharge air filter cover of compressor and air filter advice, and inject the lubricant with 100-150ml into compressor, then use hands to turn several circles to prevent compressor damaged because lack of oil.

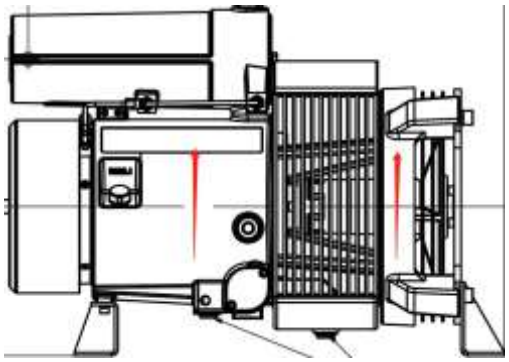
3.2.5 Never remove the oil filler plug when the machine is operating or there is still pressure inside the compressor: the hot oil would leak.

3.2.6 The working pressure is not allowed to exceed the ratio pressure of board indicated.

3.2.7 Such compressor's end allowed to catch the max working temperature till 45°C, and under working in regular temperature is 75-90°C.

3.2.8 When machine is running with error please immediately shut down the machine and off connection of wires by the personnel who were trained by NAILI Group to process

3.2.9 **Rotation direction:** the compressor can undergo severe damage if it rotates the wrong way. Looking at the compressor from the side of its shaft, the correct direction is clockwise (CW). Stickers and/or other indications always display the correct direction of the machine.



The stop procedure involves the following:

WARNING!!!
The compressor must not be started with pressure in the chamber.

Only push the compressor to maximum speed after the oil has reached the ideal temperature, determined by the thermostatic valve

In the case of a hydraulic motor, it must be started by means of the proportional distributor to reach the minimum speed.

- empty the compressor, slowly closing the delivery
(or acting on the emptying system, see in section 5-4, "OFF-LOAD VALVE (VMV) /OPTIONAL OFFLOAD SOLENOID VALVE (EV)")
¨- reduce speed to the minimum
- wait for any internal pressure to discharge (only with external off-load system) and for the demulsifying of foam for about 30 to 40 seconds
- stop the machine.

In case of controlled speed systems, it is recommended to pass from minimum speed to stop in

REDUCTION OF DOWNTIMES AFTER A FAILURE

It should be remembered that carrying out maintenance correctly can reduce downtimes after a failure to a minimum. A timely repair avoids further deterioration.

Use only original spare parts and have the faulty component repaired at your plant or send it for repair to the closest authorized service center.

CLEANING THE MACHINE

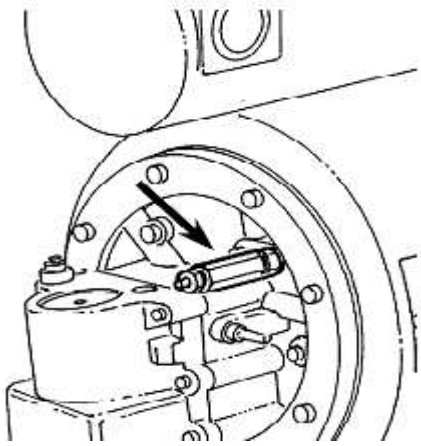
The machine must be cleaned at regular intervals, according to the frequency indicated in this manual.
To clean the delicate parts of the machine, direct the compressed air jet so that neither processing residues or humidity can penetrate inside the mechanical units in question. To clean internal and/or moving parts (in contact with lubricant) only use lint-free cloths. Always use perfectly dry air for cleaning, at a pressure which does not harm the operator.

4. Detection and Maintenance

4.1 Detection

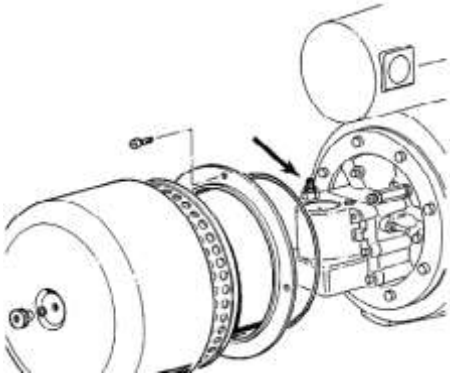
4.1.1Safety valve

Safety Valve had been set up and please don't change and replace.



4.1.2 Servo-valve

The machine can control the quantity of intake air and discharge by Servo-valve, when inner pressure is rising to max working pressure, Servo-valve to control intake valve to shut down, and the pressure is no longer raising and max working pressure has been set up to 10bar, no need to be adjusted.



4.2 Maintenance：

The time intervals in the maintenance tables are reference values concerning the machine operation in nominal working conditions. Environment factors affecting these intervals are mainly: temperature, humidity and air pollution. Preventive maintenance agreements are available, to help the user keeping the machines at best operating and efficiency conditions. Please consult NAILI for further details.

WARNING!!!
Special equipment is available to facilitate the various maintenance operations. Please contact the NAILI service center for the supply.

JOBS TO BE PERFORMED DURING MAINTENANCE

During maintenance operations pay attention to all signs that may precede a failure, and specifically:

- presence of corrosion;
- presence of wear;
- presence of loose unions or connections;
- presence of oxide contacts.

4.2.1 Brief introduction

Per week（Or 50H）

- Check the oil level

- Cleaning Oil cooler

Per half month（or 200H）

- Cleaning air filter

Every quarter（Or 500H）

- Cleaning Oil return valve filter

Every Half year（or 2000H）

- Replacing the air intake filter

- Change the oil cleaning oil filter

- Checking and tightening the screws

yearly (4000H)

- Cleaning or replacing the Oil filter

- replacing Oil return valve filter

- Oil filter must be replaced or cleaned in Oil changed for every time!

Replacement of Oil and gas Separator

WARNING!!!
In dusty environments and/or at high temperatures maintenance operations should be carried out more frequently. The manufacturing date is quoted on rubber hoses. Their operating life is 3 years, after which they should be replaced.

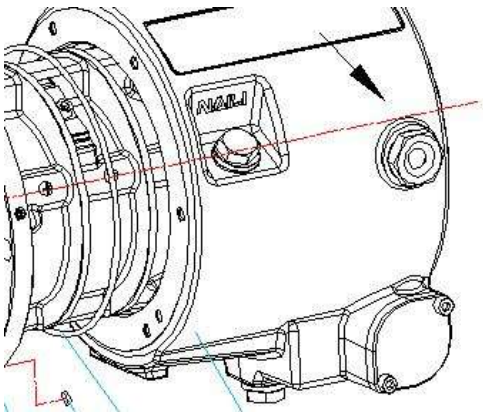
WARNING!!!
For compressors equipped with Inverter, before performing any maintenance job, wait at least 5 minutes after you have disconnected the electricity supply.

WARNING!!!
Preventive maintenance agreements are available, to help the user keeping the machines at best operating and efficiency conditions. Please consult NAILI for details..

4.2.2 Regular Checking and repairmen

4.2.2.1 To check the oil level

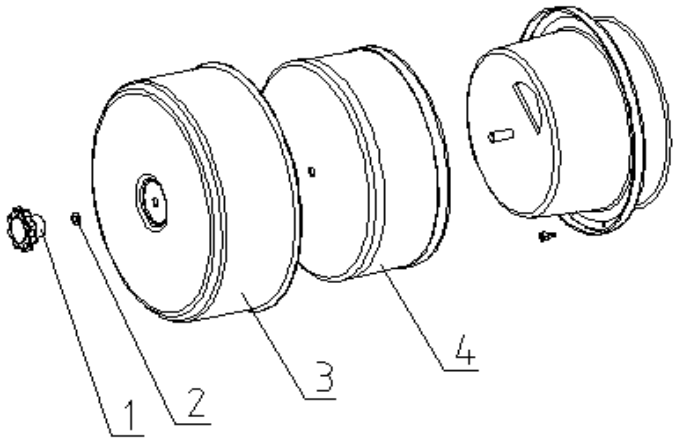
While the compressor is operating, the oil level should be about 1/2-2/3 of the indicator.



CLEANING THE AIR/OIL RADIATOR (IF PRESENT)

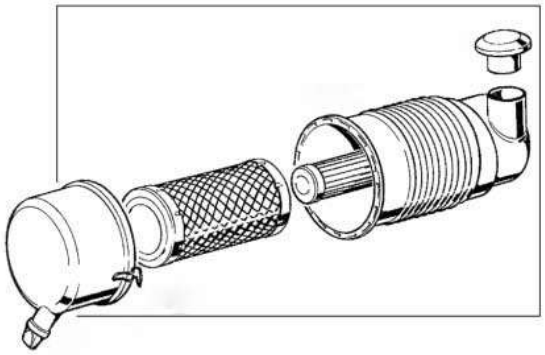
Clean the radiator fins using a compressed air jet aiming the opposite direction as the normal cooling air flow.

4.2.2.2. Cleaning and/or replacing the air intake filter



Unscrew the lock knob (1) and remove the gasket (2); remove the cover (3) and pull out the filter element (4); clean the element with compressed air by aiming the jet inside the element (about 4bar). Inner replace if ruined

High efficiency air filter replacement:

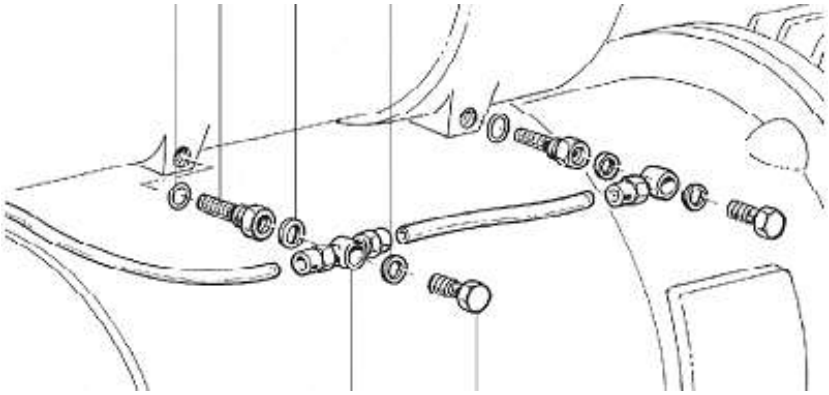


Check the worn cartridge: this could reveal traces of dust on the inner surface of the gasket indicating possible leakage in the cartridge itself. Check the new cartridge: check that it is not damaged due to transport. Never install a damaged cartridge.

Make sure that the dust exhaust valve works properly.

Check that all the fittings are airtight.

4.2.2.3. Cleaning and/or replacing the oil return valve

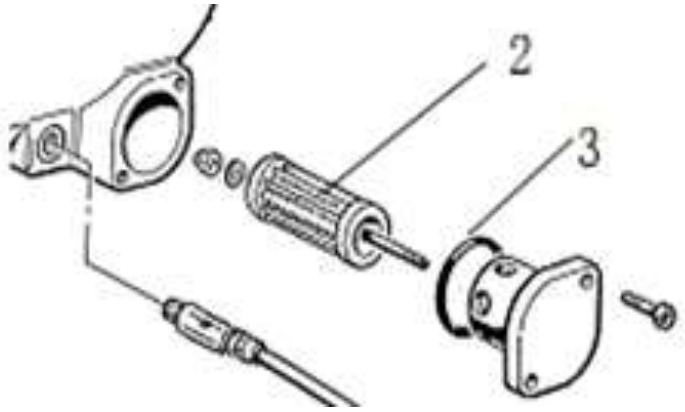


Unscrew the screws (1) locking the unions (2) of the oil return flexible pipes; take care not to lose the seal washers (3);unscrew and take out the oil return valves (4);wash the valves with detergent and blow with compressed air; replace the sintered filter if it is fouled. Always remember to replace the O rings (5) and act in reverse order to reassemble.

4.2.2.4 Cleaning and/or replacing of the oil filter

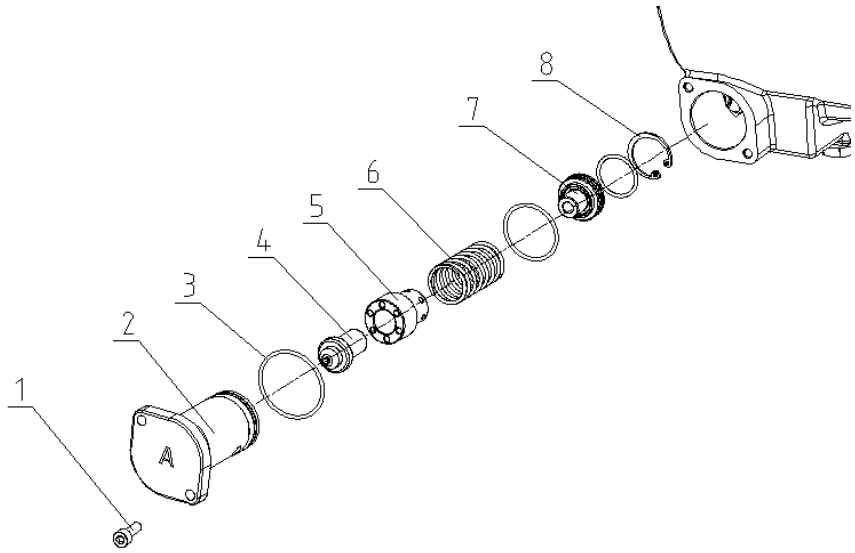
Replace the oil filter at oil is changed every time. Drain the oil, remove screws (1) of the filter cover and take out the cover (2) after rotating it by 90 degrees.

Extract filter (3) from the cover. Clean also the housing before reassembling the new filter. Reassemble in reverse order, checking conditions of the O ring (4) positioned on the cover and replace if damaged.



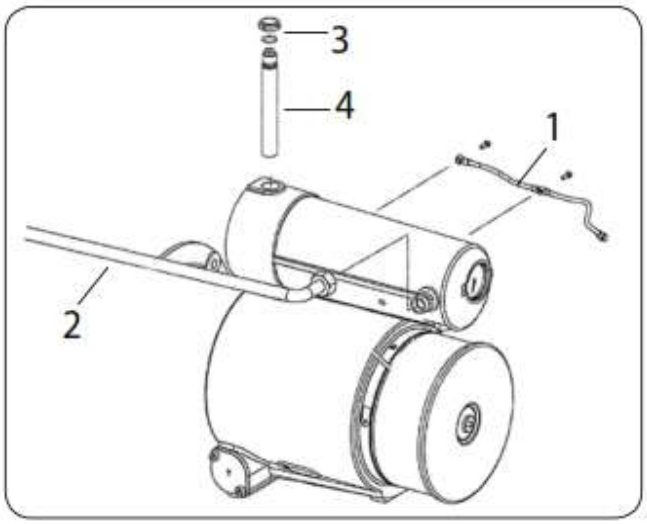
4.2.2.5 Cleaning Temperature control valve

Unscrew the screws of the filter cover (1) and remove the cover (2), after rotating it by 90°, so that it can be easily gripped. Discharge (8); take out cover (7), spring(6), piston(5), core of temp control(4),and O ring so on, located on the cover; replace it if needed.

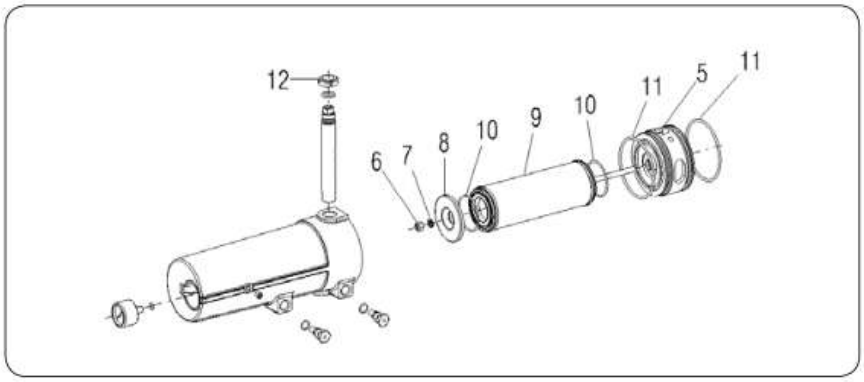


REPLACING THE AIR-OIL SEPARATOR ELEMENTS

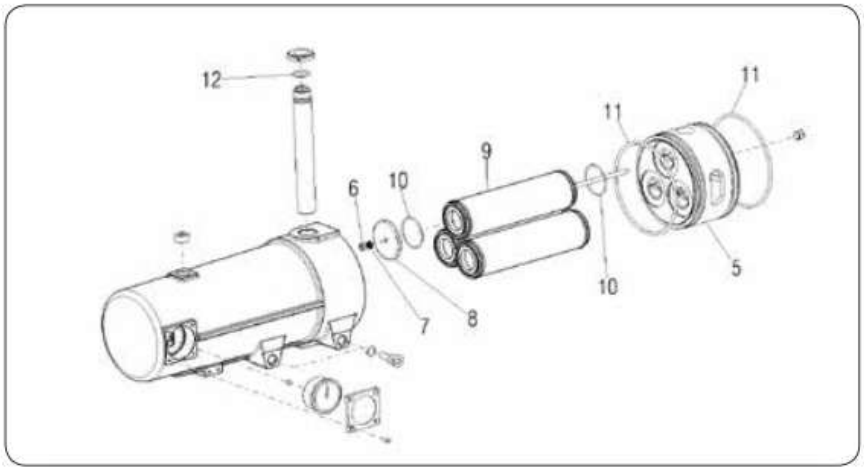
Proceeding as described in section 7-5 detach the tubes (1) of the oil return valves and the oil return valves themselves. Disassemble the air delivery tube (2). Loosen the lock ring nut (3) of the perforated screw (4) which secures the separator body to the oil chamber. Remove it paying attention to the position of the reference notch of the perforated screw (4): it must be repositioned the same way when reassembled. You may now replace the filtering elements.



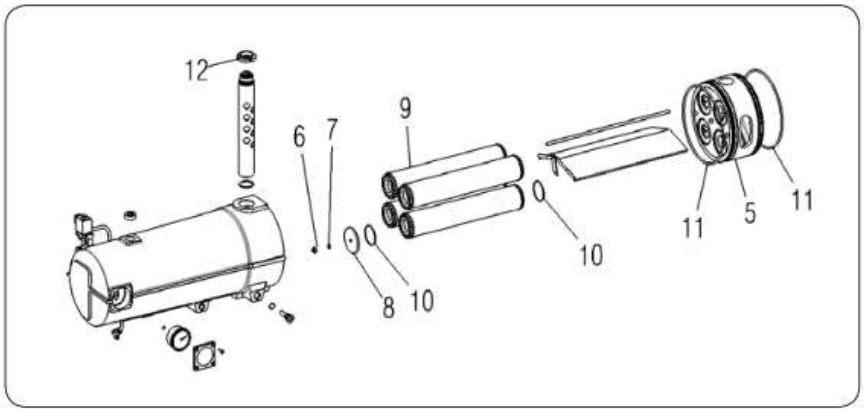
NL30
NL40



NL50



NL60

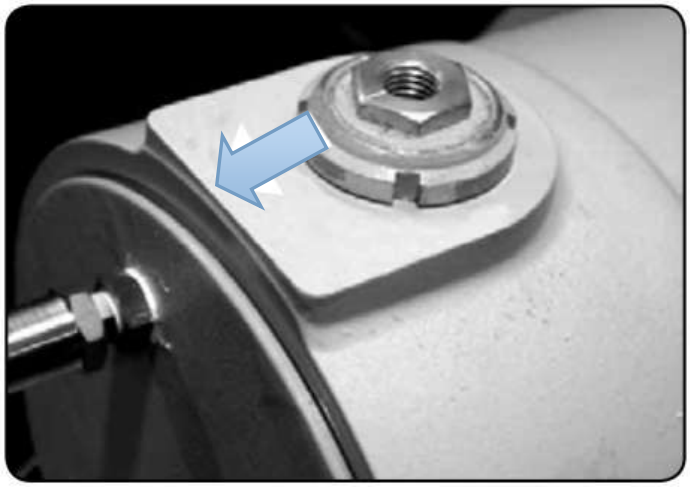


Extract the cover (5) which the separator element is attached to, making leverage with the two tools in the circular cavity of the cover.

Unscrew the lock nut (6), remove the sealing washer (7), the cover (8) and the separator element (9) with the relative gaskets. Replace the separator element (9). Replace the O-rings (10-11-12-13).

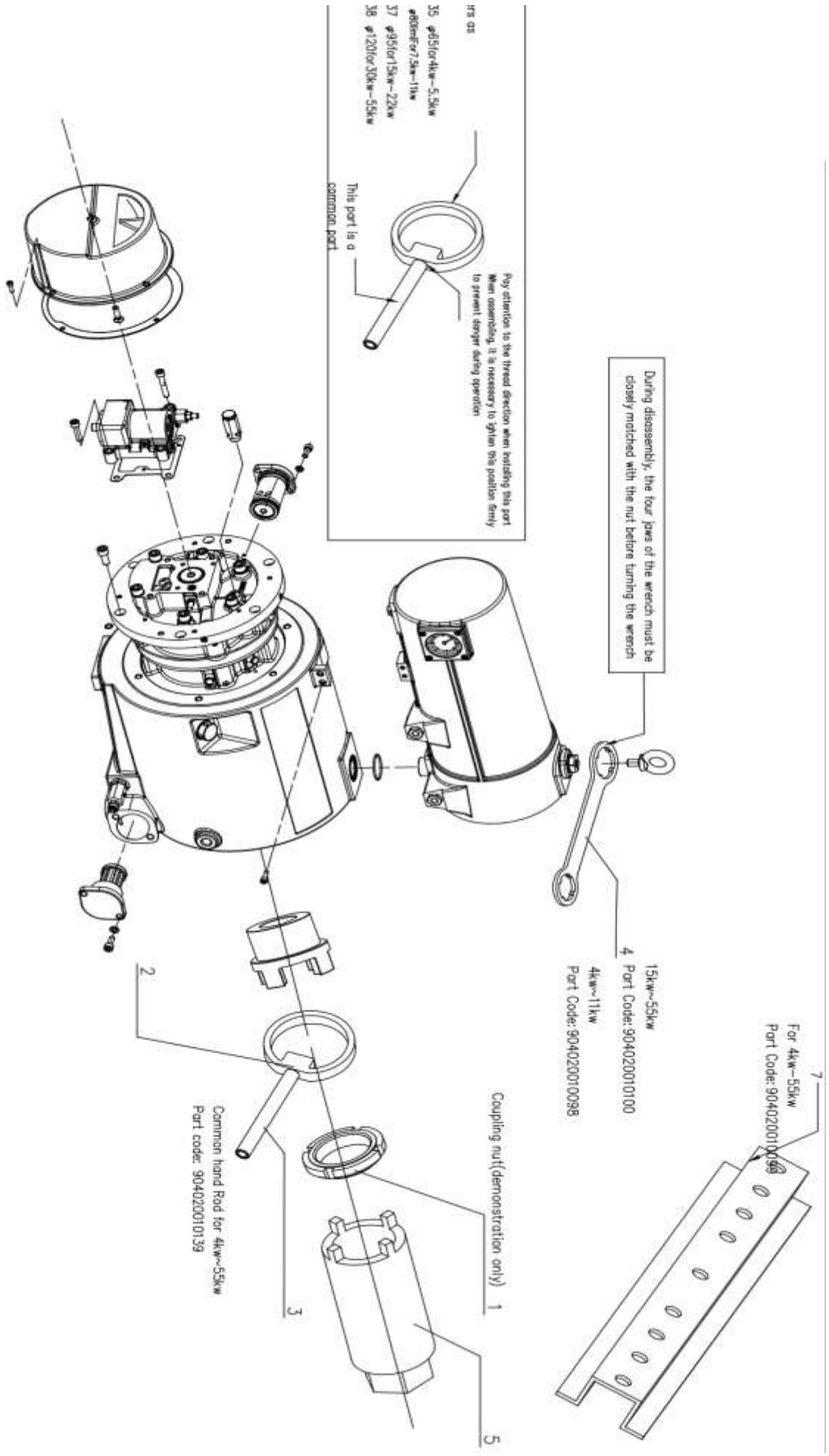
Reassemble the various parts, taking special care that the gaskets (13) are positioned perfectly in the corresponding slots. Using a small amount of grease could help to keep them in position during assembly.

WARNING!!!
The cover of the separator must be put back in the same position in which it was extracted. The perforator screw (7) must be repositioned with the notch facing the right direction, as shown in the following figures.



OIL CHANGE

If not specified otherwise in the order, the compressor is supplied with OEM oil. It is to be noted that expired oil is dangerous for the smooth operation of the compressor, hence once the forecast interval for its change has elapsed, it should be replaced. Oil replacement should be done with the machine off and with warm oil. To drain oil, wait for the complete depressurization of the compressor, while verifying that the pressure gauge on the separator shows that no more pressure exists inside. Unscrew the cap (fig.1) of the filling gate slowly, while paying attention to the possible presence of foam. If necessary, wait for some minutes for the oil to demulsify. Open the drain plug (fig. 2) and drain the oil into a suitable container. Lastly close the cock. Fill the oil chamber with new oil until lapping the filling nozzle.


Maintenance tools;
For 4kw~55kw
Part Code: 9040200100
7
During disassembly, the four jaws of the wrench must be closely matched with the nut before turning the wrench
15kw~55kw
4 Part Code: 9040200101
4kw~11kw
Part Code: 9040200100
Pay attention to the thread direction when installing this part When assembling, it is necessary to tighten this position firmly to prevent danger during operation
This port is a common port
35 φ65for4kw~5.5kw
φ80mmFor7.5kw~11kw
37 φ95for15kw~22kw
38 φ120for30kw~55kw
2
Common Hand Rod for 4kw~55kw
Part code: 9040200101
3
Coupling nut(demonstration only) 1
5

4.2.2.6 Oil Change

Be sure to use the factory supplied vane compressor oil, sometimes Compressor is filled with lubricating oil in the factory, Remind you that bad oil for the operation of the air compressor is very dangerous, Must change the oil on time, Drain oil when the compressor is in stop mode and the oil is hot. When the pressure of the compressor is zero. Gently unscrew refueling until "foam oil "overflowed, must wait in this process, until the bubble disappear, Open the discharge valve - lower part of the shell oil, the oil discharge to the appropriate container, oil discharge must be thoroughly., to refuel add lubricating oil, replace the oil plug, oil plug gasket and tighten the oil drain valve, to run compressor, start the compressor after 5 minutes, after oil temperature rise, check the oil level (ensure the oil level of the compressor, should be in proper level).Add appropriate amount of oil, check oil in the mirror, level must be between 1/2 - 2/3.

4.3 LUBRICATION OF VANE COMPRESSORS

Experience shows us that it is very difficult to lubricate vane compressors.

Improper oil could contribute in depositing build ups on the vanes and the slots of the rotor, limiting its free movement.

Many synthetic oils with different bases are available on the market (esters, glycols, etc.) which at times have proven to be suitable for vane compressors and last longer than mineral oils.

Normally they reduce build-ups of carbon, guarantee high self-ignition temperature and are very resistant to oxidising.

It is also necessary to pay attention to condensation.

Usually synthetic lubricants are more sensitive to water washing and their thin film may not provide enough protection against rust.

This problem can be worsened if the compressor does not work on a continuous basis but only occasionally.

4.3.1 LUBRICANTS

Regarding very severe environments and considering the important role of lubricant for operation of the compressor, NAILI has developed a range of special lubricants to meet very high requirements.

The final user must check the condition of the oil frequently to confirm the expected performance of the life cycle of the lubricant.

WARNING!!!

It is difficult to determine life of an oil, as there are different parameters affecting the same, among which the operating temperature and quality of the intake air are very important.

Considering the important role of lubricant for operation of the compressor, NAILI offers special lubricants to the users and recommends their use. They come in cans of 2 - 5 - 20 liters. Their life can reach the hours shown in the table, depending on the operating temperature and conditions of the intake air. Severe conditions greatly reduced the expected life.

The main NAILI are the following:

- **OEM (mineral)**
- **COLD (synthetic)**
- **FOOD (non-toxic synthetic)**

LUBRICANT OILS

Name	Ambient temperature	Working hours (max.)
OEM	From -5 °C to +130 °C	2000
COLD	From -30 °C to +130 °C	6000
FOOD	From -5 °C to +120 °C	4000

SAFETY RECAUTIONS

There is a latent risk of fire in almost all compressed air systems and ISO 5388 Standard explains the reasons. In fact, in compressed air systems both oxygen and oil are always present and are combustible.

Should for any reason oil vapors form, these could burn in presence of a flame; an ignition source may start a fire in case of use of excessive or unsuitable oil, or when neglecting maintenance.

Faulty maintenance has been mentioned, because a dirty radiator may cause a temperature rise, often quickly, which leads to oil damage and to the creation of deposits. Such processes are accelerated if unsuitable oil is used.

Based on experience, fires are almost never caused by the fact that the oil self-ignition temperature is reached (340-400 °C). Usually the cause is that the oil, while decomposing, creates carbon residues that when in contact with air and high temperature, continue to oxidize and, under special conditions, may ignite. So it is essential to use suitable lubricants and carry out correct maintenance.

WARNING!!!
It is felt that to prevent fire risks the best attention should be given to the selection of oil and the execution of maintenance operations, specifically by:
– carrying out regular and complete oil changes;
– ascertaining that the cooling system is always efficient, often checking the oil temperature;
– verifying that protecting devices installed are always in perfect working order;
– keeping the oil consumption under control;
– taking care of the machine cleaning.

WARNING!!!
Absolutely avoid the mixing of oils of a different grade and quality.
Although looking alike, they could not be compatible.
Also beware of oil leaks, not only being a waste, but also polluting, causing falls or injuries to people and also fires.

5. Storage

Protective measures should be adopted to prevent the compressor in the transport and short-term storage (3 months) of corrosion and damage occurred in the process of.

The compressor is protected against corrosion and deterioration for the shipment period and for a relatively short (3 months) period of storage. For any longer periods, please contact the manufacturer, while considering that the maximum time may vary depending on the environment in which it is stored.

However, it is suggested to keep the machine in a dry place, protected from atmospheric agents. In case of damp climates, to protect both the electrical and the mechanical parts, the machine should be kept in a heated room or closed in a barrier-bag with heaters or electric lights. For the motor specifically, please refer to that which has been indicated on the winding insulation.

DECOMMISSIONING

Decommissioning the machine does not imply special precautions except for the collection of the oil contained in the machine and the lubrication system components, i.e. the oil filter and the oil-air separators.

DISMANTLING

Once the machine has reached the end of its technical and operating life, it can be demolished, i.e decommissioned and put in such a condition so as not to be used any longer for the purposes it was designed and built, with the possible recycling of raw materials.

WARNING!!!
Both these elements and the oil should be collected and disposed of in compliance with the current regulations on the environment in order to avoid any pollution and danger of fire..

NAILI denies all responsibility for damage to people or things that may derive from the recycling of individual parts of the machine for functions or assembly situations different from the original ones.

NAILI declines any acknowledgement, be it implicit or explicit, of the suitability to specific purposes of parts of the machine reused after the final dismantling the machine.

WARNING!!!
The operations of deactivation and dismantling of the machine should be entrusted only to duly trained and equipped staff. To deactivate the machine permanently, apply the following procedure:
- drain oil from the tank;
- disconnect the machine from the power supply and pneumatic feed systems;
- lift the machine with proper lifting apparatus;
- remove the machine from its main components;
- block all moving parts of the machine;

6. Troubleshooting

Note：

The holders of the incomplete compressor end, responsible for the maintenance of compressor all wear, flawed and damaged parts must be replaced immediately.

Check the operation and maintenance should be competent trained personnel.

Discharge failure must be cut off power supply at the first place; net machine pressure inside the rear side by side can be carried out. Users such as incompetent for fault analysis and ruled out, please contact with the company.

Faults	Causes	Solutions
Compressor end is difficult to start	Driving system failure Compressor internal stuck	Check the driving system Contact with the seller
Abnormal sound in operation	The servo valve pressure is too low; Loose connections; The coupling ceiling damage; Lubricating oil is reduced; Bush Bearing damage;	Adjust the servo valve closing pressure; Fastening connection point; Replace coupling; Add lubricating oil; Repair or replace the bush bearing;
Machine pressure increases the safety valve open	Servo valve seal failure; The pressure setting is not correct;	Correction or replacement Adjust the opening pressure
Exhaust pressure is too low	Air filter jam; Oil core blockage; Pipeline leak; Intake valve does not open; The air capacity is getting lower at the compressor end	Change Check to eliminate Check the repair or replacement Contact suppliers to solve
Oil consumption is too large	Oil filter blockage; Oil core damage; Lubricating oil specification error;	Clean or replace. Replacement, Replacement,

		cleaning
High temperature shutdown	Cooler jam; Oil filter blocking; Thermostatic valve core damage ; Ambient temperature is too high, The oil level is too low; Oil core blocked.	Clean or replace Change of temperature control valve core Increased ventilation Check the oil level filling lubricating oil replace
Stop injecting air	The intake valve seal gasket damaged Intake valve seal damage	replace replace

7. Risk Assessment

7.1 General

Many accidents are often caused by the non observance of elementary safety regulations or by the lack of knowledge about the manufacturer's instructions. In order to prevent possible danger situations, a few of these events have been represented on appropriate danger signs. Following are the most common signs found on our machines.

Vane compressor is much easier to be installed and maintain, but Manufacturer is honor to advise you to learn all of below statements before the compressor end operated!

7.2 Applications

NL/AE series Vane compressor end is the latest international leading sliding vane air compressor developed by NAILI Co...Which is professional sliding vane compressor manufacturer specialized in developing, design, manufacturing, with advanced technology and strong technical strength to produce the high reliability, high economical and high quality of the air compressor.

NL/AE series Vane compressor end has designed and widely to be used in power transmission, braking, maintaining in the Automotive and Vehicles, Mining/Coal/Oil channel in Construction machinery etc. It has longer working life, Reasonable structure, light weight, stable and reliable operation, low noise, easy installation. It is a new solution for safety and environmental protection of energy-saving air compressor.

7.2.1 Air and Oil temperatures

The compressor can operate with no particular measures at room temperatures from 0 to 40 provided that suitable oil is used. Oil temperature depends on room temperature and is limited by a thermostatic valve. The maximum accepted temperature is 100 , in compliance with the latest safety standards for compressors (EN 1012-1).

In normal conditions a machine operating at a room temperature of 20 has an operating oil temperature of 80-85 .

The temperature of the delivered compressed air exceeds room temperature by approx. 5-10 downstream of the air radiator. For higher or lower temperatures, please contact the manufacturer.

7.2.2 Humidity

As far as humidity is concerned, the incomplete air compressor machine can operate at a relative humidity ranging from 0 to 90% (provided that room temperature is within the above-mentioned limits).

In case relative humidity exceeds 90%, please contact the manufacturer.

7.2.3 Rotational Speed

The designed speed of these incomplete air compressor machines is about 1440~1460 r.p.m.

RPM will decide the temperature of Airend, got extremely hot would come out the oil burn out to ruin all of spare parts, Manufacture here to advise the radiator for cooling air and oil, it will be very helpful for building up the complete machine for long lasting servicing and safety to the staffs! More options please contact with Manufacturer!

7.2.4 Noisy

Even at reduced levels, noise can disturb and cause injuries to the nervous system in the long run. Injuries to the hearing may be caused by exposures of more than 8 hours a day to sound pressure levels exceeding 90 dB(A). For more details, refer to the national standards in force.

To isolate the complete compressor machine noise from the working area, it is suggested to install the machine in a separate room. The sound pressure level depends on the quantity of the complete compressors system installed, on the dimensions of the room and the type of wall-coating.

This level can be reduced by covering walls with soundproof material and by applying acoustic screens.

The sound levels of the complete compressors system are stated in different RPM!

The same noise source can produce a higher sound pressure level in small reflecting environments (the increase may even be of 10 dB(A)). The sound level can also be affected by other adjacent noise sources, by piping and valves of the complete compressed air system, etc. The compressor does not need continuous monitoring, but only constant inspection. After identifying the noise levels in the place where the compressor is installed, the user shall inform the

operator about the potential danger of noise, mark the dangerous areas and possibly supply the operator with individual protection equipment, the Regulations in force and with the results achieved after noise inspection.

7.3 Risk behaviors

WARNING!!!
The compressor is designed to compress AIR ONLY.
The compression of other gases IS FORBIDDEN.

To ensure safe maintenance operations to all parts of the compressor end, install an automatic mains circuit breaker and a delayed circuit breaker as near to the machine as possible if it's been diving by Electric motor.

When installing the compressor, make sure that it is earthed.

Don't touch anywhere on the End when it's running through.

Drain Oil ought to be good care of packing and waste to specific location.

Do not maintain before disconnecting the power supply and discharge all the pressure.